



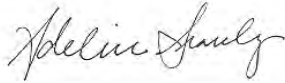
FINAL PRELIMINARY ASSESSMENT AND SITE INSPECTION OF PER- AND POLYFLUOROALKYL SUBSTANCES

Aviation Support Facility Conroe, Texas

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July 2023


PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT AVIATION SUPPORT FACILITY
CONROE, TEXAS



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Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

Aviation Support Facility Conroe, Texas

Prepared for:

U.S. Army Corps of Engineers

Contract No.: W912DR-18-D-0004

Delivery Order No.: W912DR18F0685

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EXECUTIVE SUMMARY

The United States Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) at Army installations (installations) nationwide. The PA identifies areas of potential interest (AOPIs) where PFAS-containing materials were used, stored, and/or disposed, or areas where known or suspected releases to the environment occurred. The SI includes multi-media sampling at AOPIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. This Aviation Support Facility (ASF) Conroe PA/SI was completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), National Oil and Hazardous Substances Pollution Contingency Plan, and Army/Department of Defense policy and guidance.

ASF Conroe is located in the southeast region of Texas, approximately 40 miles north of Houston, Texas. The installation occupies approximately 43 acres in Montgomery County, Texas. The installation is located in the northeast side of Conroe, Texas.

The ASF Conroe PA identified one AOPI for investigation during the SI phase. SI sampling results from the AOPI were compared to risk-based screening levels calculated by the Office of the Secretary of Defense (OSD) for PFOS, PFOA, PFBS, PFNA, and PFHxS. Of the six PFAS compounds presented in the 06 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model (CSM) developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at ASF Conroe because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS. PFOS, PFOA, PFBS, PFNA and/or PFHxS were detected in soil and/or groundwater at the one AOPI and were present at concentrations greater than the risk-based screening levels. The ASF Conroe PA/SI identified the need for further study in a CERCLA remedial investigation. **Table ES-1** below summarizes the PA/SI sampling results and provides recommendations for further study in a remedial investigation or no action at this time at each AOPI.

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Table ES-1. Summary of AOPIs Identified during the PA, PFOS, PFOA, PFBS, PFNA, and PFHxS Sampling at ASF Conroe, and Recommendations

AOPI Name	PFOS, PFOA, PFBS, PFNA, and/or PFHxS detected greater than OSD Risk Screening Levels? (Yes/No)		Recommendation
	GW	SO	
ASF Conroe Hangar	Yes	Yes	Further study in a remedial investigation

Notes:

Light gray shading – detection greater than the OSD risk screening level

GW – groundwater

SO – soil

1 INTRODUCTION

The United States (U.S.) Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) at Army installations (installations) nationwide. The Army is the lead agency under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Executive Order 12580 and is conducting the PA/SI consistent with its authority under CERCLA, 42 United States Code §§ 9600, et seq. (as amended), and the Defense Environmental Restoration Program, 10 United States Code §§ 2701, et seq. The PFAS PA/SI included two distinct efforts. The PA identified the location that is an area of potential interest (AOPI) at ASF Conroe based on the use, storage and/or disposal of PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). The SI included multi-media sampling at the AOPI to determine whether or not a release has occurred, and the analytical results were compared to the Office of the Secretary of Defense (OSD) PFOS, PFOA, PFBS, PFNA, and PFHxS risk screening levels to determine whether further investigation is warranted. HFPO-DA was not in the suite of PFAS compounds analyzed during the SI; therefore, there are no HFPO-DA SI analytical results to screen against the OSD risk screening levels. This report provides the PA/SI for Aviation Support Facility (ASF) Conroe and was completed in accordance with CERCLA and The National Oil and Hazardous Substances Pollution Contingency Plan.

1.1 Project Background

PFAS are a class of compounds that have been used in a wide range of industrial applications and commercial products due to their unique surface tension/leveling properties. Due to industry and regulatory concerns about the potential health effects and adverse environmental impacts, there has been a reduction in the manufacture and use of PFAS worldwide. In the U.S., significant reductions in the production, importation, and use of PFOS and PFOA (two individual compounds in the PFAS class) occurred between 2001 and 2015 (Interstate Technology Regulatory Council 2017). PFBS replaced PFOS in some applications and is currently used and manufactured in the U.S.

In 2016, the United States Environmental Protection Agency (USEPA) established a lifetime health advisory of 70 nanograms per liter (ng/L) in drinking water for PFOS or PFOA and for the sum of PFOS and PFOA when both are present (USEPA 2016). On 15 October 2019, the OSD provided guidance on the investigation of PFOS, PFOA, and PFBS at Department of Defense (DoD) restoration sites (OSD 2019). The DoD guidance provides risk screening levels for PFOS, PFOA, and PFBS in tap water and soil, calculated using the USEPA's Regional Screening Level (RSL) calculator for residential and industrial/commercial worker receptor scenarios. Following the issuance of the 2019 OSD memo, on 08 April 2021, USEPA published an updated toxicity assessment for PFBS (USEPA 2021). Based on the updated toxicity assessment for PFBS, the OSD issued a memorandum on 15 September 2021 to include updated PFBS risk screening levels (OSD 2021). On 18 May 2022, the USEPA published an update to the RSLs table. The May 2022 RSL table included six PFAS constituents: PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA (USEPA 2022). On 06 July 2022, the OSD issued a memorandum to include

revised risk screening levels based on the May 2022 USEPA RSLs (OSD 2022). The July 2022 Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program is provided for reference as **Appendix A**. These screening criteria are discussed further in **Section 6.5**.

1.2 PA/SI Objectives

This PA/SI was conducted consecutively because the results of the PA yielded an AOPI that necessitated continuing onto the SI phase in accordance with CERCLA. Consequently, this report provides the combined objectives of both PA and SI reports.

1.2.1 PA Objectives

During the PA, investigators collect readily available information and conduct site reconnaissance. This PA will evaluate and document areas where PFAS-containing materials were used, stored, and/or disposed, so the Army can distinguish between sites that pose little or no threat to human health and the environment and sites that require further investigation.

1.2.2 SI Objectives

An SI is conducted when the PA determines an AOPI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multi-media sampling at an AOPI to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required.

Installation-specific data quality objectives (DQOs) and the sampling design and rationale are summarized in **Sections 6.1** and **6.2**.

1.3 PA/SI Process Description

For ASF Conroe, PA/SI development followed the process as described below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for ASF Conroe. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix B**.

1.3.1 Pre-Site Visit

First, an installation kickoff teleconference was held between applicable points of contact (POCs) from United States Army Environmental Command (USAEC), United States Army Corps of Engineers (USACE), ASF Conroe, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred on 11 October 2022, five weeks before the site visit to discuss the goals and scope of the PA, project scheduling, installation access, timeline for the site visit, access to installation-specific databases, and to request available records.

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Records review was conducted before the site visit to obtain electronically available documents from the installation and external sources for review. The purpose of the records research was to identify any area on the installation that may have been a location where PFAS-containing materials were used, stored, and/or disposed, as well as to gather information on the physical setting and site history at ASF Conroe.

A read-ahead package was prepared and submitted to the appropriate POCs 2 weeks before the site visit. The read-ahead package contained the following information:

- The Installation Management Command (IMCOM) operation order
- The Army PA Operations Security requirements package
- The PFAS PA kickoff call minutes
- An information paper on the PA portion of the Army's PFAS PA/SI
- Contact information for key POCs
- A list of the data sources requested and reviewed
- A list of preliminary locations identified during the kickoff call and pre-site visit records review to be evaluated for use, storage, and/or disposal of PFAS-containing materials, where additional information on those areas will be collected through personnel interviews, additional document review, and site reconnaissance.
- A list of roles for the installation POC to consider when recommending potential interviewees.

1.3.2 Preliminary Assessment Site Visit

The site visit was conducted on 15 November 2022. An in-brief meeting was held to provide installation staff with the objectives of the site visit and team introductions. **Section 3** includes information regarding personnel interviewed.

Personnel interviews were conducted with individuals having significant historical knowledge at ASF Conroe. The interviews focused on confirming information discussed in historical documents, collecting information that may have not been in historical documents, and corroborating other interviewees' information.

Site reconnaissance included visual surveys that assessed the points of potential use, storage, and/or disposal of PFAS-containing materials, as well as potential secondary impacts, and the migration potential from each AOPI (e.g., stormwater drains, building drains and sumps, cracks in the floor/pavement). Physical attributes of the preliminary locations were documented, including local slope and ground and floor conditions (i.e., paved, unpaved, visual staining), surface water bodies and surface flow, potential receptors, and the distance to the installation boundary. Access to existing groundwater monitoring wells, if present, were also noted during the site reconnaissance in case the monitoring wells could be proposed for SI sampling. Photo documentation of the preliminary locations was collected, and access limitations or advantages related to potential future sampling activities were noted.

1.3.3 Post-Site Visit

Information collected before, during, and after the site visit was reviewed and corroborated by cross-referencing records and reviewing interview details and observations noted during site visit reconnaissance. A site visit trip report was completed and provided to the installation POC, applicable USAEC POCs, and USACE regional POCs following the site visit. The information collected during the pre-site visit and site visit activities was compiled to develop the installation-specific PA portion of the PA/SI report (**Section 3**). Site data obtained during the PA were used to develop preliminary conceptual site models (CSMs) for the AOPI, which serve as the basis for developing the SI scope of work presented in an installation-specific Quality Assurance Project Plan (QAPP) Addendum.

1.3.4 Site Inspection Planning and Field Work

The SI process was initiated at the installation to evaluate PFOS, PFOA, PFBS, PFNA, and PFHxS presence or absence at each AOPI and determine whether further investigation is warranted. A combined SI kickoff and scoping teleconference was held between the Army PA team and the ASF Conroe to obtain concurrence on the SI sampling plan from USAEC, USACE, and the installation.

The objectives of the SI kickoff teleconference were to:

- discuss the AOPI(s) selected for sampling and the proposed sampling plan for the AOPI
- gauge regulatory involvement requirements or preferences
- confirm the plan for investigation derived waste (IDW) handling and disposal
- identify specific installation access requirements and potential schedule conflicts
- discuss general SI deliverable and field work schedule information and logistics.

A Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP) was developed and finalized in October 2019 for the USAEC PFAS PA/SI (Arcadis 2019). The PQAPP details general planning processes for collecting data and describes the implementation of quality assurance (QA) and quality control (QC) activities for the SI portion for Army installations nationwide. Additionally, an installation-specific QAPP Addendum was developed to define the DQOs, present the sampling design and rationale, and provide qualifications for project personnel. The SI field work was completed in accordance with the PQAPP (Arcadis 2019) and the approved installation-specific QAPP Addendum. A Site Safety and Health Plan (SSHP) was also developed as an attachment to the QAPP Addendum to identify specific health and safety hazards that may be encountered at the installation during sampling. The SSHP was designed to supplement the Accident Prevention Plan (Arcadis 2018), which was developed for Army installations nationwide. The QAPP Addendum and SSHP were submitted to the installation and finalized before commencement of field work.

The DQOs, sampling design and rationale, and field methods employed for the SI are summarized from the QAPP Addendum developed for ASF Conroe (Arcadis 2023) in **Sections 6.1** through **6.3**.

After finalization of the QAPP Addendum and SSHP, field planning and coordination with the installation and subcontractors was completed. Once the schedule was determined, field teams mobilized to the installation to complete the scope of work defined in the QAPP Addendum.

1.3.5 Data Analysis, Validation, and Reporting

Environmental samples collected during the SI were submitted to a laboratory which is DoD Environmental Laboratory Accreditation Program (ELAP)-accredited for PFOS, PFOA, PFBS, PFNA, and PFHxS analysis by liquid chromatography with tandem mass spectrometry and compliant with the DoD Quality Systems Manual (QSM) 5.3 (DoD and Department of Energy 2019). Laboratory analytical results were then validated and verified by a project chemist to assess the usability of the data collected. Validated analytical results were summarized in the context of OSD risk screening levels (defined in **Section 6.5**).

2 INSTALLATION OVERVIEW

The following subsections provide general information about ASF Conroe, including the location and layout, the installation mission(s) over time, a brief site history, current and projected land use, climate, topography, geology, hydrogeology, surface water hydrology, potable wells within a 5-mile radius of the installation, and applicable ecological receptors.

2.1 Site Location

ASF Conroe is located in the southeast region of Texas, approximately 40 miles north of Houston, Texas (**Figure 2-1**). The installation occupies approximately 43 acres in Montgomery County, Texas. The installation is located in the northeast side of Conroe, Texas and the city has a population of approximately 98,000. The northern and eastern side of the installation is bordered by the Conroe-North Houston Regional Airport. The southern and western portion of the installation is a mix of undeveloped wooded land, residential homes, and industrial buildings (**Figure 2-2**).

2.2 Mission and Brief Site History

The property is owned by Montgomery County and began operations as a military airfield for the Navy during World War II. It is unknown when the Navy ceased operations. Heliflight Systems, Inc. began leasing the property from the county in 1978 for an unknown duration, and the Army began leasing the property from the county in 1983. ASF Conroe is currently an active Army Reserve Reconnaissance Battalion used for aircraft support administrative services, classroom training, and vehicle maintenance (SpecPro Professional Services, LLC 2020). The installation consists of the main administrative building, two hangars equipped with an aqueous film-forming foam (AFFF) suppression system, helicopter landing pads, and various equipment and maintenance buildings. Additional buildings include storage buildings, storage sheds, and a maintenance shop for vehicles. The helicopter pads are located to the south of the installation buildings. ASF Conroe does not support an on-installation residential population.

2.3 Current and Projected Land Use

The installation is used for military support, training, and maintenance services. It is not anticipated for the projected land use to differ from the land use at the time of this report. The northern and eastern portions consist of commercial and industrial land use, the southern portion consists of wooded land, and the western portion consists of open land (SpecPro Professional Services, LLC 2020).

2.4 Climate

The climate is classified as humid subtropical with hot, oppressive summers and an even distribution of precipitation throughout the year. The average temperature highs and lows are 79 and 58 degrees Fahrenheit, respectively. The average annual rainfall is approximately 49 inches (U.S. Climate Data 2023).

2.5 Topography

The topography at ASF Conroe is relatively flat, with an elevation of approximately 250 feet above mean sea level and with a slightly eastern slope (**Figure 2-3**) (Vernadero Group 2015).

2.6 Geology

The surficial geology of ASF Conroe consists of Quaternary alluvium of the Willis Formation. The Willis Formation is a gravelly loamy fine sand with moderate infiltration rates and also consists of clay, silt, sand, siliceous granule to pebble gravel, and some petrified wood (Texas Bureau of Economic Geology 1992).

2.7 Hydrogeology

The surficial Quaternary alluvium at ASF Conroe sits atop the Gulf Coast aquifer system. The Gulf Coast aquifer system consists of the Chicot aquifer to approximately 250 feet below sea level in the area of ASF Conroe, which is underlain by the Evangeline aquifer to approximately 950 feet below sea level. The bottom of the Evangeline aquifer is confined by the Burkeville confining unit, which is more than 100 feet thick in this area. Below the Burkeville confining unit lies the Jasper aquifer, which is underlain by the Catahoula confining unit (Oden and Truini 2013).

Regional groundwater flow is to the south. However, site-specific groundwater flow has not been documented at ASF Conroe. Surficial groundwater flow direction at ASF Conroe is likely to the east and south as influenced by topography and surface water bodies of Crystal Creek to the east and San Jacinto River to the south. Depth to water for the surficial aquifer system is estimated to be approximately 3 to 6 feet below ground surface (bgs; Engineering, Compliance & Construction, Inc. 2006).

2.8 Surface Water Hydrology

Surficial water flow at ASF Conroe varies throughout the property due to topography. The installation is divided into a northern and southern drainage area. The northern drainage area includes the northern side of the hangars extending to the northern property boundary. Flow from the northern drainage area runs predominately east via two earthen ditches, which could eventually flow into the tributary of the east fork of Crystal Creek to the north. The southern drainage area includes the concrete area along the eastern side of the hangars. Flow from the southern drainage area runs south and east into a vegetative ditch running along the eastern edge of the property boundary, which could eventually flow into the west fork of Crystal Creek to the south (Vernadero Group 2015).

The drainage ditches from both the northern and southern drainage areas flow into a common discharge line that discharges into a lined AFFF retention pond located in the northeastern portion of the installation. Two automatic gate valves control the path of discharge. In normal mode, the gate valves are open for utilization of an oil/water separator to allow drainage of stormwater. If the AFFF suppression system is activated, gate valves close to the oil/water separator and open for discharge to the lined AFFF retention pond. There is a discharge gate valve for release from the lined AFFF retention pond that is normally open, but automatically closes when the AFFF suppression system is activated. All three gate valves have manual open/closing capabilities (Vernadero Group 2015).

Additionally, there is an 0.08-acre ephemeral stream in the northern portion of the installation that leads to the east fork of Crystal Creek, which ultimately flows into the west fork of the San Jacinto River, which is located approximately 8 miles south of the installation (Ageiss, Inc. 2016).

2.9 Relevant Utility Infrastructure

The following subsections provide general information regarding the installation's stormwater and wastewater management systems, as well as information on how the utility infrastructures may influence the fate and transport of PFAS constituents at ASF Conroe.

2.9.1 Stormwater Management System Description

Stormwater runoff routes to various drainage ditches around the facility which eventually reach the eastern tributary of the west fork of Crystal Creek to the south. The facility rests on the side of a slight eastern slope, and has two distinct drainage areas, as mentioned in **Section 2.8**, one in the northern portion of the facility and one in the south/southeastern portion of the facility. Stormwater in the northern portion would run predominately east via two earthen ditches. This area contains two small perennial basins. Any release could eventually reach the tributary of the east fork of Crystal Creek to the north. Any release in the southern portion of the facility would run south and east, into a vegetative ditch running along the eastern edge of the property boundary. The ditch continues south and flows along the eastern side of the aviation flight line property boundary (Vernadero Group 2015).

2.9.2 Sewer System Description

Sewage waste produced at ASF Conroe is routed and treated by the City of Conroe Wastewater Treatment Plant. There is an oil/water separator that sends water via the sewer to the City of Conroe Wastewater Treatment Plant as well. Oil sludge is removed by an environmental contractor and disposed of offsite.

2.10 Potable Water Supply and Drinking Water Receptors

Drinking water at ASF Conroe is provided by the City of Conroe municipal services. The Gulf Coast aquifer system is the primary water supply for Montgomery County, including the City of Conroe. Municipal water supply wells are located throughout the county, including within 1 mile west or cross-gradient of the installation. These wells are screened approximately 600 to 1,000 feet bgs and are not likely to be affected by potential AFFF releases at ASF Conroe due to their screening depth.

An Environmental Data Resources, Inc. (EDR) report includes search results from a variety of environmental, state, city, and other publicly available databases for a referenced property. An EDR report was generated for ASF Conroe, which identified community water supply wells and private domestic wells also located within 1 mile of the installation as shown on **Figure 2-4**. These wells are screened approximately 105 to 170 feet bgs, with a depth to water of approximately 33 to 58 feet bgs (Vernadero Group 2015). Due to the absence of land use controls preventing potable use of the off-post downgradient groundwater, the groundwater exposure pathway for off-installation receptors (via drinking water ingestion and dermal contact) is potentially complete. The EDR report providing well search results is provided as **Appendix C**.

2.11 Ecological Receptors

The PA team collected information regarding ecological receptors that was available in the installation documents. The following information is provided for future reference should the Army decide to evaluate exposure pathways relevant to the ecological receptors.

In 2014, Conroe-North Houston Regional Airport conducted a wildlife hazard assessment (WHA). The Airport's WHA identified a total of 72 species of wildlife (65 avian species and seven mammalian species). According to the WHA, Conroe ASF does not support habitat for listed species and no federally listed threatened or endangered species were observed during the WHA monitoring period. In addition, no state listed species were observed during this assessment period. The property is a mix of landscaped and natural habitat. Landscape vegetation and impermeable surfaces surround the hanger facility and immediately to the west of the hanger are open fields. The airfield is surrounded on three sides by deciduous woodlands comprised of oak (*Quercus spp.*), elm (*Ulmus spp.*), hickory (*Carya spp.*), pecan (*Carya illinoensis*), black walnut (*Juglans nigra*), tupelo (*Nyssa spp.*), sweetgum (*Liquidambar spp.*), and others. Some of the avian species observed included the American Crow (*Corvus brachyrhynchos*), Barn Swallow (*Hirundo rustica*), Black Phoebe (*Sayornis nigricans*), European Starling (*Stumus vulgaris*), Great Egret (*Ardea alba*), Hairy Woodpecker (*Picoides villosus*), House Sparrow (*Passer domesticus*), Mourning Dove (*Zenaida macroura*), and Rock Pigeon (*Columba livia*). The main mammalian species observed was the White-tailed deer (*Odocoileus virginianus*) (Ageiss, Inc. 2016).

2.12 Previous PFAS Investigations

No previous (i.e., pre-PA) PFAS investigations relative to ASF Conroe, including both those conducted and not conducted by the Army, have occurred at ASF Conroe. Additionally, no public water systems located within 5 miles of ASF Conroe were sampled under the third Unregulated Contaminant Monitoring Rule.

3 SUMMARY OF PA ACTIVITIES

To document areas where any potential current and/or historical PFAS-containing materials were used, stored and/or disposed at ASF Conroe, data was collected from three principal sources of information and are described in the subsections below:

1. Records review
2. Personnel interviews
3. Site reconnaissance

Preliminary locations of potential use, storage, and/or disposal of PFAS-containing materials were then evaluated in the PA (during records review, personnel interviews, and/or site reconnaissance) and were categorized as AOPIs or as areas not retained for further investigation at this time based on a combination of information collected (e.g., records reviewed, personnel interviews, internet searches). A summary of the observations made, and data collected through records reviews (**Appendix D**), installation personnel interviews (**Appendix E**), site reconnaissance photos (**Appendix F**) and site reconnaissance logs (**Appendix G**) during the PA process for ASF Conroe is presented in **Section 4**. Further discussion regarding rationale for not retaining areas for further investigation is presented in **Section 5.1**, and further discussion regarding categorizing areas as AOPIs is presented in **Section 5.2**.

3.1 Records Review

The records reviewed for this PA included, but were not limited to, various Installation Restoration Program administrative record documents, compliance documents, Conroe Fire Department documents, ASF Conroe Directorate of Public Works documents, and geographic information system files. Internet searches were also conducted to identify publicly available and other relevant information. A list of the specific documents reviewed for ASF Conroe is provided in **Appendix D**.

3.2 Personnel Interviews

Interviews were conducted during the site visit and telephonically after the site visit. The list of roles for the installation personnel interviewed during the PA process for ASF Conroe is presented below (affiliation is with ASF Conroe unless otherwise noted).

- Facility Coordinator
- Pilot/Facility Personnel
- Facility Personnel (retired)
- Airport Manager (Conroe-North Houston Regional Airport)
- Lead Area Facility Operations Specialist (Air Force Aid Society)
- Environmental Compliance Specialist (Whitetail Environmental, LLC)
- Maintenance Shop Supervisor (Whitetail Environmental, LLC)

The compiled interview logs are provided in **Appendix E**.

3.3 Site Reconnaissance

Site reconnaissance and visual surveys were conducted at the preliminary locations identified at ASF Conroe during the records review process, the installation in-brief meeting, and/or during the installation personnel interviews. A photo log from the site reconnaissance is provided in **Appendix F**; photos were used to assist in verification of qualitative data collected in the field. The site reconnaissance logs are provided in **Appendix G**.

4 POTENTIAL PFAS USE, STORAGE, AND/OR DISPOSAL AREAS

ASF Conroe was evaluated for all potential current and historical use, storage, and/or disposal of PFAS-containing materials. As such, this section is organized to summarize the AFFF-related uses first, and all remaining potential PFAS-containing materials in the subsequent section.

4.1 AFFF Use, Storage, and Disposal Areas

AFFF was developed in the mid-1960s in response to a need for firefighting foams better suited to extinguish Class B, fuel-based fires. AFFF formulations consist of water, an organic solvent, up to 5 percent (%) hydrocarbon surfactants, and 1 to 3% PFAS (Interstate Technology Regulatory Council 2020). AFFF concentrate is designed to be diluted with water to become a 1, 3, or 6% foam. AFFF releases at DoD facilities may have occurred during firefighter training, emergency response actions, equipment testing, or accidental releases. The military still primarily uses AFFF for Class B fires; however, the current formulations of AFFF contain significantly lower amounts of PFOS, PFOA, and their precursors, and significant operational changes have been implemented to restrict uncontrolled releases and non-essential use of PFAS-containing foams. Army installations may still house AFFF, commonly stored in closed containers (e.g., 55-gallon drums, 5-gallon buckets), within designated storage buildings or at firehouses.

According to personnel interviews, AFFF is stored in one above-ground tank located inside of the main hangar on the northeast side of the building that was onsite before the Army occupied the facility in the early 1990s. The AFFF tank is routed to an AFFF suppression system affixed to the ceiling of the main hangar. The hangar floor has drains that route directly to a lined AFFF retention pond on the northeast side of the facility. Two automatic valves remain open during normal mode to allow for stormwater drainage. If the AFFF suppression system is activated, the valves close to prevent AFFF release. It was noted during the site-visit that the AFFF liner has vegetative overgrowth and has some tears and damage in the lining. There are no historical records of leaks from the AFFF tank or of the AFFF suppression system ever being activated at ASF Conroe.

There is no evidence that ASF Conroe once had an operational fire department onsite. The Conroe Fire Department services ASF Conroe Building 109 (on the northwest side of the helicopter pad, on the southern end of the facility) was built to house an onsite fire department, but the fire department was never operational. This building is now used for site storage. There are no historical records of any firefighting training that used AFFF or fire suppressants at ASF Conroe. During the PA, onsite personnel indicated that firefighter training has occurred in the past at the facility, but it only involved non-fire suppressant activities such as aircraft rescue procedures.

4.2 Other PFAS Use, Storage, and/or Disposal Areas

Following document research, personnel interviews, and site reconnaissance at ASF Conroe, metal plating facilities and former material and maintenance shops were also identified as preliminary locations for use, storage, and/or disposal of PFAS-containing materials. A summary of information gathered in the PA for each of these preliminary locations is described below. Specific discussion regarding areas not

retained for further investigation is presented in **Section 5.1** and specific discussion regarding areas retained as AOPs is presented in **Section 5.2**.

PFAS use associated with metal plating activities may also be relevant to Army installations. During metal plating operations, a metal surface may be treated with a layer of electrochemically deposited metals in an acid bath. PFAS, specifically PFOS, have been used in metal plating operations as surface tension-reducing wetting agents to mitigate the release of aerosolized chemicals into a working environment. Hard chromium plating is one type of metal plating operation where PFAS-containing mist suppressants were commonly used. Historically, it was common for spent plating baths from metal plating operations to be disposed of in a lined or unlined pit or into a sanitary or storm sewer. Therefore, PFAS present in mist suppressants during the metal plating process could be released to the environment. Metal plating activities that may have used PFAS-containing mist suppressants have been documented at the Building P0101/Organizational Maintenance Shop (OMS). Since 1993, a chemical agent resistant coating has been used on aircraft and vehicles at the Building P0101/OMS. Personnel interviews indicated that the coating operations associated with the OMS are performed with a gravity-fed pen device. No pressurization or aerosol application is used for this surface coating activity, and the surface coating only consists of small area repairs such as rust remediation and spot painting.

Building P0102 was used as paint shop starting from 1993 to an unknown date. It is used as a storage area for miscellaneous equipment at the time of this report. The Building P0103/Ground Support Equipment was used as a stripping material shop from 1993 to an unknown date. It is used as a storage and maintenance area for equipment used to support aircrafts at the time of this report. There is no record of PFAS-containing materials to have been used or stored at either of these buildings.

During a telephonic interview with the IMCOM Pest Management Consultant, it was noted that products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. During the PA records review, the IMCOM Pest Management Consultant provided records of potentially PFAS-containing pesticides and insecticides used at and/or stored at Army installations and did not identify ASF Conroe as an installation having used or stored PFAS-containing pesticides/insecticides. Additionally, the PA team reviewed available pesticide use inventory documentation provided by the installation and did not identify PFAS-containing pesticides use, storage, or disposal.

4.3 Readily Identifiable Off-Post PFAS Sources

An exhaustive search to identify all potential off-post PFAS sources (i.e., not related to operations at ASF Conroe) is not part of the PA/SI. However, potential off-post PFAS sources within a 5-mile radius of the installation that were identified during the records search and site visit are described below.

ASF Conroe borders the Conroe-North Houston Regional Airport on ASF Conroe's northeast fence line. During personnel interview, the Conroe-North Houston Regional Airport Manager indicated that the airport fire department is run by the Montgomery County Fire Marshal, and that there is a firefighting foam truck onsite. Foam and nozzle testing is performed at the airport; however it is performed at a location where runoff would not flow towards ASF Conroe. There is no historical record of any fuel spills that required a foam or fire response at the airport.

5 SUMMARY AND DISCUSSION OF PA RESULTS

The preliminary locations evaluated for potential use, storage, and/or disposal of PFAS-containing materials at ASF Conroe, were further refined during the PA process and identified either as an area not retained for further investigation or as an AOPI. In accordance with the established process for the PA/SI, one area has been identified as an AOPI. The process used for refining these areas is presented on **Figure 5-1**, below.

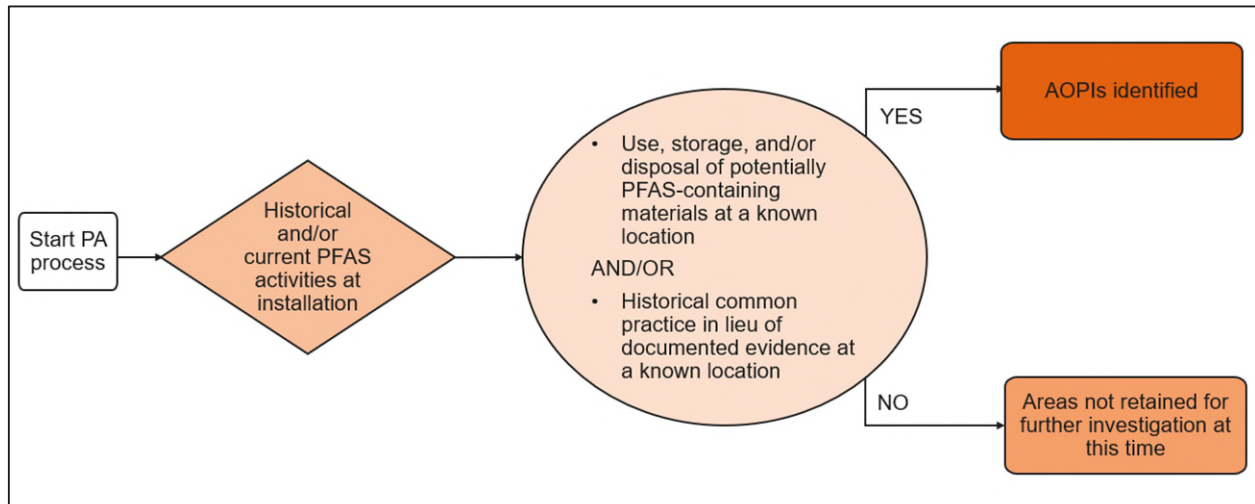


Figure 5-1: AOPI Decision Flowchart

The areas not retained for further investigation are presented in **Section 5.1**. The areas retained as an AOPI is presented in **Section 5.2**.

Data limitations for this PA/SI at ASF Conroe are presented in **Section 8**.

5.1 Areas Not Retained for Further Investigation

Through the evaluation of information obtained during records review, personnel interviews, and/or site reconnaissance, the areas described below were categorized as areas not retained for further investigation at this time.

A brief site history and rationale for areas not retained for further investigation are presented in **Table 5-1**, below.

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Table 5-1. Installation Areas Not Retained for Further Investigation

Area Description	Dates of Operation	Relevant Site History	Rationale
Non-Operational Fire Department / Building 109	Not Applicable	Planned location for fire department; however, the facility was never operational, and no training occurred at the installation. At the time of this report the building houses tools and physical equipment.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
OMS / Building P0101	1993 and Ongoing	Building is used to service and maintain vehicles at the installation. Coating application of vehicles occurs with gravity-fed pen device.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Building P0102	1993 and Ongoing	Former paint shop, at the time of this PA, used as a storage barn for miscellaneous equipment.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Building P0103 / Ground Support Equipment	1993 and Ongoing	Former stripping material shop, at the time of this PA used to store and maintain equipment used to support aircraft.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.

5.2 AOPI

An overview for the AOPI identified during the PA process is presented in this section. At the time of this PA, there are no historical Installation Restoration Program sites at ASF Conroe.

The AOPI location is shown on **Figure 2-2**. An aerial photograph of the one AOPI is presented on **Figure 5-2**.

5.2.1 ASF Conroe Hangar

The ASF Conroe Hangar is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the presence of an AFFF tank and suppression system.

The ASF Conroe Hangar AOPI consists of two hangars and a lined AFFF retention pond designed to capture released AFFF. The hangars existed when the Army occupied the facility in the early 1990s. The hangars have an AFFF suppression system installed in the ceiling that is connected to a 500-gallon AFFF storage tank in a separate room on the northeastern end of the building. Historical release of AFFF from the suppression system is suspected, but not recorded. The hangars have curtain drains installed throughout the floor that route directly to the lined AFFF retention pond on the northeastern portion of the

PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT AVIATION SUPPORT FACILITY,
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ASF Conroe facility. The majority of any AFFF release would have flowed into the retention pond via utilities. Any AFFF not captured by the curtain drain could have potentially flowed into nearby grassy areas prior to groundwater infiltration.

In-between the hangars and the retention pond to the northeast is a section of maintained grass. The hangar opens to the east, where a driveway is paved from the hangar almost to the fence line at the east, and which continues down south towards the helicopter pad. Stormwater drainage from the hangar flows east towards the fence line and south, down the driveway, towards the helicopter pad. Stormwater drainage around the retention pond flows towards the fence to the northwest, and towards a stormwater drainage ditch to the southwest of the retention pond. The retention pond has a valve that allows stormwater to drain to the drainage ditch on the eastern fence line of the facility. The valve is designed to close if the AFFF suppression system were to be activated.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at ASF Conroe, an SI for PFOS, PFOA, PFBS, PFNA, and PFHxS was conducted in accordance with CERCLA. SI sampling was completed at ASF Conroe at one AOPI to evaluate presence or absence of PFOS, PFOA, PFBS, PFNA, and PFHxS in comparison with the OSD risk screening levels. As such, an installation-specific QAPP Addendum (Arcadis 2023) was developed to supplement the general information provided in the PQAPP (Arcadis 2019) and to detail the site-specific proposed scopes of work for the SI. A preliminary CSM was prepared for the installation's AOPI in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE 2012). The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSMs identified soil, groundwater, surface water, and/or sediment pathways as potentially complete which guided the SI sampling. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The site-specific SI scope of work proposed by the PA was completed in March 2023 through the collection of field data and analytical samples.

The SI field work was completed in accordance with the standard operating procedures (SOPs), technical guidance instructions (TGIs), sampling design, and QA/QC requirements as detailed in the QAPP Addendum (Arcadis 2023) and PQAPP (Arcadis 2019). The subsections below summarize the DQOs, sampling design and rationale, sampling activities and methods, and data analyses procedures for the SI phase at ASF Conroe. Non-conformances to the prescribed procedures in the PQAPP and QAPP Addendum are described in **Section 6.3.3**. Analytical results obtained through SI field activities are summarized in **Section 7**.

6.1 Data Quality Objectives

As identified during the DQO process and outlined in the site-specific QAPP Addendum (Arcadis 2023), the objective of the SI is to identify whether there has been a release to the environment at the AOPI identified in the PA and to determine if further investigation is warranted. This SI evaluated groundwater and soil for PFOS, PFOA, PFBS, PFNA, and PFHxS presence or absence at the sampled AOPI.

6.2 Sampling Design and Rationale

The rationale for sampling at each AOPI is illustrated on **Figure 6-1** below.

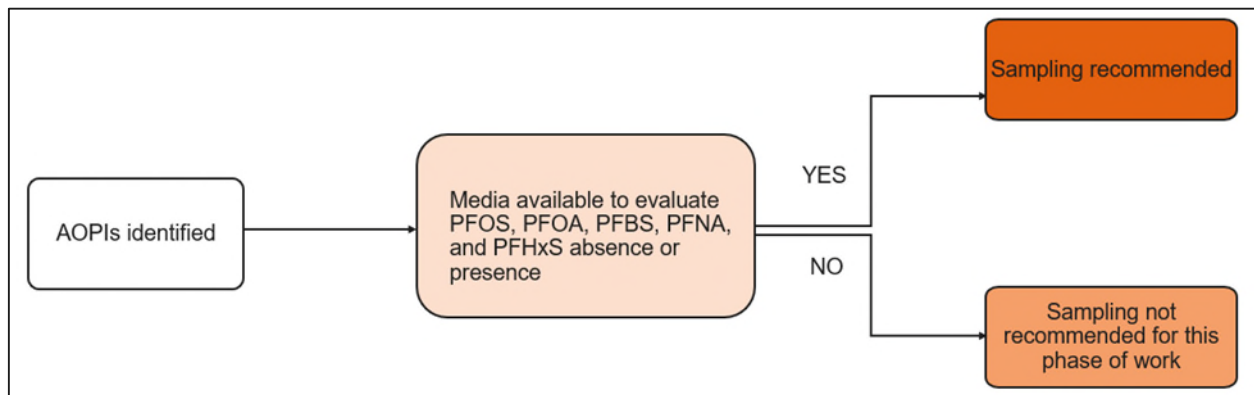


Figure 6-1: AOP Sampling Decision Tree

The sampling design for SI sampling activities at ASF Conroe is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2023). Briefly, groundwater and soil were sampled to identify PFAS presence, type, and concentrations. One soil sample will also be analyzed for total organic carbon (TOC), pH, and grain size. These data will be collected as they may be useful in future fate and transport studies. The targeted sampling locations are believed to have the potential for the greatest PFAS concentrations closest to known or suspected use, storage, and/or disposal of PFAS-containing materials. Sampling points were positioned at locations of suspected PFOS, PFOA, and PFBS-containing material uses, locations of runoff collection, and locations downgradient of known or suspected uses of PFAS-containing materials and were determined based on specific historical evidence and surface runoff/groundwater flow conditions at the AOP.

6.3 Sampling Methods and Procedures

Environmental data were collected and analyzed in accordance with the PQAPP (Arcadis 2019), the SOPs and TGIs included as Appendix A to the PQAPP, the QA/QC requirements identified in Worksheet #20 of the PQAPP, the approved scope and sampling methods outlined in the site-specific QAPP Addendum (Arcadis 2023), and the safety procedures specified in the Accident Prevention Plan (Arcadis 2018) and SSHP (Arcadis 2023). The sampling methods described in the SOPs and TGIs establish equipment requirements, procedures for preparing equipment and containers before sampling, sampling procedures under various conditions, and procedures for storing samples to ensure that sample contamination does not occur during collection, and transport. In general, sampling techniques used in the SI were consistent with conventional sampling techniques used in the environmental industry, but special considerations were made regarding PFAS-containing materials and equipment and cross-contamination potential.

The sampling methods employed during the SI are detailed in the PQAPP (Arcadis 2019) and QAPP Addendum (Arcadis 2023). The subsections below provide a summary of the field methods and procedures utilized to complete the SI scope of work. Field notes and field forms (i.e., soil boring logs, groundwater purging logs, equipment calibration forms, tailgate health and safety forms, and sample collection logs) documenting the SI sampling activities are included in **Appendices H** and **I**, respectively. Photographs of the sampling activities are included in **Appendix J**.

6.3.1 Field Methods

Grab groundwater samples were collected from first-encountered groundwater via low-flow sampling procedures from direct-push technology (DPT) soil borings at the Conroe Hangar AOPI through a decontaminated stainless-steel screen point sampler in boreholes using PFAS-free equipment (i.e., decontaminated portable bladder pumps and disposable high-density polyethylene bladders/tubing), downgradient of the hangar. A co-located soil sample was collected from each sampling location prior to the extension of the DPT boring to shallow (first encountered) groundwater.

Soil samples were collected via a decontaminated stainless-steel hand auger from the top 2 feet of soil; each 0 to 2 feet interval was homogenized on PFAS-free high-density polyethylene plastic sheeting before bottling for analysis.

Decontamination procedures for non-dedicated equipment used during sampling are described in **Section 6.3.4**.

6.3.2 Quality Assurance/Quality Control

Worksheets #20 of the PQAPP and QAPP Addendum provide QA/QC requirements for field duplicates, matrix spike/matrix spike duplicates, equipment blanks (Ebs), source blanks for water used in the initial decontamination step for drill tooling, and field blanks for laboratory-supplied water used in the final decontamination step.

QA/QC samples were collected at the frequencies specified in the QAPP Addendum (Arcadis 2023), typically at a rate of 1 per 20 parent samples. Field duplicates and matrix spike/matrix spike duplicate samples were collected for media sampled for PFOS, PFOA, PFBS, PFNA, and PFHxS, and TOC only. Ebs were collected for media sampled for PFOS, PFOA, PFBS, PFNA, and PFHxS, at a frequency of one per piece of relevant equipment for each sampling event, as specified in the QAPP Addendum (Arcadis 2023). The decontaminated reusable equipment from which Ebs were collected include hand augers and water-level meters as applicable to the sampled media. Source blanks were collected from the water used to pressure-wash drill tooling. Analytical results for blank samples are discussed in **Section 7.3**.

6.3.3 Field Change Reports

No minor or major modifications or non-conformances to the approved sampling scope and/or procedures occurred during the sampling events.

6.3.4 Decontamination

Non-dedicated reusable sampling equipment (e.g., stainless-steel trowels, hand augers, drill cutting shoes and casing, screen-point samplers, water-level meters) that came into direct contact with sampling media was decontaminated before first use, between sampling locations/intervals, and before demobilization in accordance with P-09, TGI – Groundwater and Soil Sampling Equipment Decontamination (Arcadis 2019, Appendix A).

6.3.5 Investigation-Derived Waste

IDW, including soil cuttings and decontamination fluids, was collected and placed in Department of Transportation-approved 55-gallon drums, labeled as non-hazardous, and transported to a staging area pending SI sample analysis. Equipment IDW including personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, Lexan tubes, and high density polyethylene and silicon tubing) were removed from the site immediately upon completion of each day's field activities.

Upon receiving data indicating PFOS, PFOA, PFBS, PFNA, and/or PFHxS detections in the soil and groundwater SI samples collected, the process of removing the containerized IDW to an offsite landfill is pending at the time of this report. IDW manifests will be provided to the Army project team once received.

6.4 Data Analysis

The subsections below summarize the laboratory analytical methods and the methodology used to evaluate data collected during the SI through data verification and usability assessments (as completed by a project chemist, independent of the project team).

6.4.1 Laboratory Analytical Methods

Analytical samples collected during the SI were submitted to Pace South Carolina (formerly Shealy Environmental Services, Inc.), an ELAP-accredited laboratory for PFAS analysis, including PFOS, PFOA, PFBS, PFNA, and PFHxS, by liquid chromatography with tandem mass spectrometry. Laboratory analyses associated with the SI were completed in accordance with Worksheets #12.1 through #12.5 in the PQAPP (Arcadis 2019). Eighteen PFAS-related compounds, including PFOS, PFOA, PFBS, PFNA, and PFHxS, were analyzed for in groundwater and soil samples using an analytical method that is ELAP-accredited and compliant with QSM 5.3 (DoD and Department of Energy 2019), Table B-15.

Additionally, the following general chemistry and physical characteristic analyses were completed for select soil samples in accordance with Worksheet #18 of the QAPP Addendum (Arcadis 2023) by the analytical method noted:

- TOC by Solid Waste Test Method 846 9060A
- Grain size analysis by American Society for Testing and Materials D422-63
- pH by Solid Waste Test Method 846 9045D.

These data are collected as they may be useful in future fate and transport studies.

The laboratory limit of detection (LOD) is defined as “the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence” (DoD 2017). The lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias is known as the limit of quantitation (LOQ; DoD 2017). Concentrations detected between the LOD and LOQ, therefore, are considered estimates and are qualified as such on laboratory analytical reports. Instrument-specific detection limits (e.g., the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99 percent confidence; DoD 2017), as provided for each analyte by the laboratory, are reported along with the LODs and LOQs in the laboratory analytical reports included in the Data Usability Summary Report (DUSR) (**Appendix K**).

6.4.2 Data Validation

All analytical data generated during the SI, except grain size, were verified and validated in accordance with the data verification procedures described in Worksheets #34 through #36 of the PQAPP (Arcadis 2019). Each laboratory data package/sample delivery group underwent Stage 3 data validation in accordance with DoD QSM 5.3 (DoD and Department of Energy 2019). Additionally, 10% of the data underwent Stage 4 data validation. Copies of the data validation reports for each sample delivery group are included as attachments to the DUSR in **Appendix K**. The Level IV analytical reports are included within **Appendix K** in the final electronic deliverable only.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at ASF Conroe. Documentation generated during the data usability assessments, which were compiled into a DUSR (**Appendix K**), was prepared in accordance with the USACE Engineer Manual 200-1-10 (USACE 2005), the Final DoD General Data Validation Guidelines (DoD 2019) and the Final DoD Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15 (DoD 2020), that reviewed precision, accuracy, completeness, representativeness, comparability, and sensitivity. A statement of overall data usability is included in the DUSR.

Based on the final data usability assessment, the environmental data collected at ASF Conroe during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUSR and its associated data validation reports (**Appendix K**), and as indicated in the full analytical tables (**Appendix L**) provided for the SI results. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and ASF Conroe QAPP Addendum (Arcadis 2023). Data qualifiers applied to laboratory analytical results for samples collected during the SI at ASF Conroe are provided in the data tables, data validation reports, and the Data Usability Summary Table located at the end of DUSR. Qualifiers for data shown on figures are defined in the notes of figures.

6.5 Office of the Secretary of Defense Risk Screening Levels

The OSD risk screening levels for PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA in groundwater (tap water) and soil were calculated using the USEPA's RSL calculator for residential and industrial/commercial worker receptor scenarios and current toxicity values. These risk screening levels are shown in **Table 6-1**.

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Table 6-1 OSD Risk Screening Levels Calculated for PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA in Tap Water and Soil Using USEPA's Regional Screening Level Calculator

Chemical	Residential Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator		Industrial/Commercial Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator
	Tap Water (ng/L or ppt) ¹	Soil (mg/kg or ppm) ^{1,2}	Soil (mg/kg or ppm) ^{1,2}
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6
HFPO-DA ³	6	0.023	0.35

Notes:

1. Risk screening levels for tap water and soil provided by the OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July 06 (**Appendix A**).

2. All soil data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet bgs), regardless of the current and projected land use of the AOPI.

3. Of the six PFAS compounds presented in the 06 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at ASF Conroe because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

Mg/kg = milligram per kilogram

ng/L = nanograms per liter

ppm = parts per million

ppt = parts per trillion

The OSD residential tap water risk screening levels will be used to compare all groundwater for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPI at ASF Conroe are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, PFBS, PFNA, and PFHxS will be used to evaluate detected soil concentrations. The data from the SI sampling event are compared to the OSD risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, PFBS, PFNA, or PFHxS are detected greater than the applicable OSD risk screening levels, further study in a remedial investigation is recommended in **Section 8**.

7 SUMMARY AND DISCUSSION OF SI RESULTS

This section summarizes the analytical results obtained from samples collected during the SI at ASF Conroe (field duplicate results are provided in the associated tables). Sampled media and QA/QC samples were analyzed for the constituents prescribed per Worksheet #18 of the QAPP Addendum (Arcadis 2023). The sample results discussion below focuses on the PFOS, PFOA, PFBS, PFNA, and PFHxS analytical results because they have OSD risk screening levels. The Army will make subsequent investigation decisions based on these constituents' concentrations relative to the OSD risk screening levels.

Tables 7-1 through **7-2** provide a summary of the groundwater and soil analytical results for PFOS, PFOA, PFBS, PFNA, and PFHxS. **Table 7-3** summarizes whether the AOPI SI results exceed the OSD risk screening levels. **Appendix L** includes the full suite of analytical results for these media, as well as for the QA/QC samples. **Figure 7-1** shows the PFOS, PFOA, PFBS, PFNA, and PFHxS analytical results in groundwater and soil for the AOPI. Non-detected results are reported as less than the LOQ. Detections of PFOS, PFOA, PFBS, PFNA, and/or PFHxS greater than the applicable OSD risk screening levels are highlighted in summary tables and on figures. Final qualifiers applied to the data by the laboratory and the project chemist (as defined in **Section 6.4.3**) are presented on the analytical tables. Groundwater data collected during the SI are reported in ng/L, or parts per trillion, and soil data are reported in mg/kg, or parts per million.

Field parameters measured for groundwater during low-flow purging and sample collection are provided on the field forms in **Appendix I**. Soil descriptions are provided on the field forms in **Appendix I**. The results of the SI are grouped by AOPI and discussed for each medium as applicable.

Table 7-3 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
ASF Conroe Hangar	Yes

7.1 ASF Conroe Hangar

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFNA, and PFHxS analytical results associated with the ASF Conroe Hangar.

7.1.1 Groundwater

Three grab groundwater samples were collected from three borings via DPT at first-encountered groundwater at the ASF Conroe Hangar AOPI (CON-HANGAR-01-GW, CON-HANGAR-02-GW, and CON-HANGAR-03-GW; **Figure 7-1**). Depth to water at the site ranged from 28-43 feet bgs. A summary of PFOS, PFOA, PFBS, PFNA, and PFHxS groundwater analytical results is provided in **Table 7-1**.

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- PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in groundwater samples: CON-HANGAR-01-GW (82 ng/L), CON-HANGAR-02-GW (530 ng/L), and CON-HANGAR-03-GW (4.6 ng/L).
- PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in groundwater samples: CON-HANGAR-01-GW (6.4 ng/L) and CON-HANGAR-02-GW (29 J ng/L). The J qualifier indicates that the analyte was positively identified, however the result is an estimated concentration only.
- PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in groundwater samples: CON-HANGAR-01-GW (25 ng/L), CON-HANGAR-02-GW (350 ng/L), and CON-HANGAR-03-GW (4.4 ng/L).
- PFNA was not detected in any of the groundwater samples.
- PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in groundwater samples: CON-HANGAR-01-GW (320 ng/L) and CON-HANGAR-02-GW (840 ng/L) and at a concentration less than the OSD risk screening level of 39 ng/L in groundwater sample: CON-HANGAR-03-GW (10 ng/L).

7.1.2 Soil

Soil samples were collected from six locations at the ASF Conroe Hangar AOPI (CON-HANGAR-01-SO, CON-HANGAR-02-SO, CON-HANGAR-03-SO, CON-HANGAR-04-SO, CON-HANGAR-05-SO, and CON-HANGAR-06-SO [duplicate sample collected at CON-HANGAR-01-SO; **Figure 7-1**]). A summary of PFOS, PFOA, PFBS, PFNA, and PFHxS soil analytical results is provided in **Table 7-2**.

- PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg and the industrial/commercial OSD risk screening level of 0.16 mg/kg in soil sample CON-HANGAR-04-SO (0.83 mg/kg). PFOS was detected in the following samples at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg: CON-HANGAR-01-SO (0.044 J mg/kg), CON-HANGAR-02-SO (0.047 mg/kg), and CON-HANGAR-05-SO (0.034 mg/kg) and at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in soil sample: CON-HANGAR-06-SO (0.0011 mg/kg). The J qualifier indicates that the analyte was positively Identified, however the result is an estimated concentration only.
- PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in soil samples: CON-HANGAR-01-SO (0.00066 J mg/kg) and CON-HANGAR-05-SO (0.00072 J mg/kg).
- PFBS was not detected in any of the soil samples.
- PFNA was not detected in any of the soil samples.
- PFHxS was detected at a concentration less than the residential OSD risk screening level of 0.13 mg/kg in soil samples: CON-HANGAR-01-SO (0.0059 mg/kg), CON-HANGAR-02-SO (0.0015 mg/kg), CON-HANGAR-04-SO (0.0056 mg/kg), and CON-HANGAR-05-SO (0.00086 J mg/kg).

7.2 TOC, pH, and Grain Size

In addition to sampling soil for PFOS, PFOA, PFBS, PFNA, and PFHxS, one soil sample (CON-HANGAR-03-SO) for the AOPI was analyzed for TOC, pH, moisture content, and grain size data as they may be useful in future fate and transport studies. The TOC in soil sample CON-HANGAR-03-SO was 1,100 mg/kg. The TOC at this installation was within range of what is typically observed in desert soils (less than 5,000 mg/kg). The combined percentage of fines (i.e., silt and clay) in soils at the ASF Conroe Hangar AOPI was 44.2%. In general, PFAS constituents tend to be more mobile in soils with less than 20% fines (silt and clay) and lower TOC. The average percent moisture of the soil was 16.8% which is typical for clay. The pH of the soil was neutral (6.0 standard units). While PFAS constituents are relatively less mobile in soils with high percentages of fines, depleted TOC may allow for enhanced mobility of the constituents in soil.

7.3 Blank Samples

PFOS, PFOA, PFBS, PFNA, and PFHxS were not detected in any of the blank samples collected during the SI work.

The full analytical results for blank samples collected during the SI are included in **Appendix L**.

7.4 Conceptual Site Models

The preliminary CSM presented in the QAPP Addendum (Arcadis 2023) was re-evaluated and updated, if necessary, based on the SI sampling results. The CSM presented on **Figure 7-2** and in this section therefore represents the current understanding of the potential for human exposure.

Many of the PFAS constituents found in AFFF are surfactants (which do not volatilize) and are found in a charged or ionic state at environmentally-relevant pH (i.e., pH 5 to 9 standard units). PFOS, PFOA, PFBS, PFNA, and PFHxS are each negatively charged at environmentally-relevant pH. The media potentially affected by PFOS, PFOA, PFBS, PFNA, and PFHxS releases at Army installations are soil, groundwater, surface water, and sediment. Once released to the environment, a primary factor that inhibits the movement of PFAS constituents is the presence of organic matter and organic co-constituents in soils and sediments. Generally, PFAS constituents are mobile in the potentially affected media, and they are not known to be fully broken down by natural processes.

Based on the use, storage, and/or disposal of PFAS-containing materials at the AOPI, affected media are likely to consist of soil, groundwater, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, transport via sediment carried in and dissolution to stormwater and surface water, discharge/recharge between groundwater and surface water, and adsorption/desorption between surface water and sediment. Generic categories of potential human receptors and their associated exposure scenarios that are typically evaluated in a CERCLA human health risk assessment were considered and include on-installation site workers (e.g., industrial/commercial workers, utility workers, or future construction workers who could be exposed to chemicals in soil at an AOPI or to chemicals in tap water in an industrial/commercial building), on-installation residents (e.g., adults and children who could be exposed to chemicals in tap water in a residence), and on-installation recreational users (e.g., hikers or hunters who could be exposed to

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chemicals in waterways at an installation). Off-installation receptor types could include drinking water receptors (i.e., commercial/industrial workers or residents) and recreational users.

Human exposure pathways are shown as “complete”, “potentially complete”, or “incomplete” on the CSM figure. A complete exposure pathway consists of a constituent source and release mechanism, a transport or retention medium, an exposure point where human contact with the contaminated medium could occur, and an exposure route at the exposure point. If any of these elements is missing, the exposure pathway is incomplete. Pathways are “potentially complete” where data are insufficient to conclude the pathway is either “complete” or “incomplete”. Additionally, the CSM does not include ecological receptors and exposure pathways. The potential for ecological exposures to PFOS, PFOA, PFBS, PFNA, and PFHxS may be evaluated at a future date if those pathways warrant further consideration.

Figure 7-2 shows the CSM for the ASF Conroe Hangar AOPI, where PFAS-containing materials associated with the AFFF suppression system and associated AFFF storage tank could have been released to soil and/or paved surfaces (e.g., AFFF suppression system release, filling of AFFF tank).

- There are no residents or recreational users at ASF Conroe. Therefore, all exposure pathways for on-installation residents and recreational users are incomplete.
- PFOS, PFOA, and PFHxS were detected in soil at the ASF Conroe Hangar AOPI and site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust; therefore, the soil exposure pathway for on-installation site workers is complete.
- The AOPI is wholly located within the boundary of ASF Conroe. Therefore, the soil exposure pathway for off-installation receptors is considered to be incomplete.
- PFOS, PFOA, PFBS, and PFHxS were detected in groundwater at the ASF Conroe AOPI. Drinking water at ASF Conroe is provided by municipal services. The Gulf Coast aquifer system is the primary water supply for Montgomery County, including the City of Conroe. Municipal water supply wells are located throughout the county, including within 1 mile west or cross-gradient of the installation. These wells are screened approximately 600 to 1,000 feet bgs (EDR 2022) and are not likely to be affected by potential AFFF releases at ASF Conroe due to their screening depth. Therefore, the groundwater exposure pathway for on-installation site workers is considered to be incomplete.
- Community water supply wells and private domestic wells are located within 1 mile of the installation. These wells are screened approximately 105 to 170 feet bgs, with a depth to water of approximately 33 to 58 feet bgs (Vernadero Group 2015). Due to the absence of land use controls preventing potable use of the off-post downgradient groundwater, the groundwater exposure pathway for off-installation receptors (via drinking water ingestion and dermal contact) is potentially complete.
- The hangars have curtain drains installed throughout the floor that route directly to the lined AFFF retention pond on the northeastern portion of the ASF Conroe facility. The retention pond is not used for drinking water. However, on-installation site workers could contact surface water and sediment of the retention pond; therefore, these exposure pathways are potentially complete.
- The retention pond is hydrologically connected to an off-installation intermittent drainage ditch. Off-post receptors (e.g., workers or recreational users) could contact constituents in surface water

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and sediment through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation receptors are potentially complete.

Following the SI sampling, the one AOPI was considered to have complete or potentially complete exposure pathways. Although the CSM indicates complete or potentially complete exposure pathways may exist, the recommendation for remedial investigation is based on the comparison of analytical results for PFOS, PFOA, PFBS, PFNA, and PFHxS to the OSD risk screening levels (**Table 6-1**).

8 CONCLUSIONS AND RECOMMENDATIONS

The PFAS PA/SI included two distinct efforts. The PA identified one AOPI at ASF Conroe based on the use, storage, and/or disposal of PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances (Army 2018). The SI included multi-media sampling at the AOPI to determine whether or not a release of PFOS, PFOA, PFBS, PFNA, and PFHxS to the environment occurred.

OSD provided residential risk screening levels based on the USEPA oral reference dose for PFOS, PFOA, PFBS, PFNA, and PFHxS in soil and groundwater (tap water) and industrial/commercial risk screening levels for PFOS, PFOA, PFBS, PFNA, and PFHxS in soil (**Appendix A**). A combination of document review, internet searches, interviews with installation personnel, and an installation site visit were used to identify specific areas of suspected PFOS, PFOA, PFBS, PFNA, and PFHxS use, storage, and/or disposal at ASF Conroe. Following the evaluation, one AOPI was identified.

ASF Conroe obtains its drinking water from the City of Conroe municipal services. The Gulf Coast aquifer system is the primary water supply for Montgomery County, including the City of Conroe. Municipal water supply wells are located throughout the county, including within 1 mile west or cross-gradient of the installation. These wells are screened approximately 600 to 1,000 feet bgs and are not likely to be affected by potential AFFF releases at ASF Conroe due to their screening depth.

The one AOPI was sampled during the SI at ASF Conroe to identify presence or absence of PFOS, PFOA, PFBS, PFNA, and PFHxS. Of the six PFAS compounds presented in the 06 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at ASF Conroe because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019) and the ASF Conroe QAPP Addendum (Arcadis 2023).

The one AOPI had detections of PFOS, PFOA, PFBS, PFNA, and/or PFHxS in soil and groundwater, with concentrations that exceeded OSD risk screening levels in both soil and groundwater samples. The maximum concentrations of PFOS, PFOA, PFBS, PFNA, and PFHxS detected in soil and groundwater at ASF Conroe are summarized below by media:

The maximum concentrations in groundwater occurred in sample CON-HANGAR-02-GW-030823 and were as follows:

- PFOS was detected at 530 ng/L, above the OSD risk screening level for tap water (4 ng/L)
- PFOA was detected at 29 J ng/L, above the OSD risk screening level for tap water (6 ng/L)
- PFBS was detected at 350 ng/L, below the OSD risk screening level for tap water (601 ng/L)
- PFNA was not detected in the groundwater sample
- PFHxS was detected at 840 ng/L, above the OSD risk screening level for tap water (39 ng/L)

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The maximum concentrations in soil were as follows:

- PFOS was detected at 0.83 mg/kg, above both the residential and industrial/commercial OSD risk screening levels for soil (0.013 mg/kg and 0.16 mg/kg, respectively), in sample CON-HANGAR-04-SO-030723
- PFOA was detected at 0.00072 J mg/kg, below the OSD risk screening level for soil (0.019 mg/kg), in sample CON-HANGAR-05-SO-030723
- PFBS was not detected in any of the soil samples collected
- PFNA was not detected in any of the soil samples collected
- PFHxS was detected at 0.0059 mg/kg, below the OSD risk screening level for soil (0.13 mg/kg), in sample CON-FD-01-SO-030723 which is the field duplicate for sample location CON-HANGAR-01-SO.

Following the SI sampling, the one AOPI with confirmed PFOS, PFOA, PFBS, PFNA, and/or PFHxS presence in soil and groundwater was considered to have complete or potentially complete exposure pathways. The soil exposure pathway for on-installation site workers is complete. Due to the absence of land use controls preventing potable use of the off-post downgradient groundwater, the groundwater exposure pathway for off-installation drinking water receptors is potentially complete. The hangars have curtain drains installed throughout the floor that route directly to the lined AFFF retention pond on the northeastern portion of the ASF Conroe facility. The pond surface water and sediment exposure pathways for on-installation site workers are potentially complete. The retention pond is hydrologically connected to an off-installation intermittent drainage ditch. Therefore, the surface water and sediment exposure pathways for off-installation receptors are potentially complete.

Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for future study in a remedial investigation or no action at this time is based on the comparison of the SI analytical results for PFOS, PFOA, PFBS, PFNA, and PFHxS to the OSD risk screening levels (**Table 6-1**). **Table 8-1** below summarizes the AOPI identified at ASF Conroe, PFOS, PFOA, PFBS, PFNA, and PFHxS sampling and recommendations; further investigation is warranted at ASF Conroe. In accordance with CERCLA, site-specific risk will be assessed during a future phase to evaluate whether remedial actions are required.

Table 8-1 Summary of AOPIs Identified during the PA, PFOS, PFOA, PFBS, PFNA, and PFHxS Sampling at ASF Conroe, and Recommendations

AOPI Name	PFOS, PFOA, PFBS, PFNA, and/or PFHxS detected greater than OSD Risk Screening Levels? (Yes/No)		Recommendation
	GW	SO	
ASF Conroe Hangar	Yes	Yes	Further study in a remedial investigation

Notes:

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Light gray shading – detection greater than the OSD risk screening level

GW – groundwater

SO – soil

Data collected during the PA (**Sections 3 through 5**) and SI (**Sections 6 through 8**) were sufficient to draw conclusions and recommendations summarized above. The data limitations relevant to the development of this PA/SI for PFOS, PFOA, PFBS, PFNA, and PFHxS at ASF Conroe are discussed below.

Records gathered for the use, storage and/or disposal of PFAS-containing materials were reviewed during the PA process. Documentation specific to AFFF may have been limited (e.g., each AFFF use; procurement records, documentation of AFFF used during crash responses or fire training activities) due to lack of recordkeeping requirements for the full timeline of common AFFF practices. Anecdotal accounts of AFFF use (and therefore likely PFOS, PFOA, PFBS, PFNA, and PFHxS use) were limited to available installation personnel, whose knowledge of AFFF use may have been restricted by their time spent at the installation or previous roles held that limited their relevant knowledge of potential AFFF (or other PFAS-containing material) use.

A comprehensive well survey was not completed as part of this PA; therefore, the information reviewed regarding off-post wells is limited to what is contained in the off post well search results (**Appendix C**).

The searches for ecological receptors and off-post PFOS, PFOA, PFBS, PFNA, and PFHxS sources were not exhaustive and were limited to easily identifiable and readily available information evaluated during the relevant documents research, installation personnel interviews, and site reconnaissance.

Finally, the available PFOS, PFOA, PFBS, PFNA, and PFHxS analytical data is limited to results from groundwater and surface soil samples from one AOPI. Available data, including PFOS, PFOA, PFBS, PFNA, and PFHxS, is listed in **Appendix L**, which were analyzed per the selected analytical method. HFPO-DA was not in the suite of PFAS compounds analyzed during the SI at ASF Conroe; therefore, there are no HFPO-DA SI analytical results to screen against the 2022 OSD risk screening levels.

Results from this PA/SI indicate further study in a remedial investigation is warranted at ASF Conroe in accordance with the guidance provided by the OSD.

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ACRONYMS

%	percent
AFFF	aqueous film-forming foam
AOPI	area of potential interest
Arcadis	Arcadis U.S., Inc.
Army	United States Army
ASF	Aviation Support Facility
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
DoD	Department of Defense
DPT	direct-push technology
DQO	data quality objective
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
GW	groundwater
HFPO-DA	hexafluoropropylene oxide dimer acid
IDW	investigation-derived waste
IMCOM	Installation Management Command
installation	United States Army or Reserve installation
LOD	limit of detection
LOQ	limit of quantitation
mg/kg	milligrams per kilogram (parts per million)
MIL-SPEC	military specification
ng/L	nanograms per liter (parts per trillion)
OMS	Organizational Maintenance Shop
OSD	Office of the Secretary of Defense
PA	preliminary assessment

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PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexane sulfonate
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POC	point of contact
ppm	parts per million
ppt	parts per trillion
PQAPP	Programmatic Uniform Federal Policy-Quality Assurance Project Plan
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RSL	Regional Screening Level
SI	site inspection
SO	soil
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
TGI	technical guidance instruction
TOC	total organic carbon
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
WHA	wildlife hazard assessment

TABLES



Table 7-1
 Groundwater PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results
 USAEC PFAS Preliminary Assessment/Site Inspection
 ASF Conroe, Texas



AOPI	Location	Sample/ Duplicate ID	Sample Date	Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)		PFNA (ng/L)		PFHxS (ng/L)	
				OSD Tapwater Risk Screening Level	4		6		601		6		39	
				Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
ASF Conroe Hangar	CON-HANGAR-01-GW	CON-HANGAR-01-GW-030823	3/8/2023	N	82		6.4		25		4.1	U	320	
	CON-HANGAR-02-GW	CON-HANGAR-02-GW-030823	3/8/2023	N	530		29	J	350		46	U	840	
	CON-HANGAR-03-GW	CON-HANGAR-03-GW-030723	3/7/2023	N	4.6		3.7	U	4.4		3.7	U	10	

Notes:

- Bolded** values indicate the result was detected greater than the limit of detection
- Grey shaded values indicate the result was detected greater than the 2022 Office of the Secretary of Defense (OSD) risk screening levels, (OSD, 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July).

Acronyms/Abbreviations:

ASF = Aviation Support Facility
 AOPI = Area of Potential Interest
 GW = groundwater
 ID = identification
 N = primary sample
 ng/L = nanograms per liter (parts per trillion)
 PFAS = per- and polyfluoroalkyl substances
 PFBS = perfluorobutanesulfonic acid
 PFOA = perfluorooctanoic acid
 PFOS = perfluorooctane sulfonate
 PFNA = perfluorononanoic acid
 PFHxS = perfluorohexane sulfonate
 Qual = qualifier
 USAEC = United States Army Environmental Command

Qualifiers:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
 U = The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).

Table 7-2
Soil PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
ASF Conroe, Texas



AOPI	Location	Sample ID / Duplicate ID	Sample Date	Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)		PFNA (mg/kg)		PFHxS (mg/kg)	
				OSD Industrial/Commercial Risk Screening Level	0.16		0.25		25		0.25		1.6	
				OSD Residential Risk Screening Level	0.013		0.019		1.9		0.019		0.13	
				Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
ASF Conroe Hangar	CON-HANGAR-01-SO	CON-HANGAR-01-SO(0-2)-030723	3/7/2023	N	0.044	J	0.0012	U	0.0012	U	0.0012	U	0.0041	
		CON-FD-01-SO-030723	3/7/2023	FD	0.11	J	0.00066	J	0.0012	U	0.0012	U	0.0059	
	CON-HANGAR-02-SO	CON-HANGAR-02-SO(0-2)-030723	3/7/2023	N	0.047		0.0011	U	0.0011	U	0.0011	U	0.0015	
	CON-HANGAR-03-SO	CON-HANGAR-03-SO(0-2)-030723	3/7/2023	N	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
	CON-HANGAR-04-SO	CON-HANGAR-04-SO(0-2)-030723	3/7/2023	N	0.83		0.0012	U	0.0012	U	0.0012	U	0.0056	
	CON-HANGAR-05-SO	CON-HANGAR-05-SO(0-2)-030723	3/7/2023	N	0.034		0.00072	J	0.00099	U	0.00099	U	0.00086	J
CON-HANGAR-06-SO	CON-HANGAR-06-SO(0-2)-030723	3/7/2023	N	0.0011		0.0010	U	0.0010	U	0.0010	U	0.0010	U	

Notes:

- Bolded** values indicate the result was detected greater than the limit of detection
- Data are compared to the Office of the Secretary of Defense (OSD) risk screening levels for both the residential as well as the industrial/commercial scenarios (OSD, 2022, Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program, July).
- Gray shaded values indicate the result was detected greater than the residential scenario risk screening levels (OSD 2022).
- Gray shaded and italicized values indicate the result was detected greater than the industrial/commercial scenario (i.e., and therefore greater than the residential scenario) risk screening levels (OSD 2022).

Acronyms/Abbreviations:

ASF = Aviation Support Facility
 AOPI = Area of Potential Interest
 FD = field duplicate sample
 ID = identification
 mg/kg = milligrams per kilogram (parts per million)
 N = primary sample
 PFAS = per- and polyfluoroalkyl substances
 PFBS = perfluorobutanesulfonic acid
 PFOA = perfluorooctanoic acid
 PFOS = perfluorooctane sulfonate
 PFNA = perfluorononanoic acid
 PFHxS = perfluorohexane sulfonate
 Qual = qualifier
 SO = Soil
 USAEC = United States Army Environmental Command

Qualifiers:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
 U = The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).

FIGURES

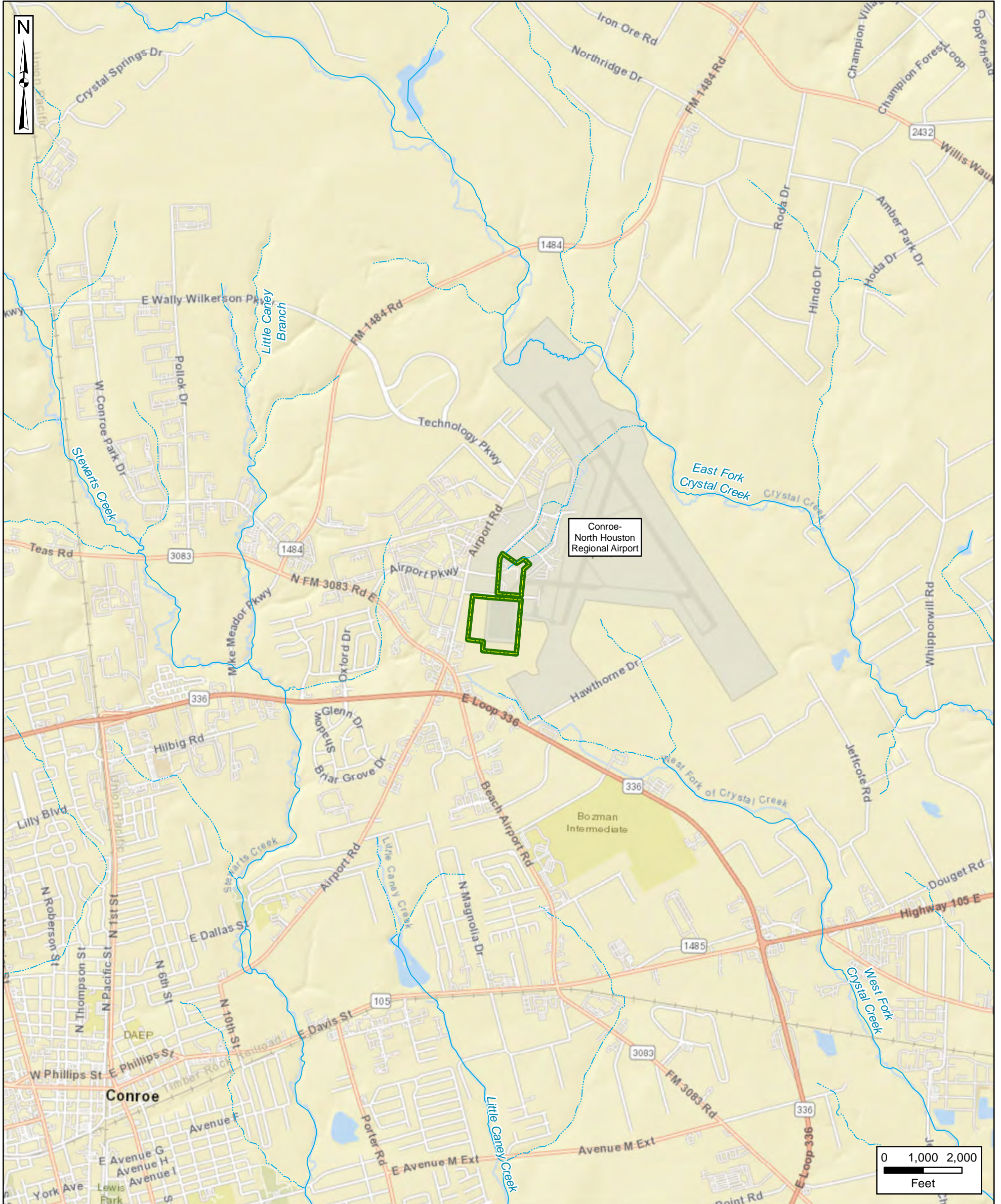







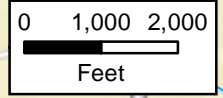
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Figure 2-1
 Site Location



- Legend**
-  Installation Boundary
 -  River/Stream (Perennial)
 -  Stream (Intermittent)



Data Sources:
 ESRI, ArcGIS Online, StreetMap Data

Coordinate System:
 WGS 1984, UTM Zone 15 North



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Figure 2-2
 Site Layout and AOPI Location



Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Water Flow Direction
- Estimated Regional Groundwater Flow Direction

AOPI = area of potential interest
 ASF = Aviation Support Facility

Data Sources:
 ESRI, ArcGIS Online, Aerial Imagery

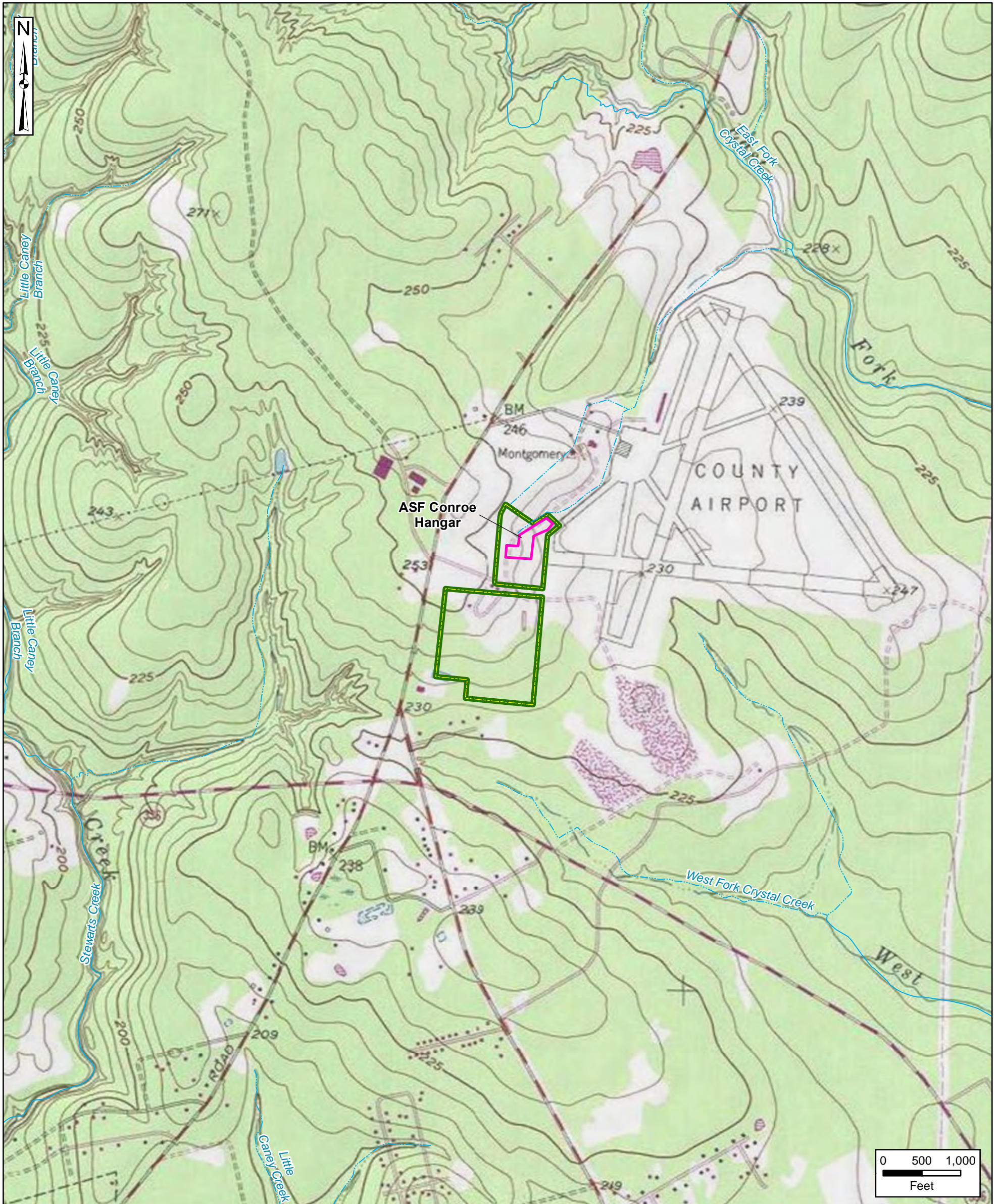
Coordinate System:
 WGS 1984, UTM Zone 15 North



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Figure 2-3
Topographic Map



- Legend**
- Installation Boundary
 - AOPI
 - River/Stream (Perennial)
 - Stream (Intermittent)

Note: Elevation contour labels are in feet.

AOPI = area of potential interest
ASF = Aviation Support Facility

Data Sources:
ESRI, ArcGIS Online, USA Topo Maps

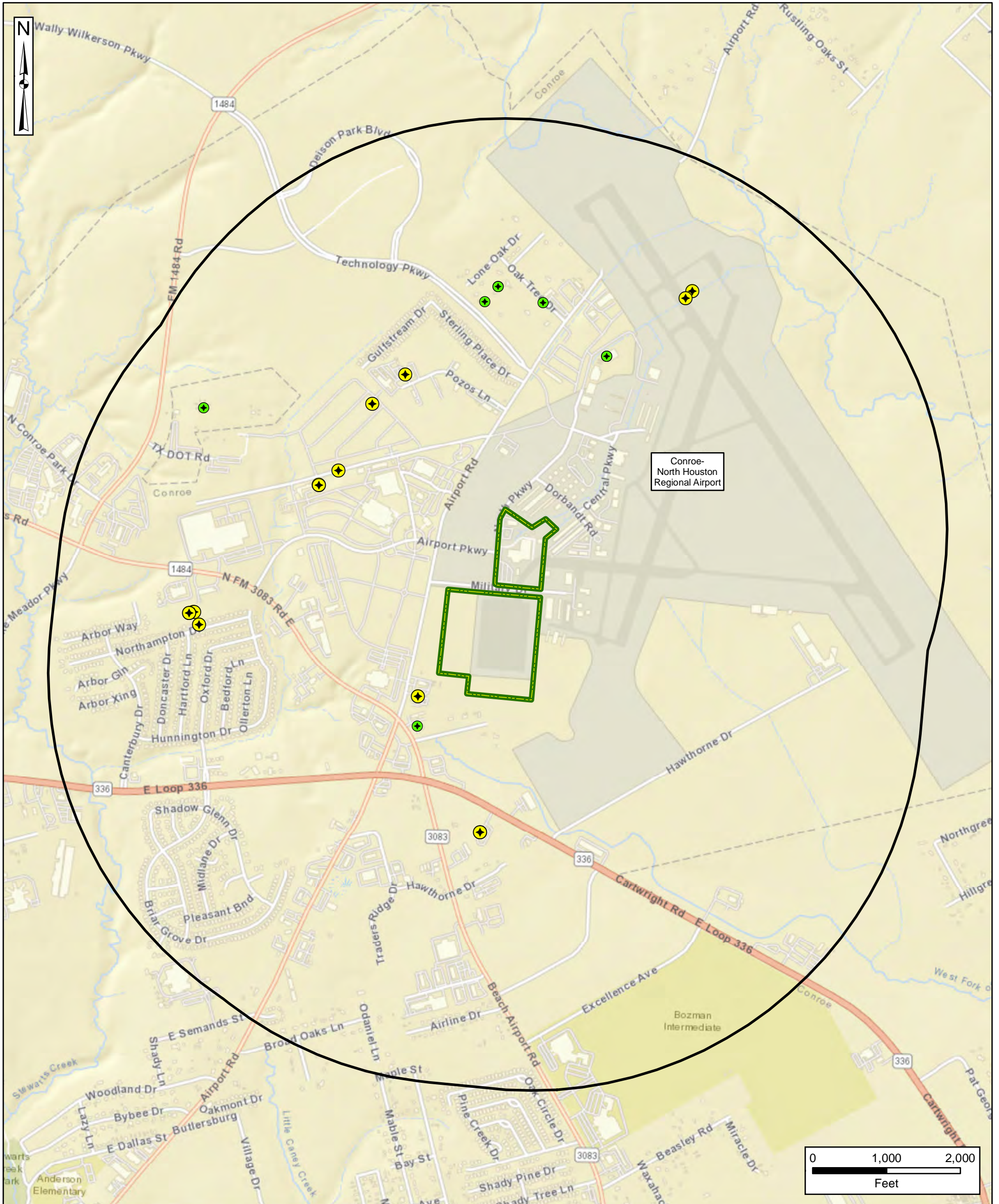
Coordinate System:
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Figure 2-4
Off-Post Potable Supply Wells



Legend

- Installation Boundary
- 1-Mile Radius
- Public Supply Well
- Domestic Well

Data Sources:
 EDR Wells, 2022
 ESRI, ArcGIS Online, StreetMap Data

Coordinate System:
 WGS 1984, UTM Zone 15 North



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Figure 5-2
 Aerial Photo of ASF Conroe Hangar



- Legend**
- Installation Boundary
 - AOPI
 - Stream (Intermittent)
 - Surface Water Flow Direction

AOPI = area of potential interest
 ASF = Aviation Support Facility

Data Sources:
 Google Earth, Aerial Imagery

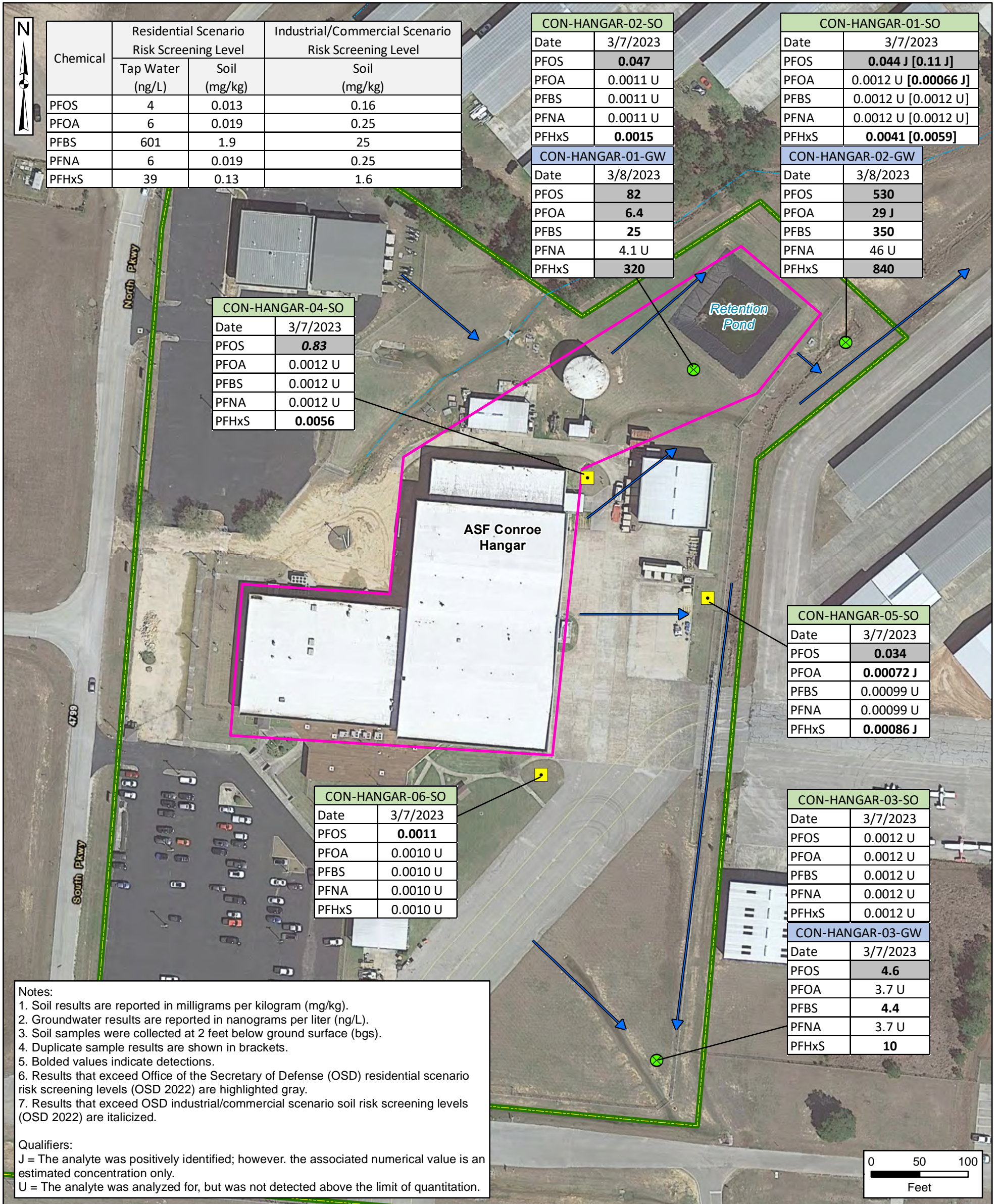
Coordinate System:
 WGS 1984, UTM Zone 15 North



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Figure 7-1
ASF Conroe Hangar
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results



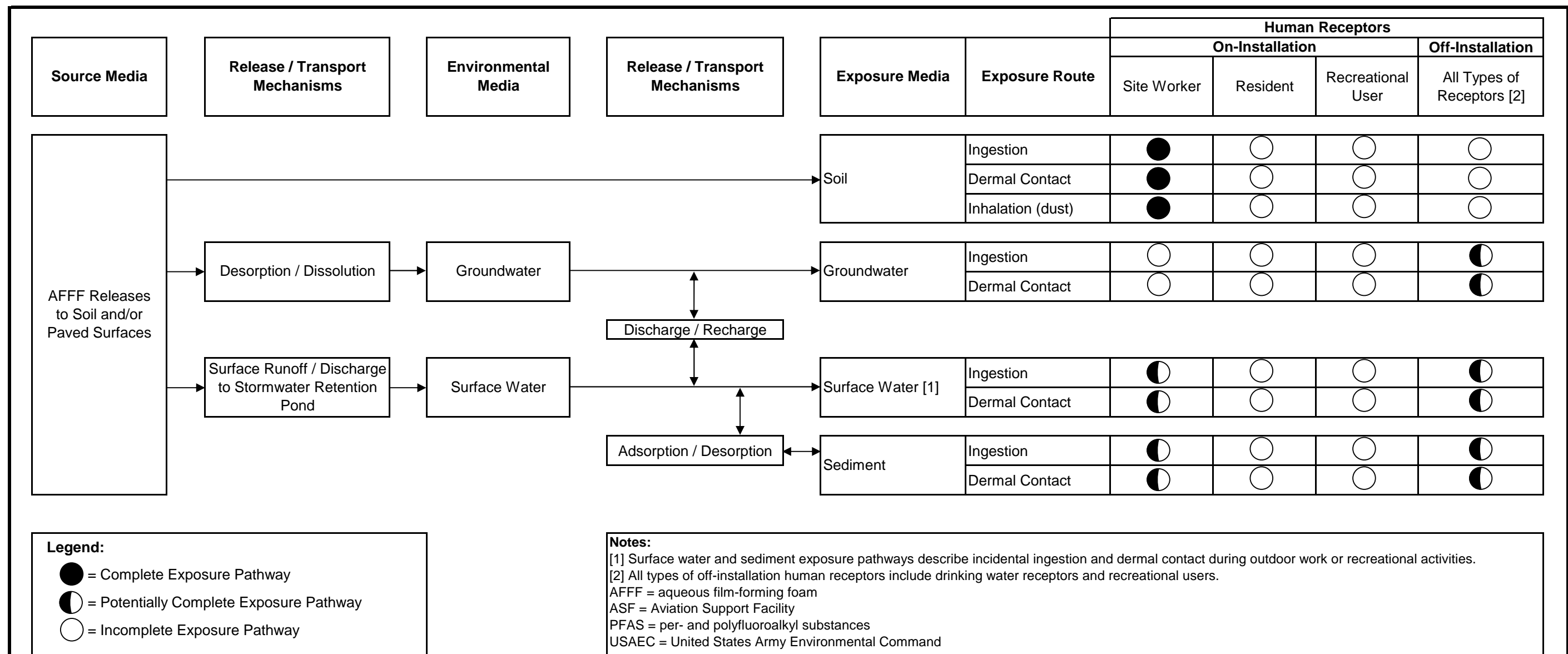
- Legend**
- Installation Boundary
 - AOPI
 - Stream (Intermittent)
 - Surface Water Flow Direction

- Sample Locations**
- Surface Soil
 - Surface Soil and Groundwater

- AOPI = area of potential interest
- ASF = Aviation Support Facility
- GW = groundwater
- PFBS = perfluorobutanesulfonic acid
- PFHxS = perfluorohexane sulfonate
- PFNA = perfluorononanoic acid
- PFOA = perfluorooctanoic acid
- PFOS = perfluorooctane sulfonate
- SO = soil

Data Sources:
Google Earth, Aerial Imagery

Coordinate System:
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Conceptual Site Model - ASF Conroe Hangar
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Figure 7-2

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