FINAL
SITE INSPECTION REPORT
PFAS AOI, BUILDING 52 – FORMER FIRE STATION
FORMER KANSAS ARMY AMMUNITION PLANT

December 2023

Prepared for:

U.S. ARMY

ODCS, G-9, ISE BRAC

Contract No. W912DQ-19-D-3001
Delivery Order W912DQ-21-F-3021

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List of Acronyms

˚F	Degrees Fahrenheit
%	Percent
µg/kg	Micrograms per Kilogram
AE	Aguirre Engineers, Inc.
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous Film Forming Foam
AOI	Area of Interest
Army	United States Army
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CoC	Chain of Custody
CSM	Conceptual Site Model
DQI	Data Quality Indicators
DQO	Data Quality Objective
DoD	Department of Defense
DO	Dissolved Oxygen
DUA	Data Usability Assessment
DZK	Day and Zimmerman Kansas, LLC
EIS	Extracted Internal Standards
ELAP	Environmental Laboratory Accreditation Program
ERB	Equipment Rinsate Blank
FRB	Field Reagent Blank
GPDA	Great Plains Development Authority
gpm	Gallons per Minute
HFPO-DA	Hexafluoropropylene oxide dimer acid
IDW	Investigation-Derived Waste
KDWP	Kansas Department of Wildlife and Parks
KSAAP	Kansas Army Ammunition Plant
LC/MS/MS	Liquid chromatography with tandem mass spectrometry
LCS	Laboratory Control Samples
LOD	Limit of Detection
LUC	Land Use Control
mm	Millimeter

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MS/MSD	Matrix Spike/Matrix Spike Duplicate
msl	Mean Sea Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NRM	Natural Resources Manager
ODCS G-9	Office of Deputy Chief of Staff, G-9
ORP	Oxidation-Reduction Potential
PA	Preliminary Assessment
PFAS	Per- and Polyfluoroalkyl Substances
PFBA	Perfluorobutanoic acid
PFBS	Perfluorobutanesulfonic acid
PFHxA	Perfluorohexanoic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PVC	poly-vinyl chloride
QA	Quality Assurance
QC	Quality Control
QSM	Quality System Manual
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SC	Specific Conductivity
SI	Site Inspection
SL	Screening Level
SOP	Standard Operating Procedure
TNT	Trinitrotoluene
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
U.S.C	United States Code
URS	URS Group, Inc.
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency

Executive Summary

The United States Army (Army) is conducting this Site Inspection (SI) to investigate the potential presence of Per-and Polyfluoroalkyl Substances (PFAS) at the former Kansas Army Ammunition Plant (KSAAP) in Parsons, Kansas. This report documents SI activities conducted for one area of interest (AOI) at the former KSAAP. The AOI was identified during the Preliminary Assessment (PA) phase of investigation. Multimedia sampling was then conducted during the SI phase to determine whether a PFAS release occurred. Activities were completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 United States Code [U.S.C.] §9601, et seq.); the Defense Environmental Restoration Program (10 U.S.C. §2700, et seq.); the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300); and guidance documents developed by the United States Environmental Protection Agency (USEPA) and the Department of the Army (Department of the Army, 2018). KSAAP is not on the National Priorities List, and the Army is responsible for compliance with CERCLA in accordance with Executive Order 12580, as amended.

An area was identified in the PA (AOI 1: Building 52 – Former Fire Station) where PFAS-containing materials were used, stored, and/or disposed of, or where known or suspected releases to the environment occurred. Based on recommendations from the PA, soil, groundwater, and sediment samples were collected at the AOI during the SI. The field investigation at former KSAAP was conducted in accordance with the Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (AECOM, 2023b). Samples collected were analyzed for PFAS using procedures compliant with the Department of Defense (DoD) Quality Systems Manual (QSM) Version 5.4, Table B-24 (DoD, 2022) and the laboratory standard operating procedure (SOP).

To determine if future investigation was warranted at the AOI, this SI followed established USEPA guidance and DoD policy and guidance for conducting PFAS investigations (Assistant Secretary of Defense, 2023). Samples collected during this SI were compared to risk screening levels (SLs) established for residential receptors using the USEPA Regional SL calculator for soil and the tap water criteria for groundwater (USEPA, 2023). The SLs apply to perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanoic acid (PFBA), perfluorobutanesulfonic acid (PFBS), perfluorohexanoic acid (PFHxA), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA). Because PFAS are a large group of thousands of individual chemicals, PFOA, PFOS, PFBA, PFBS, PFNA, PFHxA, PFHxS, and HFPO-DA altogether will be referred to in this report as "Target PFAS."

A conceptual site model (CSM) was developed during the PA and then updated for AOI 1 where Target PFAS were detected at concentrations greater than the limit of detection (LOD). The updated CSM details site geological conditions; determines primary and secondary release mechanisms; identifies potential human receptors; and summarizes complete, potentially complete, and incomplete exposure pathways for current and reasonably anticipated future exposure scenarios. Target PFAS were detected in soil and groundwater at concentrations meeting or exceeding the SLs at AOI 1. Therefore, further investigation for AOI 1 is recommended.

Table ES-1 summarizes the AOI investigated during the SI and recommendations for further investigation.

Table ES-1

Summary of Site Inspection Findings and Recommendations

AOI Name	Soil	Groundwater	Sediment	Recommendation
AOI 1: Building 52 – Former Fire Station	●	●	○	Further investigation recommended

Legend:

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

The United States Army (Army) conducted this Site Inspection (SI) to investigate the potential presence of Per-and Polyfluoroalkyl Substances (PFAS) at the former Kansas Army Ammunition Plant (KSAAP) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 United States Code [U.S.C.] §9601 et. seq.), the Defense Environmental Restoration Program (10 U.S.C. §2701 et. seq.), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 Code of Federal Regulations [CFR] Part 300), and guidance documents developed by the United States Environmental Protection Agency (USEPA) and the Department of the Army (Department of the Army, 2018). KSAAP is not on the National Priorities List, and the Army is responsible for compliance with CERCLA in accordance with Executive Order 12580, as amended.

This project is being executed by AECOM Technical Services, Inc. (AECOM) under Contract Number W912DQ-19-D-3001, Delivery Order W912DQ21F3021 issued by the United States Army Corps of Engineers (USACE) Kansas City District to complete an SI for PFAS at former KSAAP located in Parsons, Labette County, Kansas (**Figure 1-1**). The entirety of former KSAAP is referred to as the “facility” or “site.”

This SI follows the DoD policy as described in a memorandum from the Office of the Secretary of Defense dated 24 August 2023 (Assistant Secretary of Defense, 2023). Should the maximum reported concentration for sampled media exceed the USEPA regional SLs, the Area of Interest (AOI) will proceed to the next phase under CERCLA. The SLs apply to eight compounds that are referred to as “Target PFAS”: perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanoic acid (PFBA), perfluorobutanesulfonic acid (PFBS), perfluorohexanoic acid (PFHxA), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA). Soil, sediment, and groundwater samples were collected at former KSAAP to evaluate the presence or absence of these compounds with respect to the SLs.

1.1 SCOPE AND OBJECTIVES

The overall objective of the SI is to determine the presence or absence of PFAS at an AOI. This SI Report uses findings from the Preliminary Assessment (PA) in conjunction with soil, groundwater, and sediment sampling data related to AOI 1: Building 52 – Former Fire Station to determine whether PFAS have been released to the environment and whether a release has affected or may affect specific human health targets. Furthermore, this SI Report evaluates and summarizes the need for additional investigation (40 CFR 300.420(c)(1)).

The SI scope included preparation of project planning documents, field investigation, validation and management of analytical data, comparison of analytical data to the USEPA regional SLs published in the 2023 Office of Secretary of Defense Memorandum (Assistant Secretary of Defense, 2023), and documentation of the investigation results. This SI was conducted in accordance with the Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (AECOM, 2023b). The field activities followed site-specific sampling and health and safety protocols, as identified in the Accident Prevention Plan (AECOM, 2023c).

1.2 KSAAP DESCRIPTION

KSAAP encompasses 13,727 acres near Parsons, Kansas, in the northeast corner of Labette County. Construction of KSAAP began in August 1941 and was completed in November 1942. The facility originally produced the 105-millimeter (mm) shell, the 155-mm shell, and the 100-pound bomb and facilities were added for the production of fuzes, boosters, detonators, and primers and the manufacture of amatol (trinitrotoluene [TNT] and ammonium nitrate) and ammonia nitrate (URS Group, Inc. [URS], 2006). The plant operated for three major conflicts: World War II, the Korean Conflict, and the Vietnam War. Between 1975 and 1980, most of the production areas had been placed in a standby, inactive status. In 2005, Base Realignment and Closure (BRAC) recommended KSAAP be closed and the facility was deactivated in 2009. After closure, the installation was transferred from the Army to multiple third parties including the Kansas Department of Wildlife and Parks (KDWP), Day & Zimmermann Kansas, LLC. (DZK), and the Great Plains Development Authority (GPDA) (USACE, 2016). The majority of the former KSAAP footprint is now part of the Great Plains Industrial Park. Currently, AOI 1 has been remodeled into office and administrative space and is occupied by the GPDA.

During the development of the PA, historical records, interviews, aerial photographic analysis, site reconnaissance, available documentation, and physical evidence were reviewed to determine where PFAS-containing materials may have previously been stored, used, or disposed of (40 CFR 300/420(b)(5)). PAs specifically evaluate such areas as fire stations, fire training areas, landfills, plating operations, wastewater treatment plants, emergency response sites, and current or former aqueous film forming foam (AFFF) storage sites. A recommendation of the PA was one AOI undergo further investigation in an SI due to known or potential historical PFAS-containing material use, storage, or disposal. The AOI description is presented in **Table 1-1** and illustrated in **Figure 1-2**.

Table 1-1
AOIs at Former KSAAP

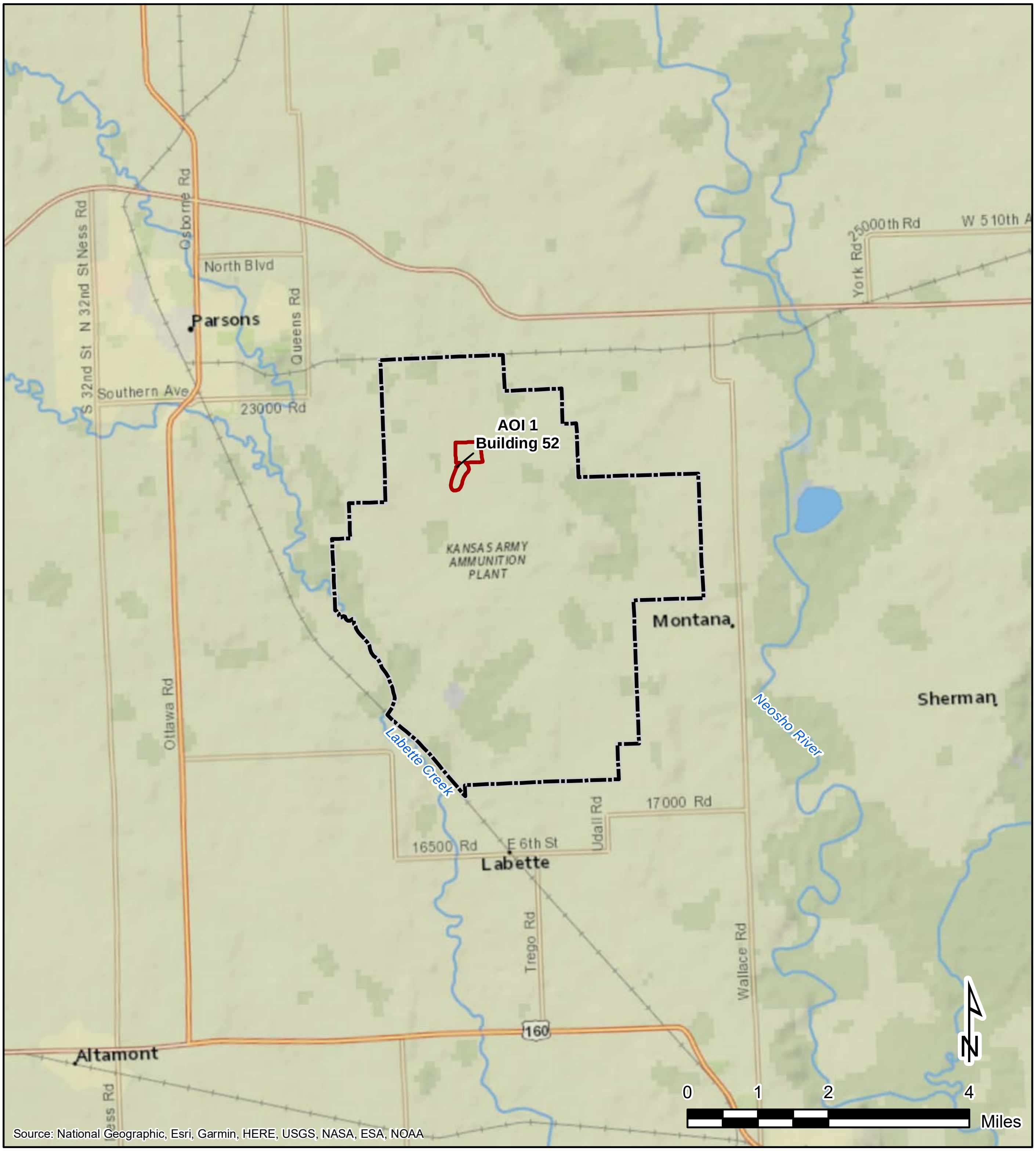
AOI Name	Dates of Operation/Release Mechanism	Size (acres)
AOI 1: Building 52 – Former Fire Station	AFFF release from single firetruck testing exercise in 1998	1.0

1.3 REPORT ORGANIZATION

The contents of the remaining sections of this SI Report are summarized below:

- ***Section 2. Environmental Setting***—This section discusses the environmental setting at former KSAAP. Demographics, land use, geology, hydrogeology, hydrology, soil, and climate are described.
- ***Section 3. Field Investigation Activities***—This section provides field procedures followed during the implementation of the SI.

- ***Section 4. Data Analysis and Quality Assurance Summary*****—**This section describes the laboratory chemical analysis program for the investigation. Sample handling procedures, laboratory equipment calibration, laboratory analytical methods, data reporting and validation, and sample data quality assurance (QA)/quality control (QC) are discussed.
- ***Section 5. Site Inspection Screening Levels*****—**This section presents the Target PFAS with SLs and the SLs to which SI results are compared.
- ***Section 6. Site Inspection Results—***This section presents the data gathered during the SI activities and an updated conceptual site model (CSM).
- ***Section 7. Conclusions and Recommendations*****—**This section summarizes the SI conclusions and presents recommendations for the AOI.
- ***Section 8. References—***This section lists the references that were used in the preparation of this report.
- ***Appendices*****—**Appendices A through H include data from field activities or related assessments:
  - Appendix A Daily Site Report
  - Appendix B Photograph Log
  - Appendix C Boring Logs
  - Appendix D Sampling Forms and Calibration Logs
  - Appendix E Survey Data
  - Appendix F Field Change Request Forms
  - Appendix G Data Usability Assessment and Validation Reports
  - Appendix H Data Presentation Tables



Legend

- Installation Boundary
- Groundwater LUC
- AOI 1

Figure 1-1

Installation Location
Former Kansas Army Ammunition Plant
Parsons, Kansas

Site Inspection Report

AECOM

Project Number:	Drawn By:
60656718	JZ

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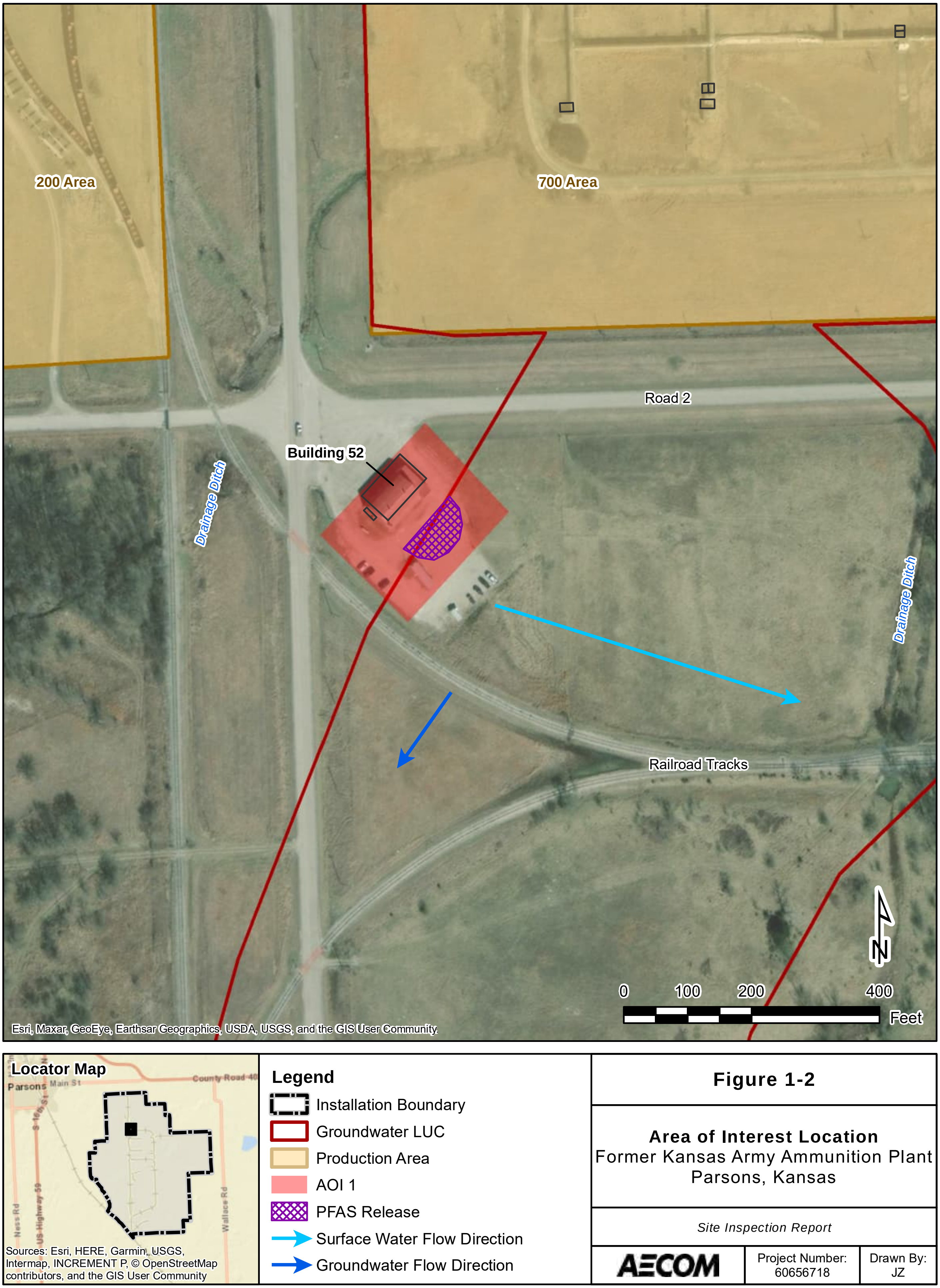

Figure 1-2

Area of Interest Location
Former Kansas Army Ammunition Plant
Parsons, Kansas

Site Inspection Report

AECOM

Project Number: 60656718

Drawn By: JZ

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This section describes general environmental setting information about former KSAAP including the site location, operational history, land use, climate, topography, geology, hydrogeology, surface water hydrology, water usage, ecological profile, and climate.

2.1 SITE LOCATION

While operational, KSAAP encompassed 13,727 acres near Parsons, Kansas, in the northeast corner of Labette County (**Figure 1-1**). KSAAP is approximately 30 miles west of the Missouri border and 20 miles north of the Oklahoma border; it is located approximately 2 miles east of Parsons, Kansas, and less than 1 mile north of Labette, Kansas.

2.2 SITE OPERATIONAL HISTORY

The construction of KSAAP was authorized by the Secretary of War on May 31, 1940. Construction began in August 1941, was completed in November 1942, and the site remained operational throughout World War II. The site initially consisted of 17,321.9 acres but was reduced to 13,727 in 1946 through the sale of three parcels that were declared excess property. The facility originally produced the 105-mm shell, the 155-mm shell, and the 100-pound bomb and facilities were added for the production of fuzes, boosters, detonators, and primers and the manufacture of amatol (TNT and ammonium nitrate) and ammonia nitrate (URS, 2006). The plant was placed on standby status from September 1945 to August 1950 (USACE, 2016).

In August 1950, the Ordnance Corps issued orders for partial reactivation of the plant in support of the Korean War, and by September 1954, all production lines were reactivated. The active production areas were decontaminated and laid away after the signing of the Korean War truce. The last active production line was laid away in July 1957, and the plant was put on standby status. While on standby status, which lasted until 1967, the plant continued on a contractor-operator basis. Activities during this period included maintenance of facilities, and receipt, storage, and issuance of ammunition items. Beginning in early 1967, all production areas were reactivated with the exception of the cartridge rework area.

On 2 March 1970, DZK began operating the plant and maintained its position as the operating contractor until site closure. By 1975, only three of the eight production lines remained in operation. The 105-mm shell production line remained active until it was laid away in 1978. By 1980, many of the production areas were on standby status (URS, 2008).

In 1989, the USEPA issued KSAAP a Resource Conservation and Recovery Act (RCRA) Part B Permit for hazardous waste treatment and storage activities. KSAAP was designated for closure under the 2005 BRAC process. The KSAAP mission to produce munitions ended on 31 December 2008, with closure of the installation on 9 March 2009.

The PA evaluated all potential PFAS release areas at KSAAP (e.g., AFFF use, landfills, metal plating facilities, water treatment plants). Based on the PA findings, the use and storage of AFFF were limited to KSAAP operations at Building 52 – Former Fire Station. Two other former fire stations were also operational at KSAAP prior to the 1960s; however, the usage of AFFF by the DoD did not come into prevalence until after 1969 when a military specification of AFFF was produced. Water was used for extinguishing or controlling fires at the burn areas, and there was no evidence of other PFAS-containing materials being used, stored, or disposed at the remaining areas evaluated in the PA, which also included landfills and waste/wastewater management areas (AECOM, 2023a).

2.3 DEMOGRAPHICS, PROPERTY TRANSFER, AND LAND USE

Since closure of the installation on 9 March 2009, the installation has been transferred from the Army to multiple third parties including the Kansas KDWP, DZK, and the GPDA (USACE, 2016). The majority of the former KSAAP footprint is now part of the GDPA. Currently AOI 1 has been remodeled into office and administrative space and is occupied by the GPDA.

The surrounding area consists of sparsely populated, rural communities with primarily agricultural land use (URS, 2006). Current land use includes residential, industrial, recreational, and open space. Future land use is anticipated to remain the same.

2.4 TOPOGRAPHY

The surface topography at KSAAP varies from being relatively flat in the north to gently rolling in the south. The ground surface elevation ranges from 950 feet above mean sea level (msl) in the northwest to 840 feet above msl near the western boundary. Except for locally steep slopes adjacent to drainages, the ground surface slopes throughout most of the KSAAP range from 0.5 to 1.0 percent (%) (Aguirre Engineers, Inc. [AE], 1998).

2.5 GEOLOGY

KSAAP is situated within the southeastern part of the Osage Cuesta Division of the Central Lowland Physiographic Province. The region is characterized by low-relief, rolling prairie typical of eastern Kansas, interrupted intermittently by east-facing escarpments of limestone beds with relatively weaker beds of shale (URS, 2005). Surficial geology generally consists of terrace and floodplain alluvial deposits in the lowlands and residual soils, from weathered bedrock, in the uplands. Regional dip of the geologic strata is to the west-northwest at about 20 feet per mile.

KSAAP, located in the typical eastern Kansas rolling prairie of the Central Lowland Province, is situated on Pleistocene terrace clays to recent floodplain clays, sands, and gravels. This alluvium occurs along major streams such as Labette Creek and the Neosho River. Between major streams, the upland soils consist of residual silts and clay derived from the weathering of underlying shales and limestones. These clay soils may contain lenses of sand and gravel resulting from more resistant bedrock units (i.e., sandstone). Pleistocene-age loess is present on the uplands as well. The United States Department of Agriculture (USDA) Soil Conservation Service has identified the following soil types in the KSAAP area: silt loam of the Catoosa, Cherokee, Parsons, and

Verdigris series; very fine sandy loam of the Bates series; and Orthents and silty clay loam of the Apperson, Dennis, Eram, Kenoma, Shidler, and Zaar Series (USDA, 1990).

Exposed consolidated rocks in Labette County are Pennsylvanian in age, consisting of interbedded marine and non-marine shales and limestones deposited in a cyclothem sequence. The stratigraphic formations underlying the county, from oldest to youngest, of the Marmaton Group are the Fort Scott Limestone, the Labette Shale, the Pawnee Limestone, the Bandera Shale, the Altamont Limestone, the Nowata Shale, and the Lenapah Limestone.

The Cherokee Group underlies the Marmaton Group and ranges in thickness from about 395 to 560 feet. The Cabaniss Formation is the first unit underlying the Marmaton Group. The shale and interbedded sandstone lenses of the Cherokee thicken toward the southwest in Labette County. Geology features for the regional area are depicted on **Figure 2-1**.

2.6 HYDROGEOLOGY

Groundwater at KSAAP is present in unconsolidated alluvial and floodplain deposits and in bedrock. Regionally, the alluvial aquifers generally offer the best potential for a potable and industrial water supply in Labette County. Groundwater in the consolidated aquifer is recharged by direct infiltration of rainfall and spring run-off, emanating from the consolidated rock bounding the valleys, and by infiltration of waters during flooding (URS, 2005).

A fractured bedrock aquifer is the primary aquifer throughout much of KSAAP due to the impermeable nature of the fine-textured soils in the area. Groundwater flow velocities are highly variable and are typically highest along joints and bedding planes within the bedrock (Radian Corporation, 1994). The bedrock aquifers do not generally yield sufficient quantities of water to make them viable water sources. The water tends to be hard and contains excessive amounts of chloride, nitrate, and hydrogen sulfide (AE, 1998).

Water table depths vary from 1 to 20 feet below the ground surface throughout KSAAP. The water table is generally deeper in upland areas, and it is generally shallower in small stream valleys and along Labette and Neosho Creeks. Artesian conditions were reported for monitoring wells near the active landfill in the eastern part of KSAAP. Based on groundwater levels measured at KSAAP, the following conclusions have been drawn (AE, 1998):

- A north-south trending groundwater divide subdivides the facility into two groundwater flow systems (**Figure 2-1**). In the north part of KSAAP, this groundwater divide roughly coincides with the surface water divide that separates the Labette Creek and Neosho Creek watersheds.
- West of the divide, groundwater flows west-southwest toward discharge areas along Labette Creek.
- East of the divide, groundwater flows generally east toward discharge areas along Neosho Creek.

A synoptic groundwater gauging event was performed at AOI 1 on 8 May 2023. Groundwater elevation measurements were collected from two newly installed permanent monitoring wells and two existing permanent monitoring wells. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-2**. Groundwater elevation data is provided in **Table 3-3**.

2.7 SURFACE WATER HYDROLOGY

A well-developed surface water drainage system is present at KSAAP. KSAAP is bisected by a major drainage divide trending northwest to southeast (**Figure 2-3**). In the northeastern part of KSAAP, surface water drains east to the Neosho River, which is located about 2 miles east of KSAAP. In the southwestern portion of KSAAP, surface water drains westward to Labette Creek, which is located immediately west of KSAAP and coincides with the KSAAP boundary. Labette Creek and the Neosho River both flow in a southerly direction and join about 15 miles south of KSAAP at the town of Chetopa (AE, 1998).

There are more than 100 ponds on KSAAP property. All of the ponds are constructed and range in size from 10 acres to less than 1 acre, but average 2 acres (KSAAP, Natural Resources Manager [NRM], 2006). Three of the ponds are in abandoned quarries, 15 are associated with KSAAP processes (later referred to as oxidation ponds), and the remainder are located in the agricultural and woodland areas. At one time, KSAAP had 40 stocked and numbered fishing ponds with open fishing (KSAAP NRM, 2006). Many of the oxidation ponds were constructed within natural surface runoff drainages with the intent to allow natural flushing of the ponds to oxidize contamination. Three ponds at KSAAP are not part of the natural drainage pattern; these include two Water Treatment Plant Sludge Lagoons (Solid Waste Management Units-121 and 122), south of the 1700 Area, and the Evaporation Pond for the 300 Area (AE, 1998).

Construction of reservoirs on the upper Neosho River during the 1950s has greatly reduced flooding. However, occasional flooding occurs for periods of up to four or five days. Approximately 200 acres are occasionally flooded for up to 24 hours during periods of heavy rainfall.

2.8 WATER USAGE

The most aerially extensive unconsolidated aquifer in Labette County is the Neosho River alluvium. The saturated thickness is about 35 feet and wells constructed in the alluvium range from 10 to 20 feet deep. These deposits have an average long-term yield of about 50 gallons per minute (gpm) but may produce up to 100 gpm. Potable water for local rural water districts is taken from alluvial units near the Neosho River about 5 miles east of KSAAP. Based on information from the Environmental Data Resources, Inc™, there are two domestic wells and one feedlot well located within a 1-mile radius from KSAAP's original boundary.

Local use of groundwater aquifers is limited. Farms and residences located within a one-mile radius of KSAAP receive potable water from rural water districts or from GPDA. Surface-water reservoirs located at least 7 miles north and west of KSAAP are also sources of water for rural water districts. A water filtration plant located on the banks of the Neosho River approximately 2 miles east of KSAAP was owned and operated by KSAAP until closure of the facility in 2009 (AE, 1998). This plant is currently owned and operated by the GPDA and draws water from the Neosho River. The unconsolidated alluvial deposits along the Neosho River and other streams are considered the best regional aquifers for potable and industrial water supply (URS, 2006).

2.9 ECOLOGICAL PROFILE

A wildlife survey has not occurred at the facility, and the facility does not have any significant areas of habitat. The following species have not been identified at the facility but may be present in the surrounding area.

The following clams, fishes, flowering plants, insects, mammals, and reptiles are federally endangered, threatened, proposed, under review, and/ or are listed as candidate species in Labette County, Kansas (United States Fish and Wildlife Service, 2023).

- **Clams:** Neosho Mucket, *Lampsilis rafinesqueana* (endangered); Rabbitsfoot, *Quadrula cylindrica cylindrica* (threatened)
- **Fishes:** Neosho madtom, *Noturus placidus* (threatened)
- **Flowering Plants:** Mead’s milkweed, *Asclepias meadii* (threatened)
- **Insects:** American burying beetle, *Nicrophorus americanus* (threatened); Monarch butterfly, *Danaus plexippus* (candidate); Regal fritillary, *Speyeria idalia* (under review)
- **Mammals**: Tricolored bat, *Perimyotis subflavus* (proposed endangered); Little brown bat, *Myotis lucifugus* (under review); Northern long-eared bat, *Myotis septentrionalis* (endangered); Eastern spotted skunk, *Spilogale putorius interrupta* (under review)
- **Reptiles**: Alligator snapping turtle, *Macrochelys temminickii* (proposed threatened)

2.10 CLIMATE

KSAAP has a continental climate with hot, humid summers and cold winters including snowfall. Average monthly temperatures range from 22 to 90 degrees Fahrenheit (˚F) with a mean annual temperature of 59.3˚F (United States Climate Data, 2023). January is usually the coldest month and thereafter temperatures gradually increase, peaking in July. The mean annual precipitation is 42.97 inches with the largest amounts of rainfall occur in May through June. Average snowfall is 9 inches.

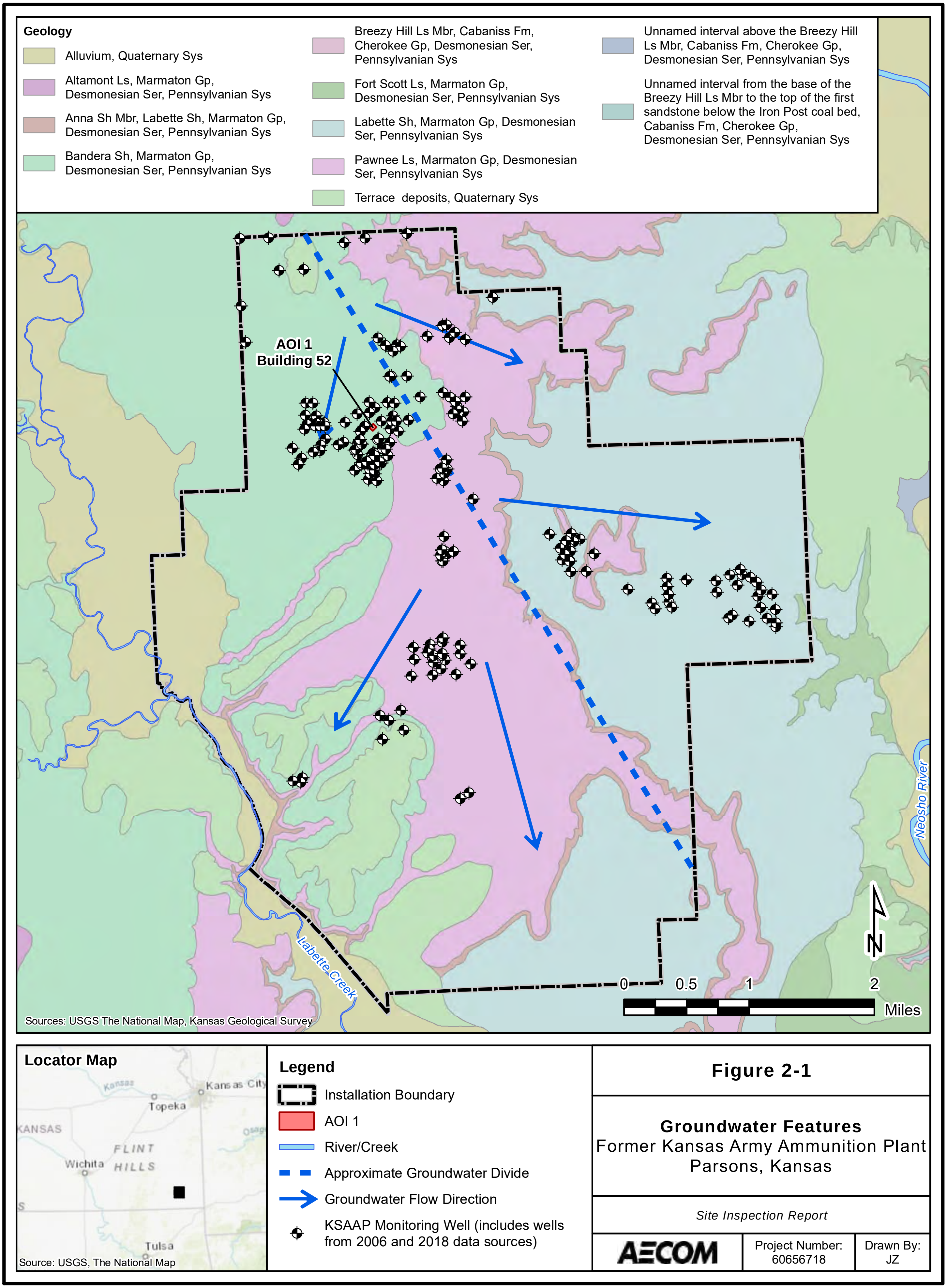
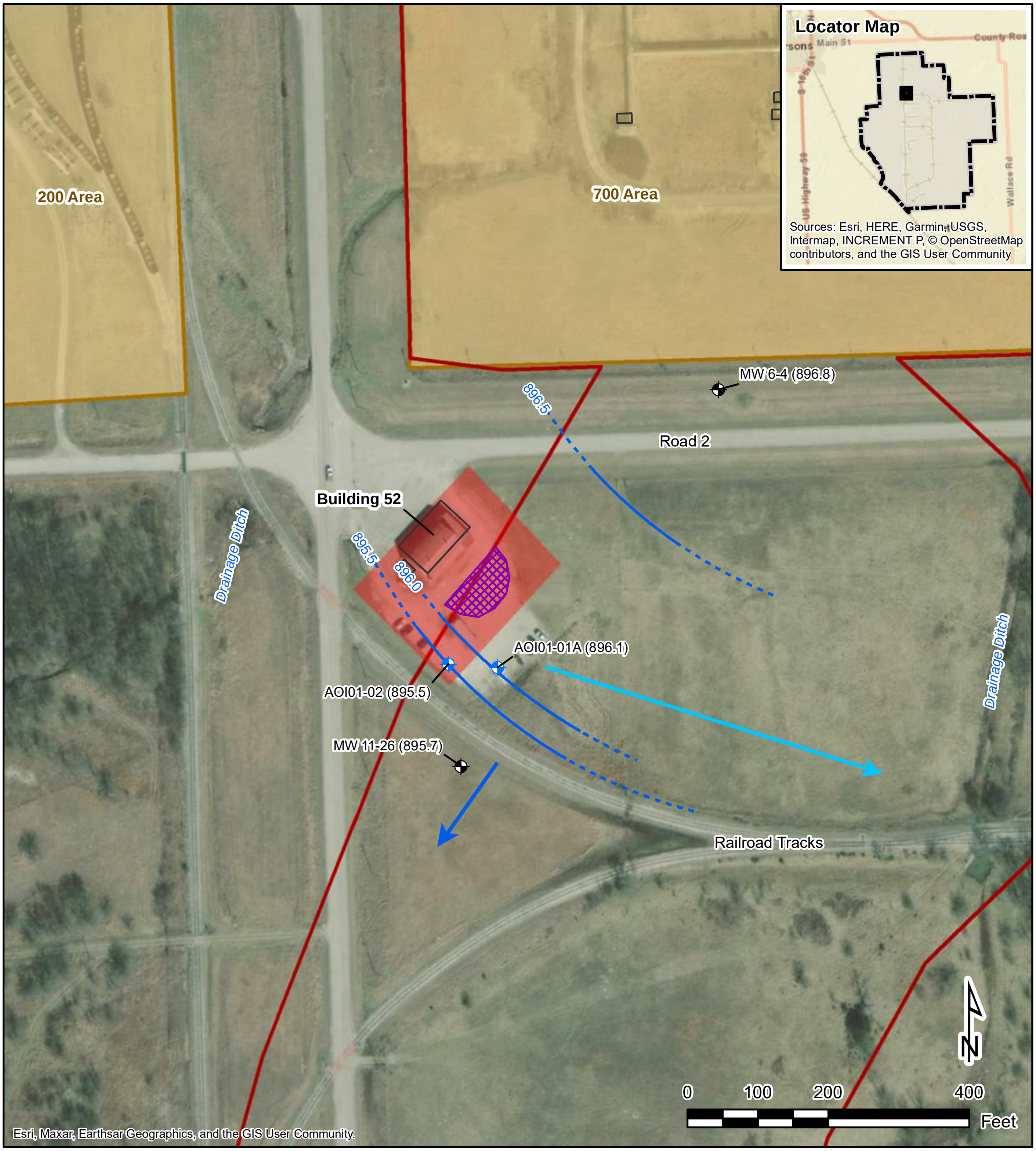


Figure 2-1

Groundwater Features
Former Kansas Army Ammunition Plant
Parsons, Kansas

Site Inspection Report

AECOM | Project Number: 60656718 | Drawn By: JZ



Legend

- Installation Boundary
- Groundwater LUC
- Production Area
- AOI 1
- PFAS Release
- Existing Monitoring Well
- Newly Installed Monitoring Well
- Surface Water Flow Direction
- Groundwater Flow Direction
- Groundwater Elevation Contour (feet NAVD88)
- Inferred Groundwater Elevation Contour (feet NAVD88)

Figure 2-2

Groundwater Contours
Former Kansas Army Ammunition Plant
Parsons, Kansas

Site Inspection Report

AECOM	Project Number: 60656718	Drawn By: JZ

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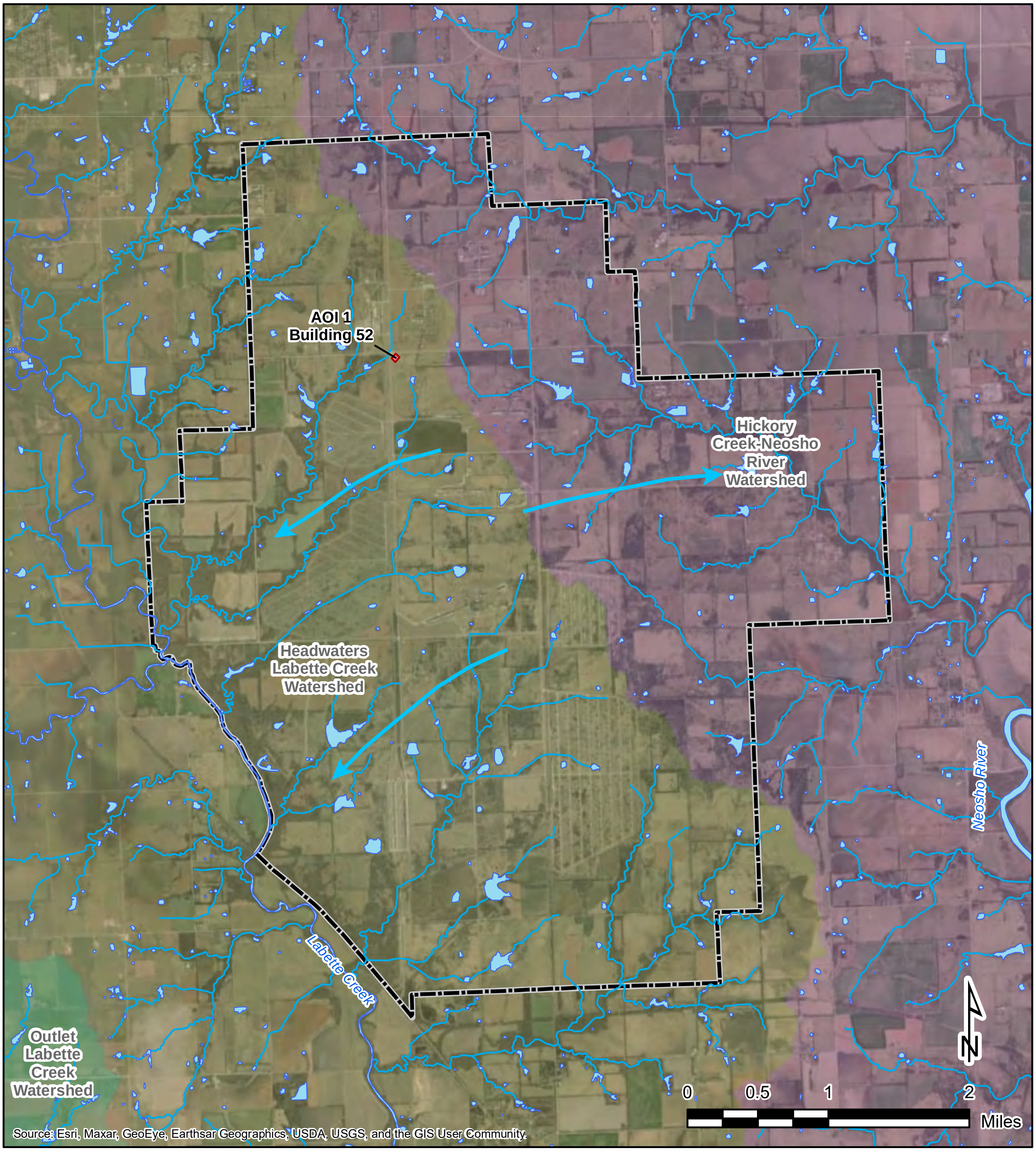


Locator Map

Legend

- Installation Boundary
- AOI 1
- Water Body
- River/Creek/Stream
- Surface Water Flow Direction

Figure 2-3

Surface Water Features
Former Kansas Army Ammunition Plant
Parsons, Kansas

Site Inspection Report

AECOM	Project Number: 60656718	Drawn By: JZ

This section describes the environmental investigation and sampling activities that occurred as part of the SI. The SI sampling approach was based on the findings of the PA and implemented in accordance with the following approved documents:

- Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (AECOM, 2023b)
- Final Accident Prevention Plan (AECOM, 2023c)
- Final Preliminary Assessment Report, Former Kansas Army Ammunition Plant (AECOM, 2023a)

The SI field activities were conducted from 17 April to 5 May 2023 and consisted of utility clearance, sonic drilling, soil sample collection, sediment sample collection, monitoring well installation, groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI UFP-QAPP (AECOM, 2023b), except as noted in **Section 3.4.8**.

Table 3-1 presents the list of samples collected for each media. The Daily Site Report is provided in **Appendix A**, and a photographic log of field activities is provided in **Appendix B**.

3.1 SITE INSPECTION DATA QUALITY OBJECTIVES

As identified during the Data Quality Objective (DQO) process and outlined in the SI UFP-QAPP (AECOM, 2023b), the objective of the SI is to identify whether there has been a release to the environment at an AOI identified in the PA. For each AOI, the Army determines if further investigation is warranted, a removal action is required to address immediate threats, or whether no further action is warranted. This SI evaluated groundwater, soil, and sediment for presence or absence of Target PFAS at the single sampled AOI.

3.2 SAMPLE DESIGN AND RATIONALE

The objective of the SI was to identify whether there has been a release to soil and groundwater at the AOI and determine the presence or absence of the Target PFAS at or above residential SLs (USEPA, 2023). A secondary objective is to collect additional data to further refine the conceptual site model such as pathway receptor relationships.

One AOI was investigated during the SI to determine the presence or absence of PFAS in the environment. Environmental media samples were collected from AOI 1 in accordance with the CSM. Six soil borings were continuously logged and sampled for soil, and two of the six borings were completed as groundwater monitoring wells and sampled for groundwater. Sediment samples were collected from an adjacent drainage ditch. The permanent groundwater monitoring wells were installed within or near where PFAS were potentially released and two existing monitoring wells were also sampled to evaluate background and downgradient conditions. Sampling forms appear in **Appendix D**.

3.3 FIELD INVESTIGATION ACTIVITIES

The SI field activities were conducted from 17 April to 5 May 2023 and consisted of utility clearance, sonic drilling, soil boring installation, sample collection, monitoring well installation and development, sediment sampling, groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI UFP-QAPP (AECOM, 2023b), except as noted in **Section 3.4.8**.

3.4 FIELD PROCEDURES

The following sections describe the environmental investigation and sampling activities that occurred as part of the SI.

3.4.1 Utility Clearance

AECOM's drilling subcontractor, Environmental Works, Inc. placed a ticket with the Kansas 811, the local one-call utility location system, to notify them of intrusive work. A site walk was scheduled with GPDA personnel to mark out locations of the subsurface utilities. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

3.4.2 Bulk Source Water Sampling

A bulk water source (KSAAP-DECON-02) was collected for PFAS analysis prior to field mobilization to determine if the source water was acceptable for drilling and drill rig decontamination. The sample was collected from a hydrant near the site, and the source water was considered acceptable for use as all detected concentrations were less than ½ the residential SLs for tap water. The results of the source water sample are located in **Appendix H**.

3.4.3 Soil Boring Installation and Sampling

Soil samples were collected via hand auger and sonic drilling technology. Six borings were advanced using sonic drilling technology at locations designated for subsurface soil sample collection. Hand augers were used for surface soil sample collection and to clear the top 5 feet of the boring in accordance with AECOM utility clearance protocols. A Geoprobe 8150LS sonic drill rig was used to collect continuous soil cores to the target depth. All drilling materials were PFAS-free. Three soil samples were collected per boring: one surface soil samples (0 to 2 feet below ground surface [bgs]), one subsurface soil sample approximately 1 foot above the groundwater table, and one subsurface soil sample at the mid-point between the surface and the groundwater table.

Boreholes were advanced to a maximum depth of 30 feet bgs. The boring depths are documented in **Table 3-2** and boring logs are located in **Appendix C**. The soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System. A photoionization detector was used to screen the breathing zone during boring activities. Observations and measurements were recorded on field forms and in a non-treated field logbook.

Soil borings were advanced either in areas without surface cover or in the asphalt parking lot. Two of the borings were converted to permanent wells and the remaining borings were abandoned. Borings in asphalt were abandoned by backfilling with bentonite chips to approximately 6 inches bgs. The remainder of the borehole were patched with an asphalt cold patch. Borings in areas without surface cover were abandoned following the requirements in Kansas Administrative Regulations, Article 30, Water Well Contractor's License, Water Well Construction by backfilling with bentonite chips to approximately 6 inches bgs, and the remainder of the borehole were filled with topsoil. The surface at each location was restored to match the surrounding area.

3.4.4 Permanent Monitoring Well Installation and Sampling

Boreholes for permanent well construction were created using a Geoprobe 8150LS sonic drill rig. After the borehole had been advanced to 30 feet bgs or refusal, the permanent well was constructed of a 10-foot section of 2-inch Schedule 40 polyvinyl chloride (PVC) screen, with a 0.010-inch slot size, and sufficient 2-inch Schedule 40 PVC casing to reach ground surface. New PVC casing and screens, certified and documented to be PFAS-free, were used for each sampling location. The target screen interval for each location was the top of the groundwater table. The permanent well construction information is presented in **Table 3-3**.

A filter pack of 20/40 silica sand was installed in the annulus around the well screen to a minimum of 2 feet above the well screen. A 2-foot-thick bentonite seal was placed above the filter pack and hydrated with water. Bentonite chips were placed in the well annulus from the top of the bentonite seal to 6 inches bgs. The remaining space was filled with concrete during construction of a 2-foot by 2-foot flush mount well pad with a steel lid.

Permanent monitoring wells were developed no sooner than 48 hours or more than 7 days after the final grouting of the well. Development was completed by a combination of surging with a surge block and over-pumping with a submersible pump and associated high-density polyethylene tubing. Water clarity was visually monitored and water quality parameters, including dissolved oxygen (DO), specific conductivity (SC), oxidation-reduction potential (ORP), pH, temperature, and turbidity was measured using a flow-through cell every 5 minutes during purging to determine progress of development. Each well was developed until the well produced clear (silt-free) water with a minimum of three stable water quality readings, as outlined in Worksheet #17 of the SI UFP-QAPP (AECOM, 2023b).

Monitoring wells AOI01-01A and AOI01-02 had slow groundwater recharge and were purged dry using a combination of low flow pumping and bailing; therefore, the wells were considered developed after they were pumped and bailed dry three times in succession and the turbidity decreased. Well development was documented on a well development form (**Appendix D**) that includes the elements listed in Section 6-8 of Engineer Manual 1110-1-4000 (USACE, 1998).

Samples were collected from the newly installed wells (no sooner than 14 days after development) and from two existing monitoring wells via low-flow sampling methods using a peristaltic pump. Water levels were measured to the nearest 0.01 inch and recorded. The pump tubing was placed at the center of the well screen. Water quality parameters (e.g., temperature, SC, pH, DO, ORP, and turbidity) were measured every 5 minutes during purging and recorded on the field sampling form until the well produced clear (silt-free) water with a minimum of three stable water quality readings. Once the water quality parameters reached stabilization, the groundwater samples were collected.

3.4.5 Surface Water Sampling

There was no surface water present at AOI 1, therefore no surface water samples were collected.

3.4.6 Sediment Sampling

Sediment samples were collected from a drainage ditch just south of AOI 1. A sediment coring device was used to collect the sediment sample from the first 1 foot of sediment. The sediment was transferred to a stainless-steel bowl or other PFAS-free container (i.e., 1-gallon Ziploc® bags), from which stones larger than 1 centimeter were removed.

3.4.7 Equipment Calibration

A water quality instrument (Horiba Model U-52) used during groundwater sampling and a photoionization detector (MiniRAE 2000) used during boring activities were calibrated by the equipment providers prior to use. Instrument calibration certificates are provided in **Appendix D**. The Horiba Model U-52 was calibrated daily per Worksheet #22 of the UFP-QAPP (AECOM, 2023b) against known standards in accordance with the manufacturer's instructions and documented on the calibration logs provided in **Appendix D**.

3.4.8 Location Survey

A small notch was cut on the northern side of the well casing which was surveyed by a state-licensed surveyor. Location coordinates and the top of casing and ground surface elevation was surveyed for each newly installed well. Survey data was collected in the applicable North American Datum 1983 State Plane (horizontal) and North American Vertical Datum 1988 (vertical). The survey data forms are located in **Appendix E**.

3.4.9 Deviations and Field Change Requests

Two deviations from the SI UFP-QAPP are documented in a Field Change Request Form (**Appendix F**) and noted below:

- The proposed location for permanent well AOI01-03 was next to an existing well, MW 11-26. Therefore, MW 11-26 was redeveloped and sampled for groundwater in lieu of installing a new permanent well. AOI01-03 was drilled solely to collect soil samples.

- The borehole for AOI01-01 was dry after installation. Therefore, a permanent well was not installed at AOI01-01 and the borehole was abandoned. A new offset location, AOI01-01A, was installed as a permanent well in the downgradient direction.

3.5 DECONTAMINATION PROCEDURES

For non-dedicated sampling equipment, decontamination was completed after each use (i.e., downhole tool and hand auger decontaminated between intervals sampled for laboratory analysis). A PFAS-free detergent (Alconox® or Liquinox®) was used with a final rinse of ASTM Type II Deionized water (certified PFAS-free) for smaller equipment decontamination needs. Cotton towels or non-recycled paper towels were used to wipe down equipment before and after each sample was collected. For larger equipment needs (e.g., drilling rig), the acceptable source water, as described in **Section 3.4.2,** was utilized for steam cleaning and final rinse of the equipment. The sample coolers were also washed with PFAS-free detergent, rinsed with ASTM Type II Deionized water, and air dried before use to prevent PFAS cross contamination.

3.6 DISPOSITION OF FIELD INVESTIGATION-DERIVED WASTE

Currently, the disposal of PFAS investigation-derived waste (IDW) is not regulated. Solid IDW (i.e., soil cuttings) and liquid IDW generated during SI activities (i.e., purge water and decontamination fluids) were containerized in properly labeled 55-gallon drums placed on pallets. The IDW was segregated by media, and liquid IDW drums were only filled 75% full to account for freeze/thaw cycles.

Because the analytical results for groundwater and soil exceed the SLs, the corresponding media will be disposed of offsite at a Subtitle C or Subtitle D landfill, depending on requirements in OERR Directive 9345.3-02 as well as all federal, state, and local regulations at the time of disposal. The IDW is currently stored in 55-gallon steel drums at the facility and pending disposal. The SI Report will be updated with the IDW waste disposal documentation once this action is completed.

Other solids such as spent personal protective equipment, plastic sheeting, tubing, rope, unused monitoring well construction materials, and other environmental media generated during the field activities were disposed of at a licensed solid waste landfill.

Table 3-1
Site Inspection Samples by Medium
Site Inspection Report, Former Kansas Army Ammunition Plant

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	PFAS (Draft Method 1633)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Soil Samples							
AOI01-01-SB-00-0.5	4/18/2023	0-0.5	X	X	X	X	
AOI01-01-SB-00-0.5-D	4/18/2023	0-0.5	X				FD
AOI01-01-SB-00-0.5-MS	4/18/2023	0-0.5	X				MS
AOI01-01-SB-00-0.5-MSD	4/18/2023	0-0.5	X				MSD
AOI01-01-SB-02-04	4/18/2023	2-4	X	X	X	X	
AOI01-01-SB-05-07	4/18/2023	5-7	X	X	X	X	
AOI01-02-SB-00-0.5	4/18/2023	0-0.5	X	X	X	X	
AOI01-02-SB-02-04	4/18/2023	2-4	X	X	X	X	
AOI01-02-SB-05-07	4/18/2023	5-7	X	X	X	X	
AOI01-03-SB-00-05	4/19/2023	0-0.5	X	X	X	X	
AOI01-03-SB-00-05-D	4/19/2023	0-0.5		X			FD
AOI01-03-SB-02-04	4/19/2023	2-4	X	X	X	X	
AOI01-03-SB-05-07	4/19/2023	5-7	X	X	X	X	
AOI01-04-SB-00-0.5	4/19/2023	0-0.5	X	X	X	X	
AOI01-04-SB-00-0.5-D	4/19/2023	0-0.5	X				FD
AOI01-04-SB-04-06	4/19/2023	4-6	X	X	X	X	
AOI01-04-SB-08-10	4/19/2023	8-10	X	X	X	X	
AOI01-05-SB-00-0.5	4/19/2023	0-0.5	X	X	X	X	
AOI01-05-SB-00-0.5-D	4/19/2023	0-0.5		X			FD
AOI01-05-SB-04-06	4/19/2023	4-6	X	X	X	X	
AOI01-05-SB-04-06-MS	4/19/2023	4-6		X			MS
AOI01-05-SB-04-06-MSD	4/19/2023	4-6		X			MSD
AOI01-05-SB-08-10	4/19/2023	8-10	X	X	X	X	
AOI01-06-SB-00-0.5	4/19/2023	0-0.5	X	X	X	X	
AOI01-06-SB-04-06	4/19/2023	4-6	X	X	X	X	
AOI01-06-SB-08-10	4/19/2023	8-10	X	X	X	X	
Groundwater Samples							
AOI01-01A-GW-050923	5/9/2023	15	X				
AOI01-01A-GW-050923-D	5/9/2023	15	X				FD
AOI01-02-GW-050923	5/9/2023	15	X				
AOI01-MW11-26-050923	5/9/2023	14.6	X				
AOI01-MW6-4-050923	5/9/2023	16.2	X				
AOI01-MW6-4-050923-MS	5/9/2023	16.2	X				MS
AOI01-MW6-4-050923-MSD	5/9/2023	16.2	X				MSD
Sediment Samples							
AOI01-07-SD-00-01	4/19/2023	0-1	X	X	X	X	
AOI01-07-SD-00-01-D	4/19/2023	0-1	X				FD
AOI01-07-SD-00-01-MS	4/19/2023	0-1	X				MS
AOI01-07-SD-00-01-MSD	4/19/2023	0-1	X				MSD
AOI01-08-SD-00-01	4/20/2023	0-1	X	X	X	X	
AOI01-08-SD-00-01-D	4/20/2023	0-1		X			FD
AOI01-08-SD-00-01-MS	4/20/2023	0-1		X			MS
AOI01-08-SD-00-01-MSD	4/20/2023	0-1		X			MSD
Decontamination Source Water							
KSAAP-DECON-02	3/21/2023	--	X				
Field QC Samples							
KSAAP-FRB-01	5/9/2023	---	X				FRB
KSAAP-ERB-01	4/20/2023	---	X				ERB from hand auger
KSAAP-ERB-02	4/20/2023	---	X				ERB from Geosub pump

Table 3-1
Site Inspection Samples by Medium
Site Inspection Report, Former Kansas Army Ammunition Plant

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	PFAS (Draft Method 1633)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
KSAAP-ERB-03	4/20/2023		X				ERB from drilling shoe
KSAAP-ERB-04	4/20/2023	---	X				ERB from hand auger

Notes:

ASTM = American Society for Testing and Materials bgs = below ground surface
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
LC/MS/MS = Liquid Chromatography tandem mass spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
PFAS = Per- and Polyfluorinated Substances
QSM = Quality Systems Manual
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

Table 3-2
Soil Borings Depths
Site Inspection Report, Former Kansas Army Ammunition Plant

Area of Interest	Soil Boring ID	Soil Boring Depth (feet bgs)
1	AOI01-01	30
	AOI01-01	30
	AOI01-02	20
	AOI01-03	10
	AOI01-04	15
	AOI01-05	15
	AOI01-06	15

Notes:
bgs = below ground surface

Table 3-3
Permanent Monitoring Well Construction and Groundwater Elevations
Site Inspection Report, Former Kansas Army Ammunition Plant

Area of Interest	Monitoring Well ID	Northing[1]	Easting[1]	Screen Interval (feet bgs)	Top of Casing Elevation (feet NAVD88)	Depth to Water[2] (feet btoc)	Groundwater Elevation (feet NAVD88)
1	AOI01-01A	1563610.87	2273791.38	10-20	902.31	6.21	896.10
	AOI01-02	1563615.18	2273721.36	10-20	902.45	6.95	895.50
	AOI01-MW11-26	1564004.46	2274105.71	9.6-19.6	904.90	9.18	895.72
	AOI01-MW6-4	1563470.53	2273739.83	11.2-21.2	905.32	8.54	896.78

Notes:

1. Northing/Easting coordinates are listed in Kansas State Plane South Zone.
2. Synoptic gauging event occurred on 8 May 2023.

bgs = below ground surface
btoc = below top of casing
ft = feet
NAVD88 = North American Vertical Datum 1988

This section summarizes the QA/QC program and laboratory chemical analysis program implemented as part of the SI field activities (40 CFR 300.420(c)(4)). Additional information on these procedures is presented in the UFP-QAPP (AECOM, 2023b).

Samples were analyzed by ALS Environmental-Kelso, located in Kelso, Washington, and accredited under the DoD Environmental Laboratory Accreditation Program (ELAP; Accreditation Number 65188). Due to a limited sampling timeframe, the bulk source water sample was analyzed by a different DoD/ELAP certified laboratory (APPL, LLC in Clovis, California) and submitted for rush analysis of PFAS by Draft USEPA Method 1633.

4.1 SAMPLE HANDLING PROCEDURES

4.1.1 Chain of Custody Record

Each PFAS sample was collected into laboratory-supplied PFAS-free high-density polyethylene bottles and labeled using a PFAS-free marker or pen. All samples were packaged on ice and transported in sample coolers via Federal Express via overnight commercial carrier under standard chain of custody (CoC) procedures to the laboratory. CoC forms and shipping documentation were reviewed internally upon their completion and verified against the packed sample coolers they represented. The shipper’s signature on the CoC was initialed by the reviewer, a copy of the CoC retained in the facility file, and the original and remaining copies taped inside the cooler for shipment. The sample cooler was sealed with custody tape and signed by the shipper.

4.1.2 Laboratory Sample Receipt

All sample coolers were shipped with a temperature blank, which was checked by the laboratory sample custodian for proper preservation (i.e. temperature below 6 degrees Celsius). Samples were additionally checked for integrity and proper and complete documentation, logged into a database, and assigned a sample delivery group designation. All samples and sample data were maintained under proper custody.

4.2 LABORATORY ANALYTICAL METHODS

Samples were analyzed for PFAS by Draft USEPA Method 1633 with specifications as per the DoD Quality Systems Manual (QSM) 5.4, Table B-24 and the laboratory standard operating procedure (SOP). Each sample was collected into laboratory supplied bottleware and submitted to the laboratory for analysis of selected parameters. Additionally, soil and sediment samples were analyzed for total organic carbon (USEPA Method 9060A), pH (USEPA Method 9045D) and clay content (ASTM D-422).

4.3 DATA QUALITY ASSURANCE/QUALITY CONTROL

4.3.1 Laboratory Quality Assurance/Quality Control

Samples were analyzed for PFAS using liquid chromatography with tandem mass spectrometry (LC/MS/MS) in compliance with DoD QSM 5.4, Table B-24 (DoD, 2022). QC checks included holding times, method blanks, calibration standards, extracted internal standards (EISs), laboratory control samples (LCSs), matrix spike/matrix spike duplicates (MS/MSDs), and detection limits. The acceptance criteria and laboratory SOP are provided in the UFP-QAPP (AECOM, 2023b). MS/MSD samples were collected in the field at the rate of 5% and analyzed for the same parameters as the accompanying parent samples.

4.3.2 Field Quality Assurance/Quality Control

Field QA/QC samples were collected at the following rates. Field duplicates were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. One field reagent blank (FRB) was collected. The FRB was collected by pouring the laboratory-provided reagent blank water into an empty FRB bottle. The FRB was analyzed for PFAS. Associated equipment rinsate blanks (ERBs) were collected at a rate of one per 20 samples for non-dedicated sampling equipment. ERBs were collected by pouring the laboratory-provided PFAS-free water over the non-dedicated sampling equipment after decontamination and then collecting the rinsate into an empty ERB bottle. ERBs were analyzed for the same analytes as the associated samples. **Table 3-1** summarizes the field QA/QC samples that were collected from the parent samples.

4.4 DATA REPORTING AND VALIDATION

One hundred percent of the data were validated based on the analytical method and provisions of the UFP-QAPP (AECOM, 2023b); and qualified in accordance with the DoD Data Validation Guidelines Module 6: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-24 (DoD, 2022).

Reported laboratory data were reviewed in accordance with DoD QSM Stage 2B validation guidelines to ensure that the QC results fell within appropriate QC limits for holding times, blank contamination, EISs, calibrations, MS/MSDs, LCSs, and ion ratios. Any data validation qualifiers resulting from outlier QC results were applied. Level IV data packages were prepared, and data validation reports are located in **Appendix G**.

4.5 QUALITY ASSURANCE SUMMARY

Available QA reports, including both field and laboratory generated forms, were reviewed for deviations from planned activities to determine their impact on the data usability. Validated data were summarized to identify patterns, trends, and anomalies as they relate to the Data Quality Indicators (DQIs) precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity. Data qualifiers were applied based on deviations from the measurement performance criteria outlined in the UFP-QAPP (AECOM, 2023b). The data validation reports and data usability assessment are provided in **Appendix G** and descriptions of each DQI are outlined as follows.

4.5.1 Precision

Precision is the degree of agreement among repeated measurements of the same characteristic on the same sample or on separate samples collected as close as possible in time and place. Field sampling precision was measured with the field duplicate relative percent differences (RPD); laboratory precision was measured with calibration verification, internal standard recoveries, LCS and MS duplicate RPD.

4.5.2 Accuracy

Accuracy is a measure of confidence in a measurement. The smaller the difference between the measurement of a parameter and its "true" or expected value, the more accurate the measurement. The more precise or reproducible the result, the more reliable or accurate the result. Accuracy was measured through percent recoveries in the LCS/LCSD, MS/MSD, and surrogates.

4.5.3 Sensitivity

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, a method detection limit study, and calibration standards at the limit of quantitation.

4.5.4 Representativeness

Representativeness qualitatively expresses the degree to which data accurately reflect site conditions. Factors that affect the representativeness of analytical data include appropriate sample population definitions, proper sample collection and preservation techniques, analytical holding times, use of standard analytical methods, and determination of matrix or analyte interferences.

4.5.5 Comparability

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Using standardized sampling and analytical methods, units of reporting, and site selection procedures help ensure comparability. Standard field sampling and typical laboratory protocols were used during the SI and are considered comparable to ongoing investigations.

4.5.6 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data meeting system QC acceptance criteria for all samples tested. Project completeness was determined by evaluating the planned versus actual quantities of data.

4.5.7 Data Usability Assessment

The Data Usability Assessment (DUA), which is provided in **Appendix G**, is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD, 2019 and DoD, 2022).

Based on the DUA, the environmental data collected during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUA and associated data validation reports. These data are of sufficient quality to meet the objectives and requirements of the SI UFP-QAPP (AECOM, 2023b).

Soil, groundwater, and sediment analytical PFAS data were compared to residential SLs for the Target PFAS listed in **Table 5-1** (USEPA, 2023). Soil and sediment samples were compared to the residential soil SLs, and groundwater samples were compared to the residential tap water SLs. The purpose of the screening is to evaluate the occurrence of a potential PFAS release by determining if PFAS is present at the site, and if PFAS is potentially migrating to the surrounding environment.

Table 5-1

Site Inspection Screening Levels

Analyte	Residential SL for Soil (Soil and Sediment) (µg/kg)[a,b]	Residential SL for Tap Water (Groundwater) (ng/L)[a,b]
HFPO-DA	23	6
PFBA	7,800	1,800
PFBS	1,900	601
PFHxA	3,200	990
PFHxS	130	39
PFNA	19	6
PFOA	19	6
PFOS	13	4

a.) USEPA, 2023. Regional Screening Levels for Tap Water and Soil. Hazard Quotient (HQ) = 0.1. May 2023. As recommended in the Assistant Secretary of Defense memorandum dated 24 August 2023.

b.) Assistant Secretary of Defense, 2023. Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. United States Department of Defense. 24 August 2023.

SL = Screening Level
µg/kg = micrograms per kilogram
ng/L = nanograms per liter

6.1 CONCEPTUAL SITE MODEL

The preliminary CSM developed for AOI 1 during the PA was further refined based on SI Target PFAS concentrations that were detected above the limit of detection (LOD) in soil, groundwater, or sediment (surface water was not present at AOI 1). The CSM presented for AOI 1 represents the current understanding of site conditions with respect to known or suspected sources of PFAS-containing materials, potential transport mechanisms and migration pathways, and potentially exposed human receptors.

The CSM evaluated ingestion and inhalation exposure routes for human receptors. 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 are sparse and continue to be the subject of toxicological study. The exposure pathways are evaluated as complete, potentially complete, or incomplete in the CSM. In the absence of toxicity information for the inhalation route, the inhalation exposure pathway of PFAS (via dust) is considered potentially complete for soil where Target PFAS are detected. The remaining exposure pathway designations were determined as follows:

- ***Complete*** **–** Human exposure pathways are considered complete where Target PFAS have been detected at concentrations exceeding SLs, and no land use controls (LUCs) are in place restricting access or use of the media.
- ***Potentially Complete*** **–** Human exposure pathways are considered potentially complete if Target PFAS have been detected at concentrations less than the SLs for soil, groundwater, or sediment or if SLs have been exceeded along a migration pathway. For example, if Target PFAS are not detected in soil but are detected at concentrations exceeding SLs in groundwater, the exposure pathway for soil is considered potentially complete. In addition, a groundwater exposure pathway is considered potentially complete where Target PFAS have been detected and could migrate from the AOI source area to offsite groundwater that is used for drinking water. Exposure pathways are also potentially complete for media where existing LUCs are in place for non-PFAS, because the LUCs are not Target PFAS specific.
- ***Incomplete*** **–** Human exposure pathways are considered incomplete for media where Target PFAS have not been detected at concentrations greater than the LODs.

6.2 AOI 1: BUILDING 52 – FORMER FIRE STATION

The following subsections describe the background, sampling results, CSM, and recommendation for AOI 1: Building 52 – Former Fire Station.

6.2.1 AOI Background

Building 52 is located on the northeast portion of the facility in the 700 Area. Building 52 housed one of the three former KSAAP fire stations and was the only fire station that was active after the 1960s until its closure in 2010. A total of four firetrucks equipped with water tanks were stored at either Building 52 or Building 53. The firetrucks consisted of two 250-gallon mini pumpers, one 1,000-gallon tank for grass fires, and one 500-gallon tank for structural fires. All firetrucks were sold off at auction except for one 250-gallon mini pumper, which has since been converted into a snowplow. Building 52 was also a storage area for ABC (dry chemical) extinguishers, water fire extinguishers, and other equipment, although storage of the one remaining firetruck and water fire extinguishers has since been moved to Building 202 within the 200 Area. Building 52 has been renovated into an office and is currently occupied by GPDA. This area was conveyed with deed restrictions that limit land use to nonresidential and restrict access or use of groundwater underlying the property for any agricultural, horticultural, or industrial purposes unless the groundwater has been tested and found to meet applicable standards of the KDHE.

Based on an interview with a retired KSAAP firefighter, there was a single documented incident where AFFF was released from a 500-gallon tank firetruck in order to test the truck's system and train staff on the general usage of AFFF. The incident occurred at the southern parking lot of Building 52 in approximately 1998. It was estimated that approximately half a 5-gallon bucket of AFFF concentrate was mixed with 200 gallons of water, and the mixture was discharged to the ground in a southern firing direction from the firetruck. No clean-up actions were taken after the release, and the release was allowed to dissipate into the grass. No other instances of AFFF releases were recalled during the personnel's tenure, which spanned from 1997 to 1999 and from 2002 to 2009. However, a total of four 5-gallon buckets of AFFF concentrate were stored at Building 52. One of the 5-gallon buckets was used for the testing exercise, but it is unknown how the other three AFFF buckets were acquired, disposed of, or used.

6.2.2 SI Sampling and Results

Soil, groundwater, and sediment samples were collected for PFAS analysis from AOI 1: Building 52 – Former Fire Station at the following locations (**Figure 6-1**):

- Eighteen soil samples and two field duplicates were collected from six borings (AOI01-01 through AOI01-06) at the surface, mid-, and above top of groundwater intervals. One of the borings (AOI01-02) was converted to a permanent monitoring well and an offset boring from AOI01-01 (AOI01-01A) was installed as a permanent monitoring well.
- Four groundwater samples and one field duplicate were collected from two newly installed permanent monitoring wells (AOI01-01A and AOI01-02) and two existing permanent monitoring wells (MW 6-4 and MW 11-26).
- Two sediment samples and one field duplicate were collected from the downgradient drainage ditches (AOI01-06 and AOI01-07).

This section presents the Target PFAS analytical results for soil, groundwater, and sediment in comparison to SLs for AOI 1: Building 52 – Former Fire Station. The soil, groundwater, and sediment results for the Target PFAS are summarized below and presented in **Table 6-1**. Detected concentrations of Target PFAS are presented in **Figure 6-2**.

6.2.2.1 Soil

PFOS was detected at the SL of 13 micrograms per kilogram (µg/kg) in 1 of 20 soil samples at AOI01-02 in the 2-4 ft bgs interval. PFOS was also detected at concentrations ranging from 0.16 J (estimated) to 2.9 µg/kg in 9 soil samples. Other Target PFAS that were detected in soil less than their respective SLs but greater than their respective LODs included PFBA, PFBS, PFHxA. PFHxS, PFNA and PFOA.

HFPO-DA was not detected in any of the soil samples.

6.2.2.2 Groundwater

PFHxS, PFNA, PFOA, and PFOS were detected at concentrations at or greater than the SLs in five groundwater samples (which include a duplicate sample) as follows:

- PFHxS was detected above the SL of 39 ng/L at 4 of 5 samples at concentrations ranging from 69 to 380 ng/L. The exceedances occurred in wells AOI01-01A, AOI01-02, and MW 11-26.
- PFNA was detected at the SL of 6 ng/L at 1 of 5 samples in well AOI01-02.
- PFOA was detected greater than the SL of 6 ng/L at 1 of 5 samples in well AOI-01-02 (6.5 ng/L).
- PFOS was detected greater than the SL of 4 ng/L at 4 of 5 samples at concentrations ranging from 7.3 to 63 ng/L. The exceedances occurred in wells AOI01-01A, AOI01-02, and MW 11-26.
- Other Target PFAS that were detected in groundwater less than their respective SLs but greater than their respective LODs included PFBA, PFBS and PFHxA.

HFPO-DA was not detected in any of the groundwater samples.

6.2.2.3 Sediment

No Target PFAS were detected greater than the LODs in the three sediment samples collected (including a duplicate).

6.2.3 CSM

Soil borings completed during the SI found low to medium plasticity fines with varying levels of sand as the dominant lithology of the unconsolidated sediments. Silt with pulverized shale or highly weathered shale was also found at the bottom of three borings. Shallow groundwater was encountered between 6.21 and 9.18 feet bgs and groundwater flows to the southwest, as measured during the synoptic groundwater gauging event (**Table 3-3** and **Figure 2-2**).

The primary release mechanism is from a firetruck releasing AFFF onto the surface soil outside of Building 52. Secondary release mechanisms result from human activities (e.g. disturbances to soil), precipitation/run-off to surface water and sediment, and leaching/infiltration to groundwater.

Receptors at the facility include site workers (e.g., facility staff), construction workers, trespassers, residents outside the facility boundary, and recreational users outside of the facility boundary.

Target PFAS were detected in soil with one detection of PFOS that equaled the residential soil SL of 13 µg/kg. Ground-disturbing activities to surface soil at AOI 1 may result in site worker and future construction worker exposure from inhalation of soil particles and ingestion of surface soil. Ground-disturbing activities to subsurface soil may result in future construction worker exposure. Trespassers and residents may also be exposed to potential PFAS contamination in surface soil via the inhalation of dust particles carried off-facility. Therefore, the exposure pathways for inhalation of soil particles and ingestion of soil are complete for the receptors.

Target PFAS were detected in groundwater at concentrations exceeding the residential groundwater SLs for PFHxS, PFNA, PFOA, and PFOS. PFAS are water soluble and can migrate readily from soil to shallow groundwater via leaching. Drinking water for KSAAP current site workers and residents who are serviced by KSAAP's water utility is drawn from alluvial units near the Neosho River about 5 miles east of KSAAP. Based on the southwestern groundwater flow direction at AOI 1 and distance to the Neosho River surface water intake, the drinking water supply for current site workers and residents is unlikely to be impacted by contaminated groundwater originating from AOI 1. Recreational user exposure to shallow groundwater is also an unlikely scenario. There is a groundwater restriction established through the Kansas Environmental Use Control enrollment of the 700 Area plume (which extends into AOI 1) (Kansas Department of Health and Environment, 2016; **Figure 6-1**). The groundwater restriction on part of this AOI is not PFAS-specific, so the potential exposure pathway for future construction workers is conservatively considered complete from the ingestion of shallow groundwater.

A drainage ditch is located 300 feet northwest of AOI 1. The railroad tracks south of AOI 1 also divert water to a drainage ditch located 800 feet east of AOI 1. These drainage ditches receive storm water and overland runoff from AOI 1 and drain into tributaries of Labette Creek, located approximately 2 miles southwest of AOI 1. Target PFAS were not detected in sediment samples collected from AOI 1 and no surface water was present within the drainage ditches. Therefore, the surface water and sediment exposure pathways are considered incomplete.

Figure 6-3 presents the CSM for AOI 1: Building 52 – Former Fire Station.

6.2.4 Recommendation

Based on the results of the SI, one detection of PFOS in soil met the SL of 13 µg/kg. Detections of PFHxS, PFNA, PFOA, and PFOS in groundwater exceeded the SLs. Nature and extent have not been defined with the existing data, therefore, further investigation is recommended for AOI 1: Building 52 – Former Fire Station. Additional sampling locations for soil and groundwater are recommended as follows:

- Immediately upgradient of the release area
- East and southeast of existing monitoring well AOI01-01A
- West and southwest of existing monitoring well AOI01-02
- Downgradient of existing monitoring well AOI01-MW11-26

Table 6-1
Target PFAS Results and Screening for Building 52 AOI 1
Site Inspection Report, Former Kansas Army Ammunition Plant

Location ID	Sample ID	Depth (feet)	Sample Date	HFPO-DA	PFBA	PFBS	PFHxA	PFHxS	PFNA	PFOA	PFOS
Soil			**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
			Screening Levels	**23**	**7800**	**1900**	**3200**	**130**	**19**	**19**	**13**
AOI01-01	AOI01-01-SB-00-0.5	0-0.5	4/18/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
	AOI01-01-SB-00-0.5-D	0-0.5	4/18/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
	AOI01-01-SB-02-04	2-4	4/18/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
	AOI01-01-SB-05-07	5-7	4/18/2023	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
AOI01-02	AOI01-02-SB-00-0.5	0-0.5	4/18/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
	AOI01-02-SB-02-04	2-4	4/18/2023	0.29 U	**0.17 J**	0.29 U	**0.20 J**	**0.86**	**0.66**	**0.21 J**	**13**
	AOI01-02-SB-05-07	5-7	4/18/2023	0.26 U	0.26 U	0.26 U	0.26 U	**0.27 J**	0.26 U	0.26 U	**0.25 J**
AOI01-03	AOI01-03-SB-00-05	0-0.5	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
	AOI01-03-SB-02-04	2-4	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
	AOI01-03-SB-05-07	5-7	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
AOI01-04	AOI01-04-SB-00-0.5	0-0.5	4/19/2023	0.25 U	**0.11 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**0.16 J**
	AOI01-04-SB-00-0.5-D	0-0.5	4/19/2023	0.25 U	**0.11 J**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**0.20 J**
	AOI01-04-SB-04-06	4-6	4/19/2023	0.25 U	**0.12 J**	**0.15 J**	**0.21 J**	**0.91**	**0.22 J**	**0.12 J**	**0.95**
	AOI01-04-SB-08-10	8-10	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	**0.25 J**	**0.13 J**	0.25 U	**1.0**
AOI01-05	AOI01-05-SB-00-0.5	0-0.5	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	**0.22 J**	**0.11 J**	0.25 U	**2.3**
	AOI01-05-SB-04-06	4-6	4/19/2023	0.25 U	**0.13 J**	**0.15 J**	**0.42 J**	**9.0**	**0.14 J**	**0.24 J**	**0.94**
	AOI01-05-SB-08-10	8-10	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	**0.17 J**	0.25 U	0.25 U	**0.30 J**
AOI01-06	AOI01-06-SB-00-0.5	0-0.5	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	**0.12 J**	**0.33 J**	0.25 U	**2.9**
	AOI01-06-SB-04-06	4-6	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
	AOI01-06-SB-08-10	8-10	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Groundwater			**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
			Screening Levels	**6**	**1800**	**601**	**990**	**39**	**6**	**6**	**4**
AOI01-01A	AOI01-01A-GW-050923	10-20	5/9/2023	2 U	**9.4 J+**	**22**	**12**	**69**	**3.3 J**	**4.0 J**	**7.3**
	AOI01-01A-GW-050923-D	10-20	5/9/2023	2 U	**10 J+**	**22**	**14**	**72**	**3.1 J**	**4.6 J**	**8.1**
AOI01-02	AOI01-02-GW-050923	10-20	5/9/2023	2 U	**14 J+**	**65**	**16**	**380**	**6.0**	**6.5**	**50**
MW 11-26	AOI01-MW11-26-050923	9.6-19.6	5/9/2023	2 U	**8.1 J+**	**18**	**12**	**81**	**2.7 J**	**5.3**	**63**
MW 6-4	AOI01-MW6-4-050923	11.2-21.2	5/9/2023	2 U	**3.4 J+**	**0.44 J**	**0.64 J**	2 U	2 U	**1.3 J**	**0.89 J**
Sediment			**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
			Screening Levels	**23**	**7800**	**1900**	**3200**	**130**	**19**	**19**	**13**
AOI01-07	AOI01-07-SD-00-01	0-1	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
	AOI01-07-SD-00-01-D	0-1	4/19/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
AOI01-08	AOI01-08-SD-00-01	0-1	4/20/2023	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

The screening levels are based on the USEPA Regional Screening Levels for Tap Water and Soil. Cancer Risk Level = 1E-6, Hazard Quotient = 0.1. May 2023.

Bold values indicate detection of an analyte.

Highlighted values indicate exceedance of a screening level.

J = Estimated concentration

J+ = Estimated concentration, biased high

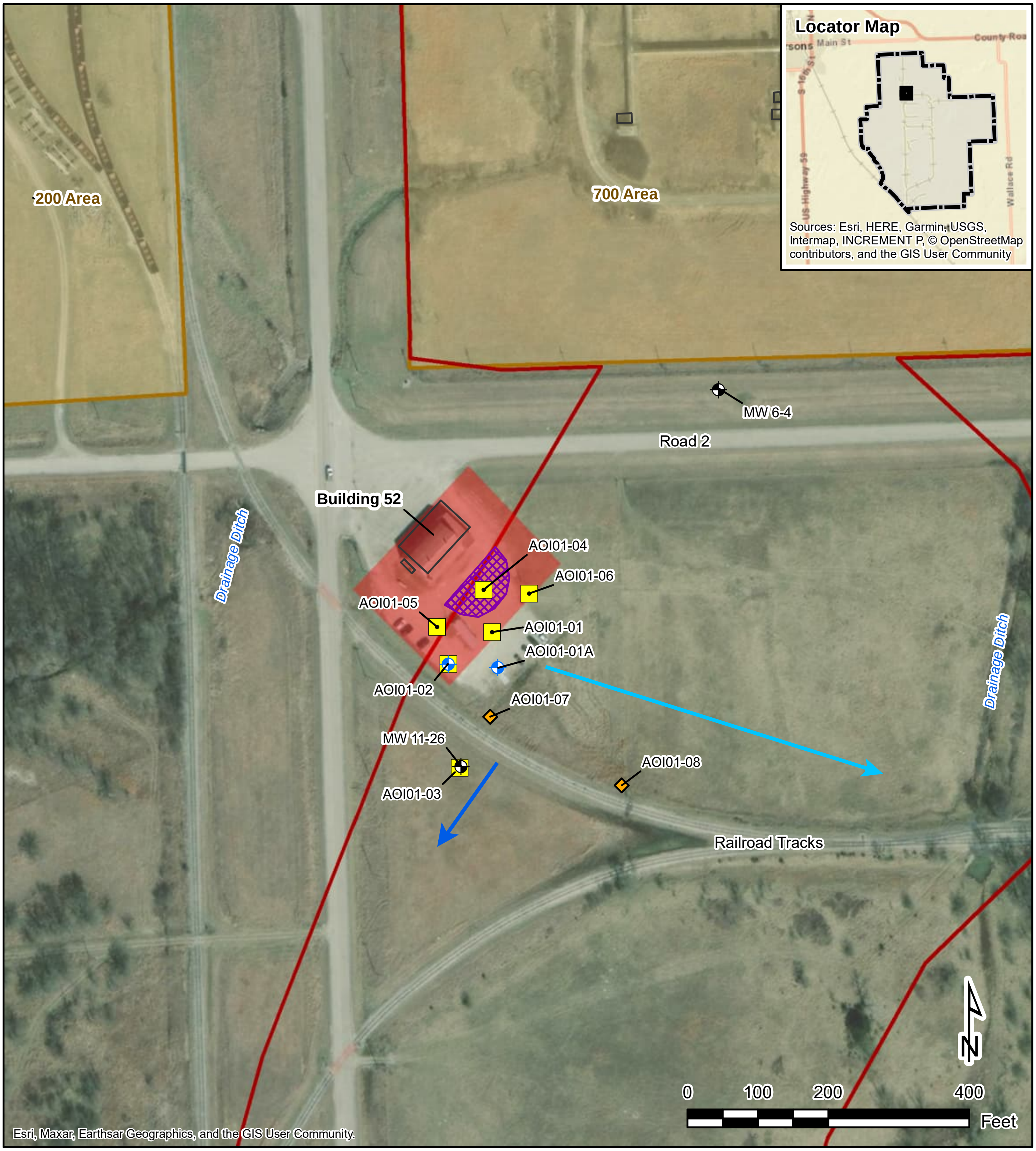
D = duplicate

ID = identification

ng/L = nanogram per liter

U = The analyte was not detected at a level greater than or equal to the adjusted DL

µg/kg = microgram per kilogram



Legend

- Installation Boundary
- Groundwater LUC
- Production Area
- AOI 1
- PFAS Release
- Surface Water Flow Direction
- Groundwater Flow Direction
- Existing Monitoring Well
- Newly Installed Monitoring Well
- Soil Boring
- Sediment Sample

Figure 6-1

Building 52 AOI 1
Sample Locations
Former Kansas Army Ammunition Plant
Parsons, Kansas

Site Inspection Report

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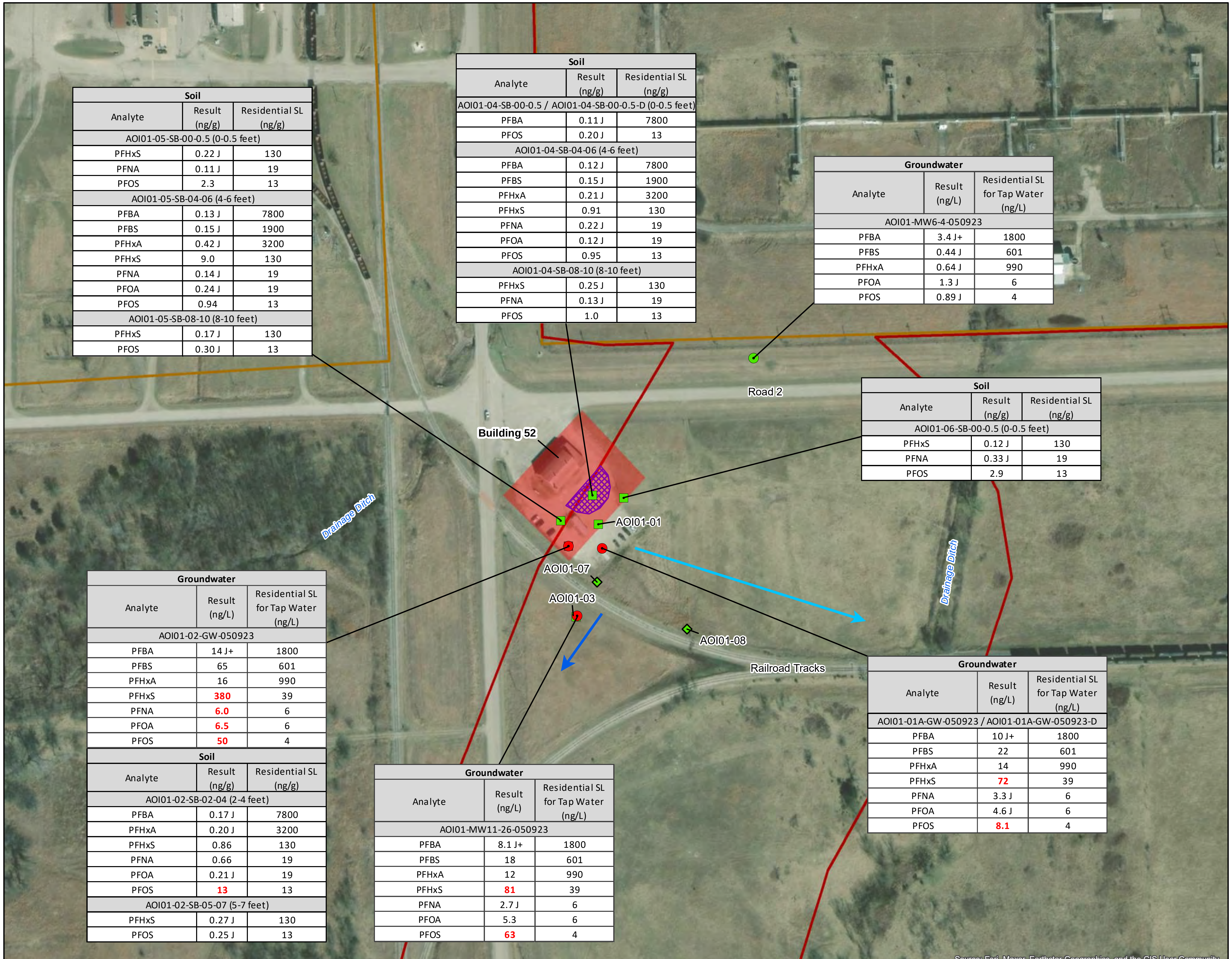


Soil		
Analyte	Result (ng/g)	Residential SL (ng/g)
AOI01-05-SB-00-0.5 (0-0.5 feet)		
PFHxS	0.22 J	130
PFNA	0.11 J	19
PFOS	2.3	13
AOI01-05-SB-04-06 (4-6 feet)		
PFBA	0.13 J	7800
PFBS	0.15 J	1900
PFHxA	0.42 J	3200
PFHxS	9.0	130
PFNA	0.14 J	19
PFOA	0.24 J	19
PFOS	0.94	13
AOI01-05-SB-08-10 (8-10 feet)		
PFHxS	0.17 J	130
PFOS	0.30 J	13

Soil		
Analyte	Result (ng/g)	Residential SL (ng/g)
AOI01-04-SB-00-0.5 / AOI01-04-SB-00-0.5-D (0-0.5 feet)		
PFBA	0.11 J	7800
PFOS	0.20 J	13
AOI01-04-SB-04-06 (4-6 feet)		
PFBA	0.12 J	7800
PFBS	0.15 J	1900
PFHxA	0.21 J	3200
PFHxS	0.91	130
PFNA	0.22 J	19
PFOA	0.12 J	19
PFOS	0.95	13
AOI01-04-SB-08-10 (8-10 feet)		
PFHxS	0.25 J	130
PFNA	0.13 J	19
PFOS	1.0	13

Groundwater		
Analyte	Result (ng/L)	Residential SL for Tap Water (ng/L)
AOI01-MW6-4-050923		
PFBA	3.4 J+	1800
PFBS	0.44 J	601
PFHxA	0.64 J	990
PFOA	1.3 J	6
PFOS	0.89 J	4

Soil		
Analyte	Result (ng/g)	Residential SL (ng/g)
AOI01-06-SB-00-0.5 (0-0.5 feet)		
PFHxS	0.12 J	130
PFNA	0.33 J	19
PFOS	2.9	13

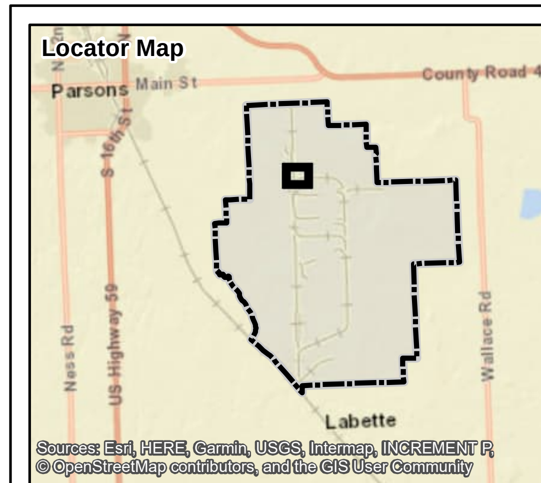
Groundwater		
Analyte	Result (ng/L)	Residential SL for Tap Water (ng/L)
AOI01-02-GW-050923		
PFBA	14 J+	1800
PFBS	65	601
PFHxA	16	990
PFHxS	**380**	39
PFNA	**6.0**	6
PFOA	**6.5**	6
PFOS	**50**	4

Soil		
Analyte	Result (ng/g)	Residential SL (ng/g)
AOI01-02-SB-02-04 (2-4 feet)		
PFBA	0.17 J	7800
PFHxA	0.20 J	3200
PFHxS	0.86	130
PFNA	0.66	19
PFOA	0.21 J	19
PFOS	**13**	13
AOI01-02-SB-05-07 (5-7 feet)		
PFHxS	0.27 J	130
PFOS	0.25 J	13

Groundwater		
Analyte	Result (ng/L)	Residential SL for Tap Water (ng/L)
AOI01-MW11-26-050923		
PFBA	8.1 J+	1800
PFBS	18	601
PFHxA	12	990
PFHxS	**81**	39
PFNA	2.7 J	6
PFOA	5.3	6
PFOS	**63**	4

Groundwater		
Analyte	Result (ng/L)	Residential SL for Tap Water (ng/L)
AOI01-01A-GW-050923 / AOI01-01A-GW-050923-D		
PFBA	10 J+	1800
PFBS	22	601
PFHxA	14	990
PFHxS	**72**	39
PFNA	3.3 J	6
PFOA	4.6 J	6
PFOS	**8.1**	4

Locator Map



Legend

- Installation Boundary
- Groundwater LUC
- AOI 1
- PFAS Release
- Surface Water Flow Direction
- Groundwater Flow Direction

Collected Sample

- Groundwater Sample Above SL
- Groundwater Sample Below SL
- Soil Sample Above SL
- Soil Sample Below SL
- Sediment Sample Below SL

N

0 100 200 400 Feet

Figure 6-2

Building 52 AOI 1
Sample Results
Former Kansas Army Ammunition Plant
Parsons, Kansas

Site Inspection Report

AECOM | Project Number: 60656718 | Drawn By: JZ

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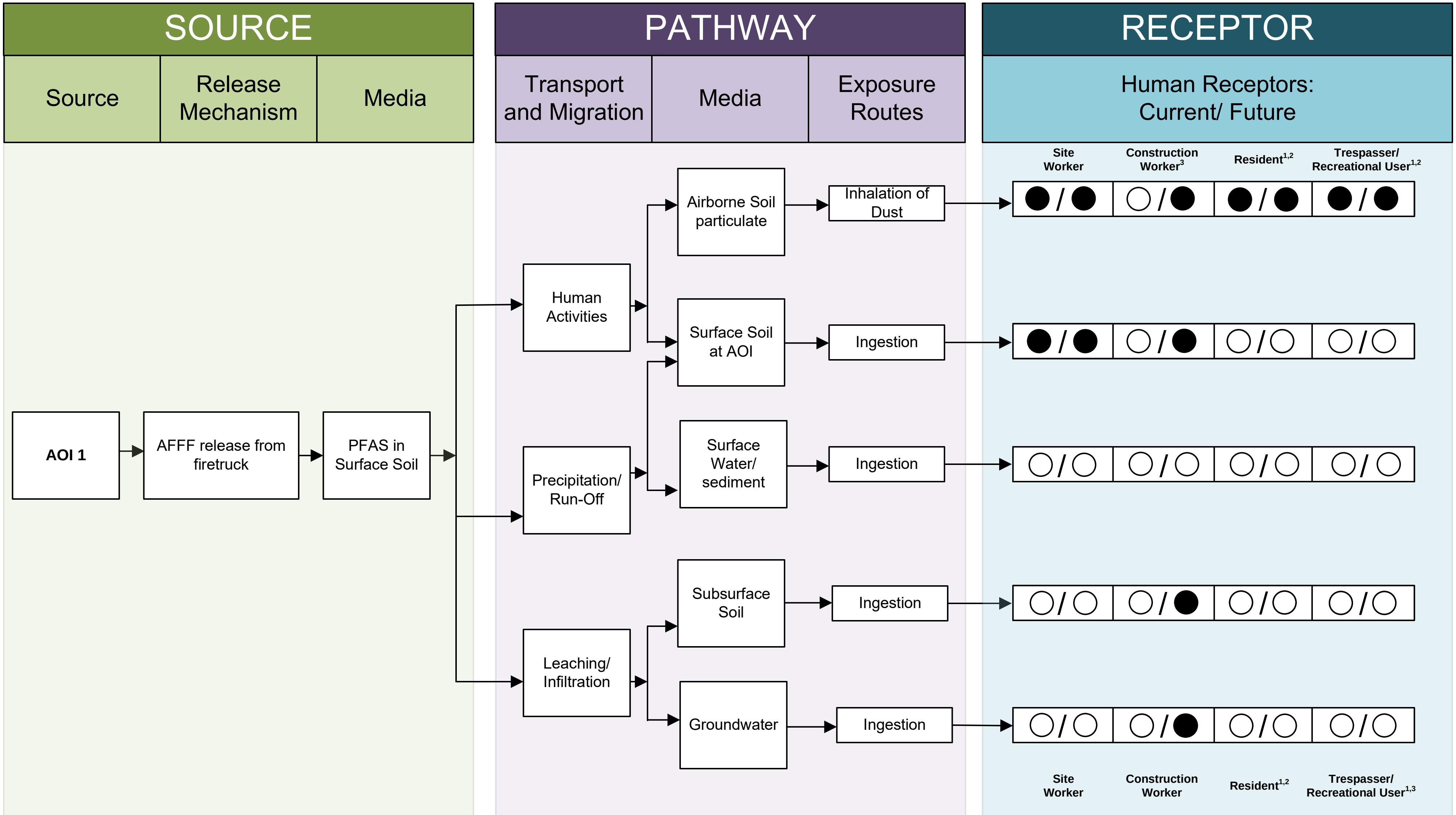

LEGEND

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

NOTES

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. No current construction ongoing at AOI 1.

Figure 6-3
Conceptual Site Model
AOI 1: Building 52 – Former Fire Station
Former Kansas Army Ammunition Plant

An SI is conducted when the PA determines an AOI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI typically includes multimedia sampling at the AOI to determine whether 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 (40 CFR 300.420(5)). This SI Report used the findings from the PA in conjunction with soil, groundwater, and sediment sampling data at AOI 1 to determine whether Target PFAS have been released to the environment and whether the release has affected or may affect specific human health targets.

Before the SI sampling, a preliminary CSM was developed in the PA based on an evaluation of existing records, personnel interviews, and site reconnaissance. The preliminary CSM identified potential human receptors and exposure pathways for groundwater and surface water that are known to be used, or could realistically be used in the future, as a source of drinking water and identified potential soil and sediment exposure pathways. The one AOI that was identified at former KSAAP was sampled during the SI to further evaluate PFAS-related releases and identify the presence or absence of Target PFAS.

Target PFAS were detected at concentrations greater than the LODs in AOI 1. Concentrations of PFOS, PFOA, PFNA, and/or PFHxS met or exceeded the SLs in groundwater, and one concentration of PFOS was detected at the SL of 13 µg/kg in soil. No Target PFAS were detected in sediment, and HFPO-DA was not detected in any of the sampled media.

The CSM for AOI 1 was updated and details site geological conditions; determines primary and secondary release mechanisms; identifies potential human receptors; and summarized complete, potentially complete, and incomplete exposure pathways for current and reasonably anticipated future exposure scenarios. The soil and groundwater exposure pathways for onsite receptors (site workers and future construction workers) are complete for AOI 1 due to Target PFAS detections or exceedances of the SLs. The soil exposure pathway for offsite receptors (residents and trespassers) are also complete due to the inhalation of soil particles carried off-facility. No complete pathway for exposure to sediment was identified.

SI sampling results were compared to the USEPA risk-based SLs presented in **Section 5** to determine if further investigation is warranted at AOI 1, as follows:

- If the maximum detected concentration for a given analyte in soil or groundwater exceeds the SL, it is concluded that further investigation is warranted.
- If the maximum detected concentration is less than the SL, it is concluded that further investigation is not warranted.

Table 7-1 summarizes the conclusions and recommendations for AOI 1.

Table 7-1

Summary of Site Inspection Findings and Recommendations

AOI Name	Soil	Groundwater	Sediment	Recommendation
AOI 1: Building 52 – Former Fire Station	●	●	○	Further investigation recommended

Legend:

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

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