FINAL
Preliminary Assessment Report
Martindale Army Aviation Support Facility
San Antonio, Texas

Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

July 2020

Prepared for:

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

UNCLASSIFIED

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Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	area of interest
ARNG	Army National Guard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	conceptual site model
EDR™	Environmental Data Resources, Inc.
ºF	degrees Fahrenheit
FTA	fire training area
IED	Installations and Environment Division
HA	Health Advisory
OMS	Organizational Maintenance Shop
OWS	oil-water separator
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
ppt	parts per trillion
SI	Site Inspection
TBWE	Texas Board of Water Engineers
TXARNG	Texas Army National Guard
UCMR3	Unregulated Contaminant Monitoring Rule 3
US	United States
USACE	United States Army Corps of Engineers
USACHPPM	US Army Center for Health Promotion and Preventive Medicine
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VSI	visual site inspection

Executive Summary

The Army National Guard (ARNG) is performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide*. A PA for per- and polyfluoroalkyl substances (PFAS)-containing materials was completed for Martindale Army Aviation Support Facility (AASF; also referred to as the "facility") in San Antonio, Texas, to assess potential PFAS release areas and exposure pathways to receptors. The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility
- Conducted a 1-day site visit on 24 April 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed
- Interviewed personnel during the site visit who were associated with Martindale AASF activities, including the Martindale AASF Aviation Safety Officer (on site since 2003)
- Identified areas of interest (AOIs) and developed preliminary conceptual site models (CSMs) to outline the potential release, pathway, and receptors of PFAS for Martindale AASF

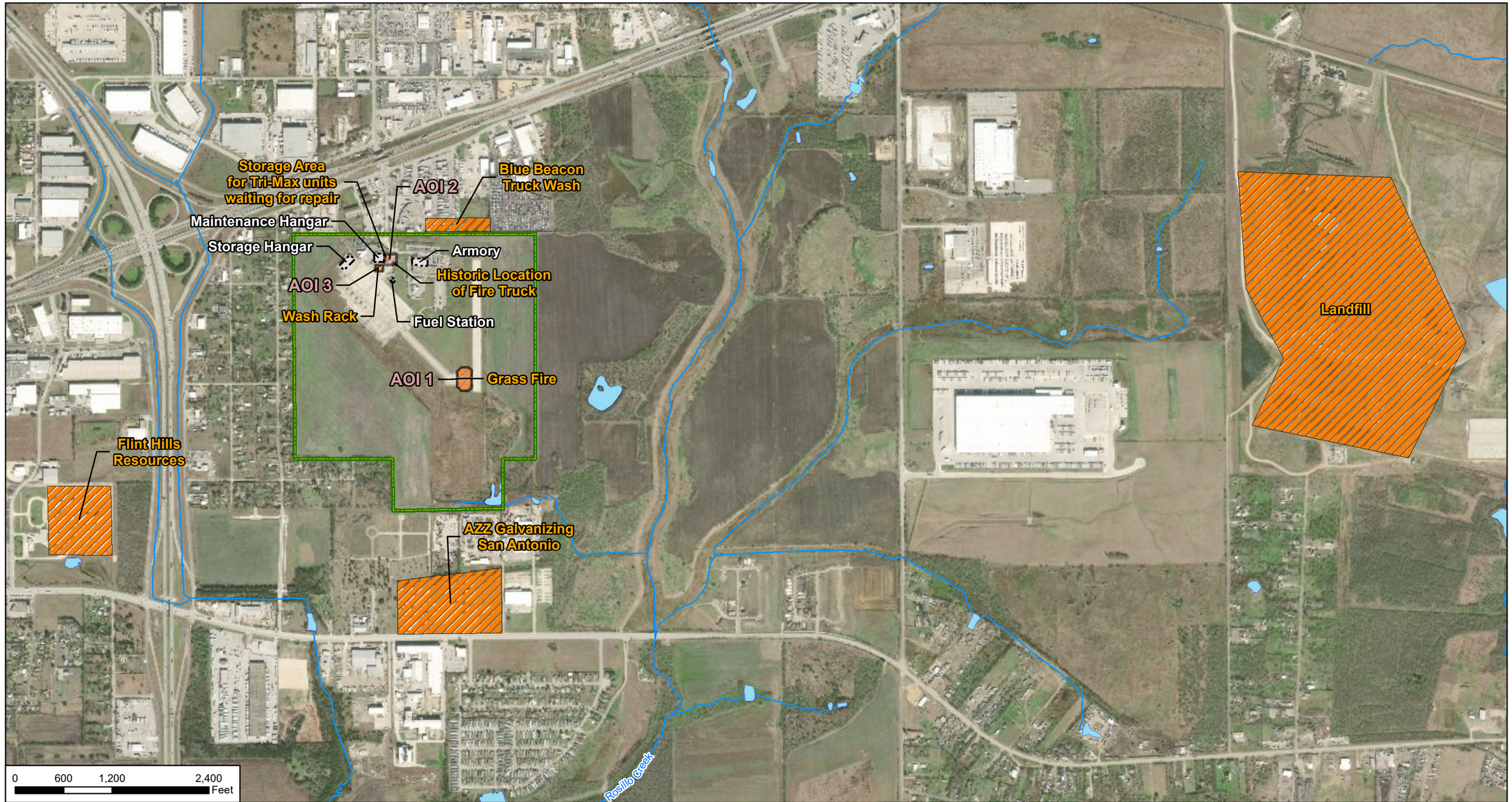
Three PFAS releases were identified during the PA, as described below. These releases constitute three AOIs identified at Martindale AASF. The AOIs are shown in **Figure ES-1** and summarized in **Table ES-1** below.

Table ES-1: AOIs at Martindale AASF

Area of Interest	Description	Used by	Release Dates
AOI 1	A Tri-Max™ unit was used to fight a grass fire adjacent to the flight line, at the southeast end of the flight line. The dispersed AFFF would likely collect in low lying areas and infiltrate into the ground.	TXARNG	Sometime between 1999 and 2014 (period during which Tri-Max™ units were used onsite)
AOI 2	The area east of the Maintenance Hangar includes the staging area where Tri-Max™ units were stored and serviced onsite by an outside contractor. Servicing the units required periodic exchange of the AFFF fluids which were then disposed at the facility, possibly at the same area. AFFF disposed at this area would have migrated to the surrounding grassy areas and eventually infiltrated into the ground. Additionally, the fire truck was historically located further east of the Maintenance Hangar and is assumed to have been equipped with AFFF tanks. AFFF potentially leaked from the fire truck and infiltrated into the soil below.	TXARNG	Sometime between 1999 and 2014 (period during which Tri-Max™ units were used onsite). Firetruck on site from 1980s-1990s.

AOI 3	The wash rack was potentially used to dispose of AFFF during onsite servicing of the Tri-Max™ units. AFFF that flowed into the wash rack would reach the oil-water separator (OWS), and then depending on the position of a diverter valve, would either travel through underground piping to the sanitary sewer or through a series of manholes to Rosillo Creek and then to Salado Creek.	TXARNG	Sometime between 1999 and 2014 (period during which Tri-Max™ units were used onsite)

Based on the reported AFFF release at these AOIs, there is potential for exposure to PFAS contamination in media at the facility. The preliminary CSMs for AOIs 1 through 3, which present the potential receptors and media impacted, are shown on **Figure ES-2** through **ES-4**. There is currently no complete pathway for exposure to PFAS in groundwater to residents via ingestion because all residents within a 1-mile radius of the facility are on city-supplied drinking water. Based on the US Environmental Protection Agency (USEPA) Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, it was indicated that no PFAS were detected in a public water system above the USEPA Health Advisories (HA) within 20 miles of the facility. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.



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PROJECT	Preliminary Assessment for PFAS at Martindale AASF, TX			
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SCALE	1:14,400	CHK BY	MC	2/20/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	2/20/2020

Legend

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

N

Summary of Findings

AECOM
12420 Milestone Center Drive
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Figure ES-1

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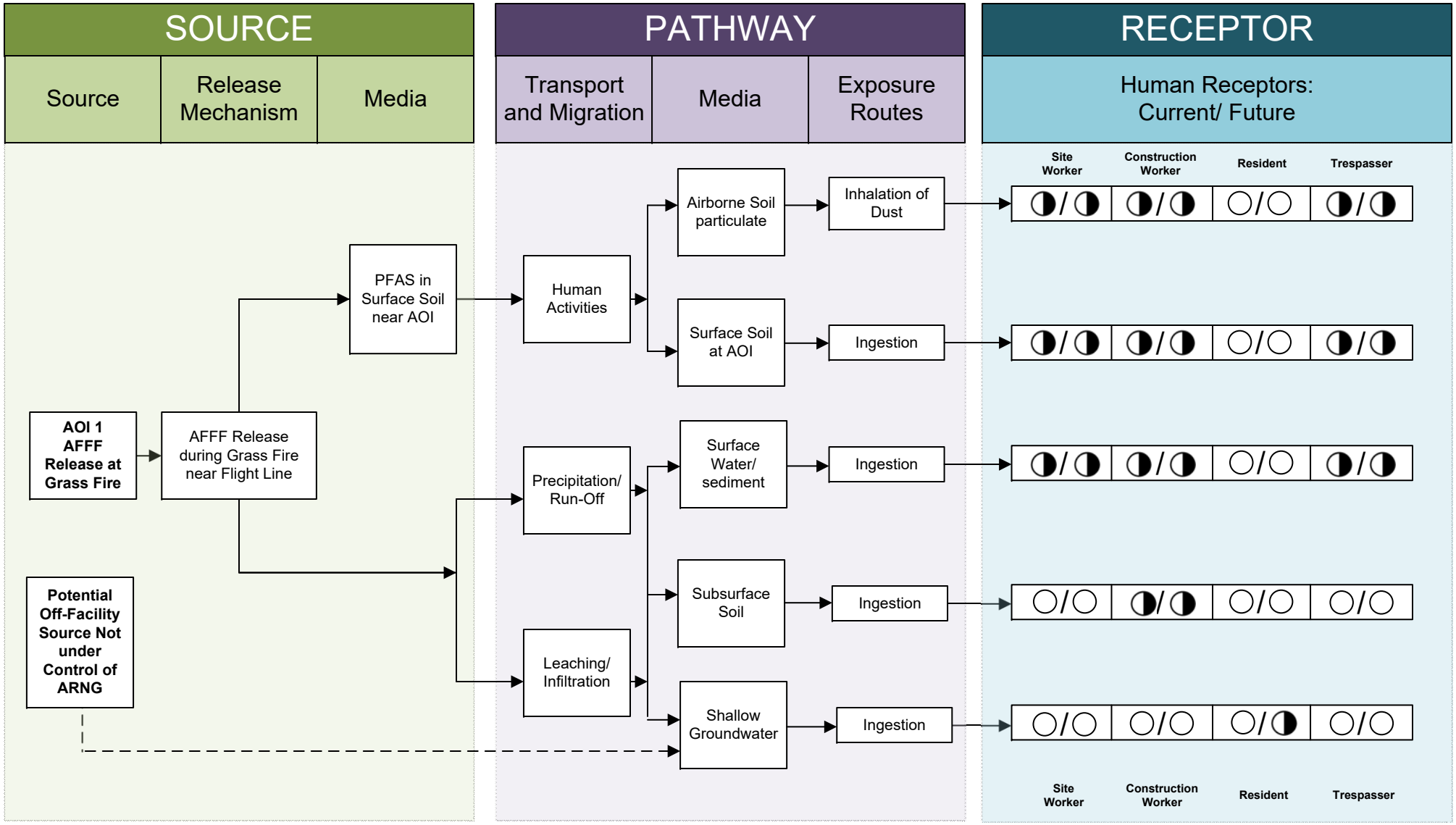
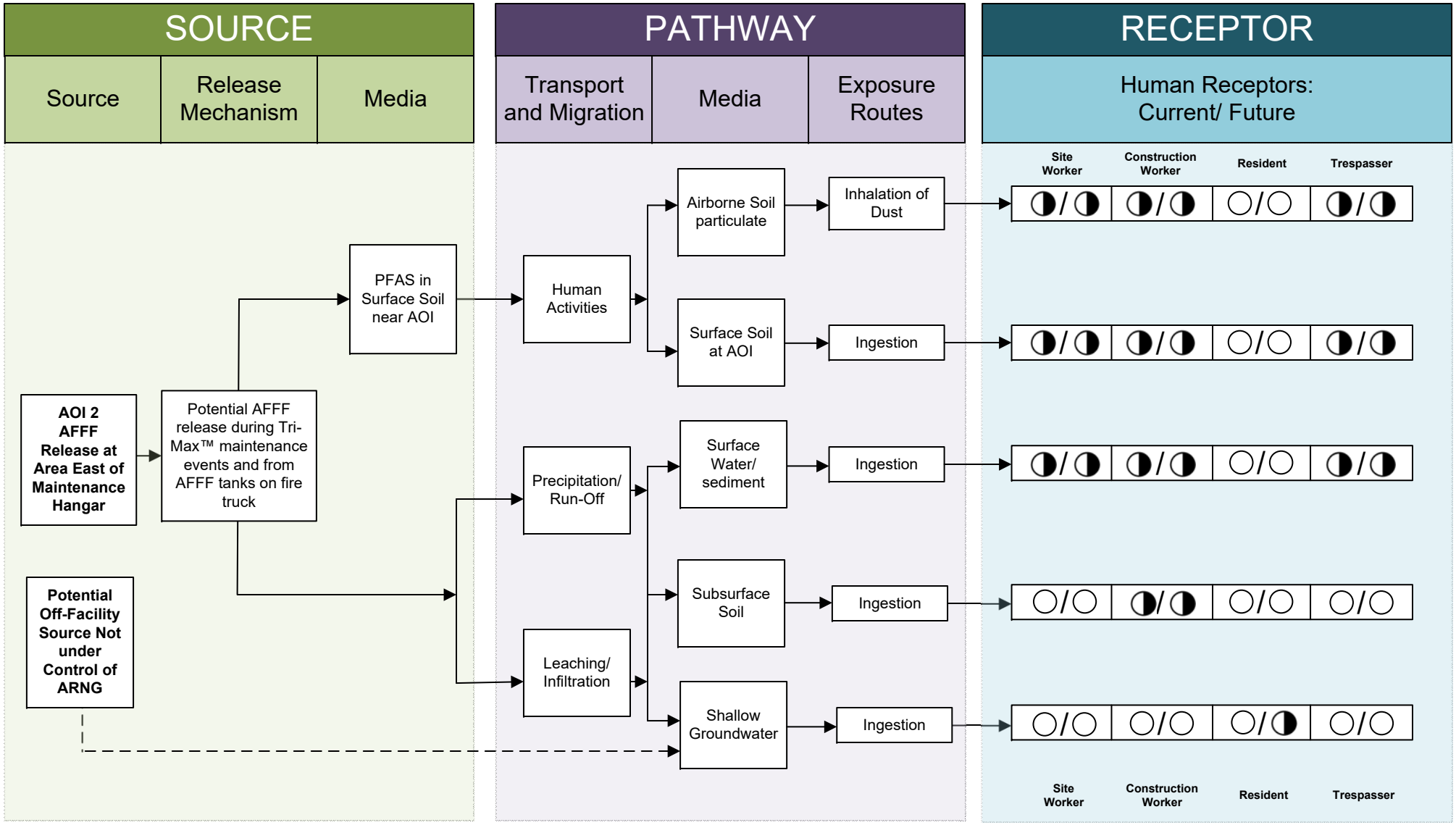


LEGEND

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

Note:
1. The residential receptor refers to an off-facility receptor.

Figure ES-2
Preliminary Conceptual Site Model
AOI 1 AFFF Release at Grass Fire near Flight Line at Martindale AASF

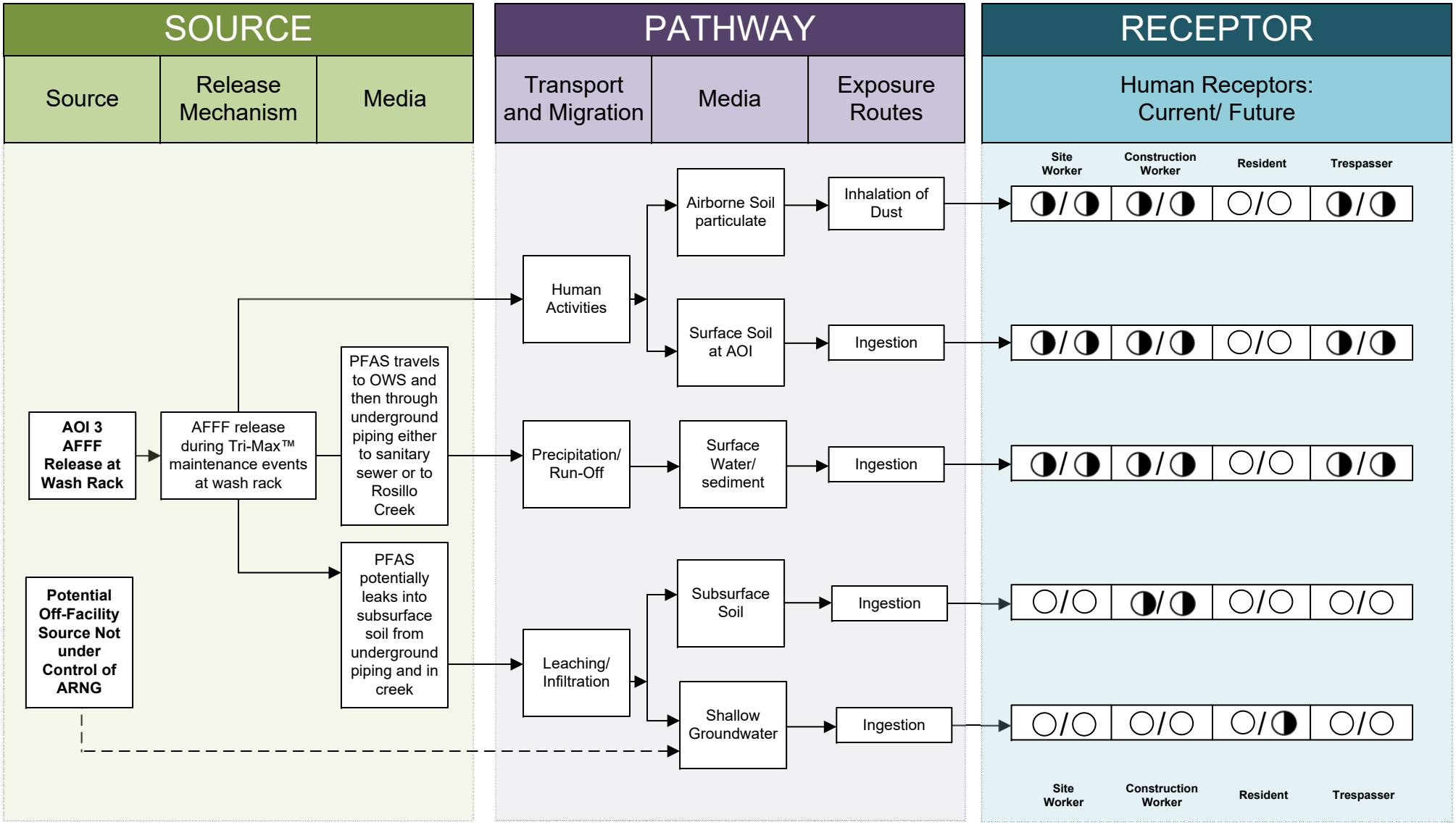


LEGEND

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

Note:
1. The residential receptor refers to an off-facility receptor.

Figure ES-3
Preliminary Conceptual Site Model
AOI 2 AFFF Release at Area East of Maintenance Hangar at Martindale AASF



LEGEND

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

Note:
1. The residential receptor refers to an off-facility receptor.

Figure ES-4
Preliminary Conceptual Site Model
AOI 3 AFFF Release at Wash Rack at Martindale AASF

1. Introduction

1.1 Authority and Purpose

The Army National Guard (ARNG)-G9 is the lead agency in performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites at ARNG Facilities Nationwide*. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor AECOM Technical Services, Inc. (AECOM) under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017.

The ARNG 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. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued a drinking water lifetime Health Advisory (HA) for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water.

This report presents findings of a PA for PFAS-containing materials at Martindale Army Aviation Support Facility (AASF; also referred to as the “facility”) in San Antonio, Texas, 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 Army requirements and guidance.

This PA documents the locations where PFAS were historically stored and reportedly released into the environment at Martindale AASF. 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 available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility
- Conducted a 1-day site visit on 24 April 2019 and completed visual site inspections (VSIs) at locations where PFAS-containing materials were suspected of being stored, used, or disposed
- Interviewed personnel during the site visit who were associated with Martindale AASF activities, including the Martindale AASF Aviation Safety Officer (on site since 2003)
- Identified areas of interest (AOIs) and developed preliminary conceptual site models (CSMs) to outline the potential release, pathway, and receptors of PFAS for Martindale AASF

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 potential or suspected fire training areas (FTAs) at the facility identified during the site visit
- **Section 3** – **Non-Fire Training Areas:** describes other locations of potential or suspected PFAS releases at the facility identified during the site visit
- **Section 4** – **Emergency Response Areas:** describes areas of suspected or potential AFFF release at the facility, specifically in response to emergency situations
- **Section 5** – **Adjacent Sources:** describes sources of PFAS release adjacent to the facility that are not under the control of ARNG
- **Section 6** – **Preliminary Conceptual Site Model:** describes the pathways of PFAS transport and receptors at the areas of interest (AOIs)
- **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

Martindale AASF is located within the San Antonio city limits, southeast of the intersection of Interstate 10 and Interstate 410. The facility is located 7 miles east of downtown San Antonio (**Figure 1-1**). The facility comprises approximately 220 acres of mostly grassland, as well as a storage hangar, maintenance hangar, armory, and flight lines (US Army Center for Health Promotion and Preventive Medicine [USACHPPM], January 1997). The facility was opened by the US Air Force in 1943 for the purpose of training and was restricted to take offs and landings. The property deed was transferred from the Air Force to the ARNG in 1954. Most of the buildings were constructed in the early 1960's except for the current Organizational Maintenance Shop (OMS) built in 1991, the Storage Hangar built in 2004, and additional facility support buildings built from 2010 to 2012.

1.5 Facility Environmental Setting

Martindale AASF is located in Bexar County, south-central Texas, approximately 140 miles northwest of the Gulf of Mexico. The facility is about 10 miles northwest of Calaveras Lake and less than 1 mile west of Rosillo Creek. The 220-acre facility is located within the San Antonio city limits, east of the city center. Industrial/commercial properties lie to the north, with Interstate 10 beyond. West and southwest of the facility are predominately single-family homes, with Interstate 410 beyond. East and southeast of the facility are agricultural/undeveloped properties with Rosillo Creek beyond. South of facility are industrial/undeveloped properties, with E. Houston Street

beyond. As described in **Section 5**, some nearby industrial facilities represent potential PFAS sources.

1.5.1 Geology

The facility is underlain by fluviatile terrace deposits of the Quaternary period consisting of gravel, sand, silt and clay. The fluviatile terrace deposits are underlain by the Midway Group consisting of clay and sand deposited in the Tertiary period (**Figure 1-2**) (USACHPPM, January 1997). The Edwards Limestone outcrops about 10 miles to the north-northwest of the facility, on the upward shifted side of significant northeast – southwest trending normal faults (Bureau of Economic Geology, 1982). The facility lies on the downward-shifted side of this fault zone and therefore has several hundred feet of younger Quaternary, Tertiary and Upper Cretaceous geologic units overlying the Edwards Limestone (Texas Board of Water Engineers [TBWE], 1959).

1.5.2 Hydrogeology

The Edwards Limestone is the sole-source aquifer for the San Antonio area, and San Antonio obtains its entire water supply from this aquifer. The presence of a fault zone coupled with the high degree of fracturing in the limestone results in a complex flow pattern. The top of the Edwards aquifer is bounded by an upper confining layer, resulting in artesian conditions. The nearest water supply well is approximately 1.5 miles north of the facility. The well is reported as 1,139 feet deep and supplies the City of Kirby. Shallower water-bearing zones are most likely discontinuous perched lenses and not used as a drinking water supply in the San Antonio area (USACHPPM, January 1997). Shallow unconfined groundwater would normally follow the local topography, which is to the southeast, towards Rosillo Creek.

No wells exist at the facility. An exploratory boring was drilled on 8 July 1988 to provide information to bidders on a contract to construct the OMS building. The borehole extended to a depth of 20.5 feet, and it remained open for at least 3 days, at which time the groundwater level was measured at 15.8 feet below the ground surface. There are no data available on the behavior of this uppermost water-bearing zone at the facility. The shallow water is not used as a drinking water supply in the San Antonio area and is probably a discontinuous perched lens with little or no interconnection with the Edwards aquifer (USACHPPM, January 1997). The direction of groundwater flow at the facility has not been determined because of the lack of static water level data collected from area wells. However, the general groundwater flow in the Edwards aquifer in San Antonio is to the southeast (TBWE, August 1954).

A query of the Texas Water Development Board's Interactive Groundwater Data Viewer identified 71 monitoring wells and 92 environmental soil boring records within a 1-mile radius of the center of the facility (**Figure 1-2**). The monitoring wells directly north of the facility are owned by Travel Centers of America, and NuStar Logistics, LP owns 13 monitoring wells approximately 0.8 miles northeast of the facility. Midtex Oil, LP and CCC Group own 18 monitoring wells approximately 0.8 miles north-northeast of the facility. Other monitoring wells located within a 1-mile radius of the facility are owned by LIT Industrial Texas, LP, Southwest Galvanizing, Summit Truck Group, and York International Corp., among others.

The facility's drinking water is supplied by the City of San Antonio. Based on the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, it was indicated that no PFAS were detected in a public water system above the HA within 20 miles of the facility. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.

1.5.3 Hydrology

Surface water at the facility flows through ditches around the perimeter of the flight line to the southeast and settles in a retention pond (**Figure 1-3**). The retention pond in the southeast corner of the facility is less than 2,000 feet from Rosillo Creek, so it is likely that surface water flows from the retention pond to the creek under heavy rain conditions.

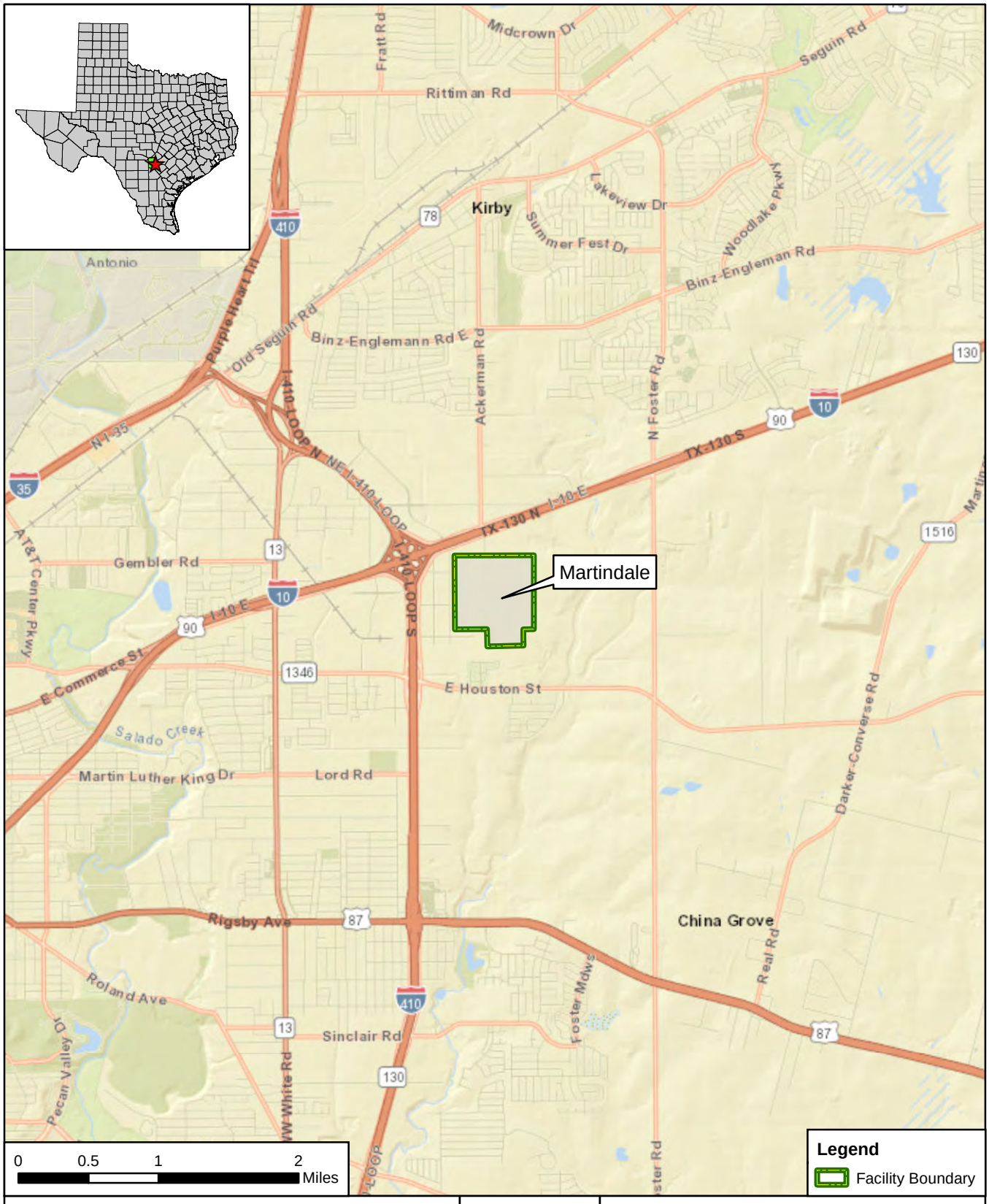
Wastewater that collects in the wash rack flows to an oil-water separator (OWS) and then, depending on the position of a diverter valve, either travels through underground piping to the sanitary sewer, or goes through a series of manholes and then discharges to Rosillo Creek and then Salado Creek.

1.5.4 Climate

The San Antonio climate is humid subtropical, with long, hot summers and warm to cool winters. Cold fronts from the north occasionally descend during the winters and affect the weather conditions. Summers are hot, with the average high temperature around 99 degrees Fahrenheit (°F) in the peak of August (National Weather Service Forecast Office, 2019). Winters range from mild to cool, with the average daily highs rarely dropping below 60°F. The spring and autumn months tend to be warm and wet. The average humidity in San Antonio is around 67%. San Antonio is usually sunny, with average annual precipitation around 32 inches. May, June, and October tend to be the rainiest months. Snowfall is rare in San Antonio, but the area experiences sleet and freezing rain on a few occasions. Floods occur regularly, and tornados occur occasionally in the region (Weather Atlas, 2019).

1.5.5 Current and Future Land Use

The Martindale AASF currently includes temporary and permanent storage buildings, an OMS building, two hangars, and an armory used for administration. Current land use in the direct vicinity of the facility includes undeveloped/agricultural land to the east, residential land to the west, and commercial/industrial land to the north and south. Historically, undeveloped land surrounding the facility was leased to a farmer who grew corn until 2 or 3 years ago (2016/2017). No future changes to the current use were noted during personnel interviews.



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SCALE	1:63,360	CHK BY	MC	10/7/2019
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	10/7/2019

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-1

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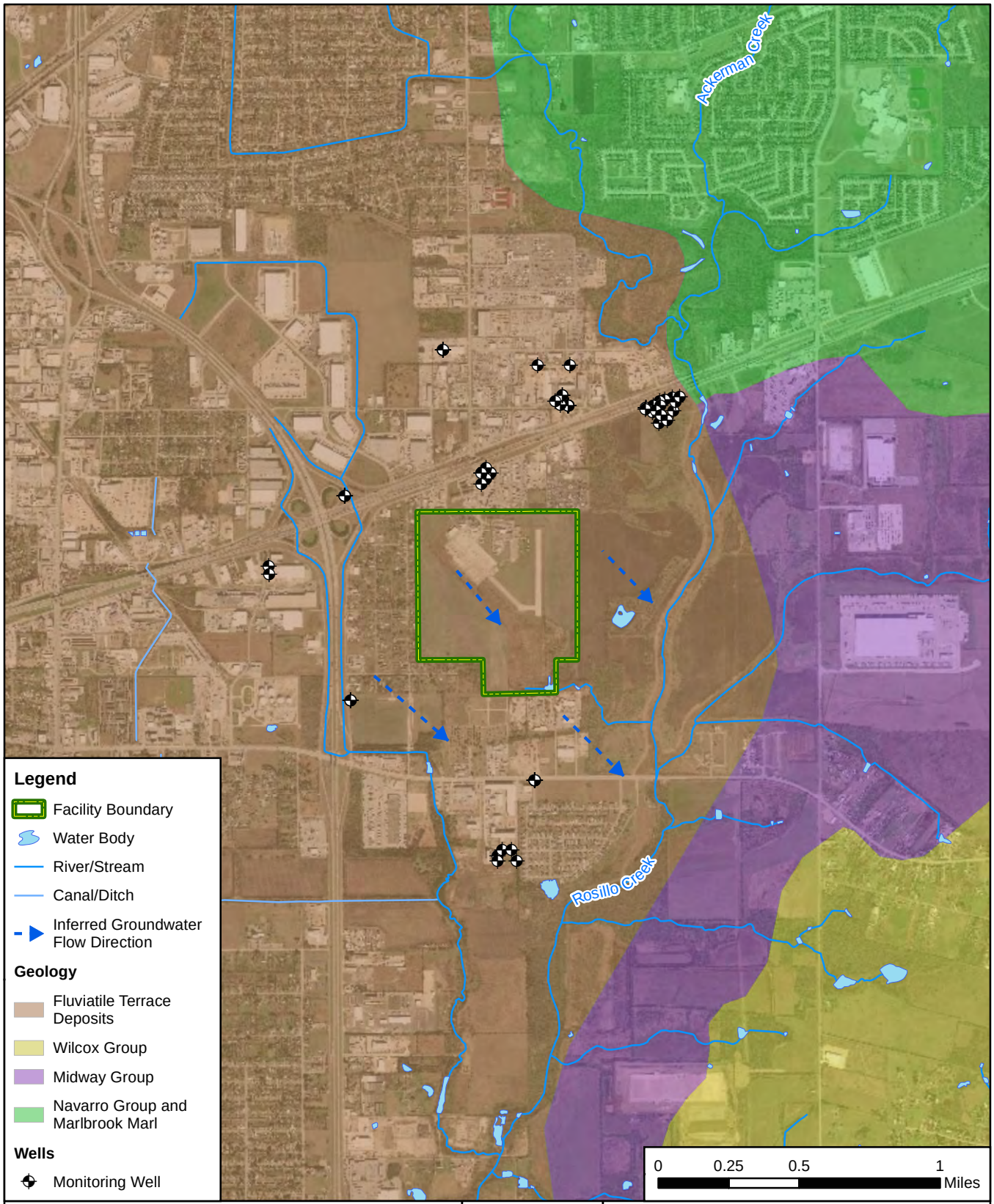

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NOTES	Preliminary Assessment for PFAS at Martindale AASF, TX			
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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	10/7/2019

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Groundwater Features

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Figure 1-2

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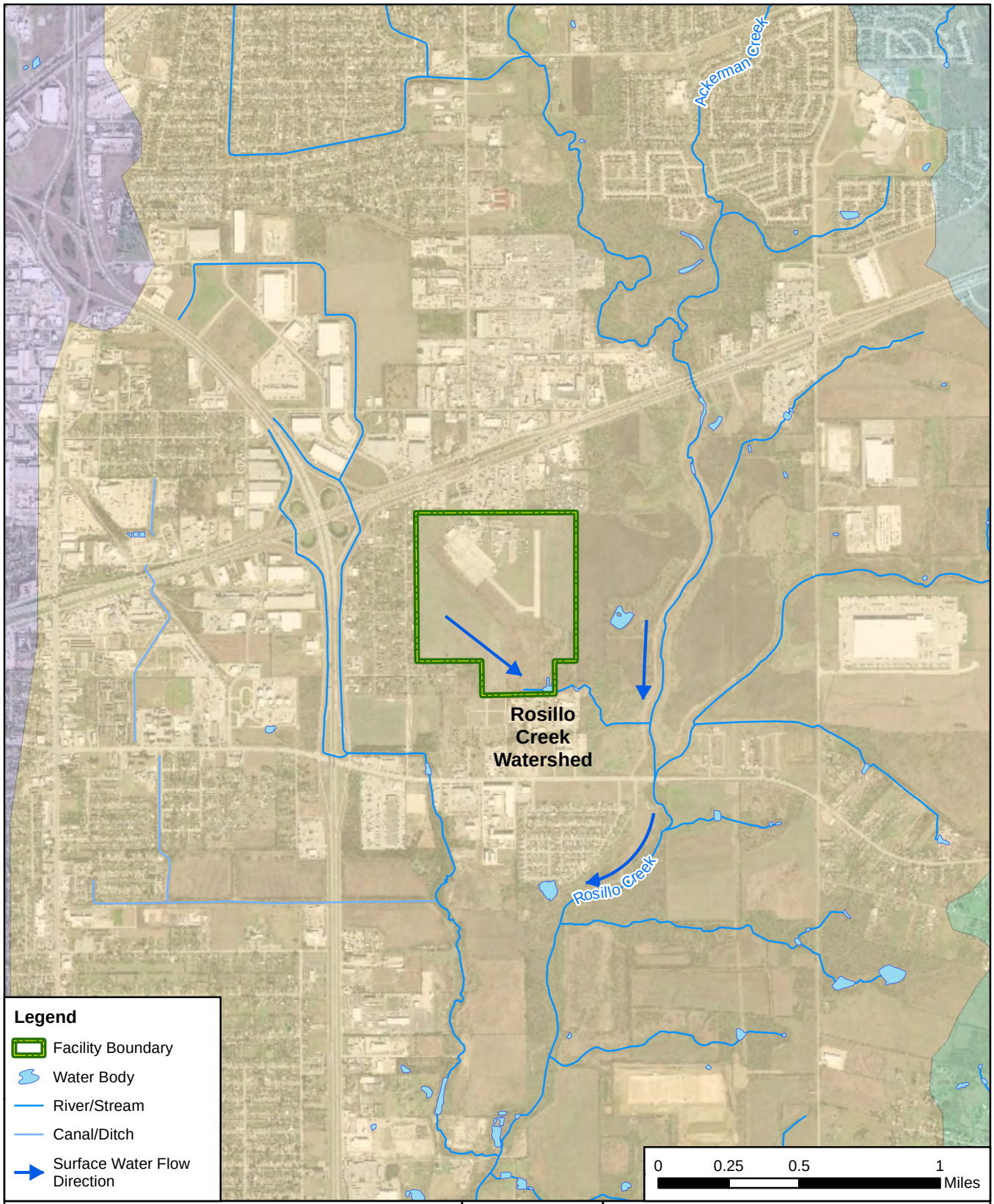

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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	10/7/2019

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Surface Water Features

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Germantown, MD 20876

Figure 1-3

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2. Fire Training Areas

Martindale AASF personnel confirmed there are no designated FTAs at the facility. There were no reports of mobile cart extinguisher testing/training anywhere at the facility, except for a report regarding training with one Tri-Max™ unit that was full of water, not AFFF. Information was obtained from personnel who had worked at the facility since 2002; however, the Tri-Max™ units had been at the facility since approximately 1999.

3. Non-Fire Training Areas

In addition to FTAs, the PA evaluated areas where PFAS-containing materials may have been broadly used, stored, or disposed. This may include buildings with fire suppression systems, paint booths, AFFF storage areas, and areas of compliance demonstrations. Information on these features obtained during the PA are included in **Appendices A** and **B**. The Martindale AASF comprises a flight line, several buildings (two hangars, an armory, administrative buildings, and storage), and a wash rack area. These non-FTAs were investigated during the PA. These and other areas are described below and shown on **Figure 3-1**, with photographs provided in **Appendix C**.

3.1 Storage and Maintenance Hangars

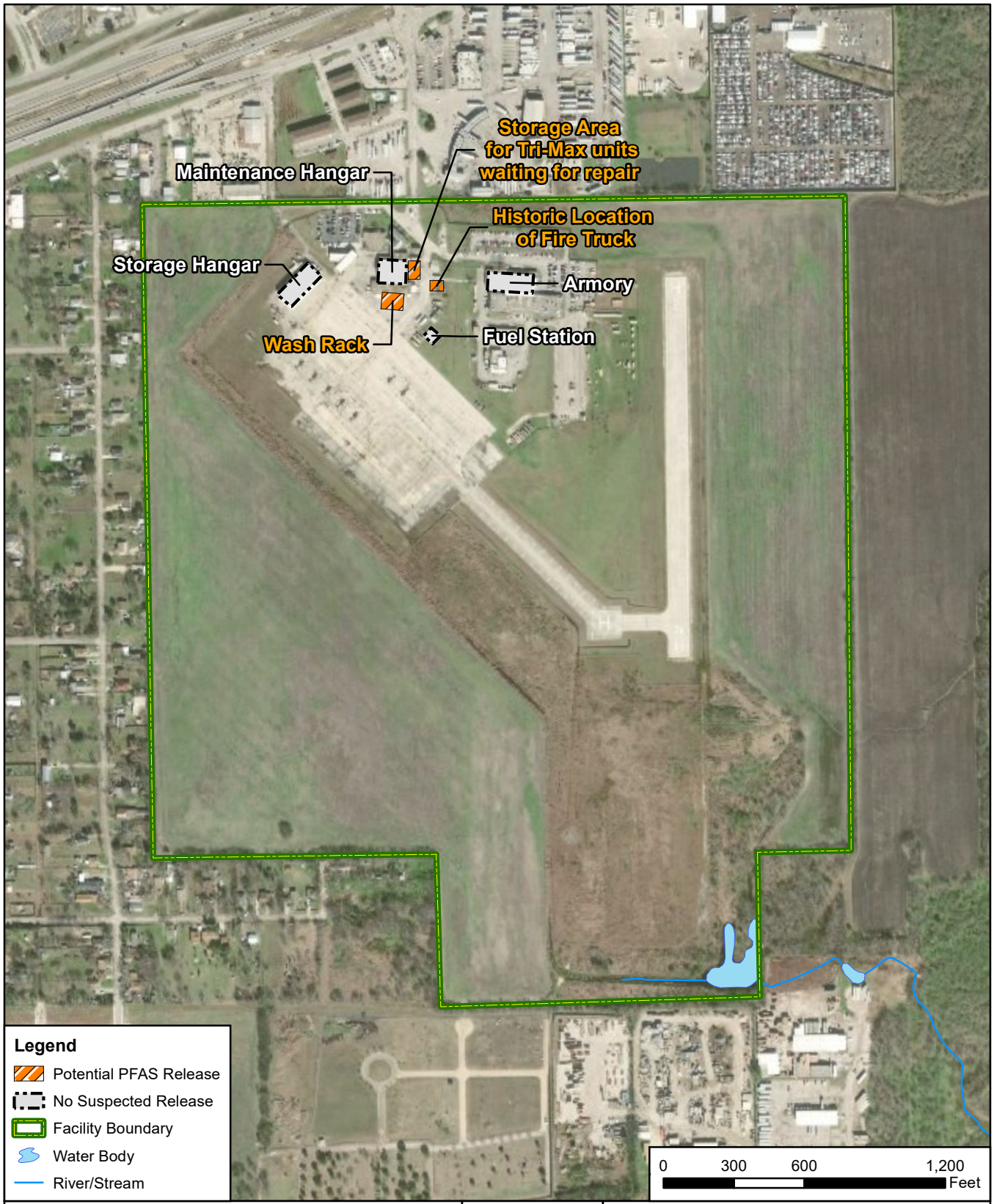
There are two hangars at the Martindale AASF: a Storage Hangar located in the northwest section of the facility and the Maintenance Hangar located east of the Storage Hangar. The hangars are used for helicopter maintenance, storage, and training. The area directly east of the Maintenance Hangar is where Tri-Max™ units were kept when they were waiting to be repaired/serviced. Interviews indicated that the Tri-Max™ units were serviced onsite by an outside contractor. This process required periodic exchange of the AFFF fluids which were disposed at the facility, possibly at this area or at the wash rack. Further east of the Maintenance Hangar is the location where the fire truck was stationed when it was on site. Although interviewees were unsure, the fire truck is assumed to have contained AFFF tanks and capability. Interviews indicated that the fire truck was never used. Martindale AASF staff report that the Tri-Max™ units were never discharged (except for an emergency response at the grass fire discussed in **Section 4**), and that the Tri-Max™ tanks were removed from the facility and hydrostatically tested at a contractor's facility off-site. TXARNG staff report that both hangars are not equipped with fire suppression systems. The geographic coordinates for the Storage Hangar are 29°26'06.52"N; 98°22'56.06"W, and the geographic coordinates for the Maintenance Hangar are 29°26'06.97"N; 98°22'51.49"W.

3.2 Armory

The armory is located to the east of the two hangars. The armory is used for mainly administrative purposes and contains an assembly hall and a kitchen. The kitchen was checked for the use of AFFF, and none was found. The kitchen uses K Class fire extinguishers, which do not contain AFFF. No TXARNG staff reported historic or current use of AFFF in the armory building. The geographic coordinates for the AASF hangar are 29°26'06.28"N; 98°22'45.32"W.

3.3 Fuel Station

Historically, one AFFF-containing Tri-Max™ unit was stationed near the Fuel Station at the facility. TXARNG staff who had been working at the facility since 2002 reported no releases of any materials in this area. Geographic coordinates for the fuel station are 29°26'04.24"N; 98°22'49.74"W.



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SCALE	1:7,200	CHK BY	MC	2/20/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	2/20/2020

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Non-Fire Training Area

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Figure 3-1

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4. Emergency Response Areas

During personnel interviews, it was revealed that Tri-Max™ units were used to fight a grass fire on the flight line. The date of the incident is unknown, but it happened sometime between 1999 and 2014, when Tri-Max™ units were present at the facility. The approximate location of the grass fire is shown on **Figure 4-1**. Three or four Tri-Max™ units were historically located along the flight line for firefighting purposes. The City of San Antonio fire department came out to fight the grass fire as well and used water (not AFFF) to put out the remaining fire.

To the best of their knowledge, TXARNG personnel who have been working at the facility since 2002 reported no other past emergency responses. Between 1954 and 2002, it is unknown if other emergency response actions occurred.

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Martindale AASF, TX			
REVISED	10/7/2019	GIS BY	MS	10/7/2019
SCALE	1:7,200	CHK BY	MC	10/7/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	10/7/2019

Emergency Response Area

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 4-1

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5. Adjacent Sources

Adjacent sources of potential PFAS include the Republic Services Landfill, the Flint Hills Resources gas storage facility, AZZ Galvanizing San Antonio, and Blue Beacon Truck Wash. **Figure 5-1** shows the various adjacent sources described in this section. The groundwater flow direction at the facility is inferred to be to the southeast, as this is the regional groundwater flow direction in the San Antonio area. Both the Flint Hills Resources gas storage facility and the landfill are cross-gradient from the AASF, with the Flint Hills Resources gas storage facility located to the southwest, and the landfill located to the east of the facility. Blue Beacon Truck Wash is upgradient of the facility, and AZZ Galvanizing is downgradient of the facility.

5.1 Republic Services Landfill

The Republic Services Landfill is located about two miles east of the facility. This landfill could be a potential source of PFAS. Landfills are not usually a primary release area of PFAS, but materials disposed in landfills may create a secondary source of contamination. Such materials may include sludge from a wastewater treatment plant that processes PFAS-laden water, used AFFF storage containers, or products associated with waterproofing such as uniforms or boots.

5.2 Flint Hills Resources Gas Storage Facility

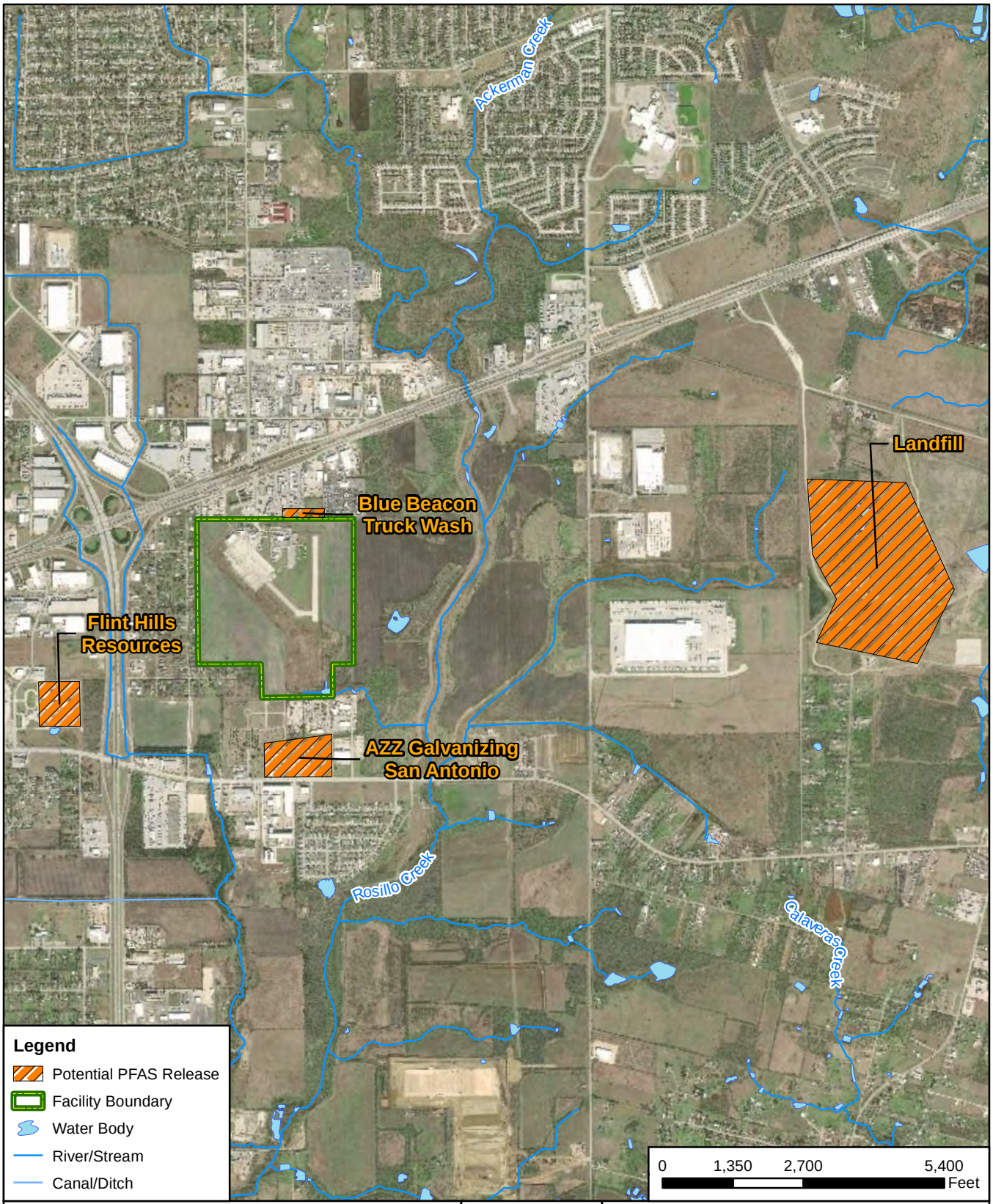
Flint Hills Resources gas storage facility is located approximately 5,000 feet southwest of the Martindale AASF. A gas storage facility may have and use AFFF on-site because of the need to have effective firefighting capabilities at facilities with large quantities of bulk fuel.

5.3 AZZ Galvanizing San Antonio

AZZ Galvanizing is located at 5731 FM 1346 in San Antonio, approximately 1,040 feet south-southeast of the facility. AZZ Galvanizing is a large quantity generator as defined by USEPA, meaning that it generates over 1,000 kilograms of hazardous waste, or over 1 kilogram of acutely hazardous waste per month. A hazardous waste summary for the site describes it as having ignitable waste, corrosive waste, arsenic, cadmium, chromium, lead, and selenium waste. The processes conducted at AZZ Galvanizing are described as metal coating and allied services. The process of metal plating and etching is known to use PFAS for corrosion prevention, mechanical wear reduction, aesthetic enhancement, surfactant, wetting agent/fume suppressant for chrome, copper, nickel and tin electroplating, and post-plating cleaner (Interstate Technology Regulatory Council, 2017). It is possible that the processes conducted at AZZ Galvanizing include the use of PFAS. More information on AZZ Galvanizing can be found in the Environmental Data Resources, Inc. (EDR)™ Radius Map Report located in **Appendix A**.

5.4 Blue Beacon Truck Wash

Blue Beacon Truck Wash of San Antonio is located at 1112 Ackerman Road in San Antonio, directly north of the facility. The truck wash shares the northern boundary of the facility. A chemical inventory of the site indicated that hydrogen fluoride in an average daily amount of 1,000 to 9,999 pounds was used at the site in 2010. Although the processes that occur at the truck wash are unknown, it is possible that PFAS are used in the buffing and water-proofing process at the truck wash. PFAS use has been linked to car wash facilities in various locations around the US. Of note is a 38,500 square foot retention pond, located to the east of the truck wash, that appears (from aerial imagery) to receive the wastewater from the truck wash activities. More information on Blue Beacon Truck Wash of San Antonio can be found in the EDR™ Radius Map Report located in **Appendix A**.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Martindale AASF, TX			
REVISED	12/13/2019	GIS BY	MS	12/13/2019
SCALE	1:32,400	CHK BY	MC	12/13/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	12/13/2019

N

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 AFFF release areas were identified. The AFFF release area associated with the Martindale AASF grass fire at the flight line was identified as AOI 1. The AFFF release area associated with the area east of the Maintenance Hangar as well as the location of the historic fire truck (located further east of the Maintenance Hangar) were identified as AOI 2, and the wash rack was identified as AOI 3. This section describes the preliminary CSM components developed for these AOIs. 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. The AOIs are shown on **Figure 6-1**, and the preliminary CSMs for AOI 1 through AOI 3 are presented on **Figure 6-2** through **Figure 6-4**.

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 at Martindale AASF include site workers and construction workers. As described below, the preliminary CSMs for the AOIs detail the specific receptors that could potentially be exposed to PFAS.

6.1 AOI 1 Grass Fire near Flight Line

AFFF was used to put out a grass fire near the southwest end of the flight line during one event that took place between 1999 and 2014. An unknown quantity of AFFF was released during this emergency firefighting response.

Releases at the grassy areas on either side of the flight line would eventually infiltrate into the soil and potentially infiltrate to the subsurface and groundwater via rainwater infiltration. Under such scenarios, ground disturbing activities in these areas could result in site or construction worker exposure to PFAS via inhalation of dust or ingestion of exposed soil. PFAS contamination may have further infiltrated to shallow groundwater; however, there are no groundwater receptors identified within a 1-mile radius of the facility, so the groundwater exposure pathway is incomplete. PFAS may have accumulated in nearby storm water ditches, located both north and south of the flight line, creating an exposure pathway to site workers, construction workers, and trespassers from surface water/sediment in this area.

6.2 AOI 2 Area East of the Maintenance Hangar

AFFF was potentially released at the area east of the Maintenance Hangar during Tri-Max™ maintenance events performed by an outside contractor. The AFFF fluids stored in the Tri-Max™ units were disposed during these maintenance events. Additionally, the fire truck, which was historically stored further east of the Maintenance Hangar, likely contained AFFF tanks, and AFFF could have leaked on to the gravel surface beneath the truck.

Releases at the area east of the Maintenance Hangar may have infiltrated into surrounding grassy areas when washed off the concrete surface, and potential releases at the fire truck may have infiltrated into the gravel and soil beneath it. Releases in either area have the potential to infiltrate into soil and further into the subsurface via rainwater infiltration. Under such scenarios, ground disturbing activities in these areas could result in site or construction worker exposure to PFAS via inhalation of dust or ingestion of exposed soil. PFAS contamination may have further infiltrated to shallow groundwater; however, there are no groundwater receptors identified within a 1-mile radius of the facility, so the groundwater exposure pathway is incomplete.

6.3 AOI 3 Wash Rack

AFFF was potentially released at the wash rack during Tri-Max™ maintenance events performed by an outside contractor. The AFFF fluids stored in the Tri-Max™ units would have been disposed during these maintenance events.

Releases at the wash rack would have traveled to the OWS and then, depending on the position of a diverter valve, either traveled through underground piping to the sanitary sewer, or traveled through a series of manholes and then discharged to Rosillo Creek and then to Salado Creek. Releases at the wash rack have the potential to infiltrate into soil and further into the subsurface via leaks in underground piping. Under such scenarios, ground disturbing activities in this area could result in site or construction worker exposure to PFAS via inhalation of dust or ingestion of exposed soil. PFAS contamination may have further infiltrated to shallow groundwater; however, there are no groundwater receptors identified within a 1-mile radius of the facility, so the groundwater exposure pathway is incomplete.

CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Martindale AASF, TX			
REVISED	2/20/2020	GIS BY	MS	2/20/2020
SCALE	1:14,400	CHK BY	MC	2/20/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	2/20/2020

Legend

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

N

Areas of Interest

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Figure 6-1

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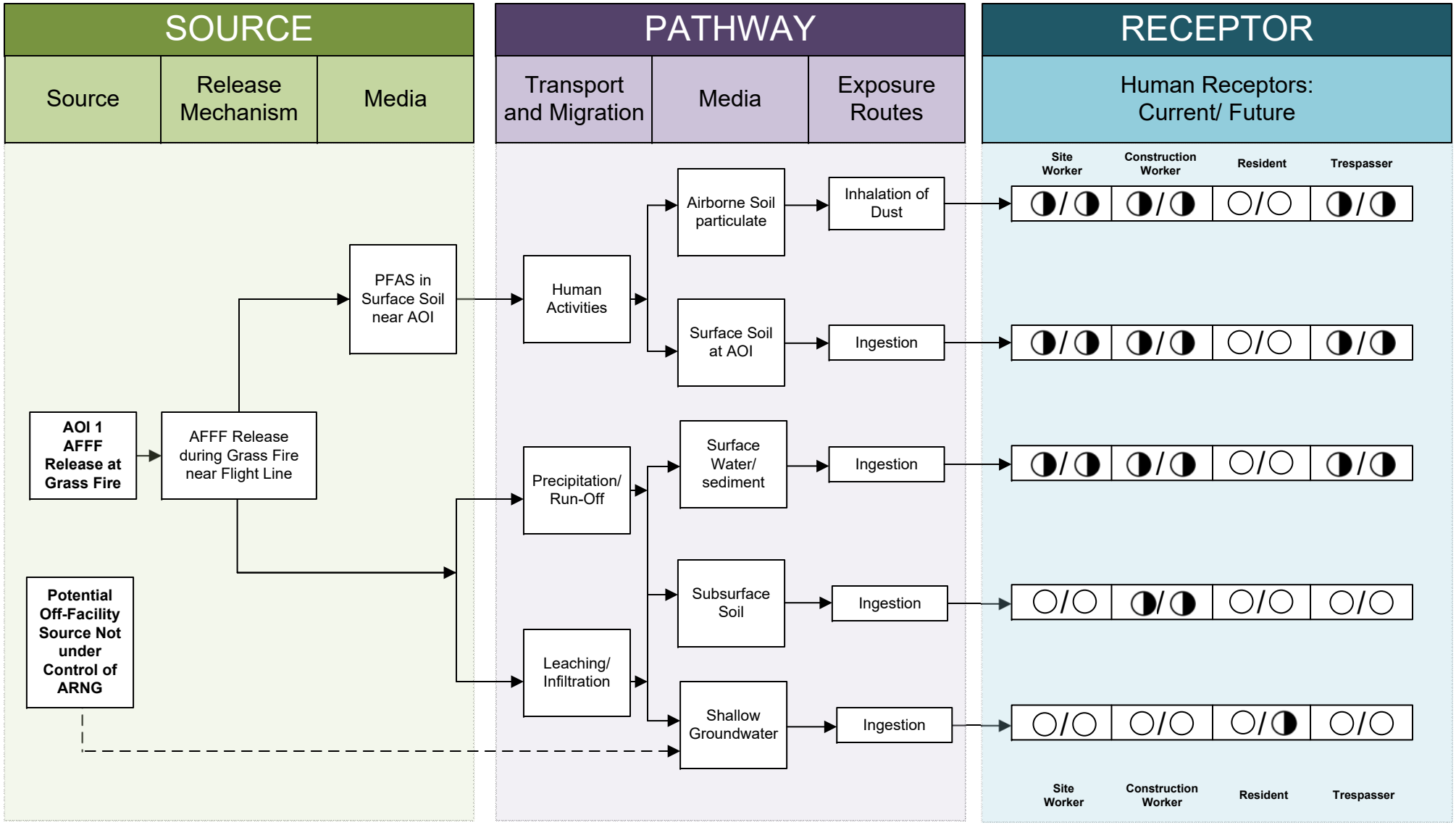
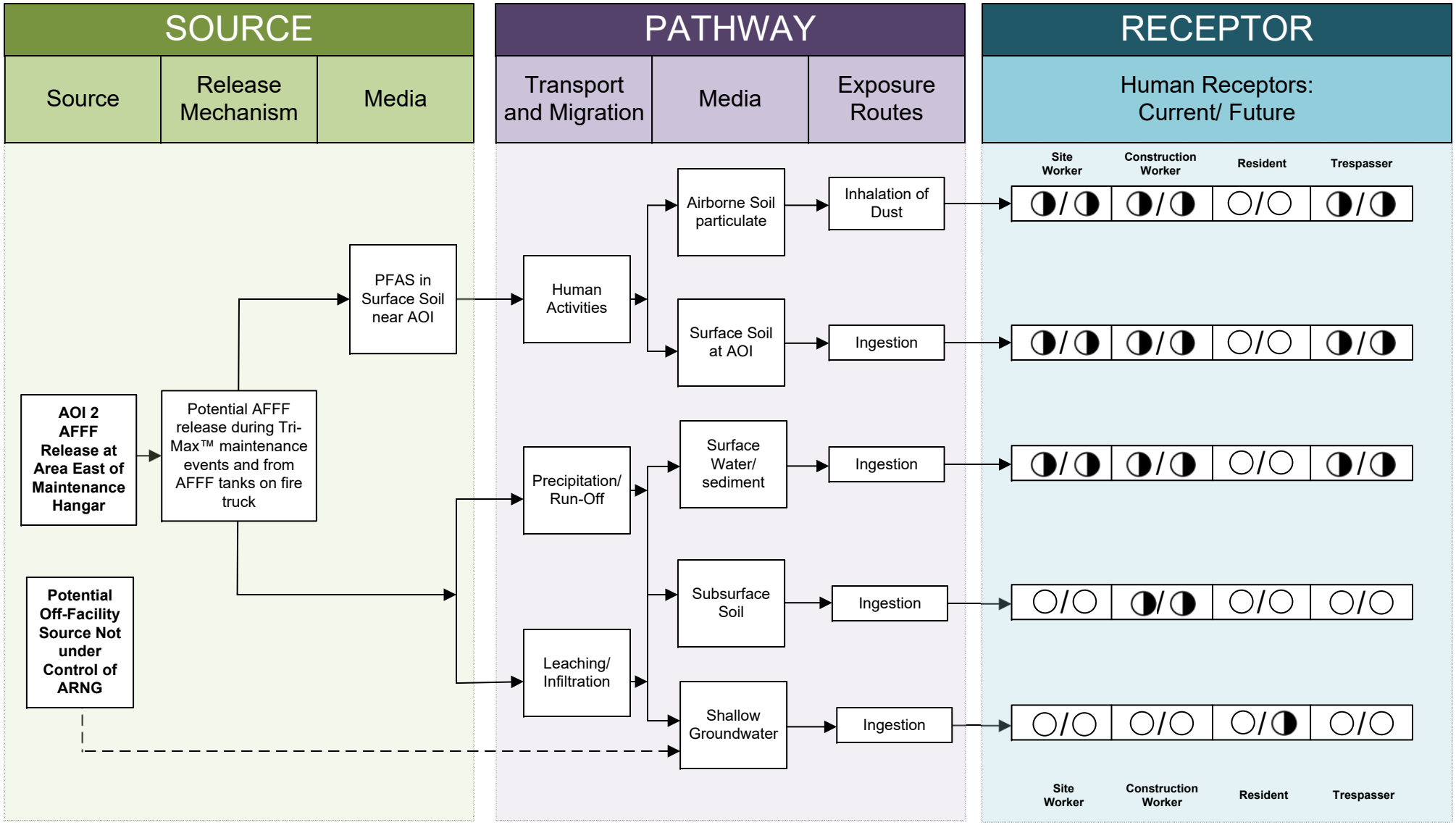


LEGEND

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

Note:
1. The residential receptor refers to an off-facility receptor.

Figure 6-2
Preliminary Conceptual Site Model
AOI 1 AFFF Release at Grass Fire near Flight Line at Martindale AASF

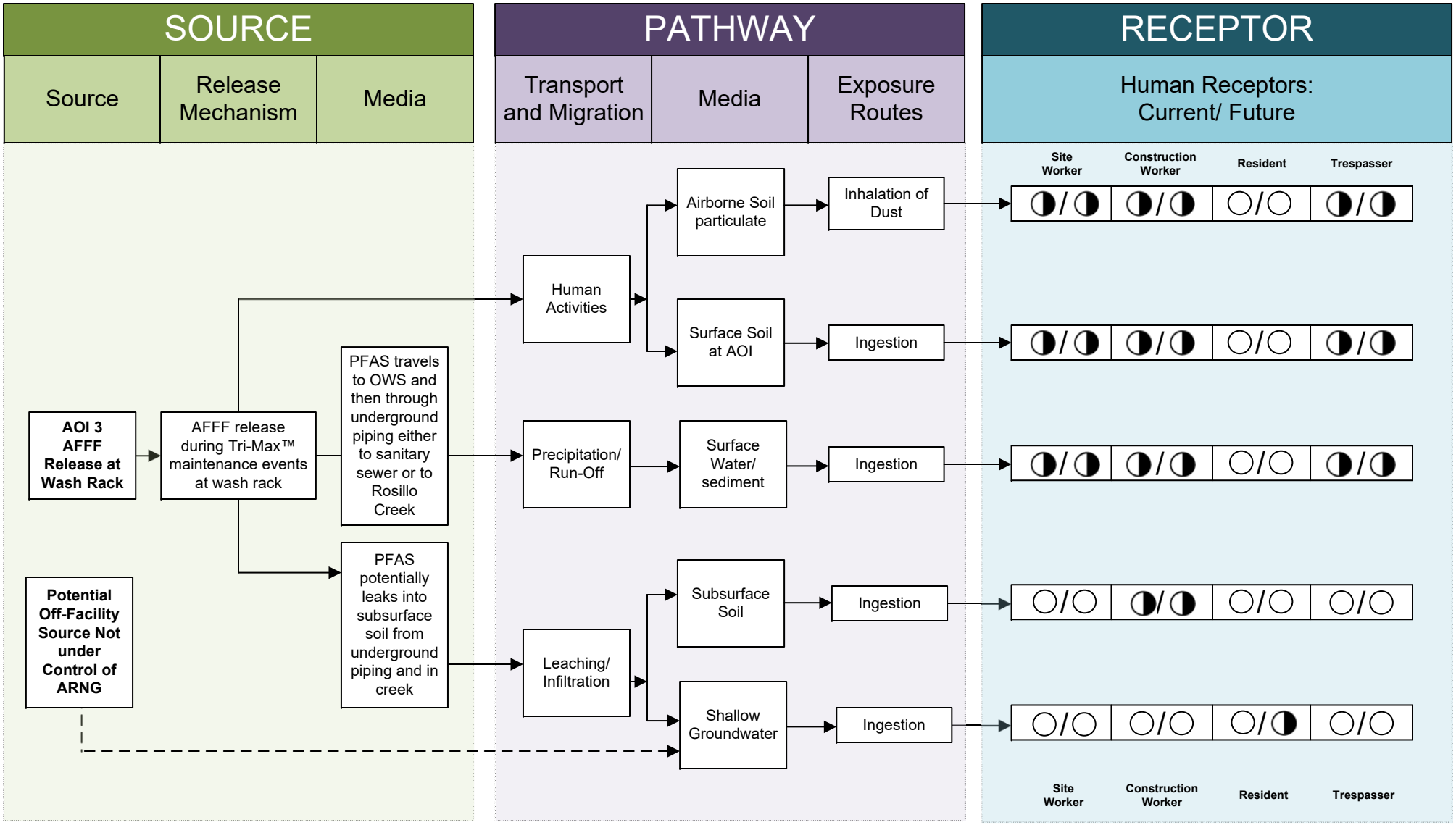


LEGEND

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

Note:
1. The residential receptor refers to an off-facility receptor.

Figure 6-3
Preliminary Conceptual Site Model
AOI 2 AFFF Release at Area East of Maintenance Hangar at Martindale AASF



LEGEND

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

Note:
1. The residential receptor refers to an off-facility receptor.

Figure 6-4
Preliminary Conceptual Site Model
AOI 3 AFFF Release at Wash Rack at Martindale AASF

7. Conclusions

Three AOIs were identified at Martindale AASF during the PA (**Figure 7-1**).

7.1 Findings

Based on interviews with current AASF personnel, Tri-Max™ units were serviced onsite by an outside contractor and required periodic exchange of the AFFF fluids. These fluids would have been disposed at the facility, either at the area east of the Maintenance Hangar, or at the wash rack. Additionally, a fire truck was stationed further east of the Maintenance Hangar and could have leaked AFFF over the years. Finally, a reported historical AFFF release was associated with the grass fire located near the southeast end of the flight line. These releases indicate the potential for PFAS contamination in surface and subsurface soil to intercept one or more receptors. Groundwater in the area is not used for drinking water. However, PFAS contamination may have accumulated in surface water and sediments in the drainage ditches located near the grass fire, in the grassy areas surrounding the Maintenance Hangar, or in the subsurface beneath the wash rack. No evidence of other accidental or incidental spills or leaks from AFFF storage containers/areas were identified during the site visit. The remaining buildings associated with the AASF are not equipped with or store AFFF. The findings of potential AFFF release are summarized in **Table 7-1** below.

Table 7-1: AOIs at Martindale AASF

Area of Interest	Description	Used by	Release Dates
AOI 1	A Tri-Max™ unit was used to fight a grass fire adjacent to the flight line, at the southeast end of the flight line. The dispersed AFFF would likely collect in low lying areas and infiltrate into the ground.	TXARNG	Sometime between 1999 and 2014 (period during which Tri-Max™ units were used onsite)
AOI 2	The area east of the Maintenance Hangar includes the staging area where Tri-Max™ units were stored and serviced onsite by an outside contractor. Servicing the units required periodic exchange of the AFFF fluids which were then disposed at the facility, possibly at the same area. AFFF disposed at this area would have migrated to the surrounding grassy areas and eventually infiltrated into the ground. Additionally, the fire truck was historically located further east of the Maintenance Hangar and is assumed to have been equipped with AFFF tanks. AFFF potentially leaked from the fire truck and infiltrated into the soil below.	TXARNG	Sometime between 1999 and 2014 (period during which Tri-Max™ units were used onsite). The firetruck was onsite from the 1980s to 1990s.
AOI 3	The wash rack was potentially used to dispose of AFFF during onsite servicing of the Tri-Max™ units. AFFF that flowed into the wash rack would reach the OWS, and then depending on the position of a diverter valve, either travel through underground piping to the sanitary sewer or through a series of	TXARNG	Sometime between 1999 and 2014 (period during which Tri-Max™ units were used onsite)

manholes to Rosillo Creek and then to Salado Creek.

7.2 Uncertainties

Available 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 based on all available information, including: previous environmental reports, EDRs™, observations made during the VSI, and interviews. Interviews of personnel with direct knowledge of a facility generally provided the most useful insights regarding a facility's historical and current PFAS-containing materials. Sometimes the provided information was incomplete. 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 were first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the concentration of AFFF used. There is also a possibility the PA has missed a source of PFAS, as the science of how PFAS may enter the environment continually evolves.

In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, 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

Area of Interest	Source of Uncertainty
AOI 1	The extent of the grass fire is unknown, as well as the quantity of AFFF deployed to fight the fire.
AOI 2	The location where the disposal of AFFF from Tri-Max™ units occurred is unknown. It is assumed that AFFF was disposed either at the area east of the Maintenance Hangar or at the wash rack. In addition, the position of the diverter valve at the OWS is unknown.
AOI 3	It would be unusual to have a fire truck at the facility that did not contain AFFF tanks and capability during the 1980s-1990s. Since the interviewees were unsure, we have assumed that the fire truck had AFFF capability.
Historic AFFF Use	Information from 1954 (when TXARNG acquired the facility) to 2002 (when interviewee started work at the facility) is not available. AFFF use during this time period is not known.

7.3 Potential Future Actions

Based on the documented absence (2002-present) of the release of PFAS-containing materials at the AASF Hangars and Armory, evidence does not indicate that current or former TXARNG activities in these areas contributed PFAS contamination to soil, groundwater, surface water, or

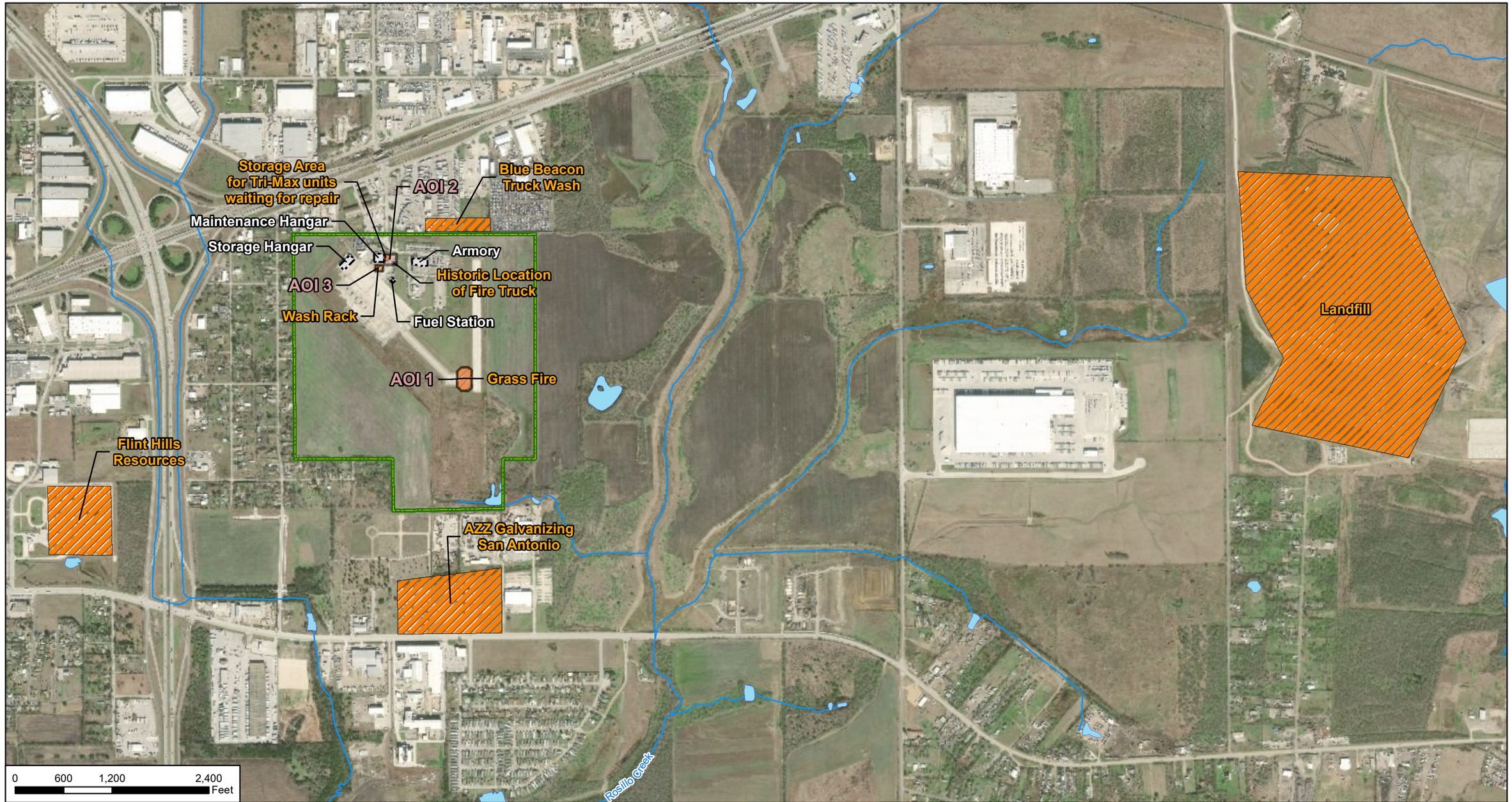
sediment at Martindale AASF. The AASF Hangars and Armory will not move forward in the CERCLA process.

Interviews (covering 2002 to present) indicate that a release of AFFF during grass firefighting occurred near the southeast end of the flight line (AOI 1) and resulted in PFAS release. Based on the preliminary CSM developed for the AOI, there is potential for receptors to be exposed to PFAS contamination in soil and surface water/sediment at AOI 1. Additionally, AFFF may have been released at both the area east of the Maintenance Hangar as well as the historic location of the fire truck (AOI 2) and at the wash rack (AOI 3). **Table 7-3** summarizes the rationale used to determine if the AOIs should be considered for further investigation under the CERCLA process and undergo an SI.

ARNG will evaluate the need for an SI at Martindale AASF based on the presence of a PFAS release, possible receptors, the migration potential of PFAS contamination to receptors, and the availability of resources.

Table 7-3: Rationale

Area of Interest	AOI Location	Rationale	Potential Future Action
AOI 1: Grass Fire near Flight Line	29°25'51.98"N; 98°22'39.68"W	One or more Tri-Max™ units were used to put out a grass fire near the southeast end of the flight line. AFFF would most likely have infiltrated into the surrounding grassy area and may have collected in nearby surface water and sediment.	Proceed to an SI, focus on soil, surface water/sediment, and groundwater
AOI 2: Area East of the Maintenance Hangar	29°26'07.1"N; 98°22'50.4"W	AFFF was potentially released in this area while Tri-Max™ units were being emptied by an outside contractor. Additionally, the fire truck historically located further east of this area was most likely equipped with AFFF, which may have leaked into the ground over the years. AFFF releases in this area would have infiltrated into soil and potentially groundwater.	Proceed to an SI, focus on soil and groundwater
AOI 3: Wash Rack	29°26'05.7"N; 98°22'51.6"W	During Tri-Max™ maintenance events, AFFF may have been disposed at the wash rack. These fluids would travel to the OWS, and depending on the position of a diverter valve, would either flow via underground piping to the sanitary sewer, or through a series of manholes to Rosillo Creek and then Salado Creek. Leaks in the underground piping may have led to AFFF infiltrating into soil and reaching the subsurface.	Proceed to an SI, focus on soil, surface water/sediment, and groundwater



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Martindale AASF, TX			
REVISED	2/20/2020	GIS BY	MS	2/20/2020
SCALE	1:14,400	CHK BY	MC	2/20/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	2/20/2020

Legend

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

N

Summary of Findings

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 7-1

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Appendix A
Data Resources

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

Previous Investigations Completed

- U.S. Army Center for Health Promotion and Preventive Medicine. January 1997. Site Assessment Survey No. 38-EH-5684-97. Texas Army National Guard. Martindale Army Aviation Support Facility. San Antonio, Texas.

Miscellaneous Data Resources

- Map 3 – Facility Drainage Area. Drainage Map, Martindale. Provided by the Texas Military Department.
- EDR™ Aerial Photo Decade Package, December 2019. Martindale AASF, 1112 Ackerman Rd, San Antonio, TX 78219.
- EDR™ Radius Map Report with GeoCheck, December 2019. Martindale AASF, 1112 Ackerman Rd, San Antonio, TX 78219.
- EDR™ Certified Sanborn Map Report, December 2019. Martindale AASF, 1112 Ackerman Rd, San Antonio, TX 78219.

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

PA Interview Questionnaire - Other

Facility: Martindale AASF
Interviewer: [redacted]
Date/Time: 4/24/19 @ 1400

Interviewee: [redacted] **Title:** Aviation Safety Officer **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:

16 years working at the facility.

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

The hangar has been in operation since the 1950s.	**Known Uses**
No fire suppression systems in any buildings.	Use
Had fire truck on-site in 1980s - 1990s. Fire	Procurement
truck was given to the City of San Antonio, then	Disposition
given back to AASF. Fire truck was lime green	Storage (Mixed)
and had Haylon fire suppression. Fire truck was	Storage (Solution)
never utilized to put out fires on-site.	Inventory, Off-Spec
	Containment
Tri-Max was historically used. Have been replaced with	SOP on Filling
Purple-K fire extinguishing units.	Leaking Vehicles
Tri-Max units were used to fight grass fire on	Nozzle and Suppression System Testing
flight line.	Dining Facilities
Tri-Max units were on-site for 15 years. They were	Vehicle Washing
not serviced often.	Ramp Washing
State fire marshal contracted out Tri-Max servicing.	Fuel Spill Washing and Fueling Stations
Used AFFF in helicopter buckets for wildfire suppression	Chrome Plating or Waterproofing

up until 2009.

PA Interview Questionnaire - Other

Facility:_____
Interviewer:_____
Date/Time:_____

AFFF provided by Texas Forest Service.
Contractor serviced Tri-Max units on-site.

Trained with Tri-Max units using only water.
Tri-Max units were taken off site ~5 yrs ago.
Most likely shipped full.

Tri-Max stored on flightline, in storage hangar, and at fueling station.

City of San Antonio provides fire protection for the AASF.
No joint training.

Municipal water used on site (no drinking water wells).
Connected to city sewer.

Truck fueling station north of site.

Landfill 2 miles NE of site.

Conoco storage facility off of Houston Street.

1 Tri-Max unit at fuel station, 3-4 on flight line, 1 in each hangar.

Fire truck was stationed near fueling station.

6-7 Tri-Max units stored to the east of the Maintenance Hangar waiting for repair (Historic)

Washrack → OWS → storm sewer

Martindale 4/24/19

Preliminary Assessment Sign-In Sheet

Name	Position	Years at the Facility	Phone Number/Email	May AECOM use your name in the PA Report?
[redacted]	Aviation Safety Off	16	[redacted]	Yes
[redacted]	Aircraft System Spvr	17	[redacted]	Yes

Appendix B.2
Visual Site Inspection Checklists

Facility ST
Visual Survey Inspection Log

Recorded by: [redacted]
ARNG Contact:
Date: 4/24/19

Site Name / Area Name / Unique ID: Martindale AASF
Site / Area Acreage: 209 acres
Historic Site Use (Brief Description): AASF since 1950s

Current Site Use (Brief Description): AASF

1. Was AFFF used at the site/area? (Y) / N
   3a. If yes, document how AFFF was used and usage time (e.g., *fire fighting training 2001 to 2014*) grass fire on flight line. On site 1999 – 2014. Used to fight
2. Has usage been documented? Y (N)
   2a. If yes, keep a record (place electronic files on a disk)

Significant Topographical Features:

1. Has the infrastructure changed at the site/area? Y (N)
   1a. If so, please describe change: (*ex. Structures structures longer exist.*) Not much has changed. Some building renovations.
2. Is the site/area vegetated? (Y) N
   2a. If not vegetated, briefly describe the site/area composition: Flight line is surrounded by vegetation. Site is mostly grass lands.
3. Does the site or area exhibit evidence of erosion? Y (N)
   3a. If yes, describe the location and extent of the erosion :
4. Does the site/area exhibit any areas of ponding or standing water? (Y) N
   4a. If yes, describe the location and extent of the ponding : Ponding present along flightline. In grassy areas, water collects in drainage ditch.

Migration Potential:

1. Does site/area drainage flow off installation? Y (N)
   1a. If so, please note observation and location: Drainage collects in retention pond at SE corner of site.
2. Is there standing water or drainage issues within the site/area? Y (N)
   2a. If so, please note observation and location: Ditches around perimeter of site/flightline convey water to the retention pond.
3. Is there channelized flow within the site/area? Y (N)
   3a. If so, please note observation and location:
4. Have man-made drainage channels been constructed within the site/area? (Y) N
   4a. If so, please note the location of the channel: Ditches transport water to retention pond.

Additional Notes

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Martindale AASF

Why has this location been identified as a site?

Historically have had Tri-Max units on-site, and 1 release of AFFF along flightline to put out a grass fire.

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

Landfill 2 miles NE of site and truck fueling station just north of site. Also, Conoco storage facility off of Houston St.

Training Events

Have any training events with AFFF occurred at this site? No recollection of training with AFFF. Used water when training with Tri-Max unit.

If so, how often? N/A

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

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

Rosillo Creek borders the site on the east.

Surface Water:

Surface water flow direction? Surface water flows to the SE retention pond.

Average rainfall? 33 inches/yr

Any flooding during rainy season? Floods often

Direct or indirect pathway to ditches? Surface water collects in ditch that runs across site.

Direct or indirect pathway to larger bodies of water? No direct pathway, but Rosillo Creek is 0.3 mi east of site.

Does surface water pond any place on site? No

Any impoundment areas or retention ponds? Retention pond in SE corner.

Any NPDES location points near the site? No

How does surface water drain on and around the flight line? Drains off flight line into ditch.

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction?

Depth to groundwater? ~10 ft

Uses (agricultural, drinking water, irrigation)? 1 well ~1 mile west of site used for industrial (GM)

Any groundwater treatment systems? No

Any groundwater monitoring well locations near the site? located N, S, and W of site

Is groundwater used for drinking water? No

Are there drinking water supply wells on installation? No

Do they serve off-post populations? No

Are there off-post drinking water wells downgradient No

Waste Water Treatment Plant:

Has the installation ever had a WWTP, past or present? No

If so, do we understand the process and which water is/was treated at the plant? No

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

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

Equipment Rinse Water

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

Unknown. Most likely would be washed at wash rack. Flow goes from wash rack to OWS to storm sewer.

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?

No known testing of nozzles.

3. Other?

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker Yes

Construction Worker Yes

Recreational User No

Residential No

Child No

Ecological Yes

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

Industrial

Documentation

Ask for Engineering drawings (if applicable). none available

Has there been a reconstruction or changes to the drainage system? When did that occur? Drainage system improvements were made ~2006.

Appendix C
Photographic Log

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Martindale AASF (April 24, 2019)	San Antonio, Texas

Photograph No. 1

Description:

Storage hangar and flightline. Facing north. Historically 1 Tri-Max unit located in hangar. No fire suppression system. No known releases.

24 April 2019

Photograph No. 2

Description:

Helicopters stationed along flight line. Photo facing southwest. Historically 2-3 Tri-Max units located along flight line. No known releases.

24 April 2019