

Final Preliminary Assessment Report Gowen Field, Boise, Idaho

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

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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
amsl	above mean sea level
ANG	Air National Guard
AOI	area of interest
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	conceptual site model
FTA	fire training area
gpm	gallons per minute
HEF	High-Expansion Foam
IDANG	Idaho Air National Guard
IDARNG	Idaho Army National Guard
IED	Installations and Environment Division
PA	Preliminary Assessment
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
USAF	United States Air Force
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, 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 the IDARNG managed portion of Gowen Field (also referred to as the “installation”), Boise, Idaho, to assess potential PFAS release areas and exposure pathways to receptors. Gowen Field is leased from the city of Boise by the Idaho ARNG (IDARNG) and the Idaho Air National Guard (IDANG). The Army Reserves, Navy, and Marine Reserves are IDARNG tenants. The IDANG-managed portion of Gowen Field is directly adjacent to the IDARNG installation.

The performance of this PA included the following tasks:

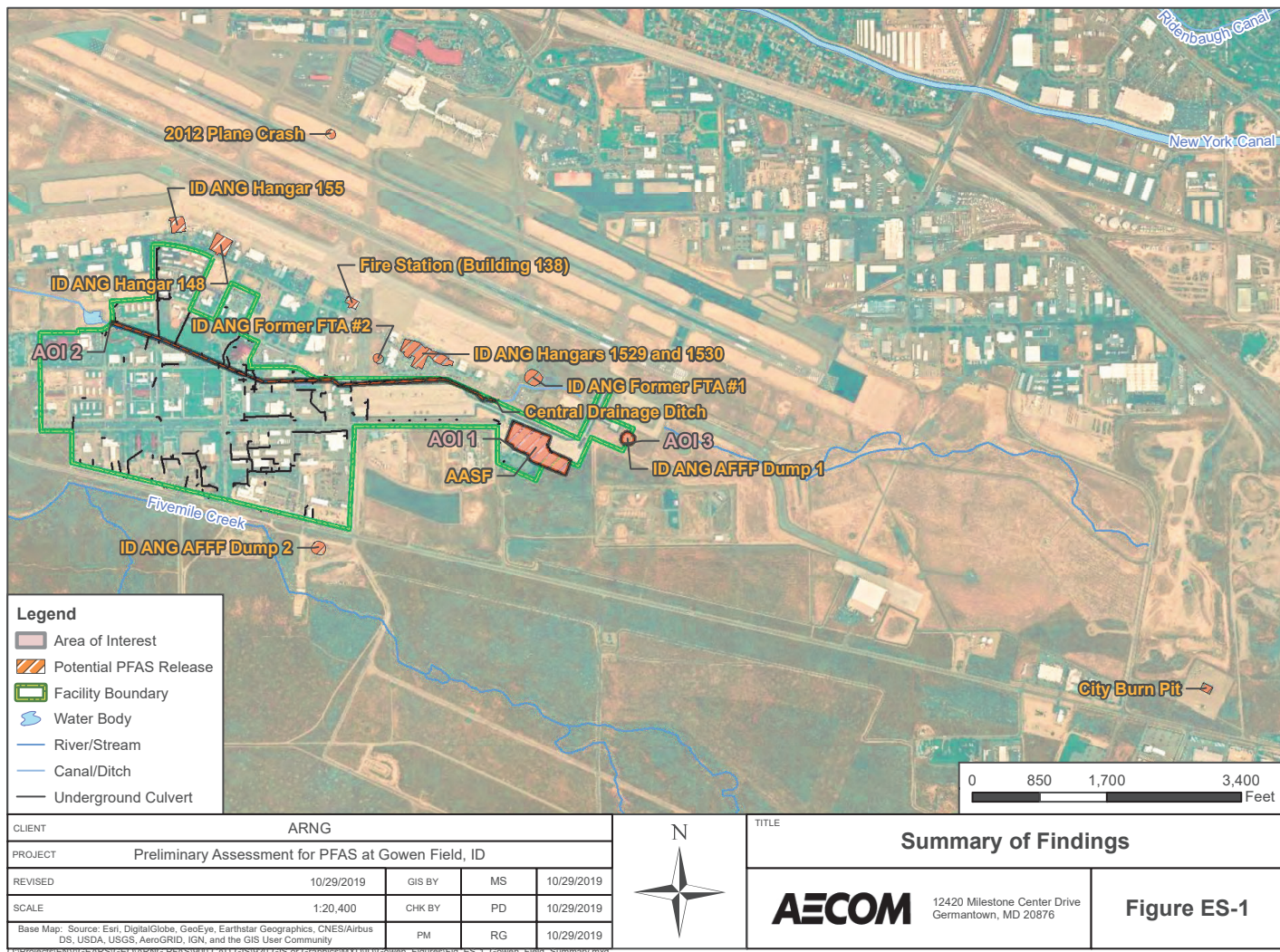
- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit on 2 February 2019
- Interviewed current IDANG and IDARNG Gowen Field personnel during the site visit including environmental managers, the IDANG Fire Chief, facility maintenance staff, Army Aviation Support Facility (AASF) staff, flight operations staff, and other operations staff
- Completed visual site inspections (VSIs) at known or suspected PFAS release locations and documented with photographs
- Developed a preliminary conceptual site model (CSM) to outline the potential release and pathway of PFAS for the Areas of Interest (AOIs) and the facility

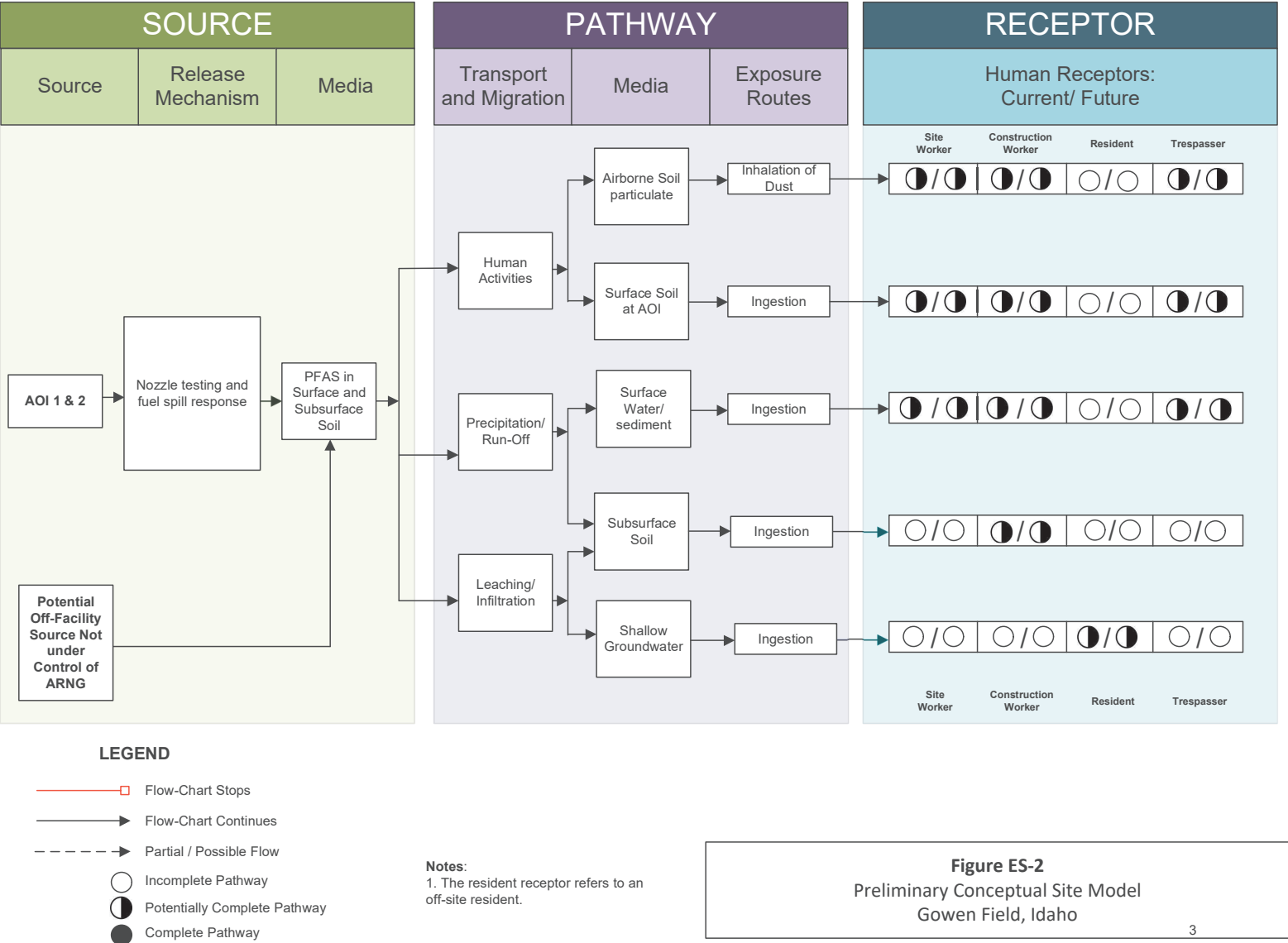
Three AOIs related to potential PFAS releases were identified at Gowen Field during the PA. The AOIs are shown on **Figure ES-1** and described in **Table ES-1** below:

Table ES-1: AOIs at Gowen Field

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	AASF	IDARNG	1990s to 2000s
AOI 2	Central Drainage Ditch	IDARNG/IDANG	1970s to 1980s
AOI 3	IDANG AFFF Dump 1	IDANG	2014 - present

Based on documented potential PFAS releases at these AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for Gowen Field, which presents the potential receptors and media impacted, is shown on **Figure ES-2**. Based on the USEPA Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in a public water system above the United States Environmental Protection Agency Lifetime Health Advisory level within 20 miles of the facility.





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, 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. The ARNG is assessing potential effects on human health related to processes at their facilities that used per- and poly-fluoroalkyl substances (PFAS), 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 (70 parts per trillion), 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 Idaho does not currently have promulgated standards for PFAS in drinking water.

Gowen Field is occupied by both the Idaho Air National Guard (IDANG) and the Idaho Army National Guard (IDARNG). This report presents findings of a PA for PFAS at the IDARNG occupied parcel of Gowen Field (also referred to as the “installation”) in Boise, Idaho, 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 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 Gowen Field. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components of AFFF.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit on 2 February 2019
- Interviewed current IDANG and IDARNG Gowen Field personnel during the site visit including environmental managers, the IDANG Fire Chief, facility maintenance staff, Army Aviation Support Facility (AASF) staff, flight operations staff, and other operations staff
- Completed visual site inspections (VSIs) at known or suspected PFAS release locations and documented with photographs
- Developed a preliminary conceptual site model (CSM) to outline the potential release and pathway of PFAS for the Areas of Interest (AOIs) and the facility

1.3 Report Organization

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

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

The Boise Airport is located in Ada County within the boundary of the city of Boise, in western Idaho (**Figure 1-1**). The Gowen Field property is leased from the city of Boise by the IDARNG and the IDANG. The Army Reserves, Navy Reserves, and Marine Reserves are IDARNG tenants. The IDANG-managed portion of Gowen Field is directly adjacent to the IDARNG installation.

In 1941, construction at Boise Air Base began. Later that year, the installation officially became Gowen Field, which remained an active Army Air Corps Base during WWII. After the end of the war, Gowen Field was turned back over to the city of Boise in 1946. The IDANG was established concurrently with the United States Air Force (USAF) in 1947 and moved to Gowen Field shortly after. The IDARNG currently occupies approximately 240 acres of Gowen Field on the southwestern portion (Idaho National Guard, 2019).

1.5 Facility Environmental Setting

Gowen Field is in the Boise River Valley, on a generally flat plot of land with an average elevation of about 2,800 feet above mean sea level (amsl). Mountains to the south and north of the installation rise up to elevations of 8,500 feet amsl. The Boise River is to the north and northeast of the site, at distances varying between 3.5 – 4 miles. The Snake River is to the southwest of the site at distances greater than 20 miles.

1.5.1 Geology

Gowen Field is located in the Boise River Valley, within the broader Western Snake River Plain, just south of the foothills of the mountainous terrain of central Idaho. The Western Snake River Plain is a fault bounded intracontinental rift basin (Wood & Clemens, 2002). The Pliocene and Pleistocene geologic history of the Boise Valley includes crustal rifting, basin filling, river incision, eruptions of lava flows, and major flooding.

The Chalk Hills Formation constitutes the earliest sedimentation in the basin, characterized by a succession of fluvio-lacustrine sediments resulting from interconnected lakes, meandering streams, and lacustrine delta deposits. These lake levels declined, resulting in erosion of part of the Chalk Hills Formation in the Boise area. A subsequent rise in lake level led to the deposition of another lacustrine sequence which includes shoreline sands, small deltas, and lacustrine mud in the deeper parts of the basin. These deposits are mapped as the Terteling Springs Formation (Wood & Clemens, 2002).

Spillover of this ancient lake system resulted in a slow lowering of the lake level and filling of the shrinking lake basins with interbedded mud and sand of lacustrine delta systems of the Glens Ferry Formation (Wood & Clemens, 2002).

In more recent geologic history, terraces were formed by rapid fluvial downcutting followed by coarse gravel deposition (Othberg, 1994).

Gowen Field sits above the Pleistocene terrace gravel deposits (**Figure 1-2**), which consist of unconsolidated silt, sand, and well-sorted gravel beds characterized by cut-and-fill channels, inclined bedding, and cross-bedding.

1.5.2 Hydrogeology

Groundwater beneath the installation has been reported to range from as shallow as 120 feet below ground surface (bgs) to depths greater than 200 feet bgs. The installation is currently supplied potable water by Suez Water Idaho, Inc. (Suez), a local provider, although some wells on-site were reported as being used for irrigation. The base has used both shallow and deep aquifers for its water supply in the past.

The aquifer system in the Boise area consists of complex series of interbedded, tilted, faulted, and eroded sediments extending to depths of over 6,000 feet. These sedimentary aquifers contain shallow, local flow systems, and a deeper, regional groundwater system (Petrich, 2004).

Within the Boise area, multiple wells have tapped into a deep aquifer (at 660 feet bgs). These wells are capable of yielding 180 to 1,400 gallons per minute (gpm). Suez Water wells are located approximately 2 miles north of the installation and have a 9.1-million-gallons-per-day capacity (Leidos, 2014). Several wells listed for domestic use are located 2-3 miles to the north of the 1-3 miles to the east of the installation. Many wells of unknown use are located around the installation within a 1-mile buffer (IDWR, 2019). It is possible that some of these wells are used for potable purposes.

Results of groundwater characterization and modeling in this area show that the deeper aquifer flows south toward the Snake River (**Figure 1-2**) (Petrich, 2004 and Petrich & Urban, 2004). This work suggests that recharge to the deep aquifer occurs primarily in the eastern portion of the Boise River Valley where parts of the Idaho Group are exposed at the earth's surface, and ultimate discharge occurs into major rivers. In the area of Gowen Field, discharge to the Snake River drives the deep groundwater flow direction to the south. No portion of the recharge zone for the deep aquifer is coincident with Gowen Field.

Recharge to the shallow groundwater systems in the Boise River Valley occurs primarily from seepage from the canals and infiltration, mostly associated with irrigation. This creates variable shallow groundwater flow directions across the Boise River valley (Petrich & Urban, 2004). Previous studies in the Gowen Field area have suggested that shallow groundwater flows in a northeast to easterly direction (Leidos, 2019).

1.5.3 Hydrology

Gowen Field is located within the Boise River drainage basin, a semi-arid area that receives annual precipitation of 11.73 inches (NOAA, 2019). Surface drainage at Gowen Field is controlled both by the local surface topography and a system of drainage ditches. The most important drainage ditch generally traverses the installation with flow from east to west. This drainage ditch originates as the remnant of an intermittent stream on the adjacent IDANG property, before traversing the IDARNG property and discharging to an off-installation retention pond, a stormwater control feature that maintains a permanent pool of water (**Figure 1-3**). The retention pond is not owned by the IDARNG.

Fivemile Creek, an intermittent stream that flows only during periods of heavy rainfall or snowmelt runoff, runs parallel to and south of West Gowen Road. The creek originates in the mountains, approximately 3 miles away and discharges into the New York Canal, approximately 1 mile downstream of the property. This canal eventually discharges into the Boise River, which is used for crop irrigation (Leidos, 2014). None of these surface water features are used for drinking water in Boise.

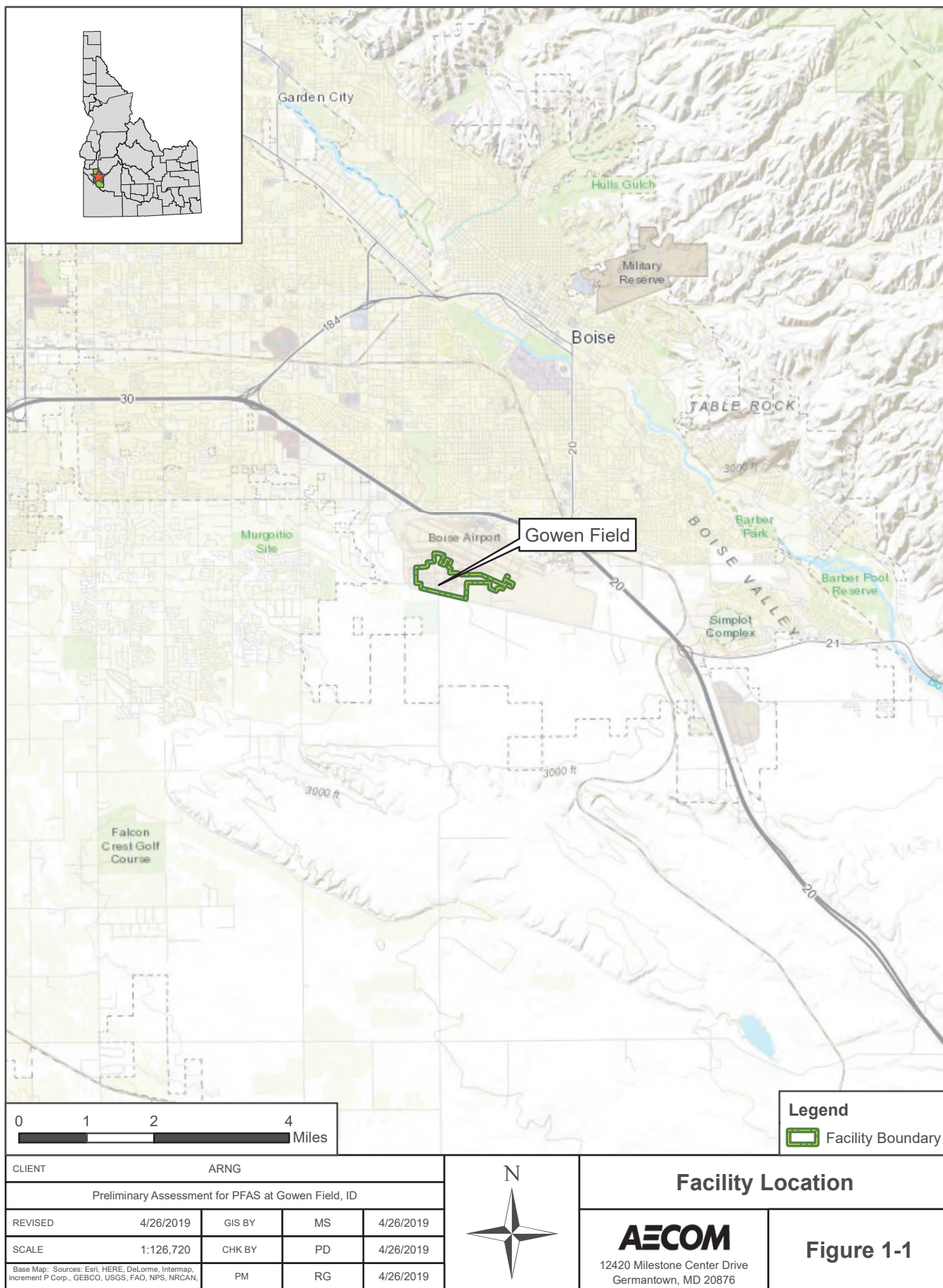
1.5.4 Climate

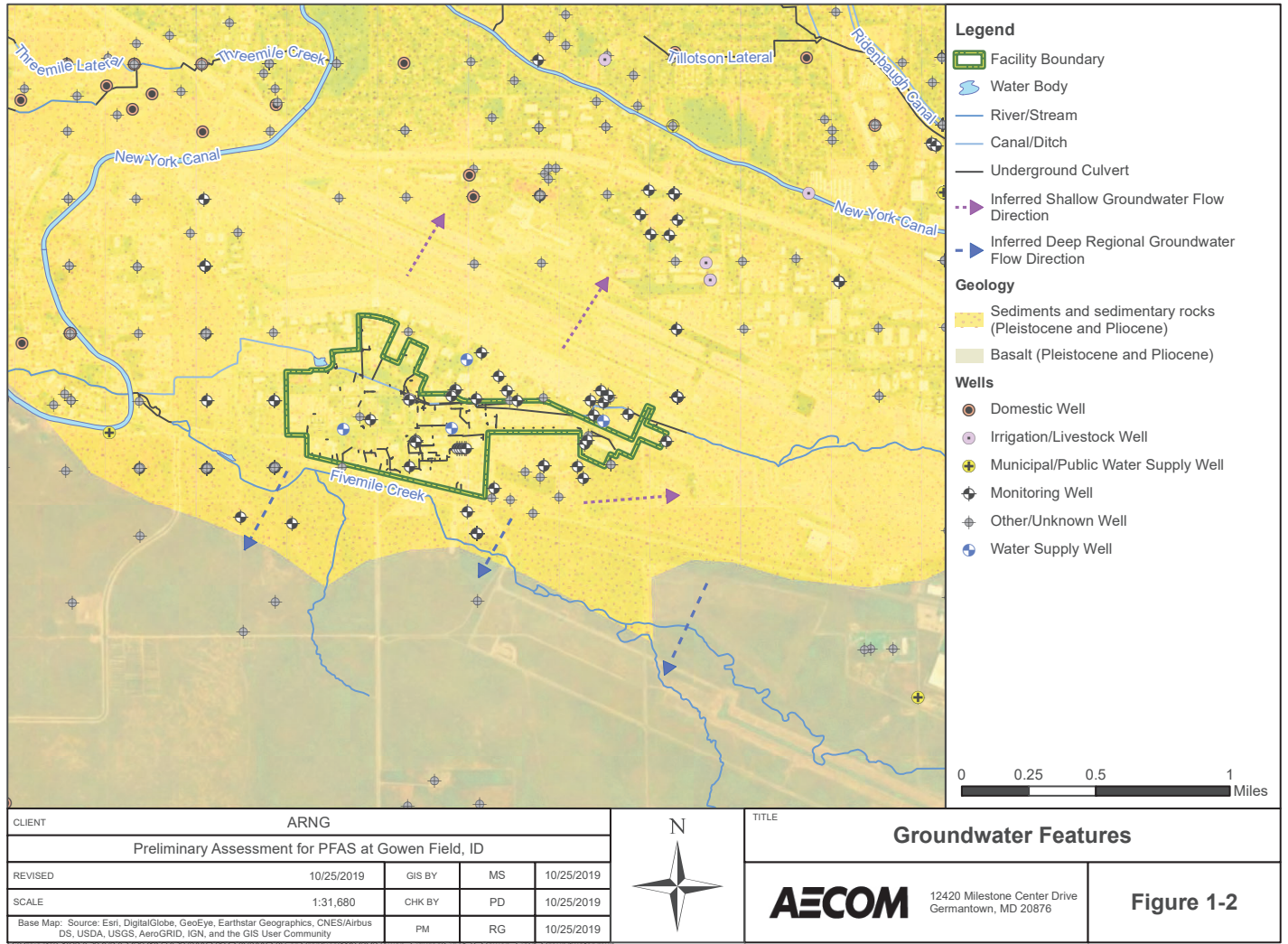
Gowen Field is located within Ada County, Idaho, which has a semi-arid climate, with hot and dry summers and moderately cold winters. The average annual temperature is 52.5 degrees Fahrenheit (°F), ranging from an average winter low of 25.6°F, to an average summer high of 87.5°F. The mean annual precipitation in Boise is approximately 11.73 inches, with most of the precipitation occurring from November through May each year (NOAA, 2019). The average number of days with over 0.1 inches or more of precipitation is over 39. Ada County only receives an annual snowfall average of 12.48 inches (Leidos, 2019).

1.5.5 Current and Future Land Use

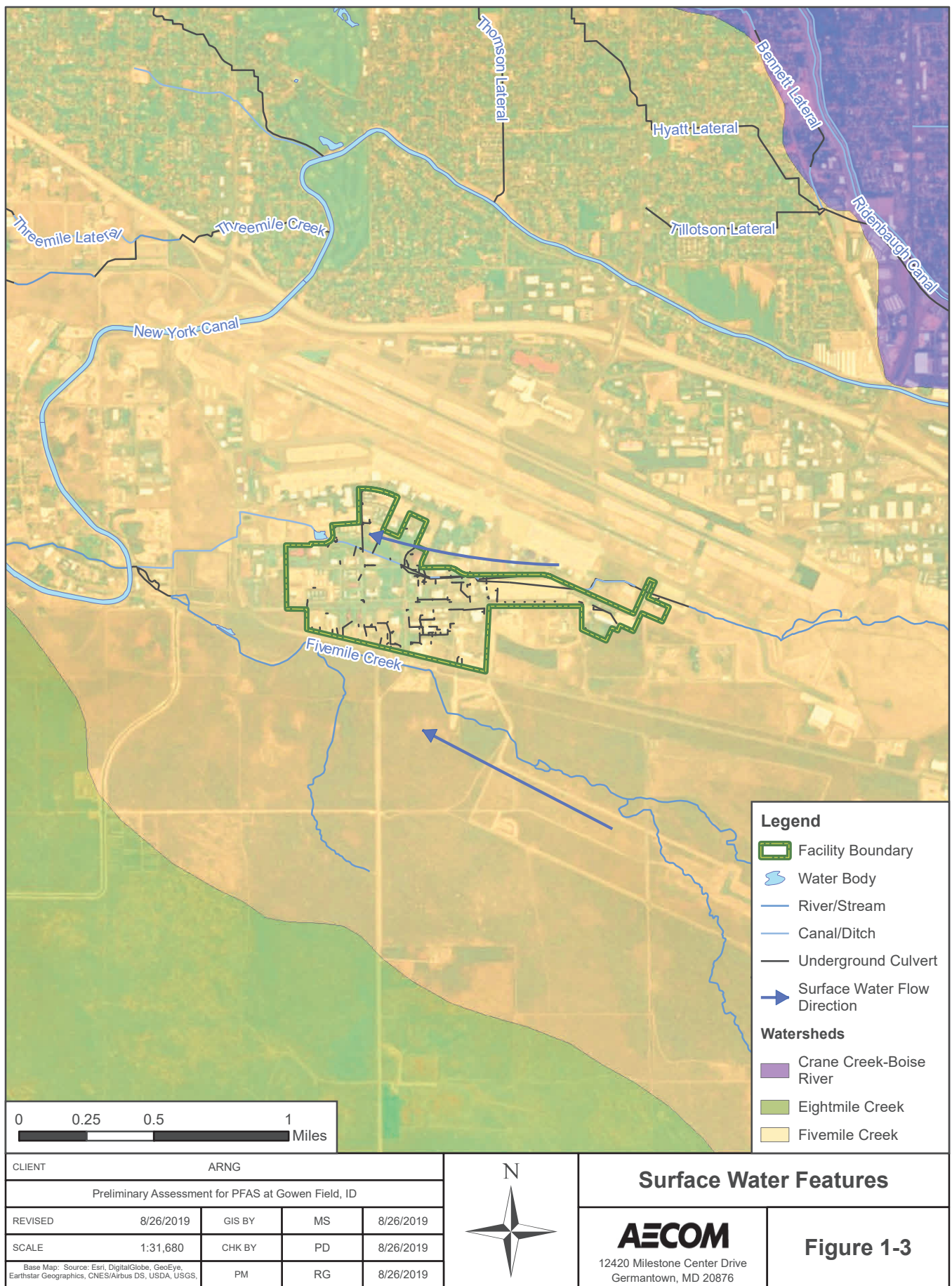
At present, the IDARNG property at Gowen Field consists of approximately 240 acres and is located adjacent to the Boise Airport and IDANG property. The IDARNG installation consists mostly of operations and support buildings, as well as an AASF. Access to the installation is controlled. Land surrounding the installation to the north, east, and west is used for industrial purposes and airport operations. Land to the south of the installation is used for agricultural purposes and livestock grazing. Residential areas are not located immediately adjacent to the installation. The closest residential areas are located approximately 0.75 miles to the north of the northern edge of the installation.

Gowen Field is located entirely within Ada County, within the city of Boise, Idaho. Based on official 2017 estimates from the US Census Bureau, Boise's population is 226,570, and it is the largest city in Idaho (USCB, 2017). The IDARNG has been operating at Gowen Field since 1946, and land use is not expected to change in the future.





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2. Fire Training Areas

No FTAs were identified at the IDARNG Gowen Field installation during the PA. According to interviews with the Fire Chief at the installation, IDARNG fire training activities have only occurred at the city of Boise burn pit, which is located off-site, about 1.6 miles away, from at least 1998 to present. This burn pit is discussed in detail in **Section 5**. The IDARNG has been in operation at the installation since the early 1946; however, no information was obtained about fire training activities associated with the IDARNG or the IDANG prior to 1998.

3. Non-Fire Training Areas

Two non-FTAs where PFAS was potentially released was identified during the PA. A description of the non-FTA is presented below, and the non-FTA is shown on **Figure 3-1**. Interview records appear in **Appendix B**, and photographs appear in **Appendix C**.

3.1 AASF

The Gowen Field AASF hangar, flight line, and apron are located in the southeast corner of the IDARNG Gowen Field installation. Information on AFFF storage and use at the AASF prior to the 1990s was not obtained. The geographic coordinates of the center of the AASF hangar are 43°33'22.6"N; 116°13'00.1"W (**Figure 3-1**). The AASF consists of a main hangar, built in 2002 – 2003, a smaller hangar built in 2016 – 2017, a wash rack, flightline, small maintenance building, and an adjacent drainage field (**Figure 3-1** inset).

A 200-gallon Tri-Max™ AFFF unit is currently stored inside the small hangar at the AASF and contains the only AFFF still on IDARNG property at Gowen Field. The AFFF unit is a hose-operated system and is not connected to a suppression system in the building. There was no reported usage of this unit, and no evidence of spills or leaking in the vicinity. Another 200 to 225-gallon Tri-Max™ unit is stored outside of the main hangar, on the east end of the AASF. This unit is currently empty. Five empty extinguishers of various sizes (30-gallons or less) are also stored in this outdoor area. It is unclear what the contents of these extinguishers once were. According to observations made during the PA site visit and a technical memorandum for a sewer investigation provided by IDARNG (Murraysmith, 2019), storm and floor drains on the flight line and inside the AASF hangars drain to the east and eventually discharge to the drain field adjacent to the AASF or to the sanitary sewer system. Water entering the drain field flows through one of two grease/sand traps and is discharged to the subsurface via a 'seepage trench,' which is a lined gravel pit (**Figure 3-1**). A valve system is also in place that can direct water off-site to the sanitary sewer system.

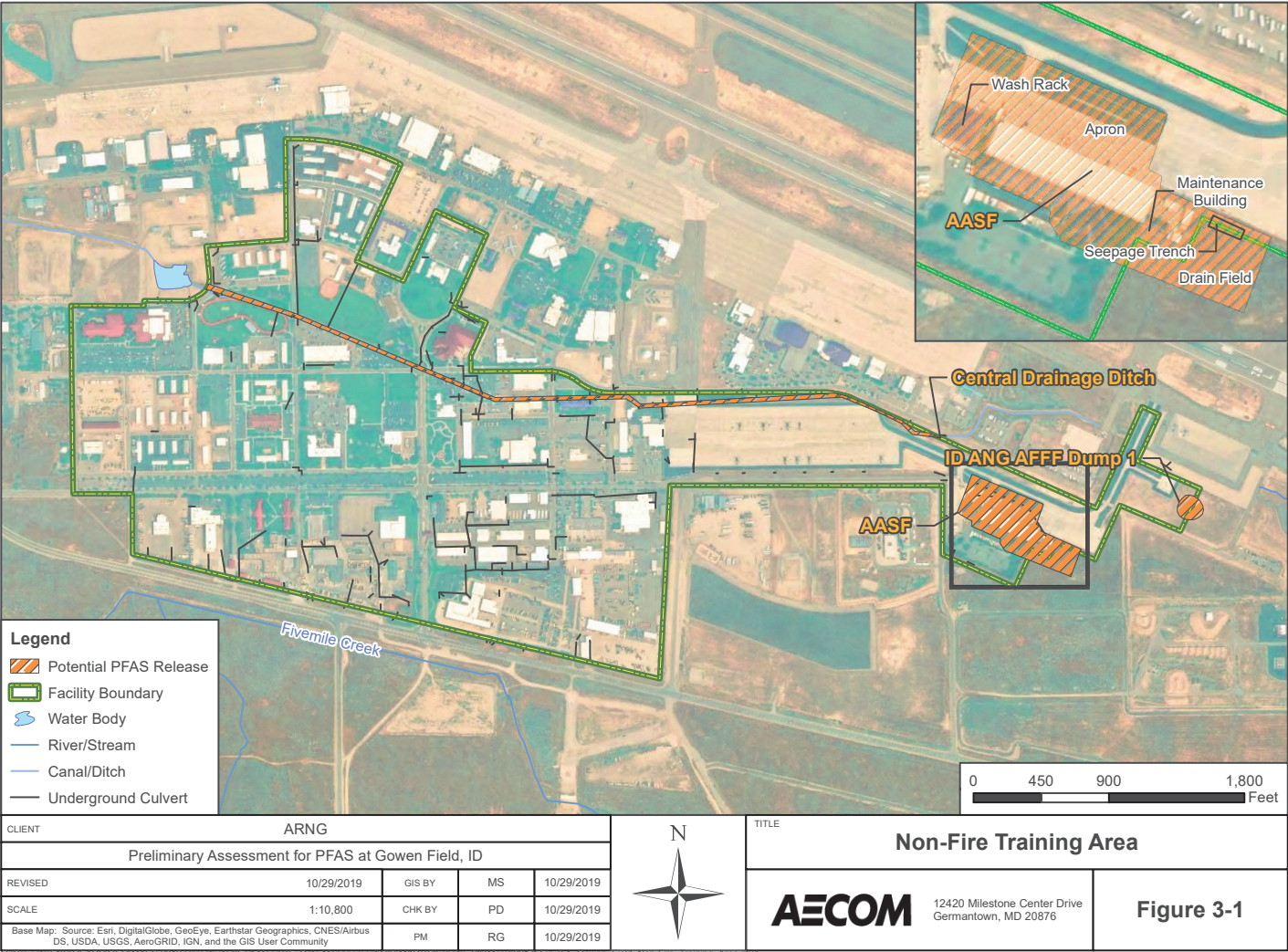
Historically, Tri-Max™ 30-gallon units containing AFFF were discharged in the vicinity of the AASF from 2005 – 2015. There were about 12 to 15 30-gallon Tri-Max™ units on the flight line during this time. It was reported that these units were fully expended before they were removed from the site, although the exact location of the foam discharge is unknown. Additionally, nozzle testing of the Tri-Max units was conducted about once every three years from 2005 to 2015 on the wash rack area and over the fence from the east compound into the adjacent grassy area. A staff member at the AASF reported that AFFF was also discharged on the flight line to clean up fuel spills on multiple occasions. The number of fuel spills and the quantity of AFFF used during these fuel spills is unknown.

3.2 Central Drainage Ditch

The Gowen Field Central Drainage Ditch begins on IDANG property off the northeast corner of the facility. The drainage ditch crosses onto IDARNG property at approximate geographic coordinates 43°33'28.6"N; 116°13'05.9"W. The ditch flows to the west and briefly crosses back onto IDANG property for approximately 500-ft, after which it crosses back onto IDARNG property and continues west across the north half of the installation until it drains into a retention pond adjacent to the west boundary of the installation (**Figure 3-1**).

Documented IDANG activities including historical AFFF releases have potentially entered the Central Drainage Ditch on IDARNG property. In particular, fire training activities at IDANG Former FTA #1, which is discussed in detail in **Section 5**, may have had an impact on the Central Drainage Ditch. AFFF discharges at the IDARNG AASF building discussed in **Section 3.1** would

not have impacted the Central Drainage Ditch. There is no surface water flow pathway from the AASF to the Central Drainage Ditch.



4. Emergency Response Areas

Information obtained during the PA identified no instances of emergency responses at the IDARNG Gowen Field installation from 1998 to present. Information on emergency responses prior to this time was not obtained. The AFFF tank in the enclosed aircraft wash rack has reportedly never been used, and Tri-Max™ units were never used for emergency response from at least 1998 to present.

The Gowen Field Fire Department covers emergency response to the IDARNG, IDANG, and municipal airport at Gowen Field. None of the staff interviewed during the PA site visit were aware of any event at the IDARNG part of the installation in which the Gowen Field Fire Department responded and used AFFF. Interview records appear in **Appendix B**.

5. Adjacent Sources

Nine potential off-facility sources of PFAS not under control of the IDARNG were identified during the PA. The sources are mentioned in the *Final Preliminary Assessment Report for Perfluorinated Compounds at Boise Air National Guard Boise, Idaho* which details the PFAS investigation conducted by the adjacent IDANG facility. A description of each potential off-facility source is presented below, and locations are shown on **Figure 5-1**.

5.1 IDANG Former FTA #1

The 230-foot diameter Former FTA #1 was in use from 1974 to 1989 as an unlined training area at which AFFF was released directly to the ground surface. Soils from the burn pit were disposed of at an off-facility landfill (CH2M Hill, 2015). Soil and groundwater samples taken at this location showed detections of PFAS (Leidos, 2019). The Former FTA #1 is located approximately 370 feet cross-gradient of the assumed regional groundwater flow direction but is located directly adjacent to the Central Drainage Ditch that eventually flows onto IDARNG property.

5.2 IDANG Former FTA #2

The Former FTA #2 was used for training activities from 1953 to 1974, with an average of 16 firefighting events held each year (HAZWRAP, 1994). Documentation reviewed during this PA does not specifically mention the use of AFFF at this location. However, given the documented use of AFFF for similar activities at the Former FTA #1, it is possible that AFFF was discharged at the Former FTA #2 from 1970 to 1974. The Former FTA #2 is located upgradient of the installation in terms of deep regional groundwater flow and downgradient of the installation in terms of shallow groundwater flow.

5.3 City Burn Pit

The installation Fire Chief reported Gowen Field fire personnel conducted semi-regular training activities using AFFF at the City Burn Pit, located approximately 1.6 miles to the east of Gowen Field, from at least 1998 to 2015. The Fire Chief also indicated that municipal fire departments used AFFF at this location. The amount and type of AFFF used is unknown, and documentation is not maintained by the installation fire department. The City Burn Pit is located downgradient of the shallow groundwater flow in this area and cross-gradient of the deep regional groundwater flow (HAZWRAP, 1994).

5.4 IDANG Hangar 148

The IDANG Hangar 148 has been equipped with an AFFF fire suppression system, including a 400-gallon AFFF tank, since 1982. Testing of the suppression system has occurred historically. AFFF was either allowed to enter the floor drains, which lead to the city of Boise waste water treatment plant, or on occasion, foam was vacuumed up and disposed of at the AFFF Dump 2 (**Section 5.8**). It was reported that no AFFF releases have escaped the confines of the hangar. PFAS were detected in soil, sediment, and surface water samples collected during a subsequent PFAS Site Inspection (SI) at this location (Leidos, 2019). IDANG Hangar 148 is located upgradient of the installation in terms of deep regional groundwater flow and downgradient of the installation in terms of shallow groundwater flow.

5.5 IDANG Hangars 1529 & 1530

The IDANG Hangars 1529 & 1530 are attached and share a fire suppression system with a 600-gallon AFFF tank. Testing of the suppression system has occurred, after which the AFFF either drained to the central floor drain that connects to the city of Boise waste water treatment plant, or on occasion, AFFF was vacuumed up and disposed of at the AFFF Dump 2 (**Section 5.8**) location. It was reported that no AFFF releases have escaped the confines of the hangars. PFAS were detected in sediment samples collected during a PFAS SI at this location (Leidos, 2019). IDANG Hangars 1529 & 1530 are located upgradient of the installation in terms of deep regional groundwater flow and downgradient of the installation in terms of shallow groundwater flow.

5.6 IDANG Hangar 155

The IDANG Hangar 155 has two large bays with floor drains that lead to an oil/water separator that discharges to the city of Boise waste water treatment plant. The fire suppression system in the building was charged with a 600-gallon AFFF tank until 2005, when it was replaced with high-expansion foam (HEF). No reported releases have escaped the confines of the hangar. PFAS were detected in soil and sediment samples collected during a PFAS SI at this location (Leidos, 2019). IDANG Hangar 155 is located upgradient of the installation in terms of deep regional groundwater flow and downgradient of the installation in terms of shallow groundwater flow.

5.7 Fire Station (Building 138)

The Fire Station has been operational since 1994 and serves the IDANG and the IDARNG at Gowen Field. AFFF is carried on four engines in the station, with between 55 and 210 gallons on each vehicle. An additional 880 gallons of AFFF are stored in 55-gallon drums with secondary containment measures in place. Trench drains in the building lead to the city of Boise waste water treatment plant. No reported AFFF releases have escaped the confines of the building (CH2M Hill, 2015). PFAS were detected in soil, groundwater, and sediment samples collected during a PFAS SI at this location (Leidos, 2019). The Fire Station (Building 138) is located upgradient of the installation in terms of deep regional groundwater flow and downgradient of the installation in terms of shallow groundwater flow.

5.8 IDANG AFFF Dump 2

AFFF released at IDANG hangars was occasionally disposed of in two locations, and one is the IDANG AFFF Dump 2. It is unknown how much AFFF was moved to Dump 2. AFFF Dump 2 is located approximately 240 feet south of IDARNG property, down-gradient of the assumed regional groundwater flow direction, and upgradient of the IDARNG facility relative to assumed shallow groundwater flow. PFAS were detected in soil and groundwater samples collected during a PFAS SI at this location (Leidos, 2019).

5.9 2012 Plane Crash

In February 2012, IDANG responded to a private plane crash located on the south side of the main runway, about 0.4 miles from IDARNG property, during which, an unknown quantity of AFFF was used to extinguish the flames (Leidos, 2019). The 2012 Plane Crash Location is located upgradient of the installation in terms of deep regional groundwater flow and downgradient of the installation in terms of shallow groundwater flow.



CLIENT				
ARNG				
Preliminary Assessment for PFAS at Gowen Field, ID				
REVISED	10/29/2019	GIS BY	MS	10/29/2019
SCALE	1:20,400	CHK BY	PD	10/29/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	10/29/2019



Adjacent Sources	
AECOM	12420 Milestone Center Drive Germantown, MD 20876
Figure 5-1	

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6. Preliminary Conceptual Site Model

Based on the PA findings, three AOIs were identified at Gowen Field: AOI 1 AASF, AOI 2 Central Drainage Ditch, and AOI 3 IDANG AFFF Dump 1. The AOIs 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. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways is sparse and continues to be the subject of PFAS toxicological study. Receptors for Gowen Field include site workers, construction workers, residents, and trespassers. The CSMs for each AOI indicate which specific receptors could potentially be exposed to PFAS.

6.1 AOI 1 AASF

AOI 1 is the AASF. PFAS releases to the soil and pavement by the IDARNG occurred multiple times during nozzle testing from 2005 to 2015. The AASF is located on the eastern boundary of the installation. No remediation activities have occurred at AOI 1.

PFAS are water soluble and can migrate readily from soil and pavement to groundwater, which is estimated to begin at 120 to 200 feet bgs. Because PFAS releases to surface soil at AOI 1 have occurred, PFAS may migrate from the surface soil to the groundwater via leaching. PFAS releases to the pavement would enter the storm drains and release to the subsurface soil via the drain field adjacent to the AASF. Drinking water for Gowen Field is supplied by a local supplier, Suez Water, which has two wells located 2 miles north of the installation, and one well 4,000 feet to the west of the installation. The entire Suez Water system supplies about 214,000 people in addition to Gowen Field (Leidos, 2019). As of the date of this report, AECOM does not have knowledge of any testing for PFAS done on Suez supplied water. According to the Idaho Department of Water Resources data, hundreds of private wells are located within a 3-mile radius of the installation, with screen intervals at varying depths (IDWR, 2019). **Figure 6-1** shows two water supply wells within the installation footprint, however, these wells are no longer active and do not represent a potential groundwater receptor.

Ground-disturbing activities to surface soil at AOI 1 may result in site worker, construction worker, and trespasser exposure to potential PFAS contamination. The pathway for inhalation of airborne soil particulates is potentially complete for the same receptors. Ground-disturbing activities to subsurface soil could result in potential construction worker exposure. Based on information gathered during the PA, three public supply wells are located within 2 miles of the facility boundary; However, recharge for the deep aquifer does not occur in the Gowen Field footprint, and it is unlikely that these wells will be impacted. Therefore, the deep groundwater pathway to all receptors is incomplete. However, many private water wells are located downgradient of AOI 1. These private drinking water wells may be screened in shallow aquifers and could potentially be impacted by PFAS releases at AOI 1. Therefore, the exposure pathway for groundwater to off-installation residents is potentially complete. No surface water features flow through this AOI; therefore, surface water and sediment exposure pathways are incomplete for AOI 1. The preliminary CSM for AOI 1 is shown on **Figure 6-2**.

6.2 AOI 2 Central Drainage Ditch

AOI 2 is the Central Drainage Ditch. AFFF releases to the soil and pavement from off-facility IDANG sources discussed in **Section 5** may have flowed to the Central Drainage Ditch within Gowen Field. AFFF discharges at the IDARNG AASF building discussed in **Section 6.1** would not have impacted the Central Drainage Ditch. There is no surface water flow pathway from the AASF to the Central Drainage Ditch. No remediation activities have occurred at AOI 2.

During a 2019 PFAS SI (**Appendix A**) conducted by the IDANG, PFAS were detected in soil and groundwater at the IDANG Former FTA #1, which is adjacent to the easternmost portion of the central drainage ditch (Leidos, 2019). PFAS were also detected in surface water and sediment samples taken from the outfall of the Central Drainage Ditch at the western boundary of the IDARNG Gowen Field facility during the 2019 IDANG PFAS SI. Many portions of the Central Drainage Ditch on the IDARNG facility are unlined, and there is the potential for PFAS present in the surface water or sediment within the ditch to leach into the groundwater at Gowen Field.

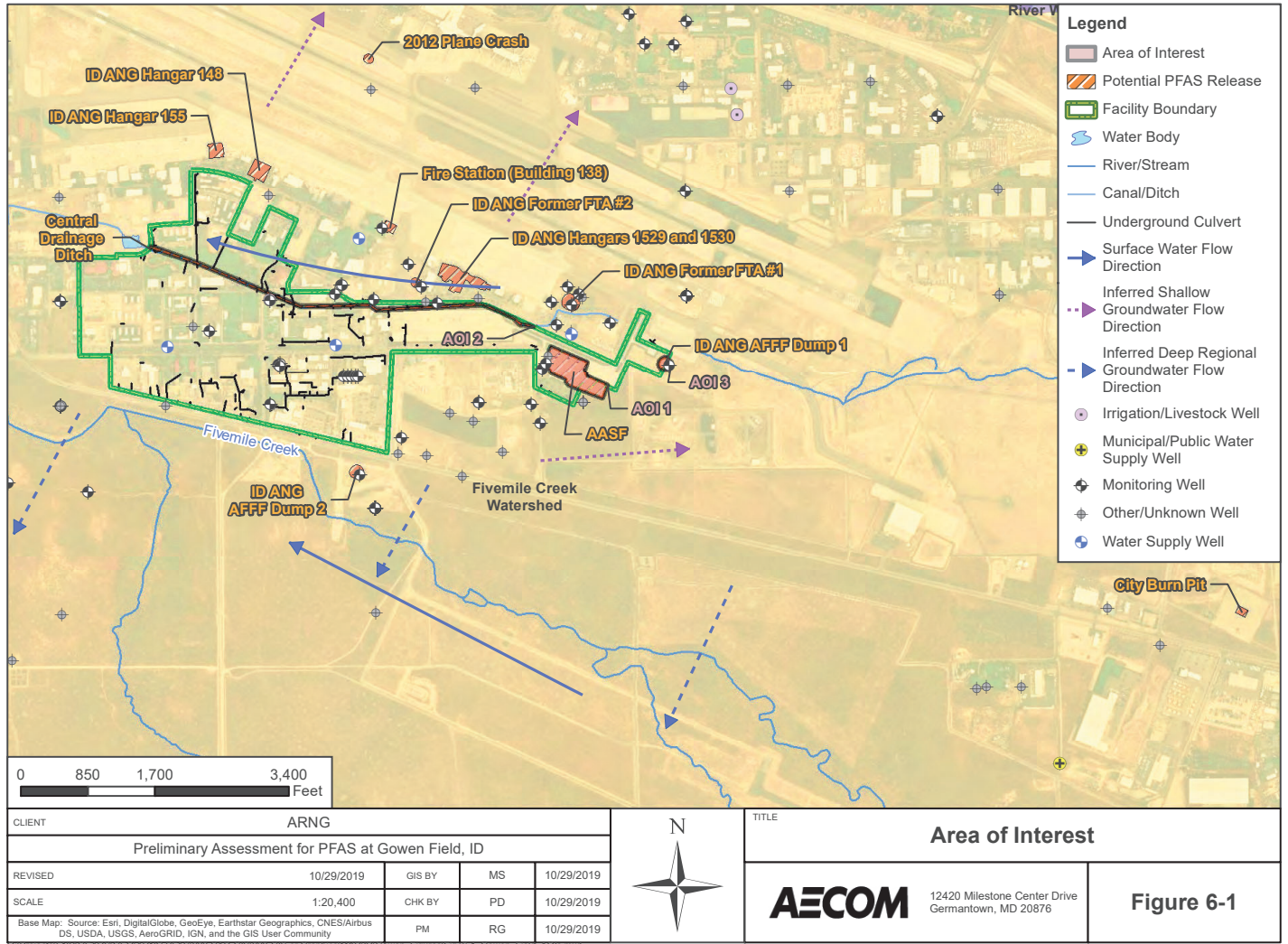
Ground disturbing activities to surface soil and sediment at AOI 2 may result in site worker, construction worker, and trespasser exposure to potential PFAS contamination. The pathway for airborne soil particulates to those receptors is also potentially complete. Ground-disturbing activities to subsurface soil could result in construction worker exposure, and this pathway is potentially complete. Recharge to the deep aquifer which feeds public drinking water supply does not occur in the Gowen Field footprint. Therefore, the deep groundwater pathway to all receptors is incomplete. Private wells located near Gowen Field have the potential to be impacted by PFAS contamination leaching from sediment and soil to shallow groundwater at AOI 2. Therefore, the exposure pathway for shallow groundwater to off-installation residents is potentially complete. Given the detections of PFAS in surface water and sediment at the Central Drainage Ditch during the 2019 IDANG PFAS SI, the exposure pathways for site workers, construction workers, and trespassers is potentially complete for these media. The preliminary CSM for AOI 2 is shown on **Figure 6-3**.

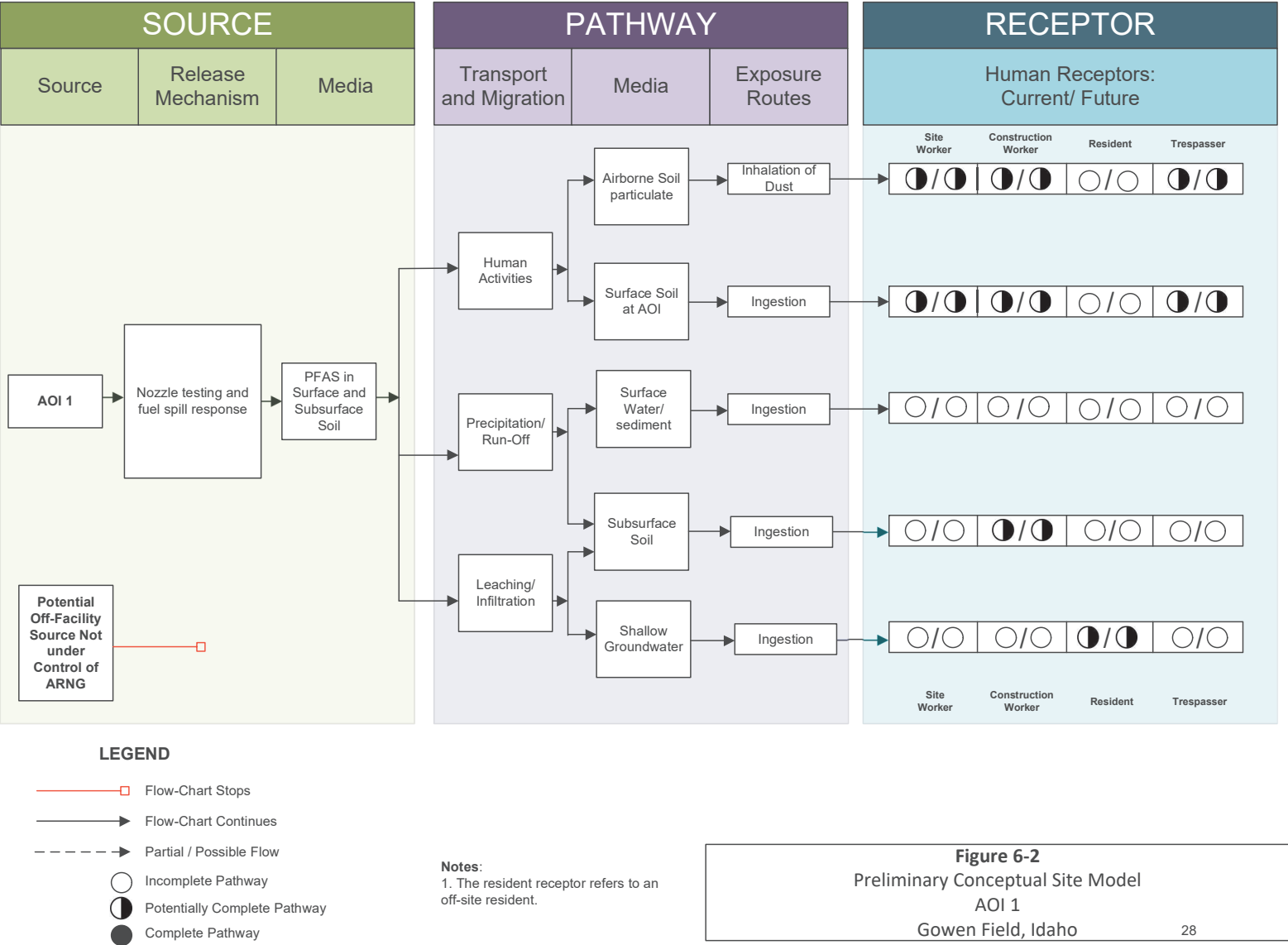
6.3 AOI 3 IDANG AFFF Dump 1

AOI 3 is the IDANG AFFF Dump 1. AFFF releases to the soil as a result of IDANG dumping of used AFFF have occurred at least six times from 2014 – present. This area is located on the eastern boundary of the installation. No remediation activities have occurred at AOI 3.

During a 2019 PFAS SI (**Appendix A**) conducted by the IDANG, PFAS were detected in soil and groundwater samples collected (Leidos, 2019). This SI report shows the dump location at least partially on IDARNG property.

Ground disturbing activities to surface soil at AOI 3 may result in site worker, construction worker, and trespasser exposure to potential PFAS contamination. The pathway for airborne soil particulates to those receptors is potentially complete. Ground-disturbing activities to subsurface soil could result in construction worker exposure, and this pathway is potentially complete. Recharge to the deep aquifer which feeds public drinking water supply does not occur in the Gowen Field footprint. Therefore, the deep groundwater pathway to all receptors is incomplete. Private wells located near Gowen Field have the potential to be impacted by PFAS contamination leaching from soil to shallow groundwater at AOI 3. Therefore, the exposure pathway for shallow groundwater to off-installation residents is potentially complete. Surface water and sediment exposure pathways are incomplete at AOI 3, given the absence of these media. The preliminary CSM for AOI 3 is shown on **Figure 6-4**.





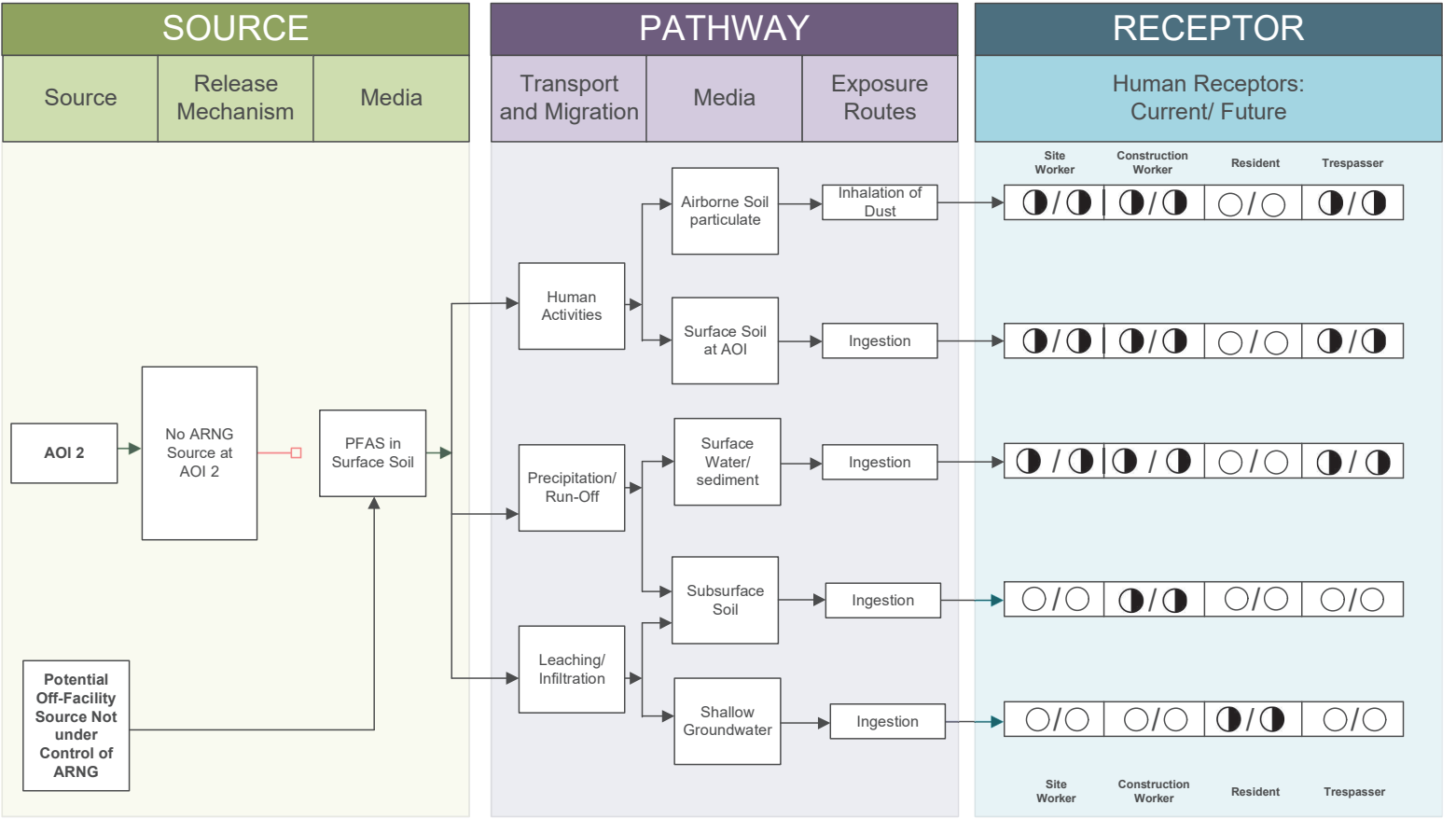
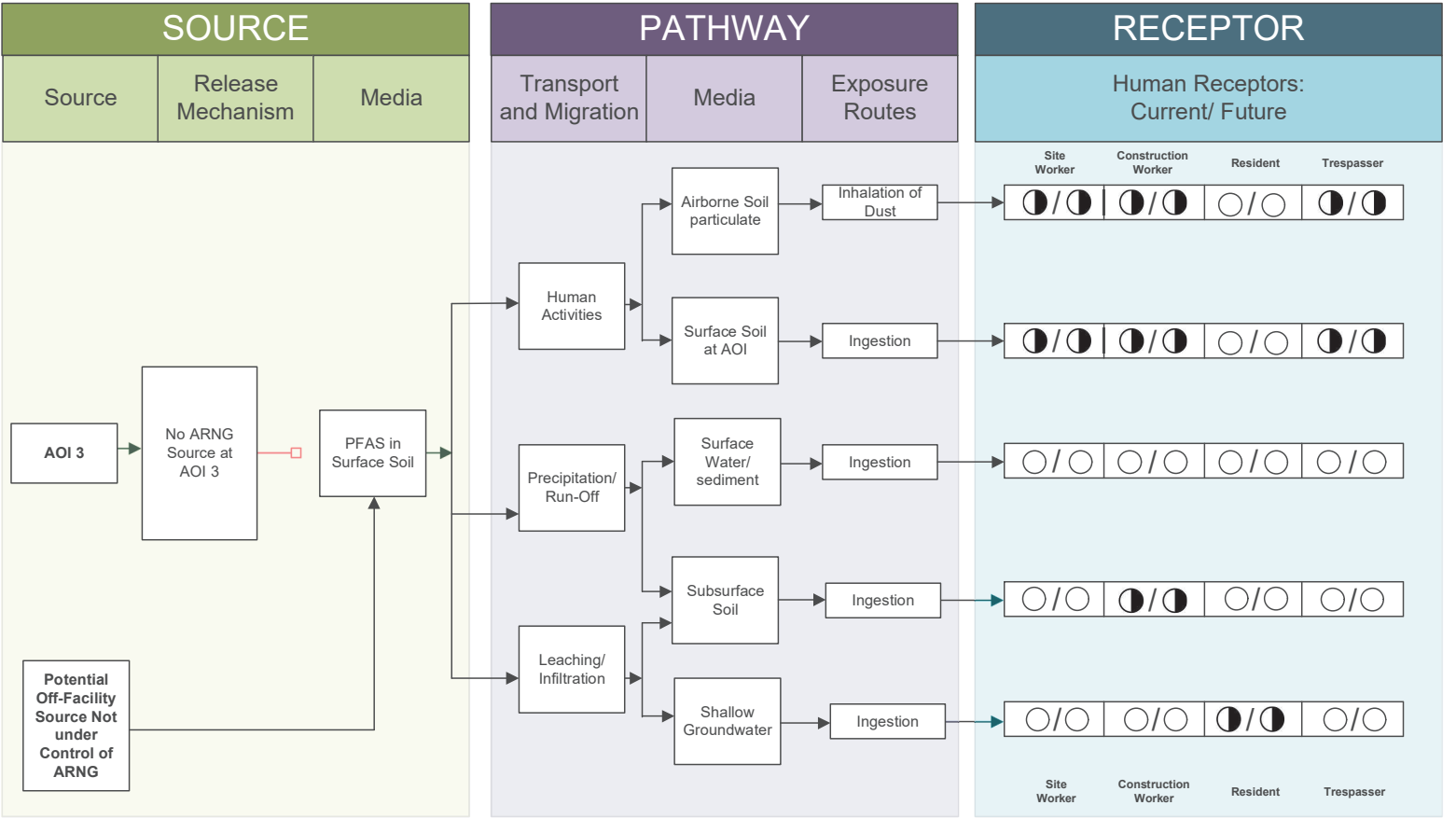


Figure 6-3
Preliminary Conceptual Site Model
AOI 2
Gowen Field, Idaho



LEGEND

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

Notes:
1. The resident receptor refers to an off-site resident.

Figure 6-4
Preliminary Conceptual Site Model
AOI 3
Gowen Field, Idaho

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 Gowen Field. 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 (**Table 7-1**) at Gowen Field during the PA (**Figure 7-1**).

Table 7-1: AOIs at Gowen Field

Potential Release Area	Used By	Determination	Rationale
AOI 1 AASF	IDARNG	Reported AFFF releases	AFFF releases occurred between 2005 and 2015 multiple times per year during nozzle testing, fuel spills, and to empty Tri-Max units prior to disposal. Water and AFFF captured by storm drains at AOI 1 is released to the adjacent drain field via a subsurface seepage trench.
AOI 2 Central Drainage Ditch	IDARNG & IDANG	Reported AFFF releases at adjacent off-facility IDANG location	AFFF releases occurred during the 1970s and 1980s at the off-facility IDANG Former FTA #1 which is adjacent to the most upgradient portion of the Central Drainage Ditch; PFAS were detected in environmental media during a 2019 IDANG PFAS SI at the former FTA and at the outfall of the Central Drainage Ditch. AFFF releases at the IDARNG AASF have not impacted the Central Drainage Ditch.
AOI 3 IDANG AFFF Dump 1	IDARNG & IDANG	Reported AFFF dumping by IDANG	Dumping of AFFF occurred at least 6 times from 2014 - present.

Numerous potential off-facility sources of PFAS were considered in the local area surrounding Gowen Field. These include:

- IDANG Former FTA #1 – AFFF was used as a part of fire training activities for 14 years, and a PFAS SI at the base reported detections of PFAS in soil and groundwater; It is possible that AFFF entered the adjacent Central Drainage Ditch which flows onto the IDARNG facility
- IDANG Former FTA #2 – Given the time period of operation, AFFF was potentially used in this location
- Current FTA – AFFF was used for training activities by IDANG, IDARNG, and municipal firefighting personnel for over 15 years

- IDANG Hangar 148 – testing of the AFFF-charged fire suppression system has occurred multiple times
- IDANG Hangars 1529 & 1530 – testing of the AFFF-charged fire suppression system has occurred multiple times
- IDANG Hangar 155 – the AFFF suppression system, which was operational until 2005, may have been released inside the hangar
- Fire Station (Building 138) – AFFF is carried on trucks and stored in drums inside the fire station
- IDANG AFFF Dump 2 – AFFF has been dumped in this area by the IDANG at least 1 time
- 2012 Plane Crash – an unknown quantity of AFFF was used to respond to a private plane crash 0.4 miles to the north of the installation

Based on documented potential PFAS releases at AOI 1 and the documented PFAS presence at AOI 2 and AOI 3, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for Gowen Field is shown on **Figure 6-2**, which presents the potential receptors and media impacted.

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 disposal.

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. However, interview information only extended back to 1995. 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. Previous environmental reports and data resources were used to supplement the information gathered during interviews (**Appendix A**). 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, current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected. **Table 7-2** summarizes the uncertainties associated with the PA:

Table 7-2: Uncertainties within the PA

Area of Interest	Source of Uncertainty
General	Interviewees direct knowledge of fire training activities only extended back to 1998 and to 1995 for general site operations. IDARNG occupancy began in 1946, leaving at least a 20-year gap in information relative to the

approximate earliest use of AFFF by the military (about 1970).

General	There are varying flow directions in the deep and shallow aquifers in the Boise area, and the exact groundwater flow directions were not determined in this PA.
AOI 1 AASF	The amount and type of AFFF released in this area is unknown.
AOI 2 Central Drainage Ditch	The amount of AFFF that entered the drainage ditch from the adjacent IDANG sources is unknown.
AOI 3 IDANG AFFF Dump 1	The frequency and volume of AFFF dumped from 2014 – present is unknown.

7.3 Potential Future Actions

Interviews and records (covering 1990s to present) indicate that current or former IDARNG activities may have resulted in potential PFAS releases at AOI 1, and former IDANG activities have resulted in potential PFAS releases to AOI 2 and AOI 3. Based on the CSM developed for the AOIs, there is potential for receptors to be exposed to PFAS contamination in soil, groundwater, surface water, and sediment. The following table summarizes the rationale used to determine if the AOI should be considered for further investigation under the CERCLA process and undergo a Site Inspection (SI).

Table 7-3: PA Findings Summary

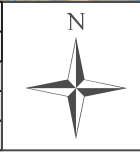
Area of Interest	AOI Location	Rationale	Potential Future Action
AOI 1 AASF	43°33'22.6"N; 116°13'00.1"W	Unknown quantity of AFFF released during nozzle testing activities and fuel spill response from 2005 to 2015.	Proceed to an SI, focus on soil, and shallow groundwater.
AOI 2 Central Drainage Ditch	Enters facility at 43°33'28.6"N; 116°13'05.9"W Exits facility at 43°33'38.7"N; 116°14'11.4"W	Unknown quantity of AFFF entered the ditch during IDANG fire training activities adjacent to the facility in the 1970s and 1980s.	Proceed to an SI, focus on soil, shallow groundwater, surface water, and sediment. ¹
AOI 3 IDANG AFFF Dump 1	43°33'24" N; 116°12'43" W	Unknown quantity of AFFF dumped by IDANG from 2014 – present.	Proceed to an SI, focus on soil, shallow groundwater, surface water, and sediment. ¹

¹ = ARNG and ANG will evaluate the need for an SI at AOI 2 and AOI 3 pending a decision on which entity will conduct future investigations at these locations.

ARNG will evaluate the need for an SI at AOI 1 at Gowen Field based on the potential receptors, the potential migration of PFAS contamination off the facility, and the availability of resources. ARNG and ANG will evaluate the need for an SI at AOI 2 and AOI 3 pending a decision on which entity will conduct future investigations at these locations.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Gowen Field, ID			
REVISED	10/29/2019	GIS BY	MS	10/29/2019
SCALE	1:20,400	CHK BY	PD	10/29/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	10/29/2019



TITLE		Summary of Findings	
AECOM		12420 Milestone Center Drive Germantown, MD 20876	Figure 7-1

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