Final
Preliminary Assessment Report Grand Ledge Army Aviation Support Facility and Armory, Michigan

Per- and Polyfluoroalkyl Substances (PFAS) Impacted Sites
ARNG Installations, Nationwide

October 2019

Prepared for:

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	area of interest
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
DLZM	DLZM Michigan, Inc.
EDR	Environmental Data Resource
FTA	fire training area
IED	Installations and Environment Division
PA	Preliminary Assessment
MIARNG	Michigan Army National Guard
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
SI	Site Inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VSI	visual site 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 for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide. The ARNG is assessing potential effects on human health related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS) (a suite of related chemicals), primarily in the form of aqueous film forming foam released during firefighting activities or training, although other PFAS sources are possible.

AECOM completed a PA for PFAS at Grand Ledge Army Aviation Support Facility (AASF) and Armory in Grand Ledge, Michigan, to assess potential PFAS release areas and exposure pathways to receptors. Grand Ledge AASF provides training and maintenance for the various aviation units that support the Michigan Army National Guard. The facility includes several buildings associated with AASF and Armory functions including maintenance and office related buildings, hangars, an unheated cold storage building, and a storage annex. Prior to 2007, the AASF facility was located in what is today the current Armory facility. Historical aerial photography indicates that the current Armory building was constructed between 1974 and 1981. A history of property ownership and/or leasing documents was not available during PA data collection efforts.

The performance of this PA included the following tasks:

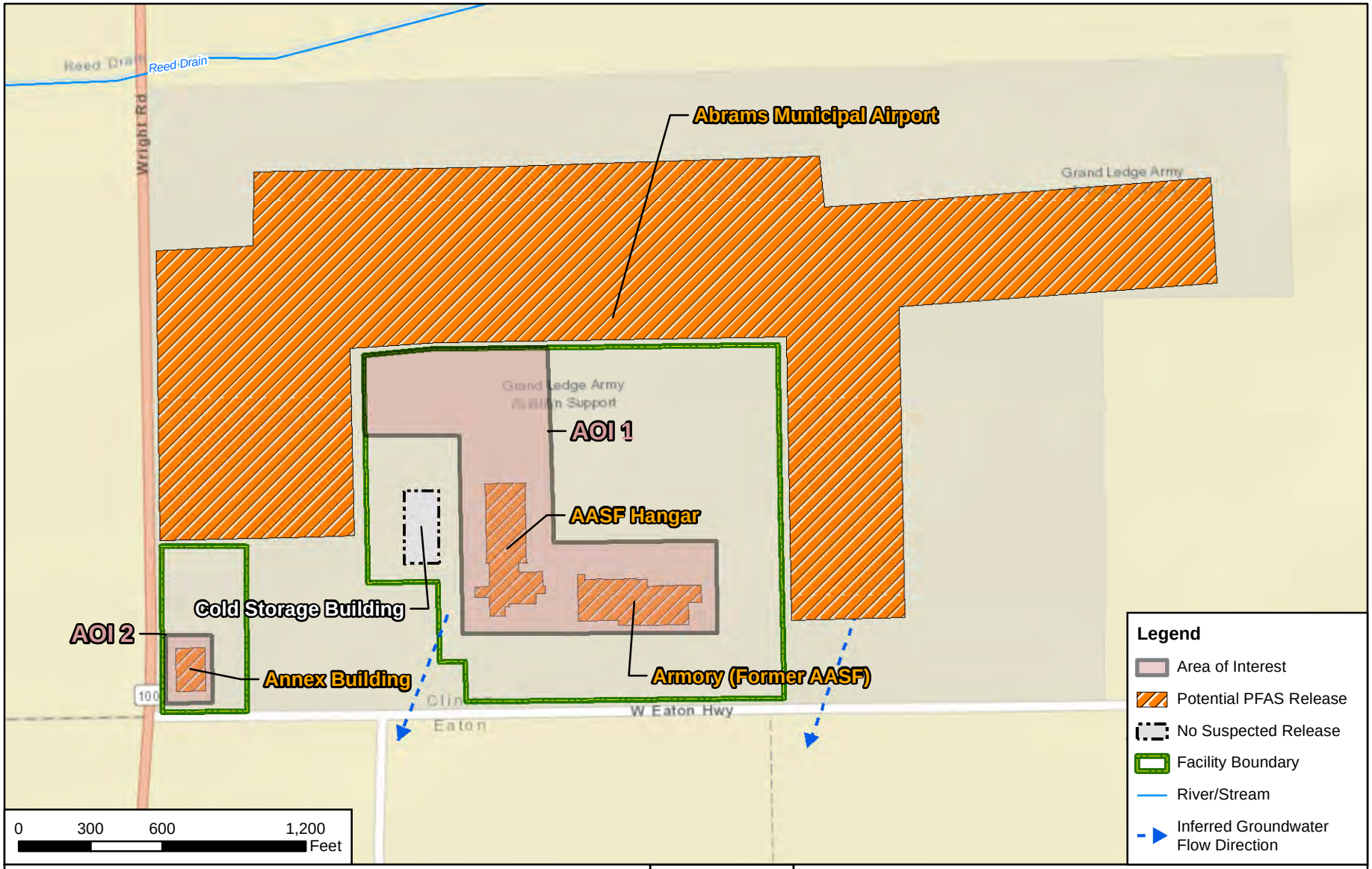
- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a 1-day site visit that included visual site inspections (VSIs) at known PFAS locations on 5 December 2017, and documented with photographs
- Interviewed current Grand Ledge AASF personnel during the site visit including the Facility Manager
- Conducted follow-on interviews on 26 April 2018 with the Aircraft Mechanic Supervisor and on 7 June 2018 with additional Armory personnel

Although no known or documented releases of PFAS to the environment were identified during the preparation of this PA report, two AOIs related to potential PFAS releases were identified at the Grand Ledge AASF and Armory during the PA. The date of potential release for each AOI is estimated based on secondary data and aerial imagery, exact dates are unknown. The AOIs are shown on **Figures ES-1** and described in the table below. The conceptual site model for the entirety of the Grand Ledge AASF and Armory facility is presented in **Figure ES-2**.

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	AASF Hangar and Armory (Former AASF)	MIARNG	Unknown; Armory (Former AASF): between late 1970s to early 1990s; AASF Hangar: 2007 to present
AOI 2	Annex Building	MIARNG	Unknown; between the late 1980s and early 1990s to present

Abrams Municipal Airport is located immediately upgradient of the identified AOIs at Grand Ledge AASF and Armory and is a potential off-facility source of PFAS.

Based on the PA findings and a lack of robust institutional knowledge regarding historical activities concerning aqueous film forming foam use and storage at the facility, there is potential for exposure to PFAS contamination in soil, groundwater, surface water, and sediment in the event that releases occurred. The following are potential receptors: site workers (e.g., Grand Ledge AASF and Armory military and non-military staff and visitors), onsite construction workers, and trespassers. Although the AASF and Armory receive municipal drinking water, the drinking water at the Annex Building is supplied by a single on-site public supply groundwater well. If a release occurred, site workers at the annex may potentially be exposed to PFAS in groundwater; however, previous National Guard Bureau sampling at the annex in May 2017 has shown that PFAS is non-detect in drinking water. In addition, if a release of PFAS to the groundwater occurred, residents using groundwater for drinking water surrounding the facility may potentially be exposed to migrating PFAS contamination via the nearby groundwater pathway. Furthermore, several residential homes are located immediately adjacent to facility boundaries. Nearby residents may be exposed to potential PFAS contamination via inhalation of fugitive dust from ground disturbing activities at the facility if a release occurred. Receptors are less likely to be exposed to potential PFAS contamination through direct contact with soil and inhalation via air; however, some PFAS chemicals are water soluble and can migrate readily from soil to groundwater or surface water via leaching and run-off. Therefore, there is a potential for PFAS contamination in soil to migrate to groundwater and surface water systems.



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PROJECT	Preliminary Assessment for PFAS at Grand Ledge AASF, MI			
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SCALE	1:7,200	CHK BY	JL	9/25/2019
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan,		PM	RG	9/25/2019

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Summary of Findings

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Figure ES-1

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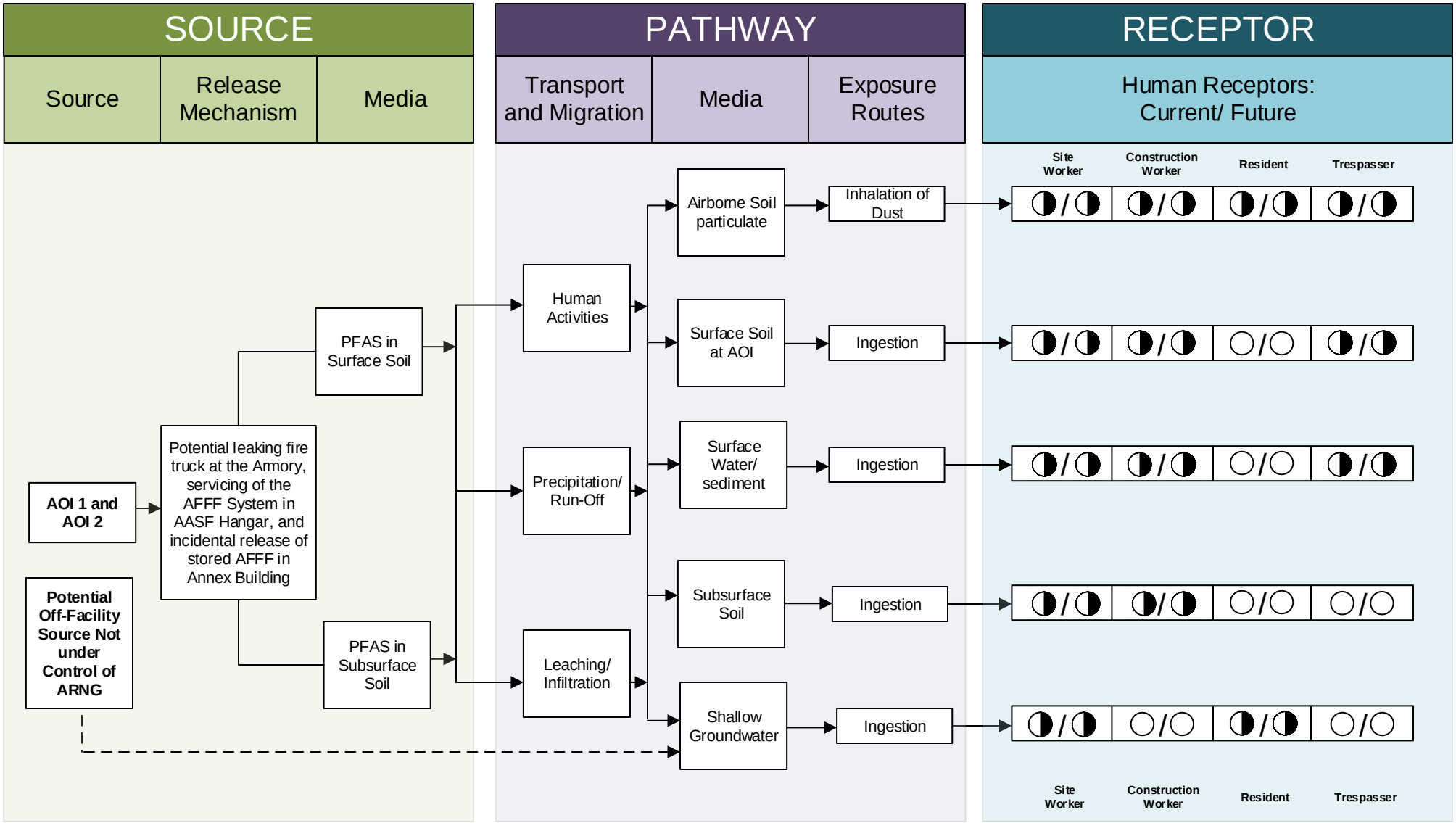


LEGEND

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

Figure ES-2
Conceptual Site Model
Grand Ledge AASF and Armory, MI

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 informally 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 varies. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued Drinking Water Health Advisories for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water. In the absence of federal maximum contaminant levels, some states, such as Michigan, have adopted their own drinking water standards for PFAS.

This report presents findings of a PA for PFAS at Grand Ledge Army Aviation Support Facility (AASF) and Armory in Grand Ledge, Michigan in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300), and USACE requirements and guidance.

This PA Report documents potential locations where PFAS containing materials are stored and have the potential to be released into the environment at or adjacent to the Grand Ledge AASF and Armory. 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 1-day site visit that included visual site inspections (VSIs) at known PFAS locations on 5 December 2018, and documented with photographs
- Interviewed current Grand Ledge AASF personnel during the site visit including the Facility Manager
- Conducted follow-on interviews on 26 April 2018 with the Aircraft Mechanic Supervisor and on 7 June 2018 with additional Armory personnel

1.3 Report Organization

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

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

1.4 Facility Location and Description

Grand Ledge AASF and Armory is located at 10600 Eaton Highway in Grand Ledge, Michigan in Clinton County, approximately 1 mile north of the Grand River **(Figure 1-1)**. The facility falls within the Watertown Township where Clinton County borders Eaton County along West Eaton Highway. It is bordered to the north by Abrams Municipal Airport, to the east and west by residences and agricultural farmland, and the south by residences and industrial activities. The AASF and Armory facilities comprise approximately 35 acres (DLZ Michigan, Inc. [DLZM], 2015).

Grand Ledge AASF provides training and maintenance for the various aviation units that support the Michigan Army National Guard (MIARNG). The AASF facility consists of office areas, a hangar, wash bay, aircraft parking area, and an unheated cold storage building. The Armory includes a shop area, fenced motor pool, and various small storage buildings. An Annex Building that is used for storage and training purposes is located on the south western portion of the property; historical aerial imagery indicates the building was built between 1986 and 1993. Prior to 2007, the AASF facility was located in what is today the current Armory facility. Historical aerial photography indicates that the current Armory building was constructed between 1974 and 1981 (EDR, 2018; **Appendix A**). According to interviews with the facility personnel and historical aerial photography, construction on the current AASF hangar began in 2005 and was completed in January/February of 2007 (**Appendix B.1**). The State of Michigan, Department of Military Affairs acquired the parcel of land associated with the current Armory in June 1975 from Grand Ledge Airport, Eagle Township; an additional adjoining parcel, associated with the current

AASF, was purchased in August 2000 by the State of Michigan, State Military Board from Grand Ledge Aviation (**Appendix A**).

1.5 Facility Environmental Setting

The Grand Ledge AASF and Armory is located in the lower peninsula of Michigan in the Central Lowlands Physiographic Province of the United States. The province is part of the Interior Plains division of the United States and is characterized by flat lands with glacial geomorphic remnants. The majority of the Central Lowlands province is bounded by higher relief and comprises elevations of 2,000 feet or less (National Park Service, 2017). Elevation at the Grand Ledge AASF ranges from 829 to 860 feet, with an average of 850 feet, possessing a gentle gradient to the north and west (**Appendix A**; Environmental Data Resource [EDR], 2018).

1.5.1 Geology

The topography at the Grand Ledge AASF and Armory is relatively flat due to glacial scouring and deposition of glacial till; at most, the elevation changes 20 feet over the course of a mile based on regional patterns. The soil consists mainly of loam to clayey loam with drainage ranging from well drained to somewhat poorly drained, depending on localized clay content. The water table is at least 46 inches below ground surface (bgs) (EDR, 2018). The area of the facility is underlain by approximately 50- to 75-foot thick deposits of medium-textured Quaternary glacial till and end-moraines (Soller and Garrity, 2018).

Bedrock units in the area are the Lower Pennsylvanian-aged Saginaw Formation and the Upper Pennsylvanian-aged Grand River Formation. The Saginaw Formation is approximately 400 feet thick and is composed mainly of an upper shale unit, main coal unit, lower shale unit, and underlying quartz sandstone unit, which vary in thickness and presence across Michigan (Stark and McDonald, 1980). The depositional environment of the Saginaw represents a typical marine beach and backwater lagoon setting, where the wave- and wind-worked sands and low-energy black muds of the sandstone and shale were deposited respectively. The low-energy environment of the lagoon also accounts for the deposition of the coal lenses and black limestones found within the formation (Milstein, 1987).

The overlying Grand River Formation is composed of sandstone with minor interbedded shale. Bedrock is found approximately 60 feet bgs at the facility, but surface outcrops, for which the City of Grand Ledge gets its name, can be found about 1.5 miles to the southwest in the city proper. The Grand River, formed after the retreat of the last Pleistocene glaciers, likely cut its current course through joint structures in the bedrock (Milstein, 1987).

1.5.2 Hydrogeology

The bedrock formations of the Lower Michigan Basin are typically sedimentary deposits of Carboniferous age and the bedrocks of the Grand Ledge area fall under this classification. Structural deformation in the region was limited to the actions of the last glacial advance and retreat resulting only in minor jointing of the bedrock, therefore aquifer conductivity is dependent on the primary porosity of the unit. The aforementioned Saginaw Formation is one such deposit which acts as the main aquifer for much of central Michigan including Michigan's capital Lansing, about 10 miles east of Grand Ledge AASF and Armory.

According to data received from the EDR report for the facility and Michigan Department of Environmental Quality data (via Wellogic), several federal and state groundwater wells are located at and within a mile of the facility (**Figure 1-2**). The majority of these wells are private domestic wells; one active well is classified as public supply and is located within facility boundaries with another located approximately 1,000 feet to the southwest of the facility boundary. However, Grand Ledge AASF and Armory receives its potable water from the City of

Grand Ledge's municipal water utility with the exception of the Annex Building, which receives water from an on-site public supply groundwater well. Drinking water from the Annex Building's well has previously been sampled by the National Guard Bureau in May 2017 and found to be non-detect for PFAS. Based on static water levels within the region, regional groundwater is estimated to flow in a south-southwest direction. All of the wells are situated in the Saginaw aquifer at depths of 140 to 170 feet bgs, with the exception of a single well installed in 1942 that was installed at a depth of 404 feet bgs (EDR, 2018). Michigan Department of Environmental Quality data (well logs obtained via Wellogic) show that depth to groundwater varies across the facility over time; historically, static water level has ranged from a high of 30 feet bgs near the Armory on the eastern side, to a low of 10 feet at the Annex to the west.

1.5.3 Hydrology

Although the Grand River is located approximately 1 mile south of the facility, the AASF and Armory fall within the Husted and Landenburg Drain-Looking Glass River Watershed. There are no permanent surface water bodies within the property boundaries of the Grand Ledge AASF and Armory (U.S. Fish and Wildlife Service, 2018). The majority of the facility is paved with grassy areas surrounding the perimeter. Drainage ditches and catchments surround the property and direct stormwater from paved areas to a stormwater detention pond located at the northwest corner of the main facility (**Figure 1-3**). Overflow from the retention pond drains to Reed Drain, a small drainage creek located 0.25 mile north of the retention pond that ultimately drains to the Looking Glass River via Husted Landenburg Drain.

1.5.4 Climate

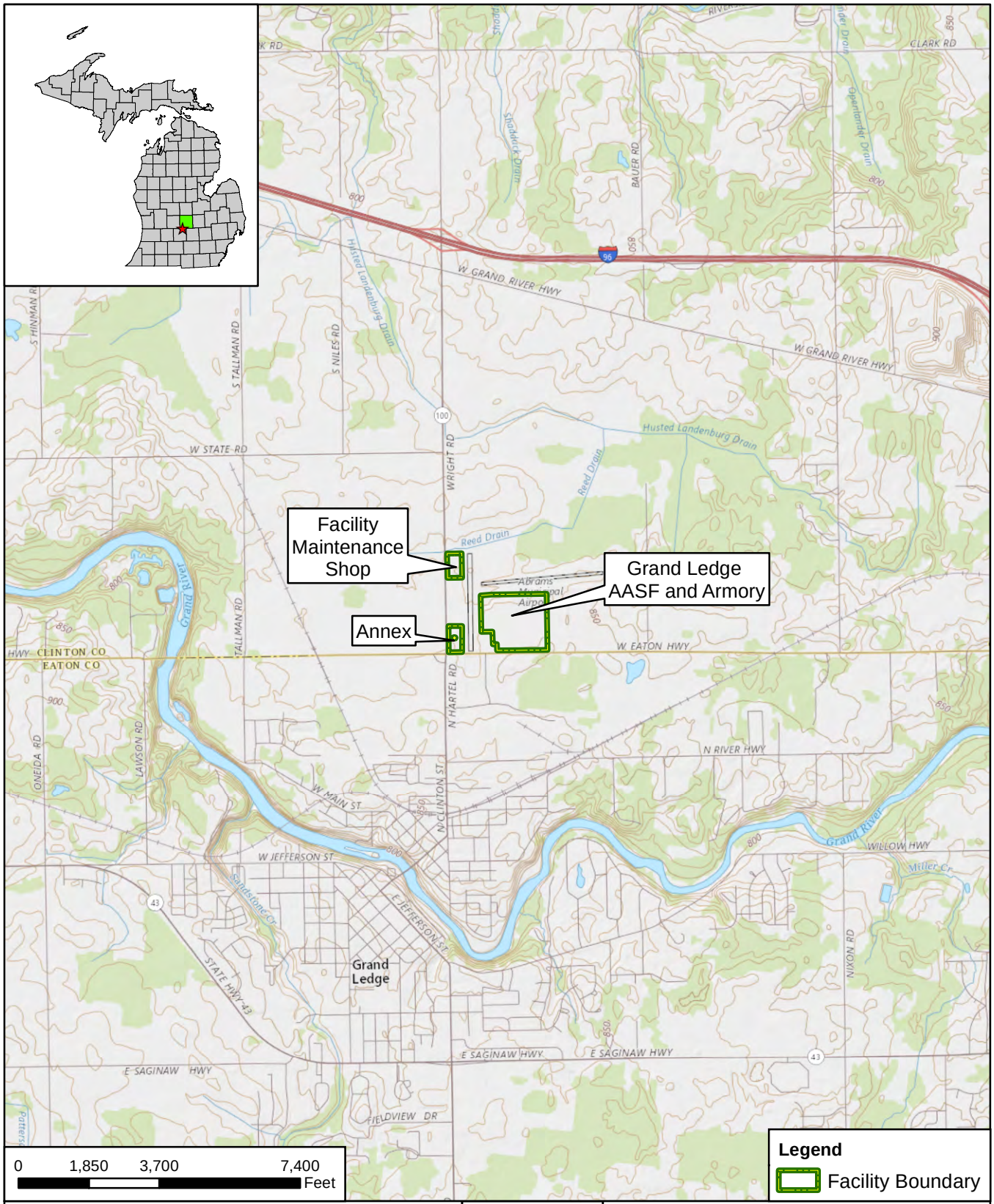
The climate of the Grand Ledge AASF area is temperate, with an average temperature of 48.7 degrees Fahrenheit (°F). Seasonally, temperatures vary from summer highs of 84 °F to winter lows of 15 °F. Precipitation is unevenly distributed during the year, falling primarily as snowfall in the winter months well into April, with an average of 7.8 inches of snowfall per month. The remainder falls as rain, distributed evenly throughout the year with an average of 3.2 inches per month. The prevailing wind is typically from the west at 8.5 miles per hour (National Oceanic and Atmospheric Administration, 2018).

1.5.5 Current and Future Land Use

Current Grand Ledge AASF and Armory operations include training and maintenance for the various aviation units, which support the MIARNG. In addition to aircraft maintenance and aircraft support for MIARNG, periodic training exercises and course work for the National Guard/Army Reserve units is conducted at the facility's flight simulators. The facility is staffed by both full- and part-time employees, and shares tarmac space with the neighboring Abrams Municipal Airport to the north.

Portions of the eastern and western borders of Grand Ledge AASF and Armory are abutted primarily by rural residences and agricultural land use. Two residential homes are located between the AASF Hangar and Armory buildings and the Annex Building. Abrams Municipal airport bounds the northern and western boundaries of the facility. Across the highway that demarcates the facility's southern border is a small industrial park and lightly wooded areas. The closest urban center is the City of Grand Ledge, approximately 1.5 miles to the southwest.

Reasonably anticipated future land use is not expected to change from the current land use described above.



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SCALE	1:44,400	CHK BY	JL	9/13/2018
Base Map: USGS The National Map: National Boundaries Dataset, National Elevation Dataset,		PM	RG	9/13/2018

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Facility Location

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Figure 1-1

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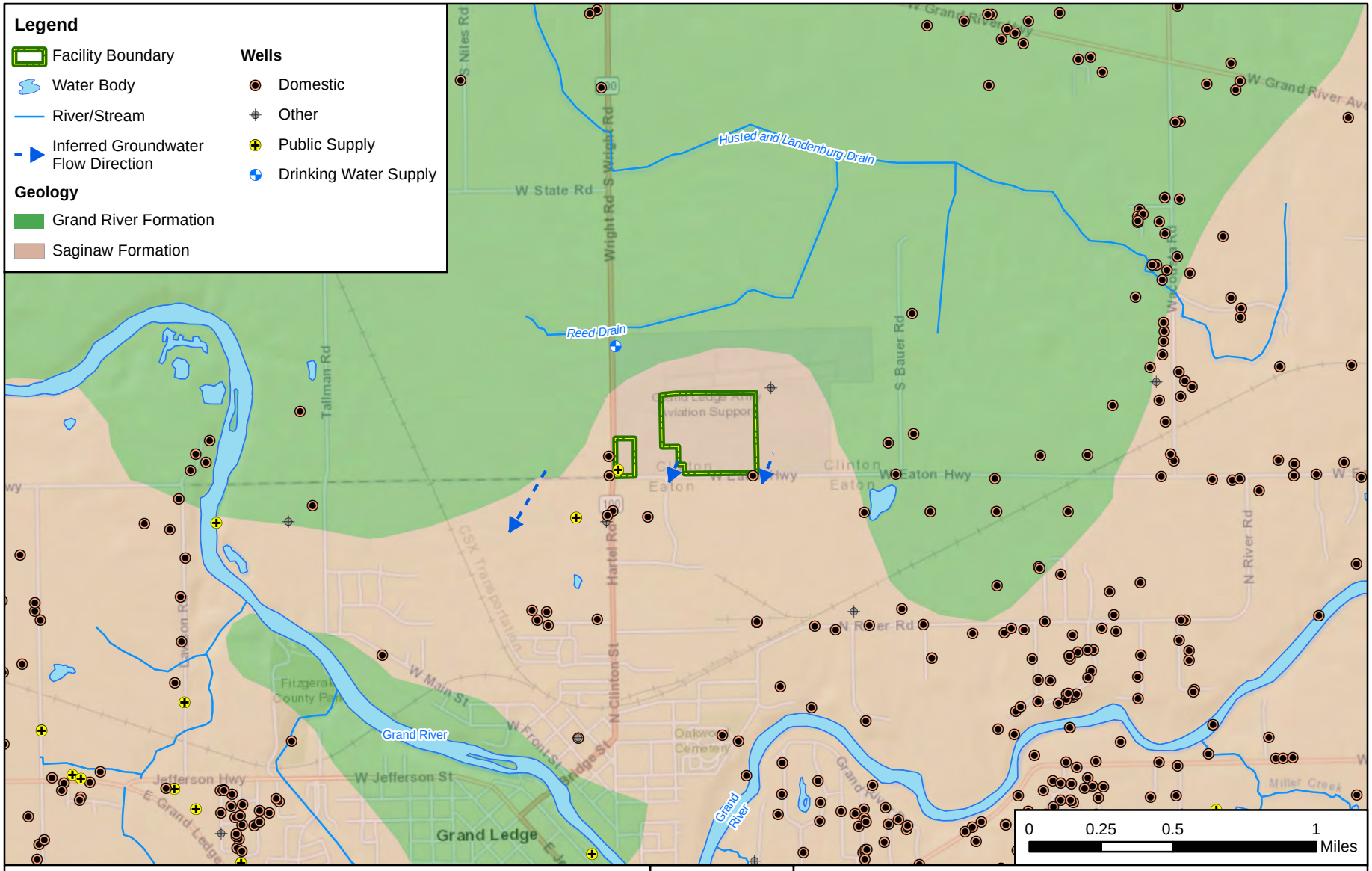

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Groundwater Features

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Figure 1-2

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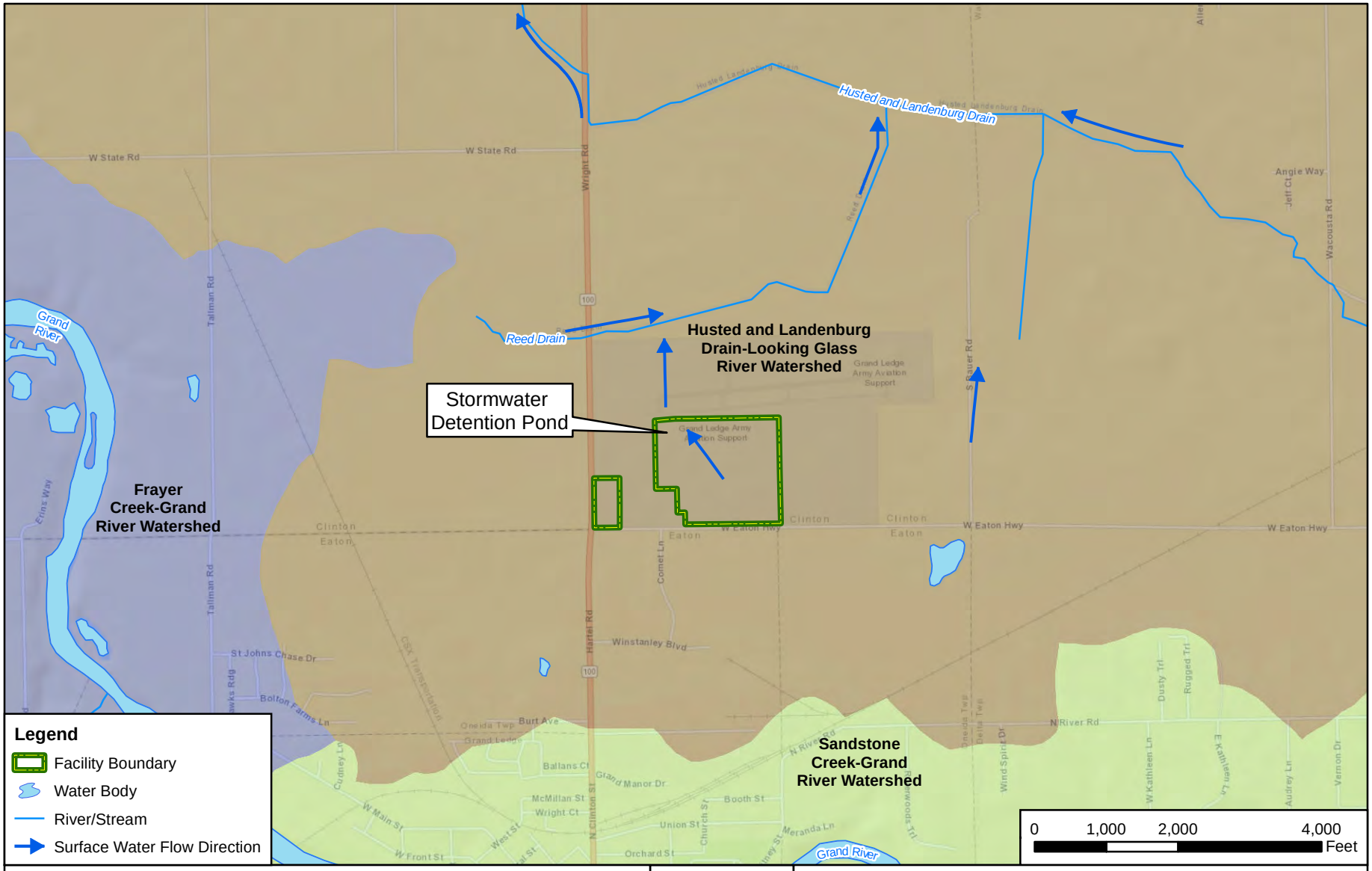

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Surface Water Features

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Figure 1-3

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2. Fire Training Areas

The Armory (former location of the AASF) historically had a certified firefighting unit in the 1980s that was disbanded in the early 1990s. Based on interviewee's knowledge of facility history since the early 1980s, fire training did not occur at the Grand Ledge AASF or Armory. According to AASF personnel, local municipal fire departments occasionally train at the municipal airfield; however, training is conducted with water from hydrants; firefighting foam has never been used. No FTAs were identified during the PA based on these data; however, information regarding facility activities prior to the 1980s is unknown.

3. Non-Fire Training Areas

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

3.1 AASF Hangar

The AASF comprises of the AASF administrative building and AASF hangar. Construction on the current hangar building was completed in January/February of 2007, moving operations over from what is now the Armory. The hangar is equipped with an AFFF fire suppression system that contains a 700-gallon tank of 3% ansulite. No leaks or releases, emergency or otherwise, have been reported or documented from this system and no evidence of leaking was observed during the VSI. The system is tested and inspected annually by an outside contractor; system contents are reportedly not discharged during testing. In May of 2014 the tank's liner required a replacement: a contractor drained the system into a holding tank, relined the system tank, and pumped the original AFFF concentrate back into the system without reported incident or release. No documentation of the testing or liner replacement was available for review during the PA. Trench drains are located in the hangar bay and maintenance/fueling areas and are connected to an oil/water separator which subsequently drains to the Grand Ledge municipal sanitary sewer.

3.2 Cold Storage Building

The cold storage building, located directly to the west of the AASF hangar, stores various maintenance related chemicals and solvents, but contains no AFFF according to interviews with AASF personnel and confirmed during the VSI. The fire suppression system within the building is a water sprinkler system.

3.3 Armory Building (Former AASF)

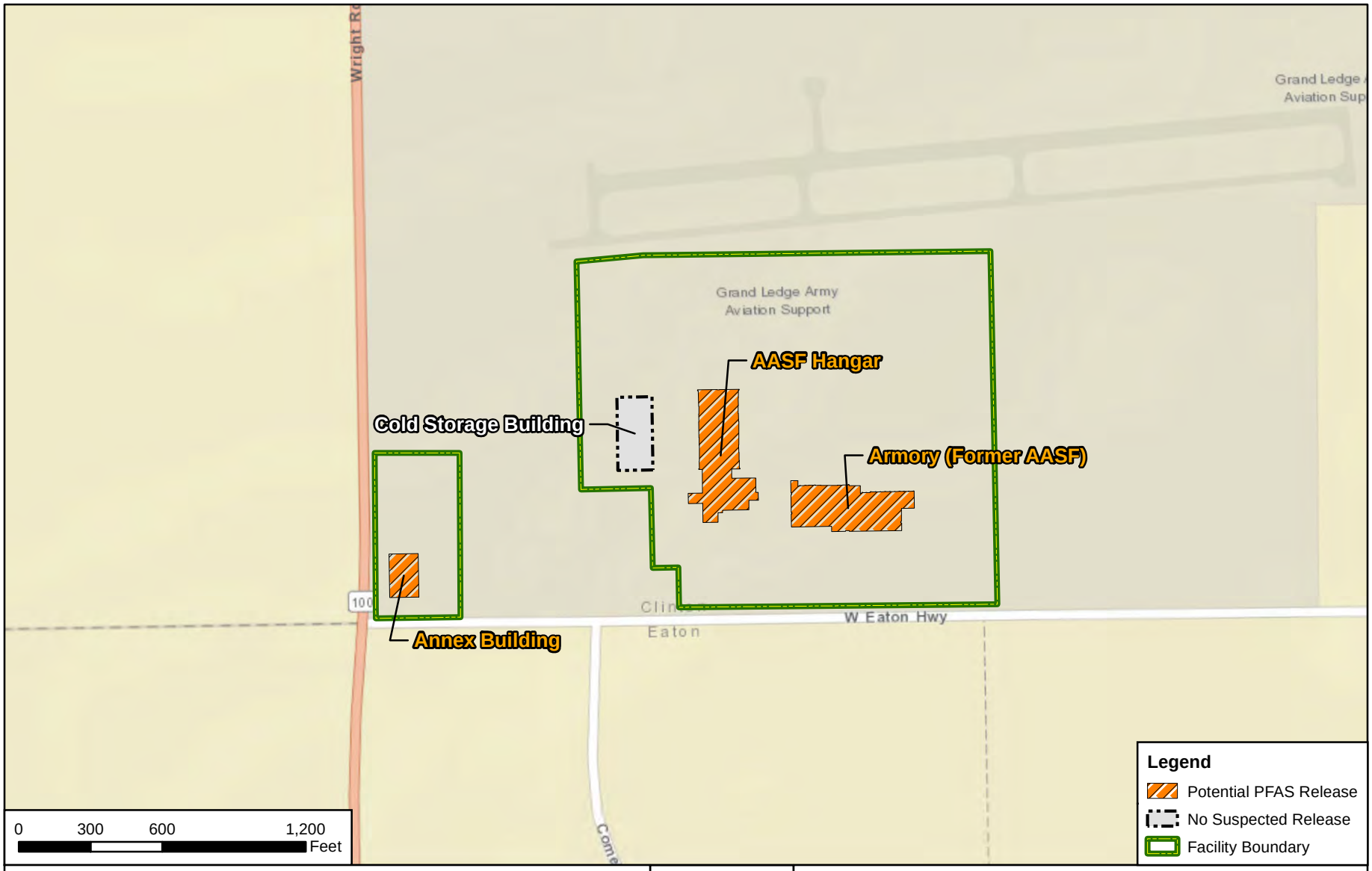
The current Armory building was the previous location of the AASF, prior to the new hangar's construction in 2007. The Armory has never been equipped with any kind of water or foam fire suppression systems. No firefighting training, leaks, or releases have been documented and AFFF is not stored within the Armory. Former Grand Ledge AASF personnel commented during their interview that a fire truck used to be stationed within a garage located in the Armory building during approximately the 1980s to early 1990s (prior to disbandment of the firefighting unit in the early 1990s). Personnel did not believe AFFF was stored on or in the fire truck; however, no other interviewees could recall specifics regarding the fire truck or firefighting unit. The garage is currently used as general office/storage space (**Appendix C**).

3.4 Annex Building

The Annex Building, located on the corner of Wright Road and Eaton Highway, is used for general storage as well as housing flight simulators used for training. Bulk and expired AFFF is stored within the annex in both 55-gallon drums and 5-gallon buckets. Manufacturer and percent (%) concentrate varies among the AFFF stored in the annex. The inventory recalled by interviewees includes:

- 3% Concentrate: 20 55-gallon drums and 6 5-gallon buckets (1,130 gallons)
- 3% / 6% Concentrate: 32 5-gallon buckets (160 gallons)
- 6% Concentrate: 46 5-gallon buckets (230 gallons)

In addition, approximately 16 empty compressed air foam portable fire suppression systems (Tri-Max 30 extinguishers) are stored in the annex. All extinguishers are empty and tagged, however it is not known if they were ever used or tested. Interviewees reported that no leaks or releases have occurred. Evidence of leaking was not observed during the VSI.



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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan,		PM	RG	9/25/2019

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Non-Fire Training Areas

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Figure 3-1

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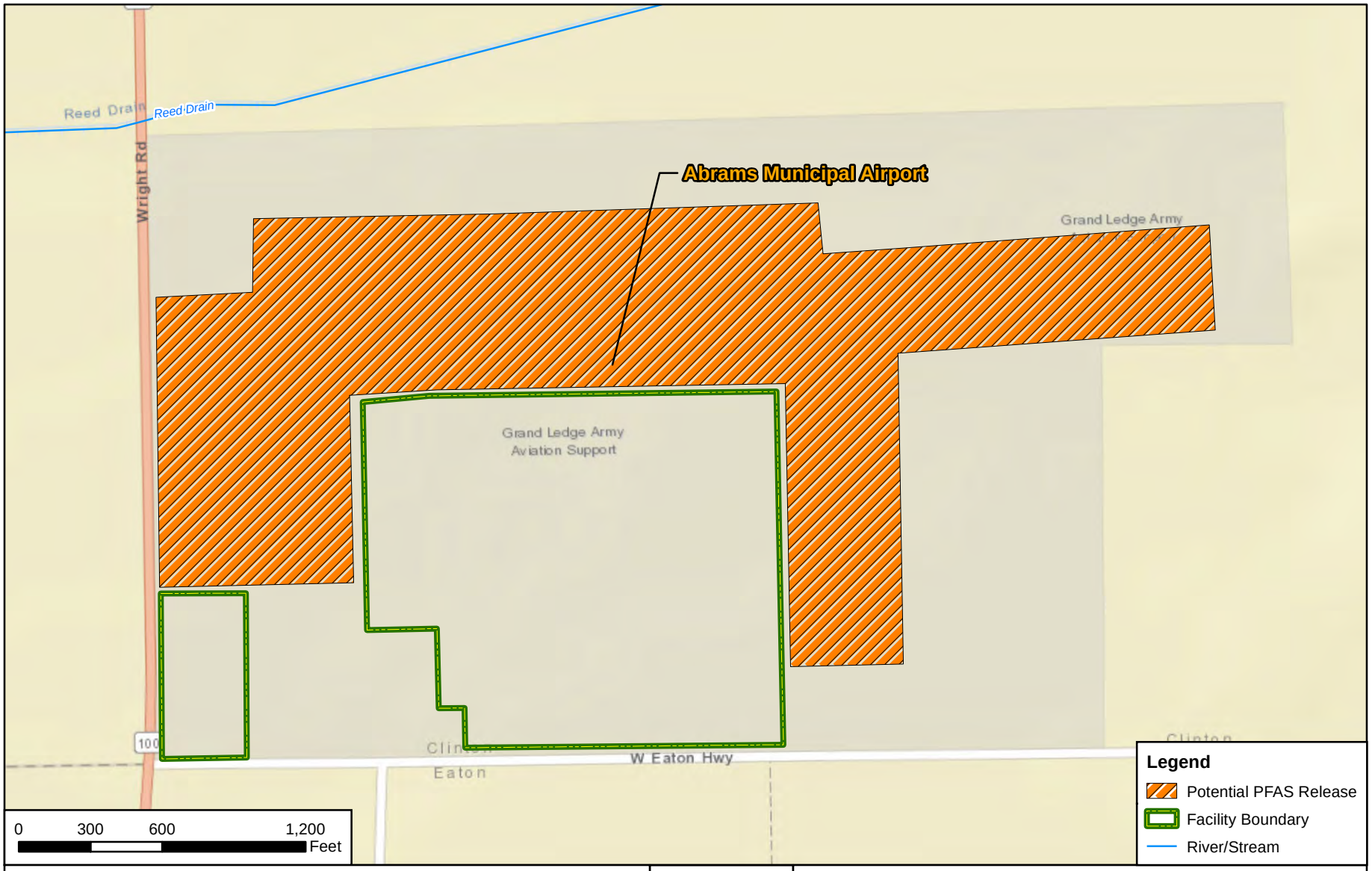
4. Emergency Response Areas

No instances of emergency response were identified at Grand Ledge AASF and Armory during the PA based on interviews, online research, and the EDR report (EDR, 2018; **Appendix A**). Following disbandment of the firefighting unit in the early 1990s, the facility now uses the local fire department for emergency needs. There has been no need for response as of the date of the PA interviews. Interviewees highlighted their history of zero incidents at the facility (**Appendix B.1**).

5. Adjacent Sources

Off-site sources of PFAS located adjacent to the Grand Ledge AASF and Armory were not identified during PA interviews (**Appendix B.1**) or in the EDR report (**Appendix A**); however, Abrams Municipal Airport is located immediately to the north and east of the AASF and Armory. Municipal Airport personnel were not interviewed during the PA because the focus of the assessment was to evaluate potential PFAS related activities and sources at MIARNG properties, not formally assess adjacent sources. Therefore, it is not known if AFFF is used or stored at the airport currently or historically. Because the presence of AFFF at the airport cannot be confirmed, Abrams Municipal Airport has been identified as a potential off-site PFAS source area. **Figure 5-1** shows the location of Abrams Municipal Airport (as a potential PFAS source area) in relation to the Grand Ledge AASF and Armory.

During the PA, an image of an article from a past issue of *The Michigan National Guardsman,* a local publication, was provided by MIARNG (**Appendix A**). This article noted personnel from Grand Ledge AASF participating in a training exercise sponsored by the Grand Ledge Fire Department (municipal). The article included photographs showing two guardsmen fighting a fire with foam during the training exercise. The photo is captioned, "…the fuel was jet fuel, JP-4, the firefighting agent was foam…" The location of where the training took place is not known; nor is the date, quantity, or type of foam used. During interviews, facility personnel did not recall any historical FTAs located at the AASF or Armory. Local municipal fire departments occasionally trained at the municipal airfield; although unknown, it is possible that the training depicted in the article occurred there.



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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan,		PM	RG	9/25/2019

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Adjacent Sources

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 5-1

Q:\Projects\ENV\GEARS\GEO\MAES 2012 Unrestricted\Fort Meade\E. Data Management\GIS\MXDs\Chisholm_6th\March2017\ Fig_5-1_Grand_Ledge_AASF_Adjacent_Sources.mxd

6. Conceptual Site Model

Based on the PA findings and a lack of robust institutional knowledge regarding historical activities concerning AFFF use and storage at the facility, two areas of interest (AOIs) were identified. The AOIs are shown on **Figures 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, and (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 (NGWA, 2018). Receptors at Grand Ledge AASF and Armory include site workers, construction workers, residents outside the facility boundary and trespassers. The CSMs for each AOI indicate which specific receptors could potentially be exposed to PFAS. Abrams Municipal Airport is a potential adjacent source of PFAS located immediately upgradient of the AOIs (**Figure 6-1**).

6.1 AOI 1: AASF Hangar and Armory (Former AASF)

A 700-gallon AFFF fire suppression system is located in the AASF Hangar. Although the system has not been activated intentionally or unintentionally, documentation regarding outside contractor testing and liner replacement of the system was not available for review. Knowledge regarding the system is based on the recollections of interviewed personnel and written record of tank liner replacement on the 700-gallon holding tank. It is not known if an unintentional release occurred during contracted servicing.

The current Armory building was the previous location of the AASF, prior to the new hangar's construction in 2007. According to an interviewee, the AASF historically had a firefighting unit during the 1980s that was disbanded in the early 1990's. During this time, a fire truck was reported to have been stationed within a garage located in the Armory building. In general, fire trucks containing/equipped with AFFF have historically had the potential to leak due to corrosion of fittings and gaskets. Because a limited number of personnel with long term institutional knowledge of the facility were available for interview, there is uncertainty associated with the potential for AFFF being associated with the fire truck.

Because there is little knowledge regarding these activities, AFFF may have been released at the Hangar and Armory. AOI 1 encompasses both the AASF Hangar and Armory buildings. The area surrounding each building is predominantly paved with a few grassy areas between paved areas. Ground-disturbing activities in these areas could result in site worker, construction worker, and trespasser exposure to potential PFAS contamination via inhalation of dust or ingestion of surface soil. In addition, several residential homes are located immediately adjacent to facility boundaries. Nearby residents may be exposed to potential PFAS contamination via inhalation of fugitive dust from ground disturbing activities at the facility if a release occurred. Ground-disturbing activities to subsurface soil could also result in site and construction worker exposure.

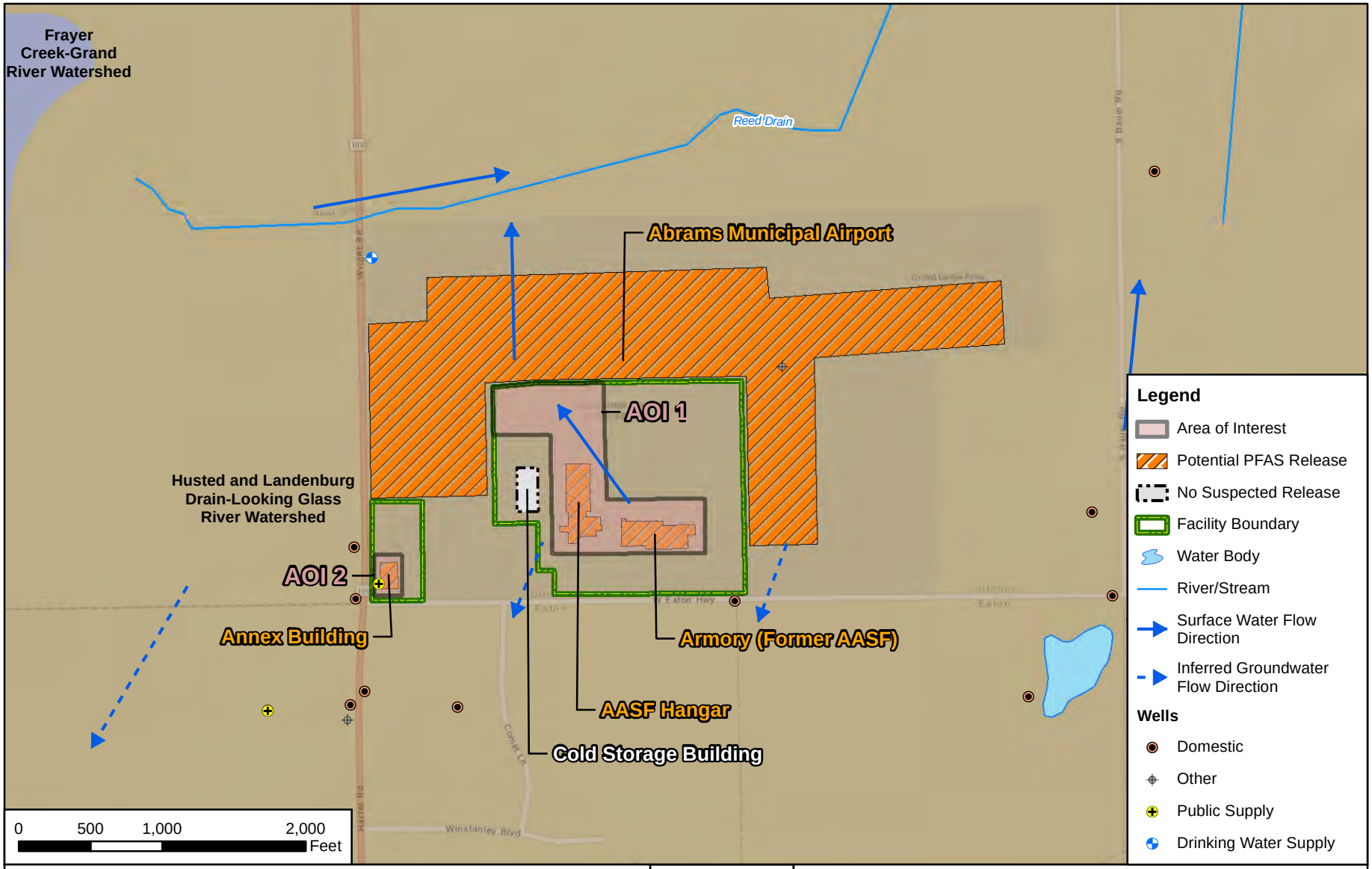
Groundwater at the facility likely flows in a general south southwest direction towards the Grand River based on regional data. Grand Ledge AASF receives its water from the City of Grand Ledge's municipal water utility; however, several private drinking water wells are located south and southwest of the facility (**Figure 6-1**). The ingestion exposure pathway for groundwater is potentially complete for residents that are located downgradient of AOI 1 and incomplete for facility workers and staff. Stormwater flows from the AOI towards a central stormwater detention pond, located at the northwest of the AASF Hangar (**Figure 6-1**); overflow from the detention pond drains to Reed Drain. The ingestion exposure pathways for surface water and sediment

are potentially complete for site workers, construction workers, and trespassers of the stormwater detention pond. AOI 1 is shown on **Figure 6-1** and the CSM is presented on **Figure 6-2**.

6.2 AOI 2: Annex Building

Approximately 1,500 gallons of AFFF and 16 empty compressed air foam portable fire suppression systems (Tri-Max 30 extinguishers) are stored in the Annex Building. Similarly to the AASF Hangar and Armory buildings, little knowledge regarding the historical use and activities associated with the stored AFFF and extinguishers is known. AFFF could have been released during routine extinguisher testing/training or transportation of excess AFFF. AOI 2 encompasses the Annex Building and the surrounding area which includes paved areas to the east and south of the building and grassy areas to the north and west. Two residential homes are located between the AASF Hangar and Armory buildings and the Annex Building. Ground-disturbing activities in these areas could result in site worker, construction worker, resident, and trespasser exposure to potential PFAS contamination via inhalation of dust or ingestion of surface soil. Ground-disturbing activities to subsurface soil could result in site and construction worker exposure.

Groundwater at the facility likely flows in a general south southwest direction towards the Grand River based on regional data. Several private drinking water wells are located south and southwest of the facility (**Figure 6-1**). Drinking water at the Annex Building is provided by a single public supply groundwater well. Because of this, the ingestion exposure pathway for groundwater is potentially complete for facility workers at the Annex building and residents that are located downgradient of AOI 2. With the exception of a dry stormwater drainage ditch that runs parallel to Eaton Highway along the southern border of facility, there are no surface water bodies or stormwater retention structures known to be present in the vicinity of the Annex Building. As such surface water and sediment exposure pathways are incomplete for AOI 2. AOI 2 is shown on **Figure 6-1** and the CSM is presented on **Figure 6-3**.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Grand Ledge AASF, MI			
REVISED	9/25/2019	GIS BY	MS	9/25/2019
SCALE	1:12,000	CHK BY	JL	9/25/2019
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan,		PM	RG	9/25/2019

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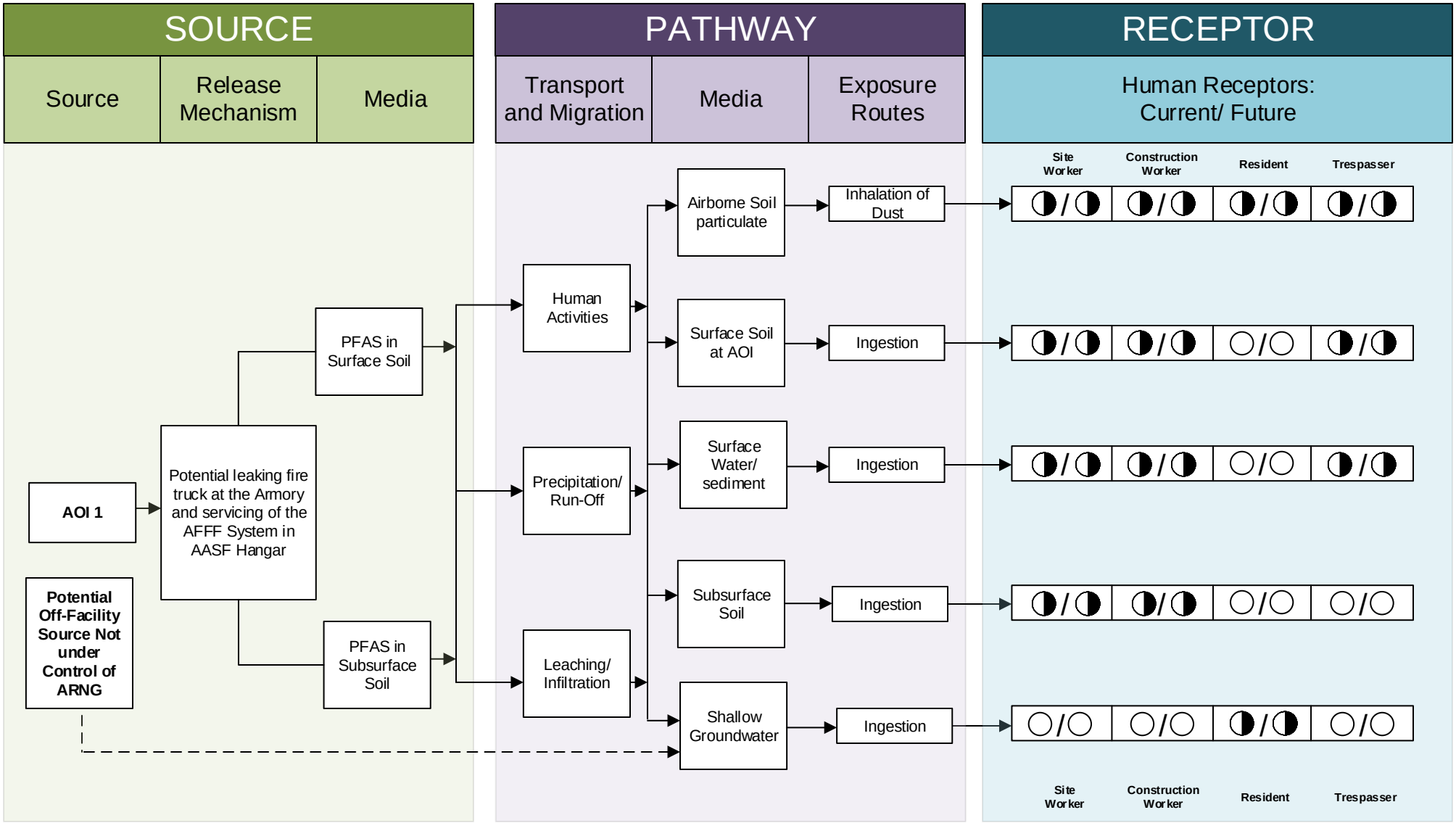
Areas of Interest

AECOM 12420 Milestone Center Drive Germantown, MD 20876

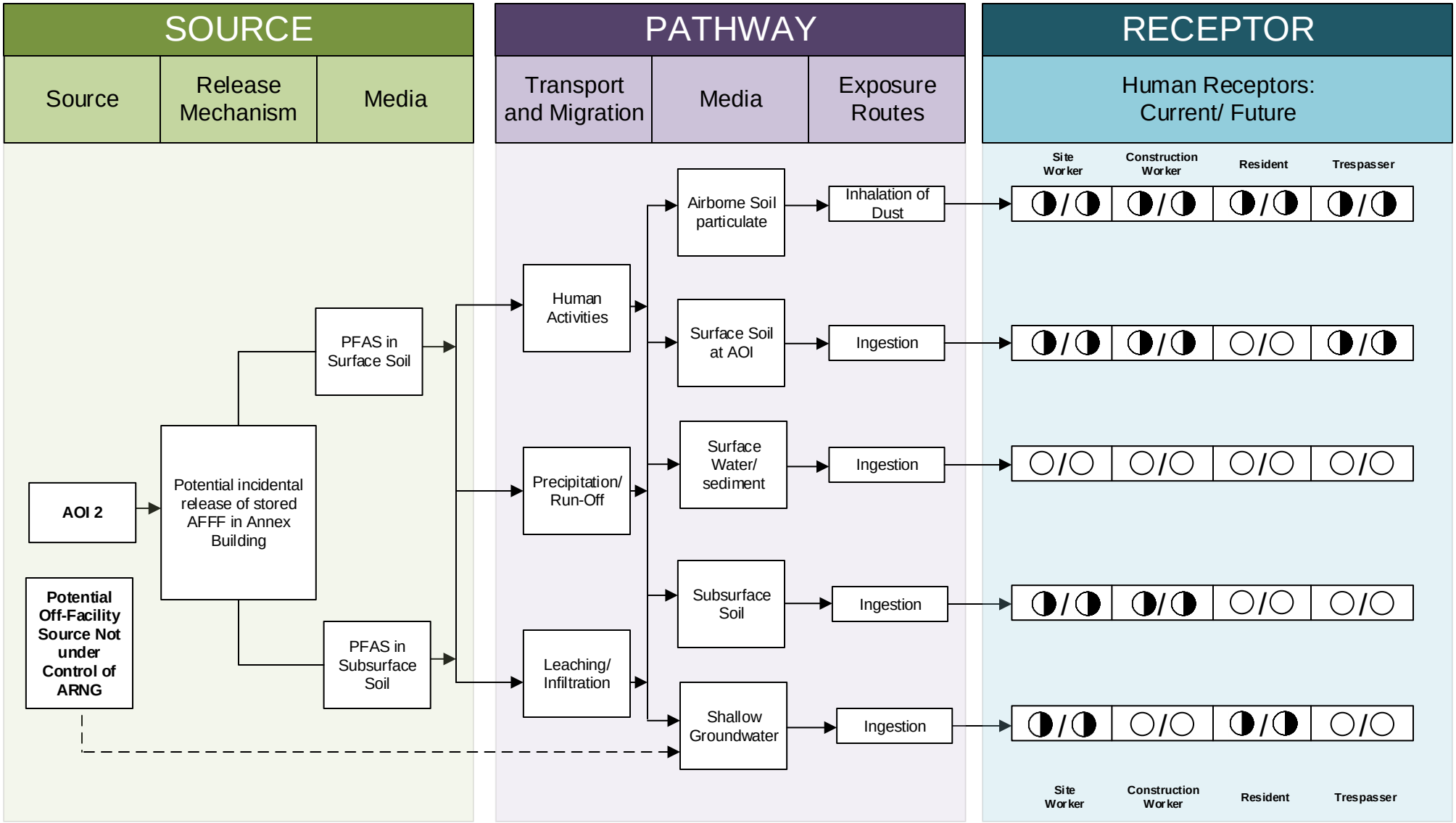
Figure 6-1



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 – AASF Hangar and Armory (Former AASF)



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 – Annex Building

7. Conclusions

This report presents a summary of available information gathered during the PA on PFAS-related activities at Grand Ledge AASF and Armory. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

Two AOIs related to potential PFAS releases were identified at the Grand Ledge AASF and Armory during the PA. **Figure 7-1** and **Table 7-1** present a summary of PA findings.

Table 7-1 AOIs at Grand Ledge AASF and Armory

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	AASF Hangar and Armory (Former AASF)	MIARNG	Unknown; Armory (Former AASF): between late 1970s to early 1990s; AASF Hangar: 2007 to present
AOI 2	Annex Building	MIARNG	Unknown; between the late 1980s and early 1990s to present

Abrams Municipal Airport is located immediately upgradient of the identified AOIs at Grand Ledge AASF and Armory and is a potential off-facility source of PFAS.

Although no known or documented releases of PFAS to the environment were identified during PA activities, because there is a lack of robust institutional knowledge regarding historical activities concerning AFFF use and storage at the facility, there is potential for exposure to PFAS contamination in soil, groundwater, surface water, and sediment in the event that releases occurred. The following are potential receptors: site workers (e.g., Grand Ledge AASF and Armory military and non-military staff and visitors), onsite construction workers, and trespassers. Although the AASF and Armory receive municipal drinking water, the drinking water at the Annex Building is supplied by a single on-site public supply groundwater well. If a release occurred, site workers at the annex may potentially be exposed to PFAS in groundwater; however, previous National Guard Bureau sampling at the annex in May 2017 has shown that PFAS is non-detect in drinking water. In addition, residents using groundwater for drinking water surrounding the facility may potentially be exposed to migrating PFAS contamination via the nearby groundwater pathway. Furthermore, several residential homes are located immediately adjacent to facility boundaries. Nearby residents may be exposed to potential PFAS contamination via inhalation of fugitive dust from ground disturbing activities at the facility if a release occurred. Receptors are less likely to be exposed to potential PFAS contamination through direct contact with soil and inhalation via air; however, some PFAS chemicals are water soluble and can migrate readily from soil to groundwater or surface water via leaching and run-off. Therefore, there is a potential for PFAS contamination in soil to migrate to groundwater and surface water systems.

7.2 Uncertainty

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 (or lack thereof) 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. Comprehensive information on all industrial practices that may potentially be sources of PFAS is incomplete. Therefore, this PA may not identify all potential PFAS sources.

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.

Inherent uncertainty is associated with information regarding potential releases at adjacent sources because direct knowledge regarding PFAS related activities at the municipal airport is not known. Interviews were not conducted with municipal airport staff and the site visit did not include visiting municipal airport assets and hangars because the focus of the assessment was to evaluate potential PFAS related activities and sources at MIARNG properties, not formally assess adjacent sources. AFFF storage or use is commonly associated with such municipal airport facilities. **Table 7-2** summarizes the uncertainties associated with the PA.

Table 7-2 Uncertainties

Location	Source of Uncertainty
AOI 1 – AASF Hangar and Armory (Former AASF)	AASF Hangar: Records documenting the replacement of the AFFF tank liner were not available during interviews for review. The PA relied on the recollections of interviewed personnel and written record on the 700-gallon holding tank. Armory (Former AASF): A fire truck was reportedly stationed within a maintenance bay of the Armory building. Exact dates were unknown; however, the time period likely coincided with the active period of the firefighting unit (1980s to early 1990s). Although AFFF was not recalled having been on the fire truck by a single interviewee, such limited data lends to uncertainty.
AOI 2 – Annex Building	Limited institutional knowledge regarding historical use and activities associated with the stored AFFF and extinguishers was available for assessment during the PA. AFFF could have been released during routine extinguisher testing/training or transportation of excess/bulk AFFF. Additionally, it is not known if the empty extinguishers were once filled with AFFF and if so where they were discharged.
Municipal fire department training (unknown location)	Grand Ledge AASF personnel participated in at least one fire training exercise conducted by the Grand Ledge (municipal) fire department based on a historical article in a local publication. The location of where the training took place is not known; nor is the date, quantity, or type of foam used. Interviewees did not recall any historical FTAs located at the AASF or Armory; however, it is possible that the municipal fire department conducted the training at Abrams Municipal Airport.

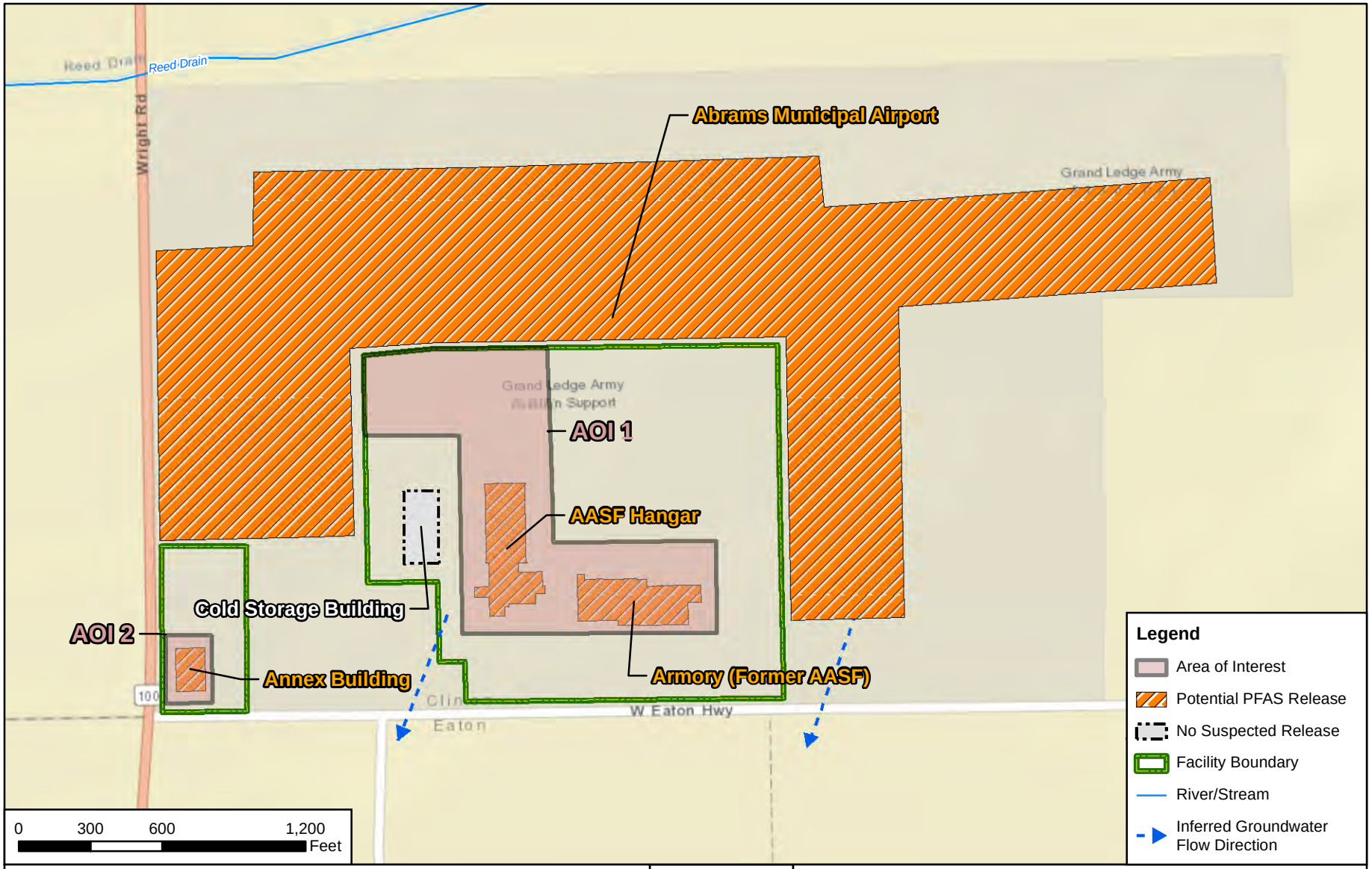
7.3 Potential Future Actions

The degree of uncertainties associated with the interviews and data collected during the PA indicates that current or former ARNG activities may have resulted in potential PFAS releases at the two AOIs identified during the PA. Based on the CSMs developed for the AOIs, there is potential for receptors to be exposed to PFAS contamination in soil, subsurface soil, surface water, sediment, and groundwater at these AOIs. **Table 7-3** summarizes the rationale used to determine if the AOI should be considered for further investigation under the CERCLA process and undergo an SI.

Table 7-3 PA Findings Summary

Area of Interest	AOI Location	Rational	Potential Future Action
AOI 1 – AASF Hangar and Armory (Former AASF)	42°46'18.04"N and 84°43'59.21"W	Potential historical AFFF leaking fire truck at the Armory and possible leaks associated with servicing the AFFF suppression system in current AASF Hangar	Proceed to an SI; focus on soil, groundwater, surface water, and sediment
AOI 2 – Annex Building	42°46'14.98"N and 84°44'20.15"W	Potential incidental release of stored AFFF and/or possible Tri-Max extinguisher testing in Annex Building	Proceed to an SI; focus on soil and groundwater

ARNG is evaluating an SI at Grand Ledge AASF and Armory based on the potential presence of a PFAS release, possible receptors, and the migration potential of PFAS contamination to receptors.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Grand Ledge AASF, MI			
REVISED	9/25/2019	GIS BY	MS	9/25/2019
SCALE	1:7,200	CHK BY	JL	9/25/2019
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan,		PM	RG	9/25/2019

N

Summary of Findings

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 7-1

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8. References

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Appendix A
Data Resources

Data resources will be provided separately on CD. Data resources for Grand Ledge AASF include:

Land Deeds

- June 1975, Warranty Deed
- August 2000, Warranty Deed

Previous Investigations Completed

- 2018 The EDR Radius Map Report with GeoCheck; Aerial Photo Decade Package; & Certified Sanborn Map Report; Target Property Grand Ledge AASF, 10602 West Eaton Highway, Grand Ledge, Michigan 48837.

Miscellaneous Data Resources

- Ansul® Safety Data Sheet for Ansulite
- The Michigan National Guardsman, Unknown Date. *Ready for that Deadly Enemy – FIRE!*.
- DLZ Michigan, Inc., 2015. *Integrated Contingency Plan for Grand Ledge AASF and Armory, Grand Ledge, Michigan*.

Appendix B

Preliminary Assessment Documentation

Appendix B.1
Interview Records

PA Interview Questionnaire - Other

Facility: Grand Ledge AASF, MI
Interviewer: J. Witte & J. Li
Date/Time: 12/6/17 @ 1500

Interviewee: [redacted] **Title:** Facility Manager **Phone Number:** [redacted] **Email:** [redacted]	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:

Current AASF Manager

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?

	Known Uses
- Hangar has AFFF suppression system (700 gal tank) for the hangar bay. 3% Ansulite	Use
↳ no leaks or releases ever - no emergency releases	Procurement
- Never trained on AFFF	Disposition
- Additional AFFF stored in Annex (corner building) waiting for word on disposal from HQ	Storage (Mixed)
	Storage (Solution)
- Hangar system tank had liner replaced May 2014 by contractor - pumped tank contents out into truck and pumped back in after replaced - no leaks or spills occured	Inventory, Off-Spec
	Containment
	SOP on Filling
	Leaking Vehicles
- Floor drains in Hangar connect to Grand Ledge municipal sewer.	Nozzle and Suppression System Testing
	Dining Facilities
- Armory building does NOT have AFFF	Vehicle Washing
- "Cold Storage" Hangar has no foam	Ramp Washing
- Storm water drains to retention pond out back	Fuel Spill Washing and Fueling Stations
↳ NW corner of facility → Drains to creek north of AASF → Retention Pond sampled frequently by HQ	Chrome Plating or Waterproofing

PA Interview Questionnaire - Other

Facility: Grand Ledge AFSF, MI
Interviewer: J. Witt & J. Li
Date/Time: 12/5/17 @ 1520

- Residential neighbors on private DW wells. AFSF on City water.
- Nearest schools likely in City of Grand Ledge.
- AFSF has SPCC w/ drainage schematics - ask HQ for copy.
- Annex has AFFF fire extinguishers (portable) - all empty & tagged.
- Annex used for storage & simulator training.
- Left additional interview forms for completion & return to AECOM.
- Received SDS for Ansulite 3% AFFF
- Does not have Requisition records - HQ may have.

PA Interview Questionnaire - Other

Facility: Grand Ledge AASF, MI
Interviewer: Jennifer Li
Date/Time: 4/26/2018 @ 1300 EST

Interviewee: _____ **Title:** Aircraft Mechanic Supervisor **Phone Number:** _____ **Email:** _____	Can your name/role be used in the PA Report? (Y) or N Can you recommend anyone we can interview? (Y) or N _

Roles or activities with the Facility/Years working at the Facility: 2002 → present

Manages fire prevention program
one of oldest / longest "tenured" people at Grand Ledge AASF currently

When was the current AASF built? Any prior occupants?

Current AASF Hangar Building built Jan/Feb 2007

Past occupancy elsewhere? Other building(s)? AASF formerly occupied adjacent building - now the Armory. No fire suppression system in Armory past or present - not even water sprinklers.

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?

Current AASF fire suppression system uses AFFF. Any historical releases/spills?	**Known Uses**
None - no releases or spills of AFFF ever. Proud history of zero incidents.	Use
	Procurement
	Disposition
Any records of maintenance or tank liner replacement? System/Nozzle testing?	Storage (Mixed)
Testing includes inspection, draining of 700 gal tank by contractor. Only ever done 2x including liner replacement. Contents pumped back into tank. No spills or leaks.	Storage (Solution)
	Inventory, Off-Spec
	Containment
What do you do with off-sec or expired AFFF?	SOP on Filling
Stored in Annex building	Leaking Vehicles
	Nozzle and Suppression System Testing
	Dining Facilities
Where is AFFF stored at the facility? How much? Stored in Annex and system tank (700gal). Total 2,220 gal w/system tank.	Vehicle Washing
	Ramp Washing
Inventory: 3% : 20 - 55gal drums, 6 - 5gal buckets 3/6 %: 32 - 5gal buckets 6%: 46 - 5gal buckets	Fuel Spill Washing and Fueling Stations
	Chrome Plating or Waterproofing

~10 Tri Max portable extinguishers in Annex - all empty + tagged.

PA Interview Questionnaire - Other

Facility: Grand Ledge AASF, MI
Interviewer: Jennifer Li
Date/Time: 4/26/2018 @ 1300 EST

Were any past buildings constructed with AFFF dispensing systems or fire suppression systems?

no past systems

Have any city, county, and/or state personnel come to the facility for training? If so, please state which state/county agency or military entity? Any joint/invited training with local FD(s)? Which FD(s)?

Local fire depts (Looking Glass Regional or Grand Ledge City FD) train out there but not ist fourn- only water from hydrants.
No off-facility training.

Any current or past training with AFFF at facility or elsewhere off-site?

no.

Any specific emergency response incidents at the facility (i.e., aircraft or vehicle crash sites and fires)? If so, may we please copy these reports? Who (entity) was the responder?

none.

Was AFFF ever brought to the facility for use by other entities? Official use or other?

no one brought AFFF in to facility.

Are there past studies you are aware of with environmental information on plants/animals/ groundwater/soil types, etc., such as Integrated Cultural Resources Management Plans or Integrated Natural Resources Management Plans? Integrated Contingency Plan?

not aware of any.

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

none known.

PA Interview Questionnaire - Other

Facility: Grand Lodge
Interviewer: C. Mitchell
Date/Time: 06/07/18 ~10am

[redacted]

Worked at Armory since early 1980's

- Fire truck stored in NW garage w/ in the Armory (~1980-1990's). Did not believe AFFF was stored in the truck. garage w/ truck → [redacted] ← armory
- Fire spression system in both hangars never went off. One system is only water. Nothing is discharged during testing. Systems tested annually by outside contractor
- No recollection of a fire, fire training activities or emergency where AFFF was used

via teleconference:

[redacted]

- Certified fire ~~training~~ fighting unit at armory (~~12~~ 12 technicians) in 1980's. Unit was disbanded in the early 1990's. Facility now uses local fire dept assistance. FF Unit was not able to maintain up to date trainings + certifications which was why they were disbanded.
- Believed the truck would have been maintained at the Armory (fire truck) but was not sure.
- Did not recall any use of AFFF for training or emergency activations

Appendix B.2
Visual Site Inspection Checklists

Visual Survey Inspection Log

Recorded by: Joe Witte
ARNG Contact: Rob Mclead
Date: Dec 5, 2017

Source/Release Information

Site Name / Area Name / Unique ID: Grand Ledge AASF
Site / Area Acreage: approx. 10 acres (based on google aerial imagery)
Historic Site Use (Brief Description): AASF

Current Site Use (Brief Description): MIARNG AASF

1. Was AFFF used (or spilled) at the site/area? Y (N)
   1a. If yes, document how AFFF was used and usage time (e.g., fire fighting training 2001 to 2014):
   However, 700 gallons of AFFF was purged from tank to truck and back to tank in 2014.
2. Has usage been documented? Y (N)
   2a. If yes, keep a record (place electronic files on a disk):
   Label on 700 gal holding tank indicates that it was filled in 2006.
3. What types of businesses are located near the site? Industrial (Commercial) Plating / Waterproofing (Residential)
   3a. Indicate what businesses are located near the site
   Loews, Seven Up, other commercial enterprises, as well as residences & farmland
4. Is this site located at an airport/flightline? (Y) N
   4a. If yes, provide a description of the airport/flightline tenants:
   City-owned, public use airport. Flightline is approximately 0.15 miles north of hangars

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:
   Trimax 30, 3M 3%/6%, Trimax Blizzard, Ansulite 3%. None used.
   1b. If yes, describe maintenance schedule/leaks:
   No leaks
   1c. If yes, how often is the AFFF replaced:
   AFFF has only been replaced once during tank purge in 2014.
   1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing?
   Floor drains in hangar (where AFFF suppression system is) connect to city of Grand Ledge municipal ~~water~~ sewer. SW

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? (Y) N
   1a. If so, note observation and location:
   North towards detention pond.
2. Is there channelized flow within the site/area? (Y) N
   2a. If so, please note observation and location: Drainage ditch parallel to W Eaton Hwy, also north in Creek north of hangar.
3. Are monitoring or drinking water wells located near the site? (Y) N
   3a. If so, please note the location: Residences to south on well water.
4. Are surface water intakes located near the site? (Y) N
   4a. If so, please note the location: Retention pond and creek. No wetlands listed by USFWS. No SW intakes.
5. Is there a wind sock present within the site/area? (Y) N
   5a. If so, please note and observe the location. Two windsocks, prevailing winds from the west. SW
   5b. Is wind sock log information available? NO

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)

Visual Survey Inspection Log

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:
Retention pond. No wetlands listed by USFWS.

Receptor Information

1. Is access to the site restricted? (Y) N

1a. If so, please note to what extent: ~~Lock~~ Fence-gate with guard

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

2a. Circle all that apply, note any not covered above: only MIARNG personnel use site.

3. Are residential areas located near the site? (Y) N

3a. If so, please note the location/distance: Adjacent to southern boundary

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

4a. If so, please note the location/distance/type:
Grand Ledge City has nearest locations of this kind.

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

5a. If so, please note the location/distance/type: Riverine wetland 0.36 miles north of site. Freshwater emergent wetland 0.38 miles east of site. Freshwater pond and forested shrub wetland in residential area 0.3 miles southeast of site.

Additional Notes

- Water suppression used everywhere except hangar (where AFFF is used)
- As-builts to be requested from JFQ
- AFFF stored at MIARNG Guard Recruites building on SW corner of property
- Tri-mex fire extinguishers stored onsite, emptied and tagged
- Spoke extensively with [redacted] and [redacted]
- Left interview forms with [redacted] to be distributed and returned

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Grand Ledge AASF

Why has this location been identified as a site?

This site operates as AASF and has an AFFF fire suppression system. Additionally, historical photos appear to show AFFF use at the site.

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

Training Events

Have any training events with AFFF occurred at this site? No, zero. Photo may be Haylon.

If so, how often? Never

How much material was used? Is it documented? No material used at any point.

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? North towards man-made retention pond

Average rainfall? 34 inches

Any flooding during rainy season? no

Direct or indirect pathway to ditches? indirect to stormwater ditches

Direct or indirect pathway to larger bodies of water? indirect stormwater drainage to Reed Drain Creek

Does surface water pond any place on site? Yes, man-made retention pond

Any impoundment areas or retention ponds? Yes, shown on map

Any NPDES location points near the site?

How does surface water drain on and around the flight line? To man-made pond and creek running north from that pond.

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? North (assumed)

Depth to groundwater?

Uses (agricultural, drinking water, irrigation)? Private residences nearby on private wells. Agricultural areas nearby likely use groundwater as well. AASF on municiple water.

Any groundwater treatment systems? unknown

Any groundwater monitoring well locations near the site?

Is groundwater used for drinking water? Yes

Are there drinking water supply wells on installation? No

Do they serve off-post populations? Off-post populations on their own wells

Are there off-post drinking water wells downgradient Generally, surface water flows north.

Groundwater flow direction is unknown.

Waste Water Treatment Plant:

Does the installation have a WWTP? NO

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

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?

3. Other?

Identify Potential Receptors:

Site Worker Yes

Construction Worker Yes

Recreational User NO

Residential Yes

Child Yes

Preliminary Assessment – Conceptual Site Model Information

Ecological

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

Residential, commercial, agriculture.

Documentation

Ask for Engineering drawings (if applicable). As-built drawings need to be requested from JFHQ.

Has there been a reconstruction or changes to the drainage system? When did that occur?

The Site hangar was built in April ~~2006~~ JW 2007

Appendix C
Photographic Log

APPENDIX C – Photographic Log

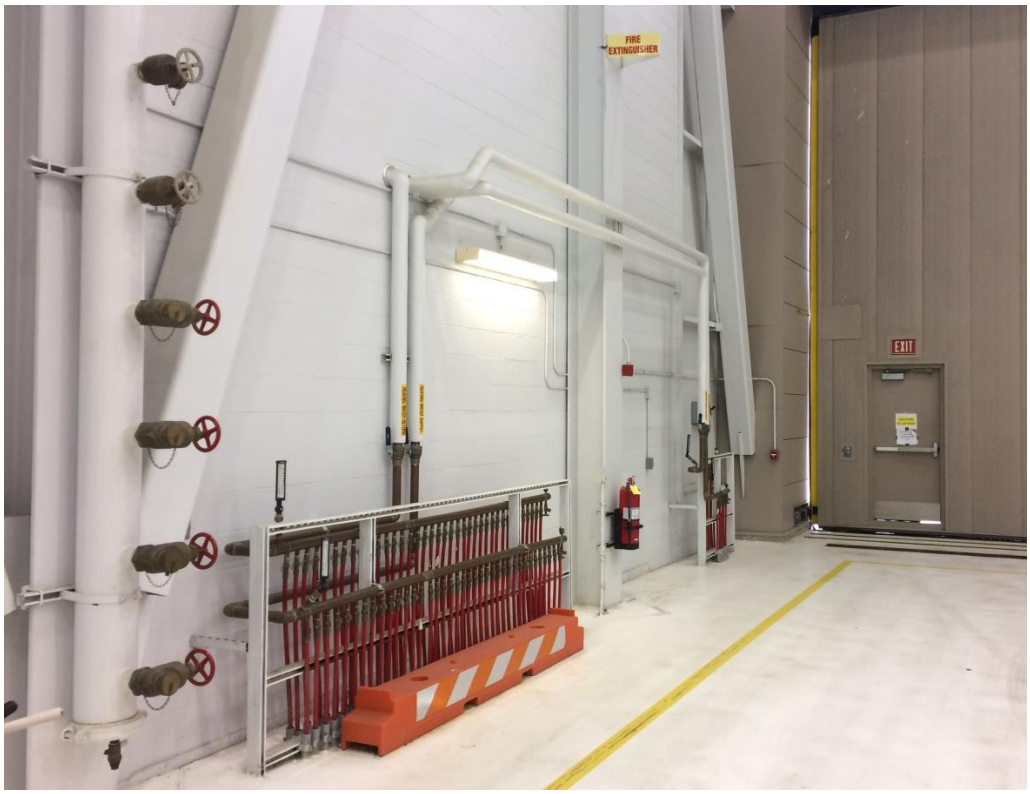
Army National Guard, Preliminary Assessment for PFAS	Grand Ledge Army Aviation Support Facility and Armory	Grand Ledge, Michigan

Photograph No. 1

Description:

AASF Hangar with AFFF fire suppression system. Standing on south side of hangar facing west.

Photograph taken on:
5 December 2017



Photograph No. 2

Description:

AASF Hangar: 700-gallon AFFF fire suppression system tank. Second floor of AASF building.

Photograph taken on:
5 December 2017

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Grand Ledge Army Aviation Support Facility and Armory	Grand Ledge, Michigan

Photograph No. 3

Description:

AASF Hangar: AFFF fire suppression system piping and warning labels. Second floor of AASF building.

Photograph taken on:
5 December 2017

Photograph No. 4

Description:

Annex building, storage area. Excess AFFF concentrate stored in 55-gallon and 5-gallon buckets. Empty Tri-Max 30 extinguishers in background.

Photograph taken on:
5 December 2017

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Grand Ledge Army Aviation Support Facility and Armory	Grand Ledge, Michigan

Photograph No. 5

Description:

Annex building, storage area. Empty and tagged compressed air foam portable fire suppression systems (Tri-Max 30 extinguishers). 5-gallon buckets of AFFF concentrate in foreground.

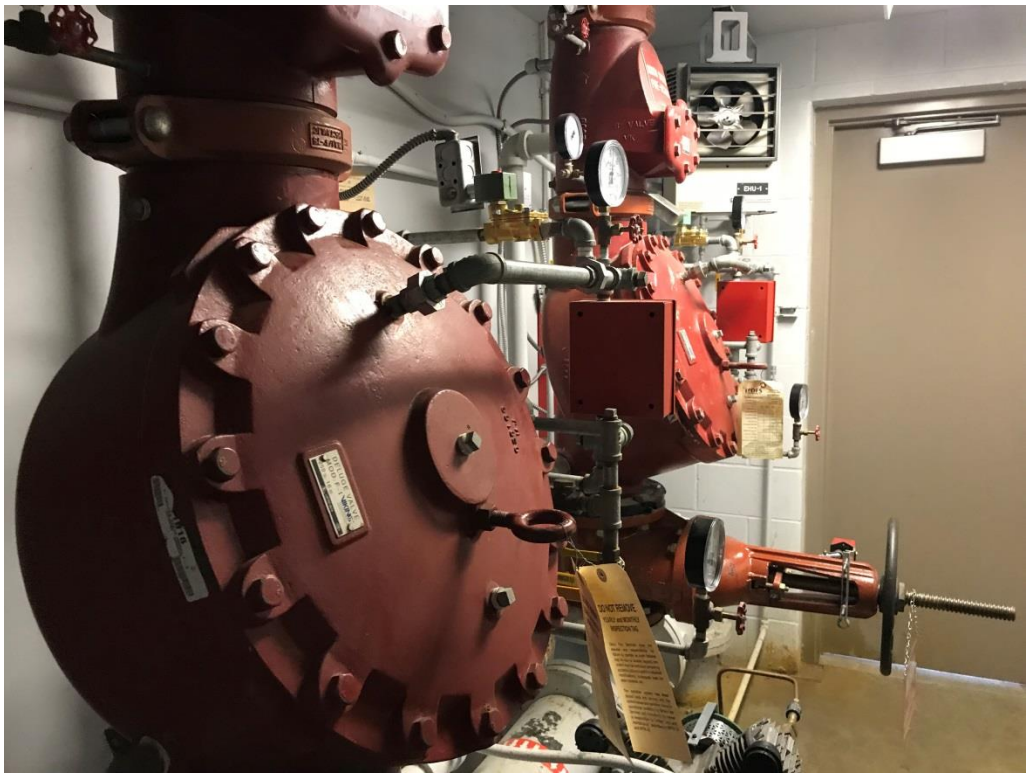
Photograph taken on:
5 December 2017

Photograph No. 6

Description:

Unheated cold storage hangar. Water sprinkler system.

Photograph taken on:
7 June 2018



APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Grand Ledge Army Aviation Support Facility and Armory	Grand Ledge, Michigan

Photograph No. 7

Description:

Armory building. Garage where fire truck used to be stored. Now used as general office/storage space.

Photograph taken on:
7 June 2018