FINAL
Preliminary Assessment Report Fort William Henry Harrison, Montana

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

August 2018

Prepared for:

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

US Army Corps of Engineers, Baltimore District
2 Hopkins Plaza
Baltimore, MD 21201

Prepared by:

AECOM
12420 Milestone Center Drive, Suite 150
Germantown, MD 20876
aecom.com

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

Table of Contents

Figures

Appendices

Acronyms and Abbreviations

°F	degrees Fahrenheit
ACUB	Army Compatible Use Buffer
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
amsl	above mean sea level
AOI	area of interest
Argonne	Argonne National Laboratory
ARNG	Army National Guard
CDM	Camp, Dresser, and McKee
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
DPW	Department of Public Works
DRFS	Dominion Restoration's Foaming Surfactant
FTA	fire training area
ft bgs	feet below ground surface
FTWHH	Fort William Henry Harrison
IED	Installations and Environment Division
MBMG	Montana Bureau of Mines and Geology
MTARNG	Montana Army National Guard
MTDEQ	Montana Department of Environmental Quality
NGWA	National Ground Water Association
NTSB	National Transportation Safety Board
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PRC	PRC Environmental Management, Inc.
SI	Site inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VA	Veterans Administration
VSI	visual survey inspection

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 (AFFF) released during firefighting activities or training, although other PFAS sources are possible.

AECOM completed a PA for PFAS at Fort William Henry Harrison (FTWHH) in Helena, Montana, to assess potential PFAS release areas and exposure pathways to receptors. FTWHH was under the jurisdiction of the Federal Government until 1966, when it was converted to a training site for ARNG, transferring management to the Montana Department of Military Affairs. The current lease, which began in 1986, extended the lease for an indefinite term.

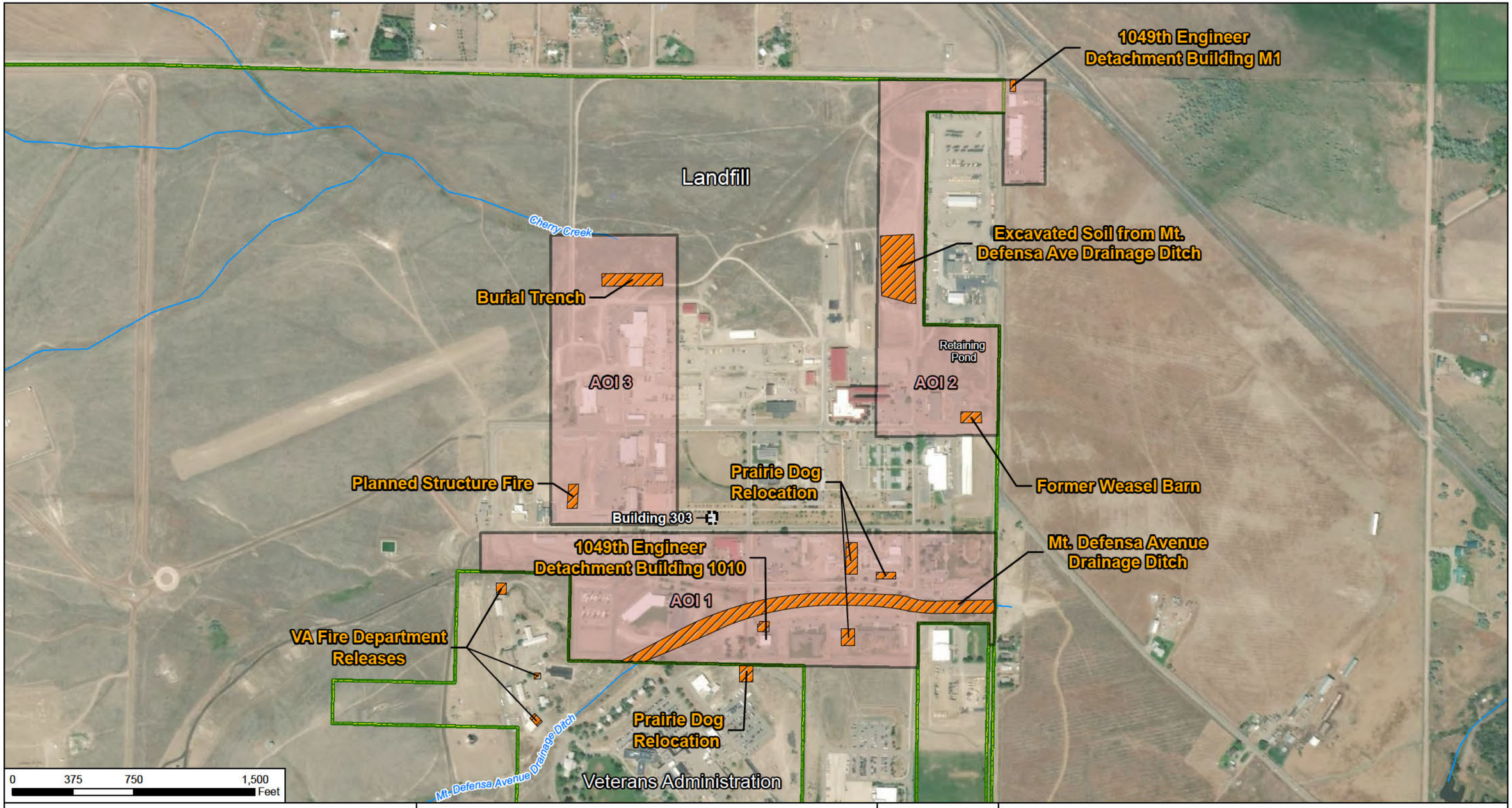
The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a 2-day site visit on January 9 and 10, 2018
- Interviewed current and retired FTWHH personnel during the site visit including Montana ARNG (MTARNG) environmental managers, the Veterans Administration (VA) Fire Chief, the MTARNG 1049th Team Chief, and other 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, pathway, and receptors of PFAS for FTWHH

Three Areas of Interest (AOIs) related to potential PFAS releases were identified at FTWHH during the PA. The AOIs are shown on **Figure ES-1** and described below:

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	Mt. Defensa Avenue Drainage Ditch AOI	VA and MTARNG	VA: 1977 to 2003 MTARNG: 1995 to early 2000s
AOI 2	Cantonment Area Northeast AOI	MTARNG	1980s, 2002, soil moved to AOI 2 in 2016 from AOI 1
AOI 3	Cantonment Area Northwest AOI	MTARNG	Prior to 1987 and 1995 to 2002

Based on documented potential PFAS releases at these AOIs, there is potential for exposure to PFAS contamination in surface soil and intermittent surface water and sediments to site and construction workers and trespassers via ingestion and inhalation, subsurface soil to site and construction workers via inhalation, and groundwater to residents via ingestion. The CSM for FTWHH is shown on **Figure ES-2**.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:7,200	CHK BY	JZ	8/8/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/8/2018

Legend

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

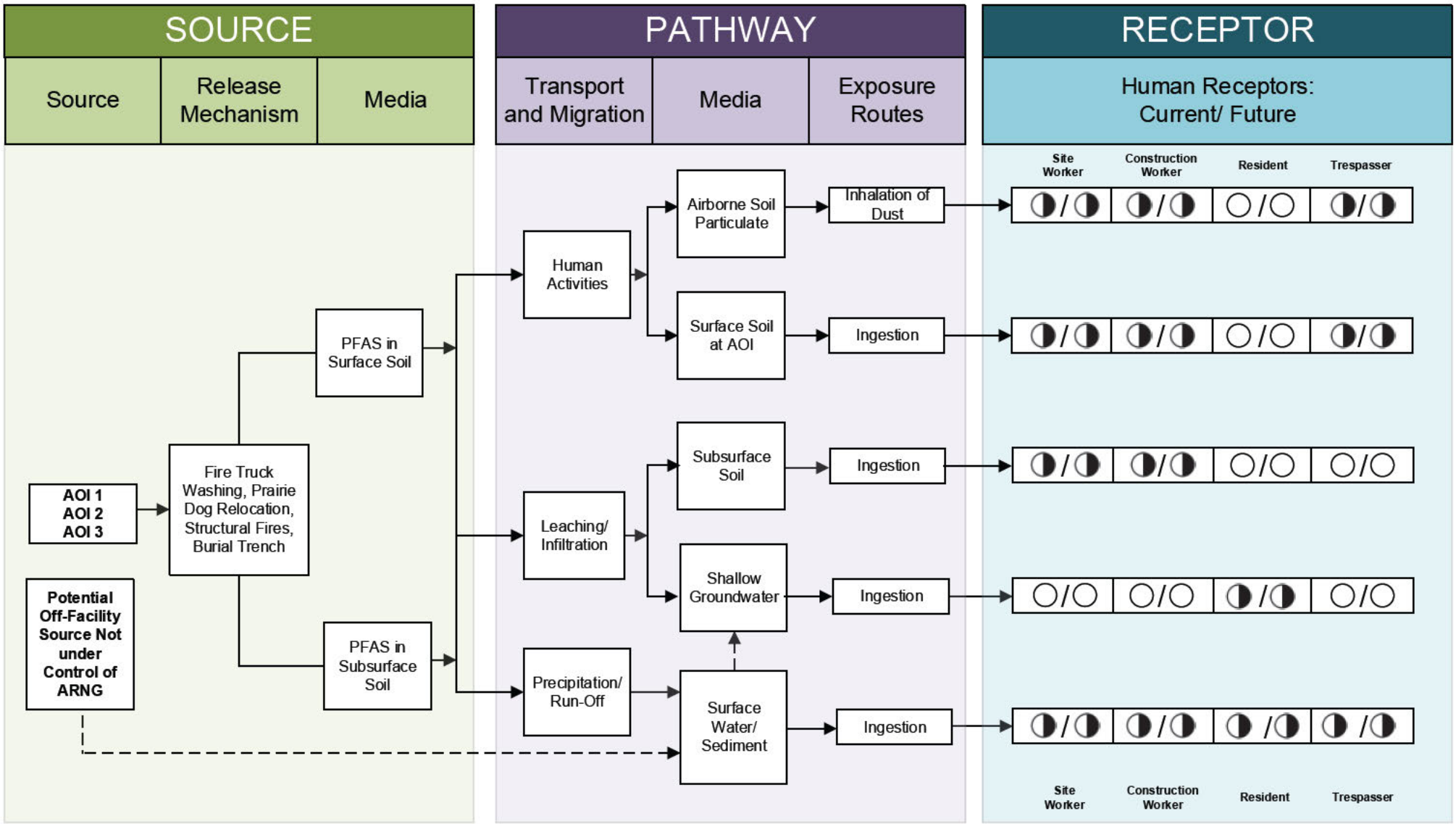
N

Summary of Findings

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure ES-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MT\FTWHH\FTWHH_PA\Fig_ES-1_FTWHH_Summary_Findings.mxd



LEGEND

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

Figure ES-2
Conceptual Site Model
Fort William Henry Harrison

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) although other sources of PFAS are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of these PFAS compounds in the environment will vary. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued Drinking Water 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. The State of Montana does not currently have drinking water standards for PFAS.

This report presents findings of a PA for PFAS at Fort William Henry Harrison (FTWHH) in Helena, Montana, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300), and USACE requirements and guidance.

This PA documents the known fire training areas (FTAs) as well as additional locations where PFAS may have been released into the environment at FTWHH. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components of AFFF.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a 2-day site visit on January 9 and 10, 2018
- Interviewed current and retired FTWHH personnel during the site visit including Montana ARNG (MTARNG) environmental managers, the Veterans Administration (VA) Fire Department Chief, the 1049th Team Chief, and other operations staff
- Completed visual survey inspections (VSI) 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 each area of interest (AOI)

1.3 Report Organization

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

- **Section 1** – **Introduction:** identifies the project purpose and authority and describes the facility location, environmental setting, and methods used to complete the PA.
- **Section 2** – **Fire Training Areas:** describes the FTAs at the facility identified during the site visit.
- **Section 3** – **Non-Fire Training Areas:** describes other locations of potential PFAS releases at the facility identified during the site visit.
- **Section 4** – **Emergency Response Areas:** describes areas of potential PFAS release at the facility, specifically in response to emergency situations.
- **Section 5** – **Adjacent 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

FTWHH is in Lewis and Clark County, approximately 4 miles west of the state capitol of Helena, Montana (**Figure 1-1**). The facility houses the headquarters of the Montana Army National Guard (MTARNG) and occupies 6,717 acres.

FTWHH was authorized by an act of Congress in 1892 and was constructed between 1894 and 1896 (Argonne National Laboratory [Argonne] 1993). In 1903, the War Department changed the installation's name from Fort Benjamin Harrison to Fort William Henry Harrison. The MTARNG began using FTWHH for training in 1911; however, FTWHH remained an active US Army post until 1913 (MTARNG 2001, Argonne 1993). In 1913, FTWHH was placed in caretaker status by the US Army and was periodically occupied by the MTARNG until 1919 (MTARNG 2001). In 1919, the US Public Health Service took possession of the facility and began to operate a hospital, which is currently under the jurisdiction of the Federal Government and is operated by the VA. From 1924 to 1928, the State of Montana expanded the FTWHH facility area by leasing surrounding land. The MTARNG was absent from the facility from 1940 to 1946. During that time, the US Army assumed control and used FTWHH as a training base and further expanded the facilities. FTWHH has been used for training by the MTARNG since 1947 (Argonne 1993). FTWHH was under the jurisdiction of the Federal Government until 1966, when it was converted to a training site for ARNG, transferring management to the Montana Department of Military Affairs. The current lease, which began in 1986, extended the lease for an indefinite term. See **Appendix A** for real estate documents. The VA property is under a separate lease. No information was available regarding the terms of the VA lease.

1.5 Facility Environmental Setting

FTWHH is within the Northern Rocky Mountain physiographic province on the western edge of Helena Valley (PRC Environmental Management, Inc. [PRC] 1996). Helena Valley is a northwest-trending, oval shaped basin that is approximately 875 square miles and is surrounded by mountains (MTARNG 2001). The facility is bounded by the Scratchgravel Hills to the north, the Spokane Bench to the east, the Elkhorn Mountains to the south, and the General Eisenhower Mountains to the west (MTARNG 2001; PRC 1996). Elevations at FTWHH range from 5,318 feet above mean sea level (amsl) at the western boundary to approximately 4,060 feet amsl in the northeast corner (Camp, Dresser, and McKee [CDM] 2006). The Continental Divide is approximately 5 miles west of the facility (MTARNG 2001).

1.5.1 Geology

Helena Valley is bounded by folded and fractured sedimentary, metamorphic, and igneous bedrock of Precambrian to Cretaceous age (US Geological Survey [USGS] 1992). The valley fill has been mapped with thicknesses of up to 6,000 feet with source materials consisting of fine- and coarse-grained Tertiary materials. The valley fill is unconformably overlain by up to 100 feet of Quaternary alluvium (Montana Department of Environmental Quality [MTDEQ] 2006).

FTWHH is on gently sloping pediment gravels at the base of General Eisenhower Mountains between two principal streams flowing into Helena Valley: Sevenmile Creek to the north and Tenmile Creek to the south (MTARNG 2001; CDM 2006). Quaternary alluvial deposits form the uppermost unit. The thickness of the alluvial deposits is highly variable and is predominantly thicker in the northern half of the facility (MTARNG 2001). The gravel layers of the alluvium are made up of fragments of quartzite, shale, and limestone between layers of clay and silt (MTARNG 2001).

Precambrian rocks crop out in the hills and mountains to the south, west, and north of FTWHH and underlie it at depths ranging from 80 to 100 feet. The Precambrian bedrock consists mainly of argillite, feldspathic quartzite, limestone, and dolomite of the Empire and Helena formations and members of the Missoula Group (Argonne 1993).

1.5.2 Hydrogeology

Stratified lenses of cobbles, gravel, and sand form the primary Helena Valley aquifer. The water bearing zones, intercalated clay, and silt compose the upper few hundred feet of the valley fill. Discontinuity of the clay and silt deposits allows for hydraulic connection of the water bearing zones to make up a single complex aquifer (USGS 1992). The estimated transmissivity of the water bearing zones is 10,000 square feet per day (Argonne 1993).

The principal water bearing zones at FTWHH are Quaternary alluvium and Tertiary pediments deposits. The unconfined Quaternary aquifer attains a maximum saturated thickness of about 70 feet in the southern half of the facility and is largely absent near the northeastern corner (Argonne 1993).

The estimated depth to groundwater at the facility is between 22 and 55 feet below ground surface (ft bgs) (CDM 2006). In 1992, the USGS estimated that 60 percent of the wells near the facility are drilled to 70 ft bgs or less.

Regionally, groundwater in the Helena Valley aquifer flows from the south, west, and north margins of the valley toward the northeast corner of the Helena Valley basin (USGS 1992). Locally at Fort Harrison, the groundwater flow direction is predominantly to the east in the southern half of the installation and to the east-southeast in the northern part of the installation

(MTDEQ 2006) (**Figure 1-2**). However, groundwater flow direction may be seasonally impacted by watering of the golf course at Green Meadow Country Club, which is approximately one mile southeast of the facility.

Recharge to the Helena Valley aquifer is through infiltration of streamflow and precipitation, leakage from irrigation canals, infiltration of excess irrigation water, and inflow from underlying bedrock fractures (USGS 1992). Lake Helena is the primary point for surface water (**Figure 1-3**) and groundwater discharge from the basin. Discharge also occurs to stream and irrigation canals and withdrawals from wells (USGS 1992).

Although it is outside Helena city limits, FTWHH draws from the city water supply. The City of Helena uses groundwater and surface water (the Missouri River and Tenmile Creek) as water sources for its residents (Helena Water Utilities Public Water System 2004, Department of Public Works [DPW] 2012). The Eureka Well is an intake for the public water supply and is approximately 3 miles southeast from FTWHH in the downtown Helena area (DPW 2012). According to the 2018 Consumer Confidence Report (DPW 2018), the Eureka Well is a pure groundwater source that requires no further treatment. In addition, the City of Helena was selected to participate in the Third Unregulated Contaminant Monitoring Rule assessment monitoring, and no PFAS were detected for Helena, Montana. A search of the Montana Bureau of Mines and Geology (MBMG) Groundwater Information System confirmed the presence of domestic water supply wells adjacent to FTWHH (MBMG 2018). During the site visit, residential lots east of Williams Street were identified as having private wells.

1.5.3 Hydrology

FTWHH is within the Sevenmile Creek watershed (CDM 2006) (**Figure 1-3**). Three perennial streams and a number of intermittent streams that originate in the foothills west of the facility flow through the facility (Argonne 1993; CDM 2006). Cherry Creek is a perennial stream that flows east through training and maneuver areas at FTWHH (MTARNG 2001). Granite Creek is a perennial tributary of Sevenmile Creek that flows northeast through the northern third of the facility (MTARNG 2001). Blue Cloud Creek, a perennial tributary of Tenmile Creek, crosses the extreme southwestern corner of the facility, and drains an area of undeveloped land on the western and southwestern side (MTARNG 2001; CDM 2006). Blue Cloud Creek and Granite Creek do not drain into the Cantonment Area, which was the main focus of the PA. The rest of the streams on FTWHH are intermittent and occur during heavy rainfall or rapid snowmelt. The VA property and much of the Cantonment Area drain to an intermittent stream that runs in a ditch parallel to Mt. Defensa Avenue and ultimately off-Post to a retention area opposite the Main Gate.

Sevenmile Creek and Tenmile Creek are the largest perennial streams near the facility (CDM 2006). Sevenmile Creek joins Tenmile Creek about one mile east of the downstream property boundary (Argonne 1993; CDM 2006). The water diverted from Tenmile Creek provides about 70 percent of the municipal supply for Helena from June through September and 100 percent of the city supply from October through May (USGS 2000). Streamflow in the lower Tenmile Creek, which runs south of FTWHH, is partly controlled by two small municipal-supply reservoirs (Scott and Chessman) in the upper Tenmile Creek watershed and by diversions for municipal water supply and irrigation (USGS 2001). In addition, a 30-acre spring-fed man-made lake exists approximately one mile southeast of the facility within Spring Meadow State Park. The lake is a popular swimming, fishing, and recreational area for Helena residents.

1.5.4 Climate

The climate at FTWHH is semiarid (USGS 1992). In January, the average temperature is 19.7 degrees Fahrenheit (°F). July and August have the highest average temperatures, at 69.2°F and

67.4°F, respectively (World Climate 2018). The greatest mean monthly precipitation occurs in May and June, and the greatest mean monthly snowfall occurs in January (World Climate 2018). The average annual precipitation is 10.8 inches at the Helena Regional Airport weather station, approximately 6 miles southeast of the facility.

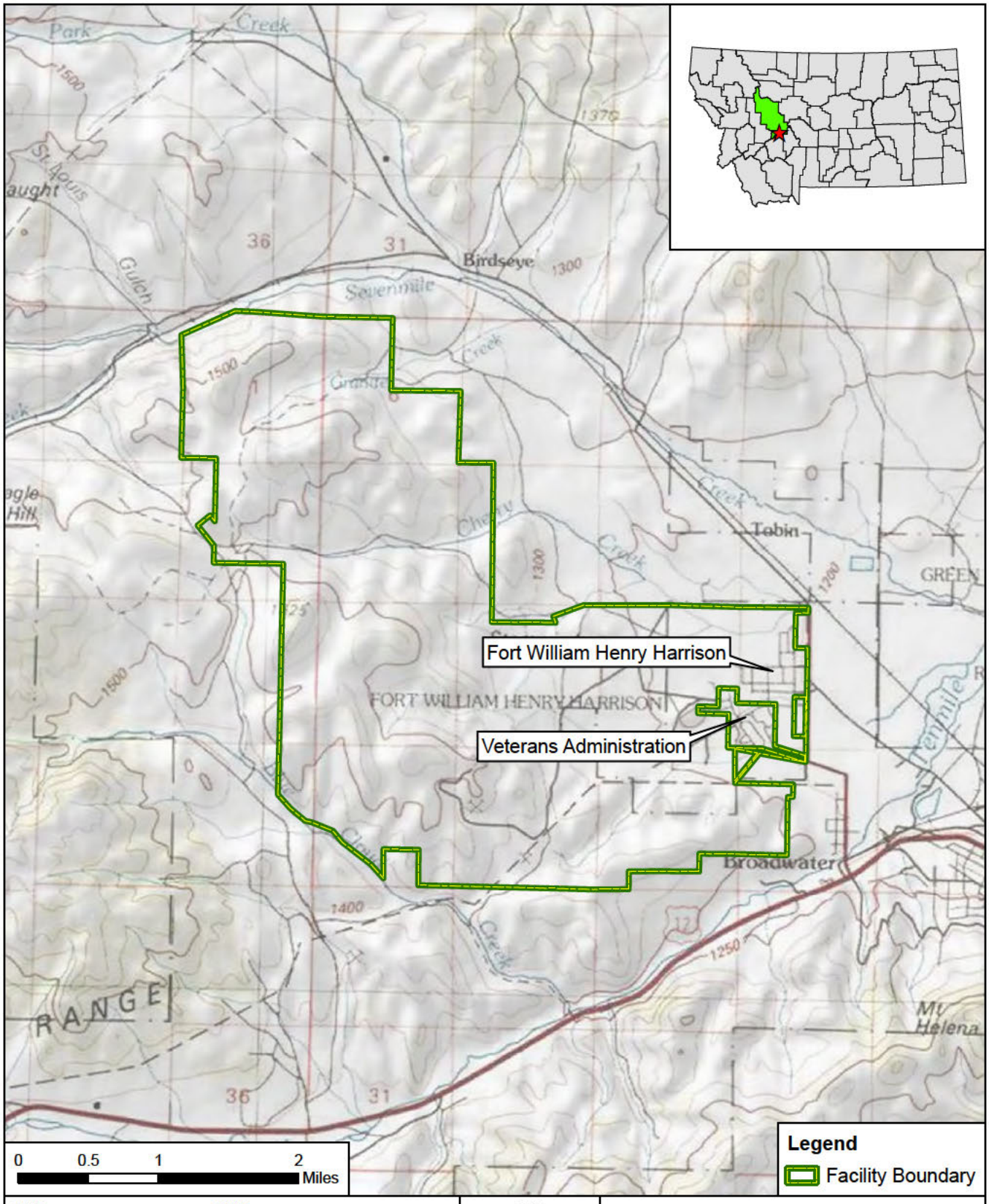
The area is subject to hailstorms. Flash flooding can occur in the Helena Valley during heavy rainstorms and rapid snowmelt (Argonne 1993). The frost-free period is usually from May to September. Winds generally blow westerly at about 7 to 8 miles per hour. Stronger gusts can reach 55 to 65 miles per hour (MTARNG 2001). Brisk westerly and northwesterly winds are common, particularly in the late winter and early spring. Chinook winds, which produce warmer temperatures in the winter months, are also common (Argonne 1993).

1.5.5 Current and Future Land Use

FTWHH contains a cantonment area with dining and support facilities and five training range areas for the ARNG, the US Armed Forces, and other government and civilian organizations to practice combat skills and operations. Access to the facility is controlled. The VA controls property immediately adjacent to the south and west of the Cantonment Area. Land use to the east, west, and north of the facility is primarily agricultural with scattered farms and residences, grazing land, and hilly to mountainous terrain. Land use to the south is a mixture of residential and agricultural.

The nearest urban area is Helena, approximately 4 miles to the east. According to the 2016 US Census, the estimated population of Helena is 31,169 (United States Census Bureau 2016). Helena has experienced significant population growth over the last decade, and several agricultural lands have been converted to residential subdivisions and single-resident lots to accommodate the growth (MTARNG 2001). Lands to the east and north of FTWHH are designated as urban growth areas for Lewis and Clark County. Land use to the south and west is not expected to change.

The influx of people and need for new housing in the vicinity of FTWHH has created the possibility of encroachment (Nakata Planning Group, LLC 2000). In 2015, the Prickly Pear Land Trust acquired 558 acres in the area east of Williams Street in partnership with FTWHH with funding from the Army Compatible Use Buffer (ACUB) Program to address the encroachment concerns. This land is designated for open space and habitat (Westech Environmental Services, Inc. 2017). See **Appendix A** for the ACUB Cooperative Agreement.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/6/2018	GIS BY	MS	8/6/2018
SCALE	1:63,360	CHK BY	JZ	8/6/2018
Base Map: Copyright© 2013 National Geographic Society, i-cubed		PM	RG	8/6/2018

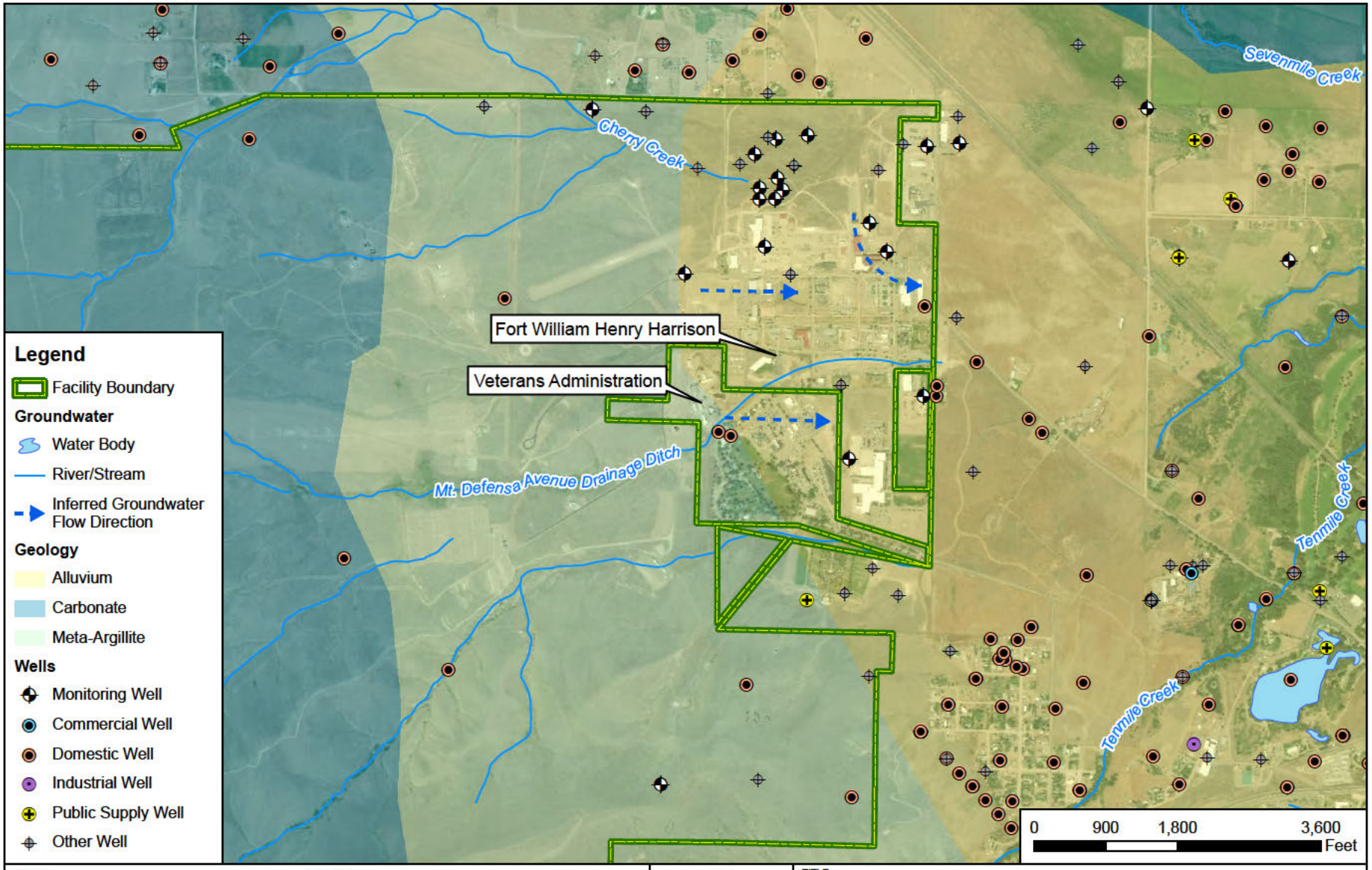
N

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-1

\\ursgermantown.us.ie.urs\germantown\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MT\FTWHH\FTWHH_PA\Fig_1-1_FTWHH_Facility_Location.mxd



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:21,600	CHK BY	JZ	8/8/2018
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,		PM	RG	8/8/2018

N

TITLE

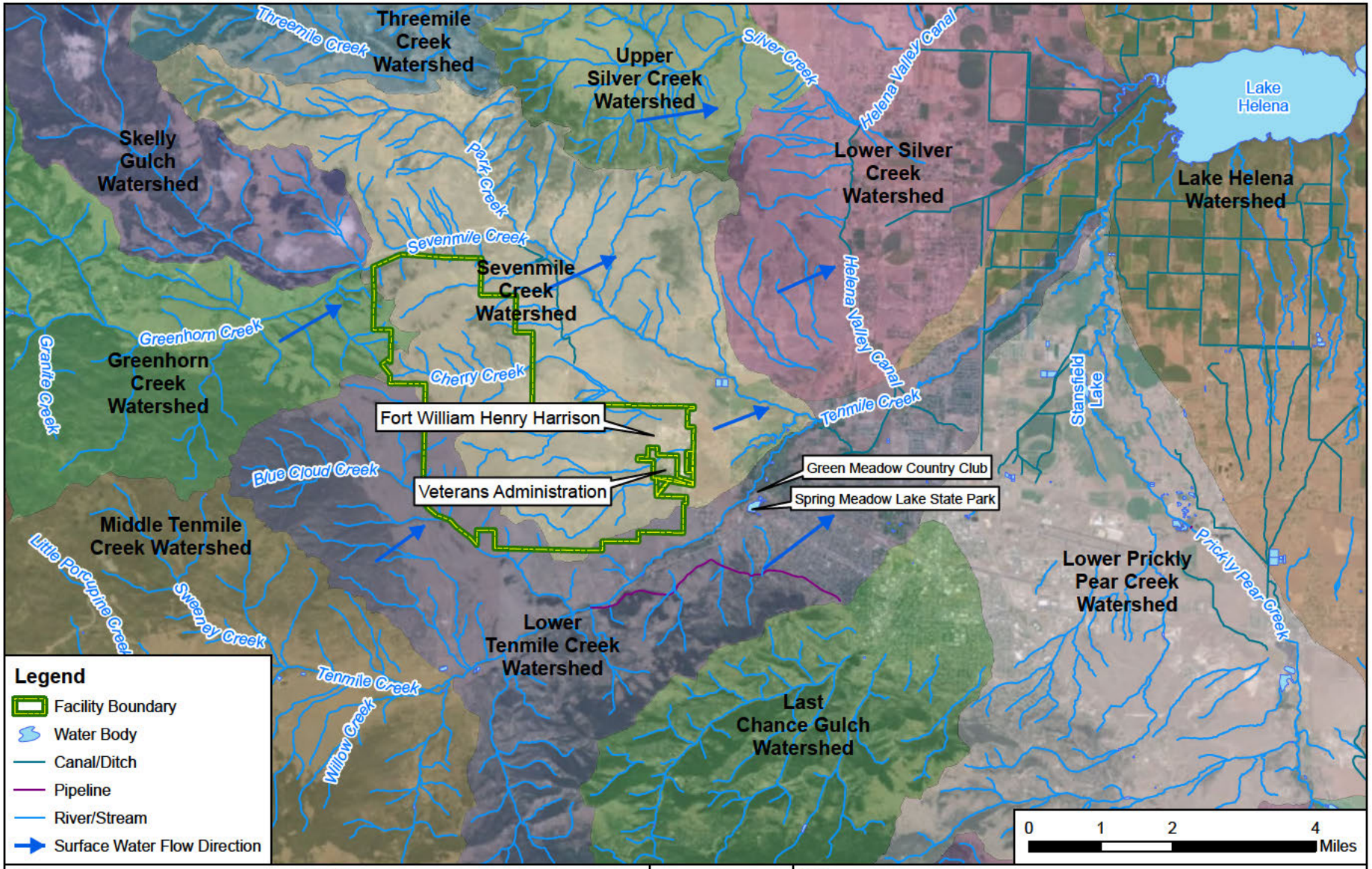
Groundwater Features

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-2

G:\Projects\ENV\GEARS\GEO\MAES 2012 Unrestricted\Fort Meade\E. Data Management\GIS\MXDs\Chisholm_6th\March2017\ Fig_1-2_FTWHH_Groundwater_Features.mxd



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:126,720	CHK BY	JZ	8/8/2018
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,		PM	RG	8/8/2018

TITLE: **Surface Water Features**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-3

G:\Projects\ENV\GEARS\GEO\MAES 2012 Unrestricted\Fort Meade\E. Data Management\GIS\MXDs\Chisholm_6th\March2017\ Fig_1-3_FTWHH_Surfacewater_Features.mxd

2. Fire Training Areas

Two FTAs where PFAS was potentially released were identified during the PA. A description of each FTA is presented below, and the FTAs are shown on **Figure 2-1**. Interview records appear in **Appendix B**. Photographs appear in **Appendix C**.

2.1 Planned Structure Fires

Two planned structure fires used for fire training at FTWHH were identified during the PA (**Figure 2-1**). The former Weasel Barn located in the northeast section of the Cantonment Area, north of Sanananda Drive, was demolished in the winter of 2002 as part of a fire training exercise. The geographic coordinates are 46°37'29.5"N and 112°05'43.4"W. The MTARNG 1049th burned the structure, and the MTARNG 1049th Team Chief recalled using AFFF to extinguish the fire. No information was available on the concentration or amount of AFFF used during the event, and no remediation activities have occurred at this location. The Montana Tools Program building was constructed at the location of the former weasel barn.

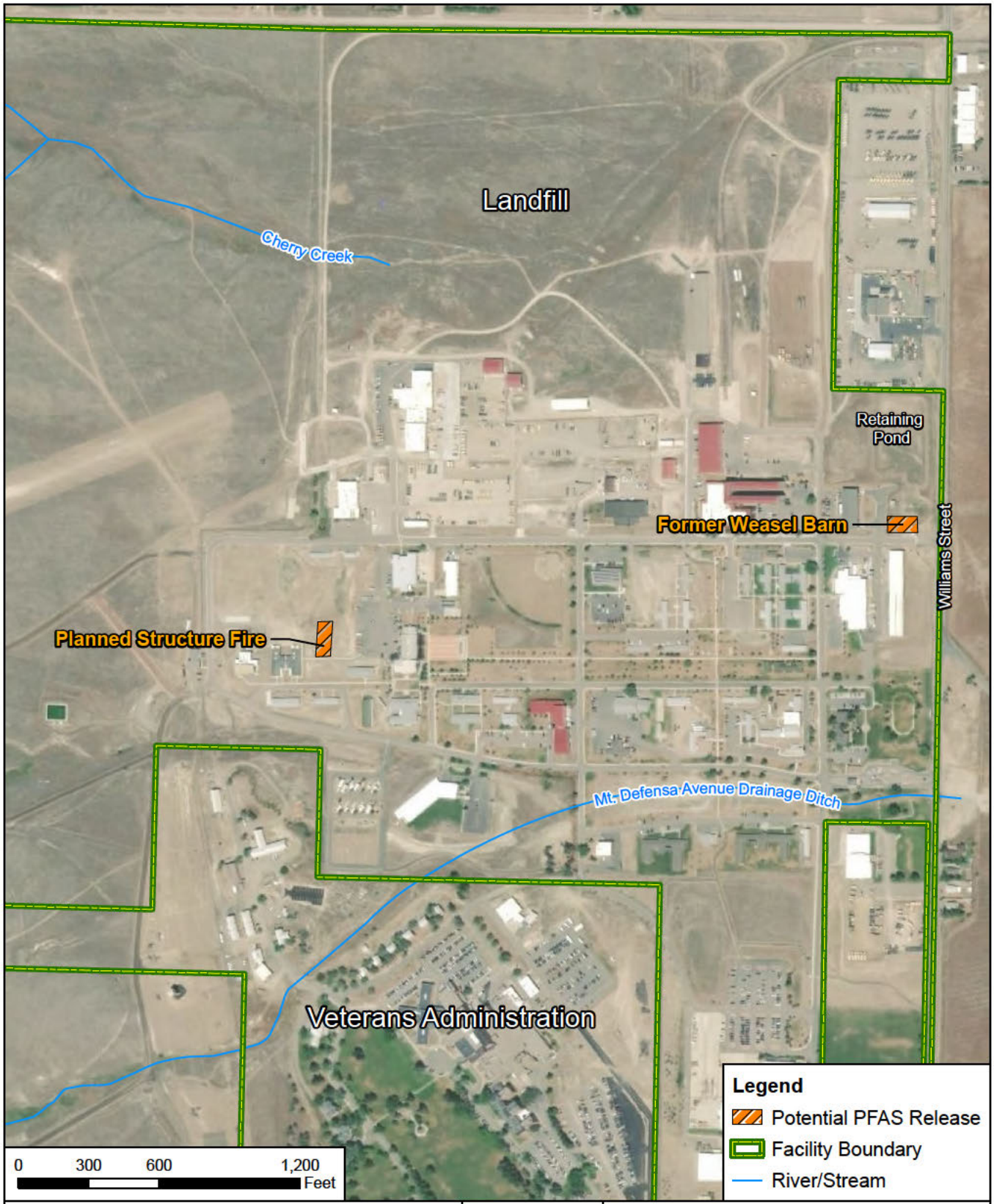
A second structure was burned in the northwest portion of the Cantonment Area near the current Dining Facility (Building 410). The geographic coordinates are 46°37'24.4"N and 112°06'17.9"W. The MTARNG 1049th Team Chief also recalled using AFFF to extinguish this structure fire. Based on aerial photography, the structure was burned sometime between 1995 and 2002. No information was available on the concentration or amount of AFFF used during the event, and no remediation activities have occurred at this location.

2.2 Off-Facility Fire Training Area

The MTARNG 1049th Team Chief indicated that coordinated AFFF training with the Helena Regional Airport was conducted at the Helena Regional Airport, east end of Runway 9/27 at least once per year from 1982 until the early 2000s. The Helena Regional Airport is located approximately 7 miles southeast of FTWHH. During the training, fuels and solvents were ignited on an old school bus and extinguished with an unknown quantity of AFFF. No information was available on the concentration or amount of AFFF used during the training. The geographic coordinates are 46°36'04.1"N and 111°57'21.3"W. This off-facility FTA is addressed further in the PA for the Helena Army Aviation Support Facility. The interviewee also indicated annual AFFF training was conducted at Great Falls approximately 95 mile northeast of FTWHH.

2.3 Prescribed Burns

The FTWHH Integrated Natural Resources Management Plan (MTARNG 2001) establishes a goal to prevent and suppress wildfires to maintain ecosystem biodiversity and functionality. MTARNG pursues that goal through the use of prescribed burns as a habitat management tool in accordance with the Fire Management Plan. Water is used for suppression by the MTARNG and the VA Fire Department during wildfire training and prescribed burns at FTWHH. AFFF is not used during wildfire operations.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:7,200	CHK BY	JZ	8/8/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	8/8/2018

N

Fire Training Areas

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MT\FTWHH\FTWHH_PA\Fig_2-1_FTWHH_Fire-Training_Areas.mxd

3. Non-Fire Training Areas

Several non-FTAs where PFAS 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**. Interview records appear in **Appendix B**. Photographs appear in **Appendix C**.

3.1 Burial Trench

Prior to 1987, an area about 200 feet north of Colle Ferro Avenue in the northwest section of the Cantonment Area was used to dig a burial trench and dispose of debris and ordnance (**Figure 3-1**). The geographic coordinates are 46°37'37.1"N and 112°06'14.2"W. One MTARNG retiree recollected to MTARNG Environmental personnel that vehicles were placed in the burial trench, burned, and extinguished with AFFF by MTARNG fire fighters. This use of AFFF could not be confirmed by any other interviewees during the PA, and no information was available on the concentration or amount of AFFF used. The Combined Support Maintenance Shop was constructed due south of the burial trench in 1987.

3.2 Mt. Defensa Avenue Drainage Ditch

A large, unnamed drainage ditch runs from west to east through the VA property adjacent to FTWHH, through FTWHH along Mt. Defensa Avenue, and off-Post by the Main Gate to a retention pond inside the ACUB area on the east side of Williams Street. For the purposes of this report, this drainage ditch will be referred to as the Mt. Defensa Avenue Drainage Ditch (**Figure 3-1**).

As described in **Section 3.2.1** and **Section 3.2.2**, potential PFAS releases to soil have occurred along the Mt. Defensa Avenue Drainage Ditch. In addition, adjacent off-facility potential PFAS releases have occurred upgradient of FTWHH near this ditch. The adjacent potential releases are detailed further in **Section 5**. In February 2012, a rapid snowmelt event caused water to run vigorously through the drainage ditch. The vigorous movement of the water caused foaming in the drainage ditch that ran off-Post to the retention pond in the ACUB area. The cause of the foaming is unknown; however, potential PFAS releases in and around the drainage ditch were noted by interviewees. Therefore, it is possible that the cause of the foaming was residual AFFF.

3.2.1 Montana Army National Guard 1049th Engineer Detachment

The MTARNG 1049th Engineer Detachment currently operates out of Building 1010 located at the southeast corner of Rome Avenue and Middle Road (**Figure 3-1**). The geographic coordinates are 46°37'15.4"N and 112°06'00.7"W. This building was constructed in 1995. Prior to construction, the MTARNG 1049th Engineer Detachment operated out of the former Post Engineers Maintenance Shop (Building M1), near the Field Maintenance Shop #3, at the southeast corner of Williams Street and Barrett Road in the 1980s. The geographic coordinates are 46°37'49.0"N and 112°05'40.1"W. Between the Building M1 location and the current location at Building 1010, the MTARNG 1049th Engineer Detachment briefly operated out of the buildings currently known as the Troop Medical Clinic (Building 1009) and out of a building located where the Range Operations (Building 1017) currently exists.

AFFF was stored at the MTARNG 1049th Engineer Detachment buildings and only added to the firetrucks when it was intended for imminent use due to its corrosive action on the storage tanks. No information was available on the concentration or amount of AFFF stored; however, the MTARNG 1049th Engineer Detachment operated two types of trucks: small trucks capable of holding approximately 40 gallons of solution and large trucks capable of holding approximately 100 gallons of solution. Annual AFFF fire training exercises were conducted by

the MTARNG 1049th Engineer Detachment off-Post at the Helena Regional Airport and/or at Malmstrom Air Force Base in Great Falls, Montana (**Section 2.2**). No regularly scheduled fire training exercises were conducted at FTWHH.

During fire training exercises, the majority of AFFF added to the trucks was expended. Upon return to the MTARNG Fire Department, the trucks were washed and residual AFFF was discharged with the wash water and allowed to dissipate on the ground. Per the MTARNG 1049th Team Chief, the washing and emptying of the trucks occurred only at the Building M1 location in the late 1980s and the current MTARNG Fire Department (Building 1010) from 1995 to the early 2000s. At the Building M1 location, a drainage area where the discharge may have been allowed to dissipate was observed to the east of the building during the VSI. At the current MTARNG Fire Department (Building 1010), the discharge was washed into the Mt. Defensa Avenue Drainage Ditch. The last known occurrence of washing and emptying of the trucks was noted by the MTARNG 1049th Team Chief to be in the early 2000s. No remediation activities have occurred at these locations. Truck washing did not occur at the current Range Operations and Troop Medical Clinic locations.

The VA Fire Department is currently contracted to perform fire-fighting services for FTWHH. According to the VA Fire Chief, AFFF has never been used by the VA Fire Department to extinguish a structure or range fire at FTWHH.

3.2.2 Black-Tailed Prairie Dog Relocation

In 1997, the MTARNG began renovations in the southeast section of the Cantonment Area near the Mt. Defensa Avenue Drainage Ditch. At the time, a colony of black-tailed prairie dogs inhabited the renovation zone. The MTARNG live-trapped and moved the prairie dogs to a previously unoccupied area approximately 1/2 mile north of the cantonment area and to the Charles M. Russell National Wildlife Refuge (FaunaWest 1998).

During the last week of trapping in February 1998, an attempt was made to flush remaining prairie dogs from their burrows at multiple locations using a mixture of water and fire-fighting training foam. The Active Guard Reserve for the 1063rd Fire Fighters recalled using fire-fighting training foam, not AFFF, to flush the prairie dogs from their burrows. The *Relocation of the Fort Harrison Prairie Dog Colony* (FaunaWest 1998) contains materials information from Defense Supply Center, Columbus, for Dominion Restoration's Foaming Surfactant (DRFS) in a 3 percent solution. According to this pamphlet, DRFS is "a solvent free, environmentally acceptable surrogate that was developed to simulate AFFF" and "a non-hazardous, water-based, neutral pH product that is 100 percent completely biodegradable" with the same appearance as AFFF.

The foam mixture was delivered through a 2-inch diameter fire hose from a FTWHH fire engine to approximately 20 prairie dog burrows. Two prairie dogs were flushed from their burrows, captured, and placed into a live-trap for later release. Approximately 750 gallons of the fire-fighting training foam mixture were used to flush the prairie dog burrows (FaunaWest 1998). The geographic coordinates of the multiple potential release locations are 46°37'20.6"N and 112°05'53.4"W, 46°37'19.6"N and 112°05'50.3"W, and 46°37'15.8"N and 112°05'53.5"W. These potential release locations are shown on **Figure 3-1**. One potential release location was on the VA property and is discussed further in **Section 5** and shown on **Figure 5-1**. No remediation activities have occurred at these locations.

3.3 Excavated Soil from Mt. Defensa Avenue Drainage Ditch

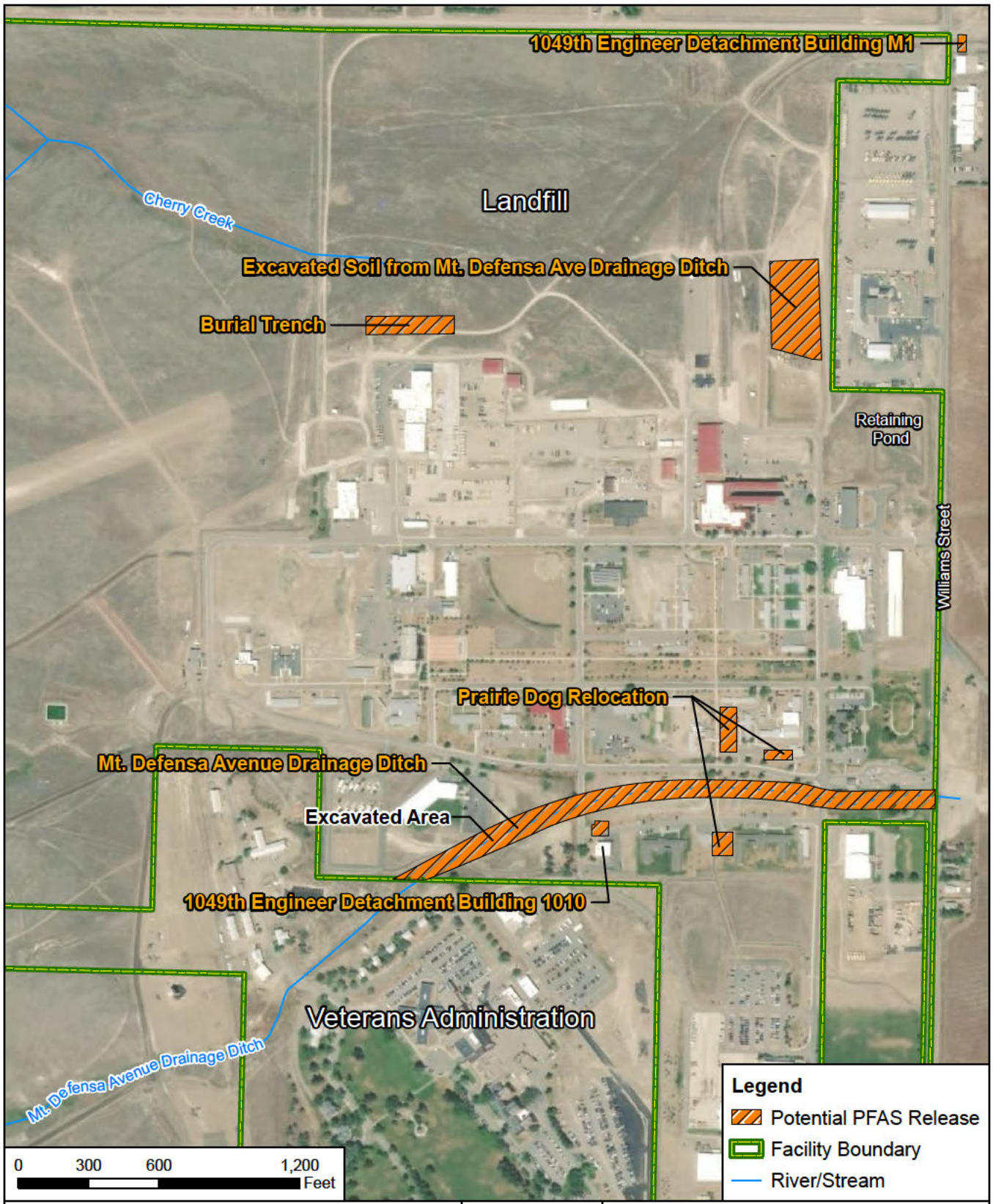
Due to flooding of the Mt. Defensa Avenue Drainage Ditch during rapid snowmelt and large rainfall events, the central portion of the ditch within the FTWHH boundary was widened in 2016

by excavating soil from the ditch. Based on the potential PFAS releases to this ditch described in **Section 3.2**, this soil is potentially contaminated with PFAS and was used to create a military vehicle staging area on-Post near a retention pond in the northeast section of the Cantonment Area The geographic coordinates are 46°37'38.5"N and 112°05'49.9"W.

3.4 Landfills

There is one known landfill area at FTWHH north of the Combined Support Maintenance Shop. The geographic coordinates are 46°37'47.6"N and 112°06'08.3"W (**Figure 3-1**). Information collected during a previous PA (Argonne 1993), indicates 40 to 50 burial trenches were in operation in this area from at least 1964 until the mid-1970s and interred waste from all of FTWHH. The burial cells were reportedly filled one by one and contain solid waste, including 55-gallon and smaller drums of unknown contents.

Landfills are not usually a primary 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 used AFFF storage containers or products associated with waterproofing uniforms or boots. At FTWHH, no information obtained indicates PFAS-related materials were disposed of in the landfill burial cells area.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:7,200	CHK BY	JZ	8/8/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	8/8/2018

N

Non-Fire Training Areas

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MT\FTWHH\FTWHH_PA\Fig_3-1_FTWHH_Non-Fire_Training_Areas.mxd

4. Emergency Response Areas

FTWHH personnel identified two emergency response areas, one on-Post and one off-Post, during the PA. The emergency response areas are shown on **Figure 4-1** and **Figure 4-2**. Interview records appear in **Appendix B**.

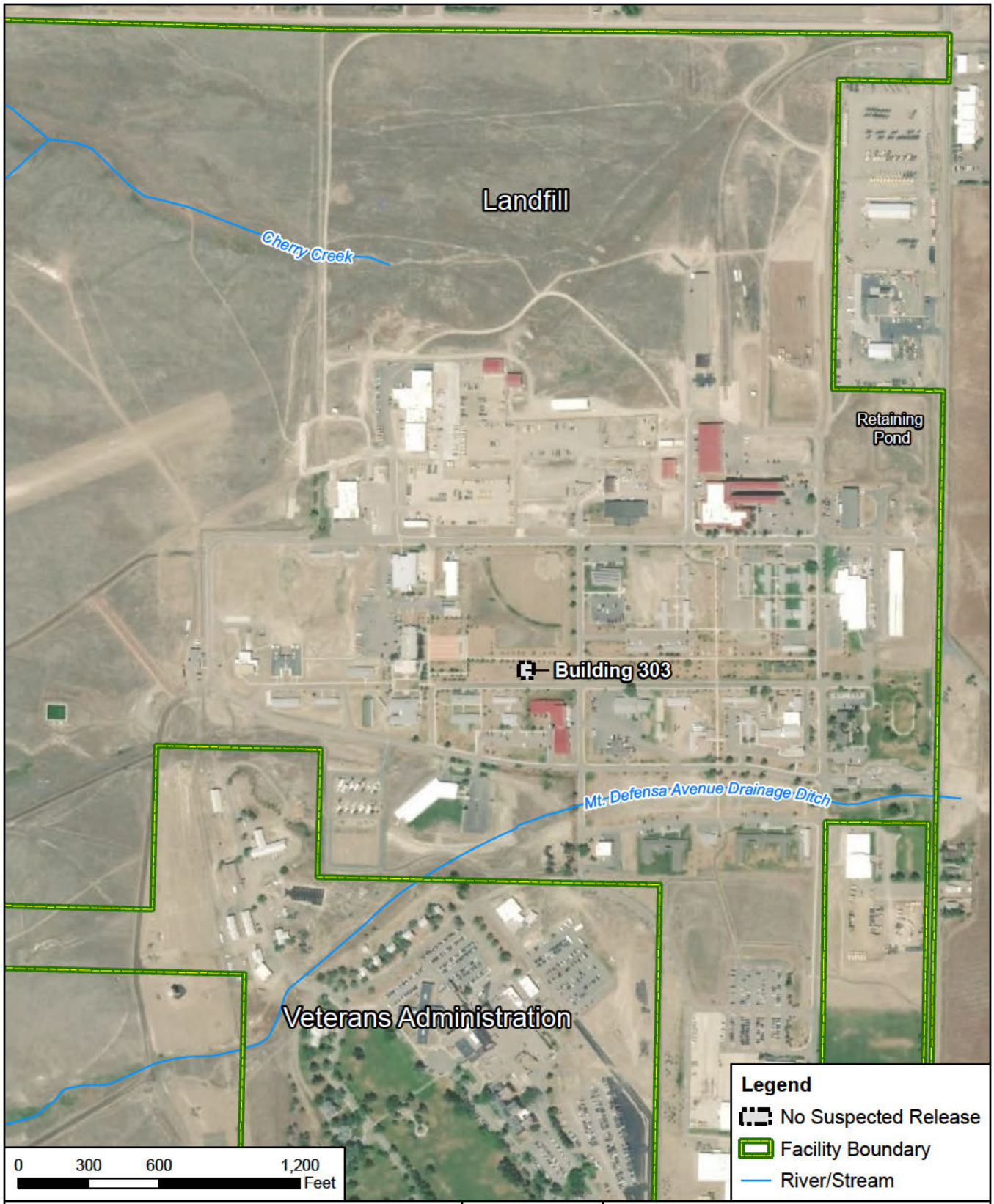
4.1 Former Dining Facility (Building 303)

The former Dining Facility (Building 303) was located in the Cantonment Area west of Middle Road and north of Central Avenue (**Figure 4-1**). The geographic coordinates are 46°37'22.8"N and 112°06'05.9"W. This structure was considered a potential PFAS release area because in January 2012 the structure caught fire due a faulty heating system and was extinguished by the VA Fire Department. Interviewees did not recall the use of AFFF to extinguish the fire, and photographs viewed during the site visit indicate only water was used. The photographs were not available for use in this report. Therefore, Building 303 is not considered a potential PFAS release area. Based on aerial photography, the remains of Building 303 were demolished in 2012 or 2013.

4.2 1989 Helena Train Wreck

The MTARNG 1049th Team Chief recalled the use of AFFF during an off-facility emergency response in 1989, the Helena Train Wreck. Based on interviewee recollection, the Helena Train Wreck occurred off-Post near the Benton Avenue Crossover, directly across from Cretex Concrete Products West (**Figure 4-2**). The geographic coordinates are 46°36'19.5"N and 112°02'14.0"W.

According to the National Transportation Safety Board (NTSB), on February 2, 1989, 49 train cars from a Montana Rail Link, Inc., collided with a work train at a railway crossing near the Benton Avenue crossing and the Bill Roberts Golf Course (NTSB 1989). The collision caused the derailment of 15 cars, including cars carrying isopropyl alcohol, hydrogen peroxide, and acetone. The release of these hazardous materials resulted in a fire and subsequent explosions. Due to below freezing temperatures and the nature of the hazardous materials on board, water could not be used to extinguish the fire. According to the MTARNG 1049th Team Chief, AFFF was deployed by the VA Fire Department, the MTARNG 1049th Engineer Detachment, and volunteer fire fighters to extinguish the fire. No information was available on the concentration or amount of AFFF used during the emergency response.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:7,200	CHK BY	JZ	8/8/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	8/8/2018

N

Emergency Response Area

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 4-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MT\FTWHH\FTWHH_PA\Fig_4-1_FTWHH_Emergency_Response_Area.mxd

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:6,000	CHK BY	JZ	8/8/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	8/8/2018

N

Off-Facility Emergency Response Area

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 4-2

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MT\FTWHH\FTWHH_PA\Fig_4-2_Off-Facility_Emergency_Response_Area.mxd

5. Adjacent Sources

Four potential off-facility sources of PFAS contamination were identified during the PA. The off-facility sources are shown on **Figure 5-1**. Interview records appear in **Appendix B**. Photographs appear in **Appendix C**.

5.1 Veterans Administration Fire Station

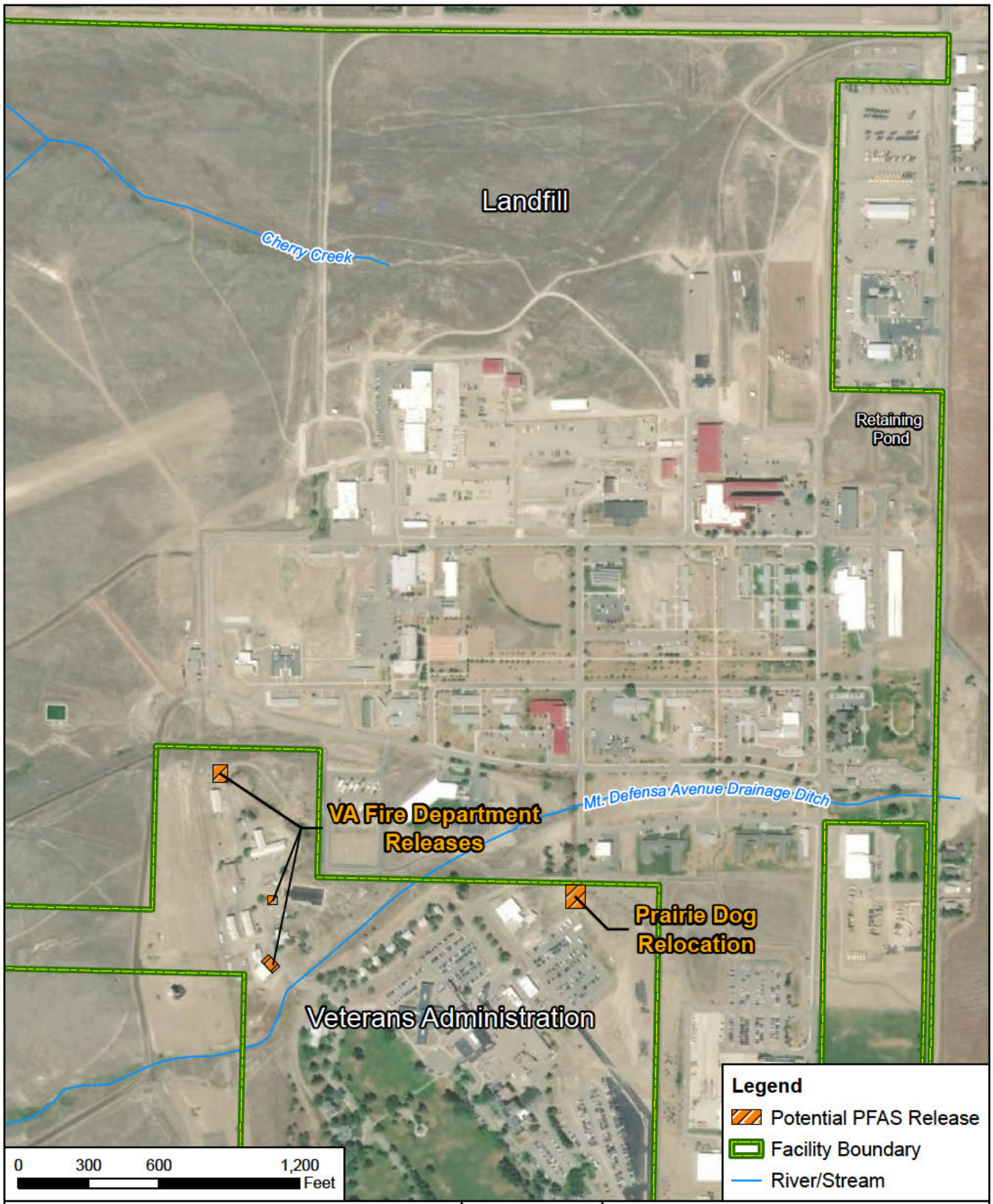
The VA property is adjacent to FTWHH, southwest of the Cantonment Area. The VA facilities include the VA Fire Station (Building 16), located northwest of Middle Road. The geographic coordinates are 46°37'10.0"N and 112°06'21.5"W.

The VA Fire Chief recalled that AFFF concentrate was stored in 5-gallon buckets inside the VA Fire Station and that twice a year from 1977 until 2003, old or expiring AFFF was sprayed by the VA Fire Department outside of the VA Fire Station into the parking lot. When dispensed, the foam would reach up to five feet high, fill the parking lot, and dissipate into the Mt. Defensa Avenue Drainage Ditch. As described in **Section 3.3**, this ditch runs from west to east through the VA property and FTWHH along Mt. Defensa Avenue. Intermittent surface water has been observed in this ditch during large rainfall and rapid snowmelt events. AFFF was also dispensed by the VA Fire Department outside of the VA Animal House (Building 54) and the VA Engineer Warehouse (Building 31) from 1977 until 2003. According to the VA Fire Chief, 4 percent AFFF concentrate was used; however only 3 percent and 6 percent AFFF concentrate are approved for military use. The VA Fire Department began using Class A foam in 2004, and fire training with AFFF has not been conducted at the VA facilities since 2012.

The geographic coordinates of the VA Fire Department potential PFAS release areas are 46°37'10.1"N and 112°06'20.9"W, 46°37'12.7"N and 112°06'20.1"W, and 46°37'17.9"N and 112°06'24.7"W. The VA potential release locations are shown on **Figure 5-1**. Because it is outside the boundary of FTWHH, the VA potential PFAS release areas are considered adjacent potential sources of PFAS for FTWHH. The VA facilities are run by the Veterans Health Administration of the US Department of Veterans Affairs.

5.2 Black-Tailed Prairie Dog Relocation

As described in **Section 3.3.2**, the MTARNG relocated a black-tailed prairie dog colony in 1997. In 1998, an attempt was made to flush remaining prairie dogs from their burrows at multiple locations using a mixture of water and fire-fighting training foam. One of these locations was on the VA property (**Figure 5-1**). The geographic coordinates are 46°37'13.4"N and 112°06'01.6"W. Because it is outside the boundary of FTWHH, this area is considered an adjacent off-facility source of PFAS for FTWHH.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:7,200	CHK BY	JZ	8/8/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	8/8/2018

N

Adjacent Sources

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

6. Conceptual Site Model

Based on the PA findings, the potential release areas were grouped into three areas of interest (AOIs): AOI 1 Mt. Defensa Avenue Drainage Ditch; AOI 2 Cantonment Area Northeast; and AOI 3 Cantonment Area Northwest. The AOI locations are shown on **Figure 6-1**. The following sections describe the CSM components and the specific CSMs developed for each AOI. The CSM identifies the three components necessary for a potentially complete exposure pathway: (1) source, (2) pathway, (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

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 [NGWA] 2018). Receptors for FTWHH include site workers, construction workers, farmers, residents, and trespassers. The CSMs for each AOI indicate which specific receptors could potentially be exposed to PFAS.

6.1 AOI 1 Mt. Defensa Avenue Drainage Ditch

AOI 1 is the Mt. Defensa Avenue Drainage Ditch. Potential PFAS releases to soil by the MTARNG occurred at AOI 1 at the MTARNG 1049th Engineer Detachment (Building 1010) from 1995 to the early 2000s and at the Black-Tailed Prairie Dog Relocation areas in 1998.

In addition, adjacent potential PFAS releases to soil by the VA Fire Department occurred at the VA Fire House (Building 16), Animal House (Building 54) and the Engineer Warehouse (Building 31) from 1977 until 2003 and by the MTARNG in 1998 during Black-Tailed Prairie Dog relocation. These off-facility sources are upgradient of AOI 1 and may contribute to potential PFAS contamination in this AOI.

In February 2012, a rapid snowmelt event caused an intermittent stream at AOI 1. The vigorous movement of the stream created foaming in the water flowing through FTWHH then off-Post to a retention pond in the ACUB area east of Williams Street. The cause of the foaming is unknown; however, PFAS are surfactants and potential PFAS releases in and around AOI 1 were noted during the PA. Therefore, it is possible that the cause of the foaming was residual AFFF. 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 and subsurface soil have occurred, it is possible that PFAS migrated from the surface soil at AOI 1 to intermittent surface water and to the ACUB area soil via over land surface water flow during rapid snowmelt and large rainfall events. In addition, precipitation infiltrating AOI 1 and the ACUB area may cause the migration of PFAS from surface and subsurface soil to groundwater which is estimated to be 22 to 55 ft bgs (CDM 2006).

Ground-disturbing activities to surface soil and intermittent surface water and sediment at AOI 1 could result in site and construction worker and trespasser exposure to potential PFAS contamination. Ground-disturbing activities to subsurface soil could result in site and construction worker exposure. Therefore, the exposure pathway for inhalation of soil particles and ingestion of soil is potentially complete for these receptors. FTWHH drinking water is supplied by the City of Helena; however, domestic water supply wells and off-Post, residential wells are present to the east and southeast of AOI 1. Groundwater flow at FTWHH is predominantly to the east-southeast; therefore, these wells are downgradient of AOI 1, and the exposure pathway for groundwater to residents through domestic drinking water ingestion is potentially complete. The City of Helena uses groundwater and surface water from Tenmile Creek, which is about one mile east of the facility, as a water source for its residents. However,

the city water intakes for Tenmile Creek are upgradient of AOI 1. The CSM for AOI 1 is shown on **Figure 6-2**.

6.2 AOI 2 Cantonment Area Northeast

AOI 2 is the Cantonment Area Northeast AOI. Potential PFAS releases to soil by the MTARNG occurred at AOI 2 at the former MTARNG 1049th Engineer Detachment (Building M1) in the 1980s and the former weasel barn in 2002. In addition, PFAS was potentially released to soil at the Mt. Defensa Drainage Ditch from 1995 to the early 2000s. This soil was excavated from the Mt. Defensa Drainage Ditch and moved to AOI 2 in 2016.

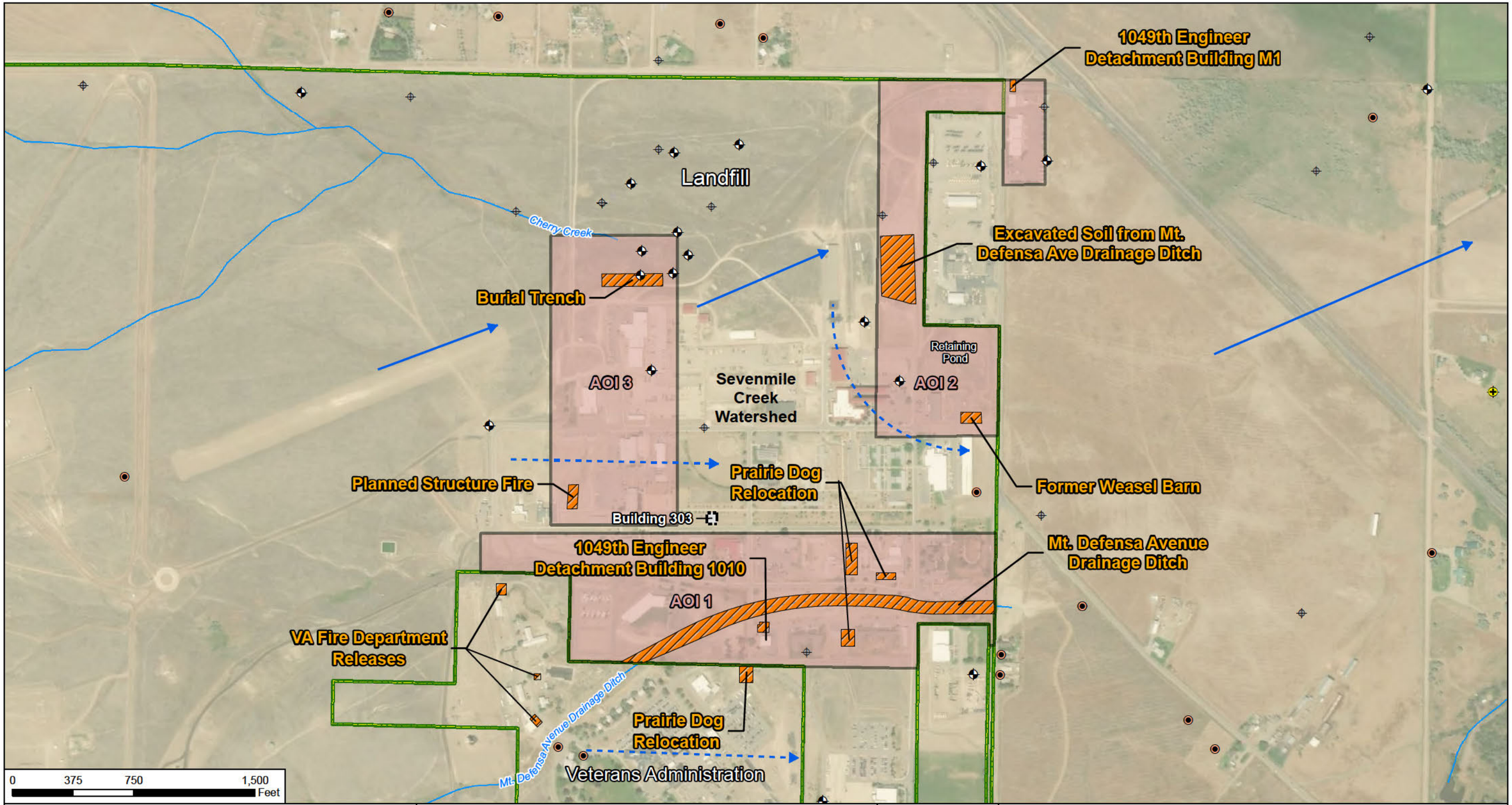
During large rainfall and rapid snowmelt events, water gathers at a retention pond near AOI 2 and periodically flows off-Post to the east across Williams Street. Because potential PFAS releases to surface soil at AOI 2 have occurred, PFAS may migrate from surface soil at AOI 2 to surface water via run-off and to groundwater via leaching.

Ground-disturbing activities to surface soil at AOI 2 could result in site and construction worker and trespasser exposure to potential PFAS contamination. Ground-disturbing activities to subsurface soil could result in site and construction worker exposure. Therefore, the exposure pathway for inhalation of soil particles and ingestion of soil is potentially complete for these receptors. One domestic water supply well within the FTWHH boundary is located downgradient of AOI 2. In addition, off-Post domestic water supply wells and private, residential wells are downgradient of AOI 2. Therefore, the exposure pathway for groundwater to residents through domestic drinking water ingestion is potentially complete. The city water intakes for Tenmile Creek are upgradient of AOI 2. The CSM for AOI 2 is shown on **Figure 6-3**.

6.3 AOI 3 Cantonment Area Northwest

AOI 3 is the Cantonment Area Northwest. Potential PFAS releases to soil by the MTARNG occurred at AOI 3 during a planned structure fire sometime between 1995 and 2002 and at a burial trench prior to 1987.

Because potential PFAS releases to surface and subsurface soil have occurred, it is possible that precipitation infiltrating AOI 3 may cause the migration of PFAS from surface and subsurface soil to groundwater. AOI 3 is upgradient of AOI 2, and the pathways and receptors are the same as described in **Section 6.2**. The CSM for AOI 3 is shown on **Figure 6-4**.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:7,200	CHK BY	JZ	8/8/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/8/2018

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

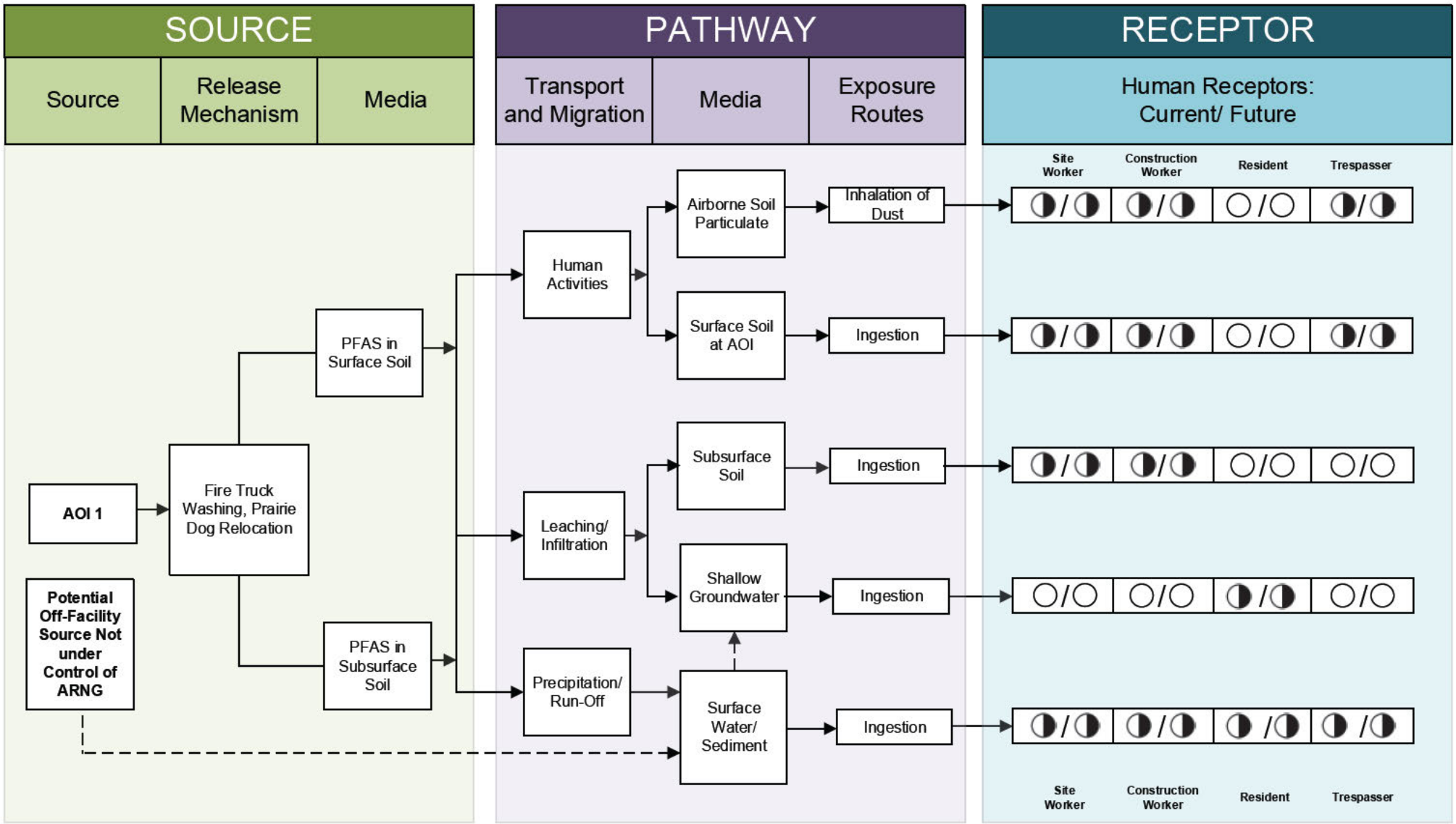
N

Areas of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

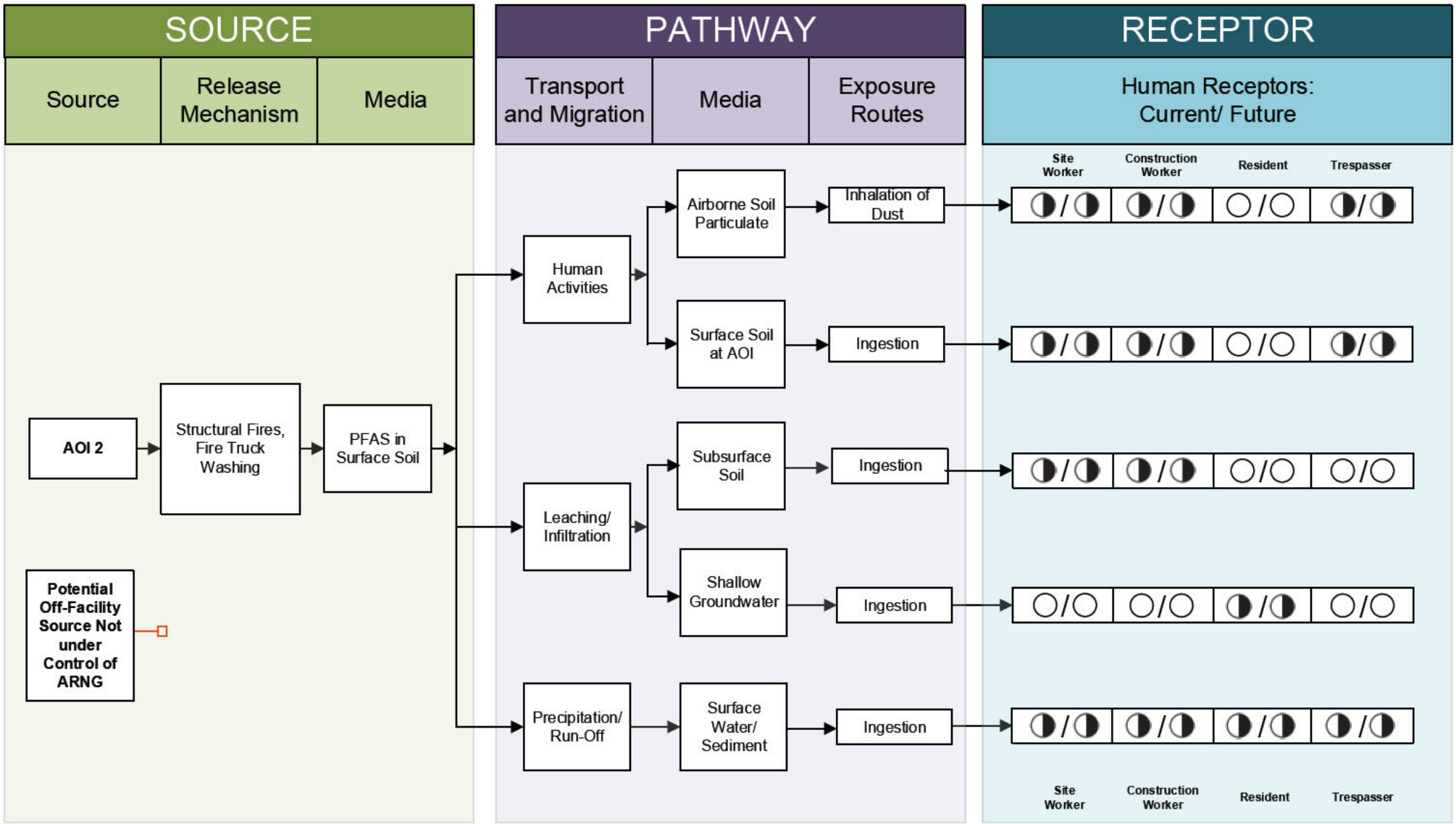
Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MT\FTWHH\FTWHH_PA\Fig_6-1_FTWHH_Areas_of_Interest.mxd



LEGEND

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

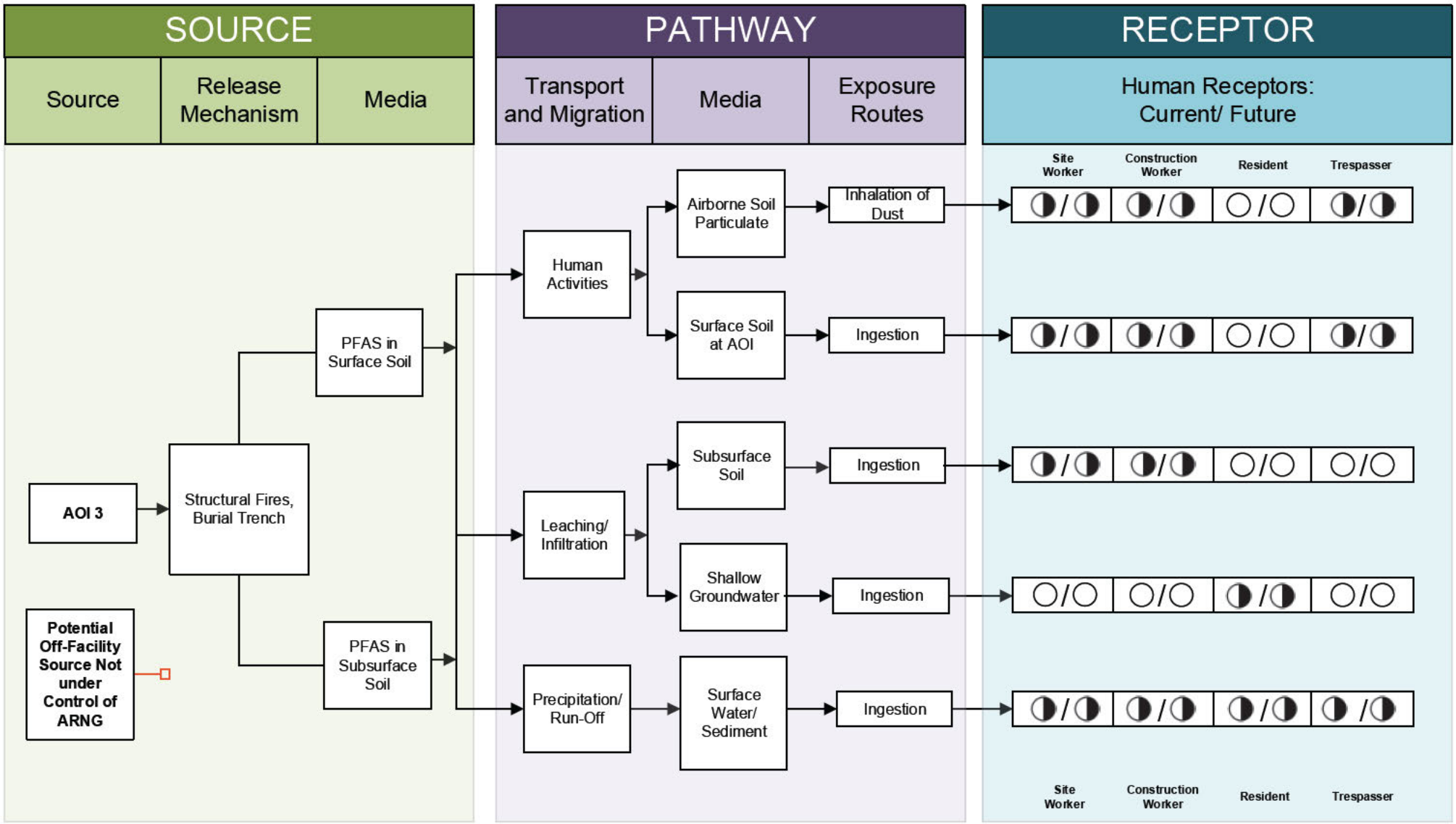
Figure 6-2
Conceptual Site Model
AOI 1 Mt. Defensa Avenue Drainage Ditch



LEGEND

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

Figure 6-3
Conceptual Site Model
AOI 2 Cantonment Area Northeast



LEGEND

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

Figure 6-4
Conceptual Site Model
AOI 3 Cantonment Area Northwest

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

7.1 Findings

Three AOIs related to potential PFAS release were identified at FTWHH during the PA (**Figure 7-1**).

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	Mt. Defensa Avenue Drainage Ditch AOI	VA and MTARNG	VA: 1977 to 2003 MTARNG: 1995 to early 2000s
AOI 2	Cantonment Area Northeast AOI	MTARNG	1980s, 2002, soil moved to AOI 2 in 2016 from AOI 1
AOI 3	Cantonment Area Northwest AOI	MTARNG	Prior to 1987 and 1995 to 2002

Based on documented potential PFAS releases at these AOIs, there is potential for exposure to PFAS contamination in surface soil to all receptors via ingestion and inhalation, subsurface soil to site and construction workers via inhalation, and groundwater to residents via ingestion.

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 Dining Facility (Building 303)	MTARNG	Interviewees did not recall the use of AFFF to extinguish the fire, and photographs viewed during the site visit indicate only water was used.

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.

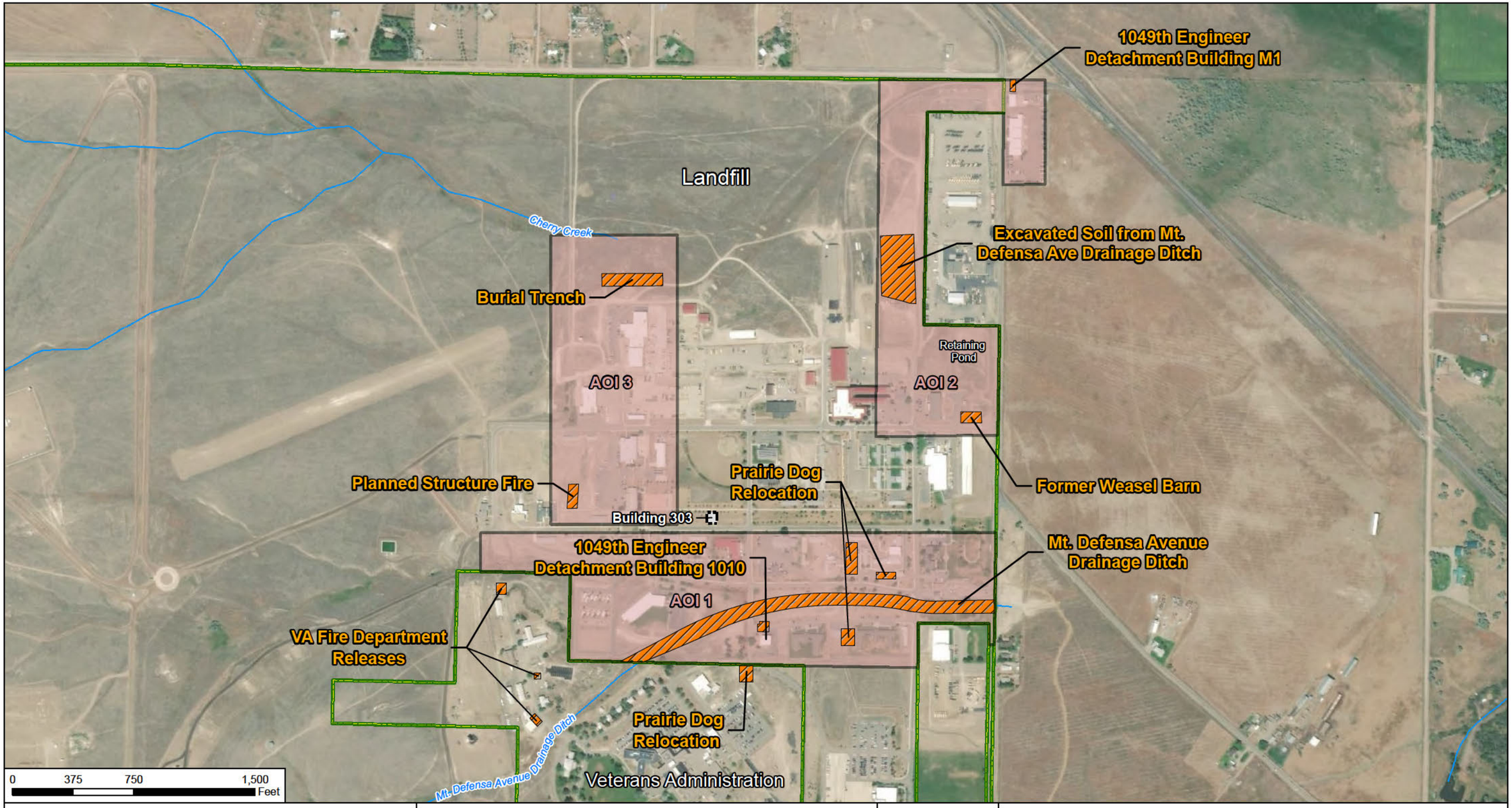
The conclusions of this PA are predominantly based on the information provided during interviews with personnel who had direct knowledge of PFAS use at the facility. Sometimes the provided information was vague or conflicted with other sources. Gathered information has a degree of uncertainty due to 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 3 Cantonment Area Northwest	One interviewee recalled that vehicles were burned in the burial trench and extinguished with AFFF; however, no other interviewees recalled these potential releases.
AOI 1 Mt. Defensa Avenue Drainage Ditch	The information sheets included in the *Environmental Assessment for Management of Black-Tailed Prairie Dogs at Fort William Henry Harrison* (FaunaWest 1997) indicate the fire fighting training foam, DRFS, is a "solvent free, environmentally acceptable surrogate that was developed to simulate AFFF" and is a "non-hazardous, water-based, neutral pH product that is 100 percent completely biodegradable". However, the ingredients listing in the Department of Defense Hazardous Materials Information System printout lists the ingredients only as "non-hazardous ingredients". Because the contents of the fire fighting training foam are inconclusive, the black-tailed prairie dog relocation areas were retained as potential PFAS release areas.
AOI 2 Cantonment Area Northeast	At the Building M1 location for the 1049th Engineer Detachment, fire trucks were washed after AFFF use; therefore, PFAS releases to soil may have occurred. According to the 1049th Team Chief, the trucks were washed outside of Building M1, but the exact location of the fire truck washing and potential PFAS release could not be determined. A drainage area where the discharge may have been allowed to dissipate was observed to the east of Building M1.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Fort William Henry Harrison, MT			
REVISED	8/8/2018	GIS BY	MS	8/8/2018
SCALE	1:7,200	CHK BY	JZ	8/8/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/8/2018

Legend

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

N

Summary of Findings

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 7-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MT\FTWHH\FTWHH_PA\Fig_7-1_FTWHH_Summary_Findings.mxd

8. References

Argonne National Laboratory (Argonne). 1993. *Preliminary Assessment Report for Fort William Henry Harrison, Montana National Guard, Helena, Montana.* July.

Camp, Dresser, and McKee (CDM). 2006. *Draft Data Summary Report Combat Pistol and M16 Shooting Ranges Fort Harrison Helena, Montana*.

Department of Public Works (DPW), Helena Water Treatment Division. 2012. *2012 Consumer Confidence Report, Water Quality, Treatment Sampling Monitoring.*

FaunaWest Wildlife Consultants. 1998. *Relocation of the Fort Harrison Prairie Dog Colony.* March.

Helena Water Utilities Public Water System. 2004. *Source Water Delineation and Assessment Report PWSID# MT0000241.*

Montana Army National Guard (MTARNG). 2001. *Integrated Natural Resource Management Plan and Environmental Assessment*. October.

Montana Department of Environmental Quality (MTDEQ). 2006. *Helena Valley Ground Water: Pharmaceuticals, Personal Care Products, Endocrine Disruptors (PPCPs) and Microbial Indicators of Fecal Contamination.* March.

Montana Bureau of Mines and Geology (MBMG). 2018. Online Web Mapping Application. Accessed via http://data.mbmg.mtech.edu on April 22, 2018.

Nakata Planning Group, LLC. 2000. *Range and Training Land Program Development Plan, Montana Army National Guard.* Prepared for Montana Army National Guard. Colorado Springs, CO.

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

National Transportation Safety Board (NTSB). 1989. *Collision and derailment of Montana Rail Link Freight Train with Locomotive Units and Hazardous Materials Release.* December. https://www.ntsb.gov/investigations/AccidentReports/Pages/RAR8905.aspx (Accessed April 22, 2018).

PRC Environmental Management, Inc. (PRC). 1996. Final Site Inspection Report Fort William Henry Harrison Montana Army National Guard Helena, Montana. September.

United States Census Bureau. 2016. *Population and Housing Unit Estimates.* Available at https://www.census.gov/quickfacts/fact/table/helenacitymontana/PST045217 (Accessed August 4, 2018).

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

US Geological Survey (USGS). 1992. *Hydrogeology of the Helena Valley-Fill Aquifer System, West-Central Montana.* April.

USGS. 2000. Streamflow and Water-Quality Characteristics in the Upper Tenmile Creek Watershed, Lewis and Clark County, West-Central Montana. September.

USGS. 2001. *Streamflow and Water-Quality Characteristics in the Lower Tenmile Creek Watershed, Lewis and Clark County, West-Central Montana, 1997 and 1998.* August.

Westech Environmental Services, Inc. 2017. *Environmental Assessment Freedom's Path at FortHarrison Project*. August.

World Climate. 2018. *Climate, Global Warming, and Daylight Charts and Data: Helena, MT, Montana, USA.* Available at http://www.climate-charts.com/Locations/u/US72772002440551.php (Accessed April 17, 2018).

Appendix A
Data Resources

Data Resources will be provided separately on CD. Data Resources for Fort William Henry Harrison:

FTWHH Leases, Licenses, and Permits

- 1955 Warranty Deed, J.Schatz and Edna R. Schatz unto State of Montana
- 1966 Department of The Army License for Fort William Henry Harrison
- 2007 Warranty Deed, Matilde S. Macdonald unto the State of Montana, Department of Military Affairs
- 2015 Special Military Project Cooperative Agreement Prickly Pear Land Trust
- 2016 General Abstract Water Right Number 41l 71124-00 Exempt Notice
- 2018 Fort William Henry Harrison Cantonment Area Map

FTWHH AFFF Release Documentation

- 1998 Prairie Dog Relocation Video
- 2012 Flood Photos
- 2016 Fort William Henry Harrison Potential AOI Map
- 2017 PFAS Release Sites Map
- 2018 Known or Suspected PFC Contamination Sites at FTWHH

Previous Investigations Completed at FTWHH

- 1993 Preliminary Assessment for Fort William Henry Harrison
- 1997 Environmental Assessment for Management of Black-Tailed Prairie Dogs at Fort William Henry Harrison
- 2001 Integrated Natural Resources Management Plan
- 2013 Operational Range Assessment Phase II Report, Fort William Henry Harrison
- 2017 Groundwater and Well Notes
- 2017 Test America Analytical Report
- 2017 Fort William Henry Harrison Ground Water Sampling Summary Memorandum
- 2018 Consumer Confidence Report

FTWHH Environmental Data Resources Report

- 2018 Fort William Henry Harrison EDR Report

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

PA Interview Questionnaire - Other

Facility: Fort William Henry Harrison
Interviewer: [redacted]
Date/Time:_1/9/2018, 09:30

Interviewee: [redacted] **Title: Team Chief** **Phone Number: N/A** **Email: N/A**	Can your name/role be used in the PA Report? Y or **N** Can you recommend anyone we can interview? **Y** or N [redacted]

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

The interviewee was a member of the 1049th from 1982-2003 and part of the ARNG until 2016. He also worked at the Helena Airport from 1987-1991.

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

The interviewee had direct knowledge of AFFF use during fire fighting training. He indicated most AFFF training was conducted at the Helena Airport. At least once per year, the 1049th conducted coordinated AFFF training with the Helena Airport at the east end of runway 27. During the training, fuels and solvents contained on an old school bus were ignited and extinguished with AFFF. The approximate pin coordinates from Google are -46.6010284, -111.9589897. The area may be identifiable through a previous investigation/removal completed during which arsenic was identified as a COC. The interviewee also indicated a lot of AFFF use occurred during annual training at Great Falls.

At FTWHH, the interviewee indicated AFFF was used by the 1049th during the weasel barn fire (potential AOI "D" on the FTWHH Potential AOI Map in Appendix A) and possibly during another weasel barn fire (potential AOI "J" on the FTWHH Potential AOI Map in Appendix A) due to the burning of barrels of petroleum based product.

The interviewee indicated AFFF was ordered through supply (Pat McCann) and was only put on the trucks when it was intended to be used. The small trucks were capable of holding ~40 gallons and the large trucks were capable of holding ~100 gallons. All AFFF added to the trucks for training would be expended then the trucks were washed and any emptied into the Mt. Defensa drainage ditch on FTWHH (potential AOI "B" on the FTWHH Potential AOI Map in Appendix A). The last known occurrence of washing and emptying the trucks into the drainage ditch was in the early 2000s. The 1049th also previously operated near FMS#3 in the late 1980s (potential AOI "K" on the FTWHH Potential AOI Map in Appendix A) and the current Range OPS (not a potential AOI) and Troop Medical Clinic buildings (not a potential AOI). The interviewee indicated the areas of greatest concern for AFFF release are potential AOIs "B" and "K" on the FTWHH Potential AOI Map in Appendix A. The current 1049th location (P1010) was constructed in 1995. The interviewee indicated AFFF was never released for any "washing" purposes.

The only other use of AFFF noted by the interviewee was during an emergency response to a train wreck in 1989 near the Benton Avenue crossing, Carroll College, and the Bill Roberts Golf Course. Due to below freezing temperatures and the nature of the materials on board (isopropyl alcohol), water could not be used to extinguish

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

the fire; therefore, AFFF was used. The interviewee previously served as the unit historian and may have pictures available. He will compile pictures and provide to the project team.	

PA Interview Questionnaire - Other

Facility: Fort William Henry Harrison
Interviewer: [redacted]
Date/Time:_1/9/2018, 10:30

Interviewee: [redacted] **Title:** **Phone Number:** [redacted] **Email: N/A**	Can your name/role be used in the PA Report? **Y** or N Can you recommend anyone we can interview? **Y** or N [redacted] (Shop Chief)

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

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

[redacted] indicated a burn pit was dug and filled with fluorescent light bulbs and debris in the 1980s near the Muscle Mountain Dumps. The debris was then lit on fire and extinguished with water by the ARNG.

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

PA Interview Questionnaire - Other

Facility: Fort William Henry Harrison
Interviewer: [redacted]
Date/Time:_1/10/2018, 10:10

Interviewee: [redacted] **Title:** **Phone Number: N/A** **Email: N/A**	Can your name/role be used in the PA Report? **Y** or N Can you recommend anyone we can interview? Y or **N**

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

[redacted] has been with the ARNG for 30 years.

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

[redacted] provided information and photographs of the fire at the old Dining Facility (Building 303) (potential AOI "C" on the FTWHH Potential AOI Map in Appendix A). The fire was caused by an old hearing system. The fire was extinguished by the VA fire department and some volunteer fire departments. [redacted] does not recall the use of AFFF during this fire. [redacted] supplied photographs of the fire and it appeared only water was used. The fire occurred in January.

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

PA Interview Questionnaire - Other

Facility: Fort William Henry Harrison
Interviewer: [redacted]
Date/Time:_1/9/2018, 09:00

Interviewee: [redacted] **Title: Current Captain of the VA Fire Department** **Phone Number: 4**[redacted] **Email: N/A**	Can your name/role be used in the PA Report? **Y** or N Can you recommend anyone we can interview? **Y** or N [redacted] (VA fire 1977-2012) (retired)

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

[redacted] is the current captain of the VA fire department. He has been with the VA fire department since 1999.

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

[redacted] indicated AFFF was sprayed outside of the VA fire house twice a year from 1977-2003 to use up old or expiring foam. [redacted] recalled the foam to be 4% AFFF stored in four 5-gallon buckets. Class A foam use started in 2004 or 2005. [redacted] recollected that fire training with AFFF has not been conducted since 2012.

The VA fire department covers the ARNG and has done so under contract for the last 10 or so years. According to [redacted], AFFF was never used by the VA fire department to extinguish a fire on FTWHH. In addition, [redacted] said AFFF was never used on the ranges.

[redacted] recommended contacting [redacted] (retired). [redacted] mentioned previously to [redacted] that AFFF was sprayed near the CSMS for training (several vehicles were burned and then extinguished using AFFF prior to construction of CSMS).

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

Preliminary Assessment – Pre-Interview Form

1. Installation Name: Fort William Henry Harrison (Fort Harrison)

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

ARNG:

USACE:

Installation: [redacted]

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

See attached spreadsheet with previous interviews and scheduled interviews

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

DoD property

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

ARNG military training base

6. Potential Sites to Investigate:

Various sites throughout installation

(Attach to the front of the Interview Form)

Preliminary Assessment – Pre-Interview Form

7. Have we requested the following information from ARNG?

Lease Information:	YES / NO	Comment:
Material Purchase Information:	YES / NO	Comment:
	YES / NO	Comment:
	YES / NO	Comment:

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)

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)

(Attach to the front of the Interview Form)

Preliminary Assessment – Pre-Interview Form

Various GIS datalayers can be provided if needed.

(Attach to the front of the Interview Form)

Appendix B.2
Visual Site Inspection Checklists

Visual Site Inspection Checklist

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

Recorded by: [redacted]

ARNG Contact: [redacted]

Date and Time: ***January 8, 2018, 15:30***

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

Source/Release Information

Site Name / Area Name / Unique ID: MTARNG 1049th Fire Department

Site / Area Acreage: Fort William Henry Harrison

Historic Site Use (Brief Description): Fire Station built in 1995

Current Site Use (Brief Description): Fire Station

Physical barriers or access restrictions: Gated access to FTWHH

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

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

Residual AFFF was rinsed from the fire trucks and fire trucks were washed at the Fire Station. The residual AFFF and rinse water were washed into the drainage ditch (1995-early 2000s).

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

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

Verbal documentation only

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

3a. Indicate what businesses are located near the site

Residents are on the east side of Williams Street

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

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

N/A

Visual Survey Inspection Log

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N**

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

N/A

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

N/A

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

N/A

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

N/A

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Mt. Defensa Avenue Drainage Ditch

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

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

Mt. Defensa Avenue Drainage Ditch

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

3a. If so, please note the location:

Yes, MBMG printout provided by MTARNG

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

4a. If so, please note the location:

N/A

5. Can wind dispersion information be obtained? **Y / N**

5a. If so, please note and observe the location.

N/A

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

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

Veterans Administration

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

Visual Survey Inspection Log

Significant Topographical Features:

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

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

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

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

AFFF was released to asphalt and concrete, but the rest of the area is vegetated

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

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

Yes, the Mt. Defensa Drainage Ditch created by intermittent water from heavy rainfall and rapid snowmelt

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:

Gated access to FTWHH

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

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

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

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

East less than 1/2 mile

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

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

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

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

Visual Survey Inspection Log

Additional Notes

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
Photograph No. 2	11/2012; Upgradient of Building 1010	Intermittent stream in the Mt. Defensa Avenue Drainage Ditch following rapid snowmelt. Photo provided by MTARNG.
Photograph No. 3	11/2012; Downgradient of Building 1010	Intermittent stream in the Mt. Defensa Avenue Drainage Ditch following rapid snowmelt. Photo provided by MTARNG.

Visual Site Inspection Checklist

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

Recorded by: [redacted]

ARNG Contact: [redacted]

Date and Time: ***January 8, 2018, 15:30***

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

Source/Release Information

Site Name / Area Name / Unique ID: Excavated Soil from Mt. Defensa Avenue Drainage Ditch

Site / Area Acreage: Fort William Henry Harrison

Historic Site Use (Brief Description): None

Current Site Use (Brief Description): Excavated Soil from Mt. Defensa Avenue Drainage Ditch

Physical barriers or access restrictions: Gated access to FTWHH

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

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

Several releases were noted along the Mt. Defensa Avenue Drainage Ditch. The ditch was widened in 2016. The excavated soil was disposed on-Post at this location.

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

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

Verbal documentation only

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

3a. Indicate what businesses are located near the site

Residents are on the east side of Williams Street

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

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

N/A

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N**

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

N/A

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

N/A

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

N/A

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

N/A

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Intermittent surface water from large rainfall and snowmelt events ponds at a retention pond to the east of the area with the excavated soil. Occassionally the water floods over Williams Street.

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

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

N/A

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

3a. If so, please note the location:

Yes, MBMG printout provided by MTARNG

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

4a. If so, please note the location:

N/A

5. Can wind dispersion information be obtained? **Y / N**

5a. If so, please note and observe the location.

N/A

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

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

Veterans Administration

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

Visual Survey Inspection Log

Significant Topographical Features:

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

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

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

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

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

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

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

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

Receptor Information

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

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

Gated access to FTWHH

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:

Southeast less than 1/4 mile

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

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

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

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

Visual Survey Inspection Log

Additional Notes

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
None		

Visual Site Inspection Checklist

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

Recorded by: [redacted]

ARNG Contact: [redacted]

Date and Time: ***January 10, 2018, 11:30***

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

Source/Release Information

Site Name / Area Name / Unique ID: Previous MTARNG 1049th Fire Station

Site / Area Acreage: Fort William Henry Harrison

Historic Site Use (Brief Description): MTARNG 1049th Fire Station

Current Site Use (Brief Description): Field Maintenance Shop #3

Physical barriers or access restrictions: Gated access

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

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

Residual AFFF was rinsed from the fire trucks and fire trucks were washed at the Fire Station. The residual AFFF and rinse water were washed into the drainage ditch (1980s).

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

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

Verbal documentation only

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

3a. Indicate what businesses are located near the site

Residents are due south

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

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

N/A

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N**

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

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

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

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

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

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

2a. If so, please note observation and location:
Possible channelized flow noted to the north. The area was full of snow so channelized flow could not be confi

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

3a. If so, please note the location:
Yes, MBMG printout provided by MTARNG

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

4a. If so, please note the location:
N/A

5. Can wind dispersion information be obtained? **Y / N**

5a. If so, please note and observe the location.
N/A

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

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

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

Visual Survey Inspection Log

Significant Topographical Features:

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

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

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

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

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

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

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

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

Receptor Information

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

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

Gated access

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:

South less than 1/4 mile

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

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

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

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

Visual Survey Inspection Log

Additional Notes

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
Photograph No. 9	1/10/2018; FMS #3	Looking northwest. Previous MTARNG 1049th Fire Station.
Photograph No. 10	1/10/2018; FMS #3	Looking northeast. Drainage area north of previous MTARNG 1049th Fire Station.

Visual Site Inspection Checklist

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

Recorded by: [redacted]

ARNG Contact: [redacted]

Date and Time: ***January 8, 2018, 15:00***

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

Source/Release Information

Site Name / Area Name / Unique ID: Veterans Administration F

Site / Area Acreage: Fort William Henry Harrison (The VA is adjacent to FTWHH)

Historic Site Use (Brief Description): Fire Station; The VA Fire Station provides firefighting services for FTWHH

Current Site Use (Brief Description): Fire Station; The VA Fire Station provides firefighting services for FTWHH

Physical barriers or access restrictions: None

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

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

AFFF was sprayed by the VA Fire Department onto the ground at multiple locations on the VA property, most notably, the Fire Station (1977-2003)

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

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

Verbal documentation only

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

3a. Indicate what businesses are located near the site

Residents are on the east side of Williams Street

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

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

N/A

Visual Survey Inspection Log

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N**

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

N/A

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

N/A

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

N/A

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

N/A

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Mt. Defensa Avenue Drainage Ditch

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

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

Mt. Defensa Avenue Drainage Ditch

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

3a. If so, please note the location:

Yes, MBMG printout provided by MTARNG

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

4a. If so, please note the location:

N/A

5. Can wind dispersion information be obtained? **Y / N**

5a. If so, please note and observe the location.

N/A

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

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

Veterans Administration

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

Visual Survey Inspection Log

Significant Topographical Features:

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

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

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

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

AFFF was released to asphalt and concrete, but the rest of the area is vegetated

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

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

Yes, the Mt. Defensa Drainage Ditch created by intermittent water from heavy rainfall and rapid snowmelt

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:

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

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

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

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

East approximately 3/4 mile

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

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

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

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

Visual Survey Inspection Log

Additional Notes

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
Photograph No. 9	1/8/2018; Veterans Administration	Looking southeast. Parking lot in front of the VA Fire Station

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Fort William Henry Harrison (FTWHH)

Why has this location been identified as a site?
Multiple AFFF release locations have been documented on the property. Upgradient releases have also been documented at the adjacent Veterans Administration (VA).

Are there any other activities nearby that could also impact this location?
Yes, the VA Fire Department is located adjacent and upgradient to FTWHH.

Training Events

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

If so, how often? N/A

How much material was used? Is it documented? N/A

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

Surface Water:

Surface water flow direction? Intermittent surface water only during large rainfall and snowmelt events. Flow direction is east-southeast.

Average rainfall? 10.8 inches

Any flooding during rainy season? Flash flooding

Direct or indirect pathway to ditches? Yes, Mt. Defensa Avenue Drainage Ditch

Direct or indirect pathway to larger bodies of water? No

Does surface water pond any place on site? Yes, intermittent surface water ponds at a retention pond in the northeast section of the Cantonment Area.

Any impoundment areas or retention ponds? Yes, retention pond in the northeast section of the Cantonment Area.

Any NPDES location points near the site? No

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

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? East-southeast

Depth to groundwater? 22 to 55 feet

Uses (agricultural, drinking water, irrigation)? Irrigation, off-Post residents with private wells on the east side of Williams Street

Any groundwater treatment systems? None known

Any groundwater monitoring well locations near the site? Yes

Is groundwater used for drinking water? FTWHH groundwater is supplied by the City of Helena. Off-post residents use groundwater for drinking water

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? No

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

Do we understand the fate of sludge waste? N/A

Is surface water from potential contaminated sites treated? N/A

Equipment Rinse Water

1. Is firefighting equipment washed? Where does the rinse water go? Yes. Residual AFFF and rinse water was washed into the Mt. Defensa Avenue Drainage Ditch. At the previous FMS #3 location, water was washed to an area north of the building.

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? Testing and training is done off-Post at the Helena Regional Airport or Great Falls.

3. Other? Firefighting services for FTWHH are provided by the VA.

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker Yes

Construction Worker Yes

Recreational User No

Residential Yes

Child Yes

Ecological Yes

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

Documentation

Ask for Engineering drawings (if applicable).

Has there been a reconstruction or changes to the drainage system? When did that occur?
Yes, the western end of the Mt. Defensa Avenue Drainage Ditch was widened in 2016. The excavated soil was disposed on-Post near the Scale House and retention pond in the northeast section of the Cantonment Area. Widening of the eastern end of the ditch is in the planning stages.

Appendix C
Photographic Log

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana

Photograph No. 1

Description:

Looking northeast. Mt Defensa Avenue Drainage Ditch. The white material in the photograph is snow.

Photograph No. 2

Description:

Looking east. Intermittent stream in the Mt. Defensa Avenue Drainage Ditch after rapid snowmelt. Location is on-Post, upgradient of the MTARNG 1049th Fire Department (Building 1010). Photograph provided by MTARNG.

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana

Photograph No. 3

Description:

Looking east. Intermittent stream in the Mt. Defensa Avenue Drainage Ditch after rapid snowmelt. Location is on-Post, downgradient of the MTARNG 1049th Fire Department (Building 1010). The white material in the photograph is suspected AFFF. Photograph provided by MTARNG.

Photograph No. 4

Description:

Looking southeast. Intermittent stream in the Mt. Defensa Avenue Drainage Ditch after rapid snowmelt. Location is on the west side of the Main Gate (on-Post). The white material in the photograph is suspected AFFF. Photograph provided by MTARNG.

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana

Photograph No. 5

Description:

Looking south. Foam in the intermittent stream in the Mt. Defensa Avenue Drainage Ditch after rapid snowmelt. Location is on the west side of the Main Gate (on-Post). The white material in the photograph is suspected AFFF. Photograph provided by MTARNG.

Photograph No. 6

Description:

Looking southeast. Intermittent stream running off-Post into a culvert on the east side of the Main Gate. The white material in the photograph is suspected AFFF. Photograph provided by MTARNG.

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana

Photograph No. 7

Description:

Looking east. Intermittent stream off-Post in the ACUB area after rapid snowmelt. Location is on the east side of Williams Street. The white material in the photograph is suspected AFFF. Photograph provided by MTARNG.

Photograph No. 8

Description:

Looing northeast. Retention pond in the northeast section of the Cantonment Area after rapid snowmelt. The white material in the photograph is snow. Photograph provided by MTARNG.

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana

Photograph No. 9

Description:

Looking northwest. Previous MTARNG 1049th Fire Station. The white material in the photograph is snow.

Photograph No. 10

Description:

Looking northeast. Drainage area due north of the previous MTARNG 1049th Fire Station. The white material in the photograph is snow.

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort William Henry Harrison	Helena, Montana

Photograph No. 11

Description:

Looking southeast. Parking lot in front of the VA Fire Station. The white material in the photograph is snow.