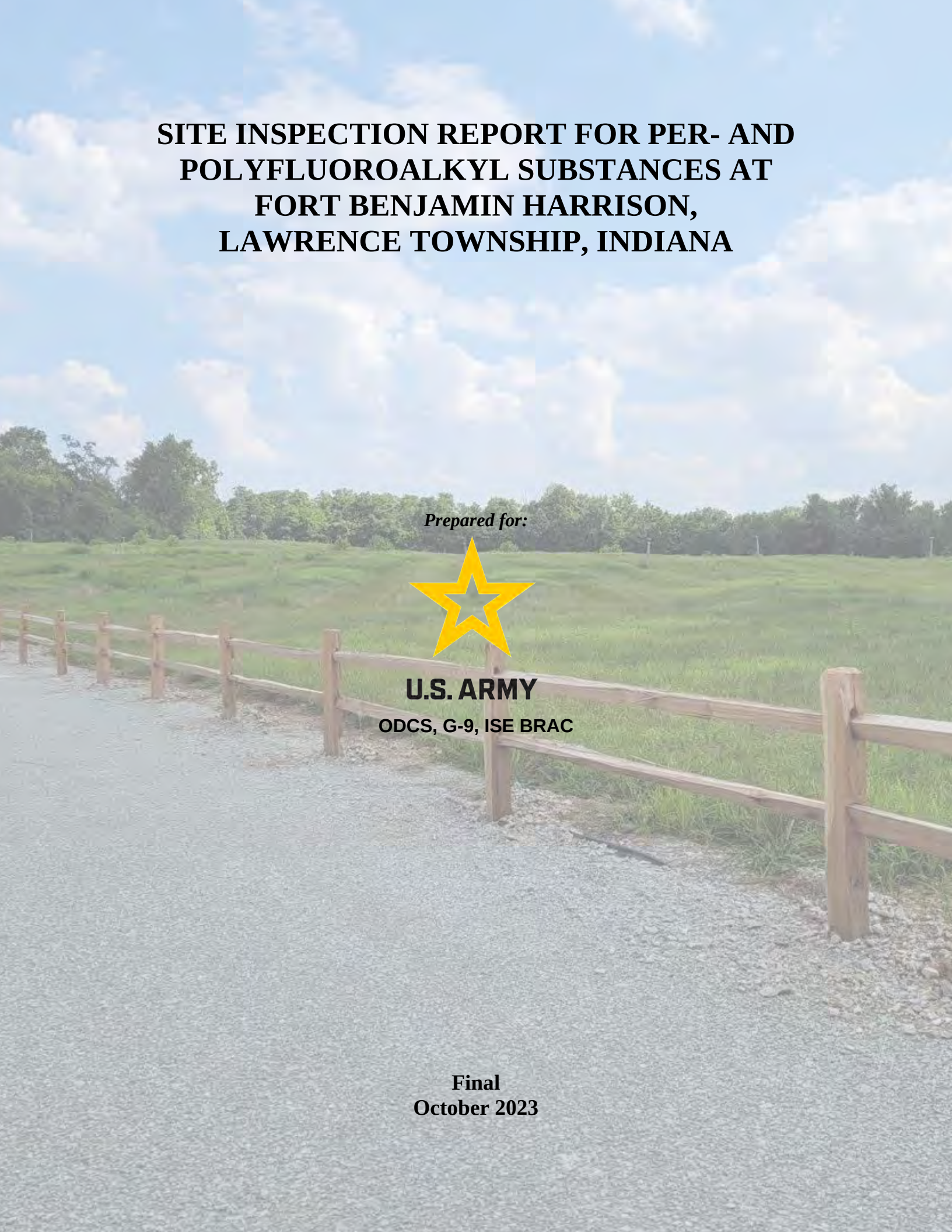
SITE INSPECTION REPORT FOR PER- AND POLYFLUOROALKYL SUBSTANCES AT FORT BENJAMIN HARRISON, LAWRENCE TOWNSHIP, INDIANA



Prepared for:

U.S. ARMY

ODCS, G-9, ISE BRAC

Final
October 2023

SITE INSPECTION REPORT FOR PER- AND POLYFLUOROALKYL SUBSTANCES AT FORT BENJAMIN HARRISON, LAWRENCE TOWNSHIP, INDIANA

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LIST OF ACRONYMS AND ABBREVIATIONS

%R	Percent Recovery
AAFES	Amy and Air Force Exchange Service
AFFF	Aqueous Film-Forming Foam
amsl	Above Mean Sea Level
AOPI	Area of Potential Interest
Army	U.S. Army
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
btoc	Below Top of Casing
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CoC	Chain-of-Custody
CSM	Conceptual Site Model
DERP	Defense Environmental Restoration Program
DNR	Department of Natural Resources
DO	Dissolved Oxygen
DoD	U.S. Department of Defense
DPT	Direct-Push Technology
DQO	Data Quality Objective
DUA	Data Usability Assessment
EDR	Environmental Data Resources, Inc.
EIS	Extracted Internal Standard
FBH	Fort Benjamin Harrison
FHRA	Fort Harrison Reuse Authority
FTA	Fort Training Area
GPS	Global Positioning System
GSA	General Services Administration
HDPE	High-Density Polyethylene
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid (GenX)
HQ	Hazard Quotient
ID	Identifier
IDEM	Indiana Department of Environmental Management
IDW	Investigation-Derived Waste
IPaC	Information for Planning and Consultation
LC/MS/MS	Liquid Chromatography with Tandem Mass Spectrometry
LCS	Laboratory Control Sample
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUC	Land Use Control
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NGVD	National Geodetic Vertical Datum
NPL	National Priorities List
ORP	Oxidation-Reduction Potential
OSD	Office of the Secretary of Defense
P.E.	Professional Engineer
P.G.	Professional Geologist

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PDT	Project Delivery Team
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonate
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PMP	Project Management Professional
ppb	Parts per Billion
PPE	Personal Protective Equipment
ppt	Parts per Trillion
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
QSM	Quality Systems Manual
REM	Registered Environmental Manager
RPD	Relative Percent Difference
RSL	Regional Screening Level
SDG	Sample Delivery Group
SI	Site Inspection
SL	Screening Level
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
T&E	Threatened and Endangered
TCLP	Toxicity Characteristic Leaching Procedure
U.S.C.	United States Code
UFP-QAPP	Uniform Federal Policy Quality Assurance Project Plan
USACE	U.S. Army Corps of Engineers
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WFPA	Well Field Protection Area
WWI	World War I
WWII	World War II
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

The U.S. Army (Army) is conducting Preliminary Assessments (PAs) and Site Inspections (SIs) to determine the use, storage, disposal, or release of per- and polyfluoroalkyl substances (PFAS) at multiple Base Realignment and Closure (BRAC) installations, nationwide. This report documents SI activities conducted for six areas of potential interest (AOPIs) at the former Fort Benjamin Harrison (FBH) Army Installation in Lawrence Township, Marion County, Indiana. AOPIs were identified during the PA phase for investigation through multimedia sampling in an 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 (DERP, 10 U.S.C. §2700, et seq.); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 Code of Federal Regulations [CFR] Part 300); Army and U.S. Department of Defense (DoD) policy and guidance; and U.S. Environmental Protection Agency (USEPA) guidance.

The PA identified areas where PFAS-containing materials were used, stored, and/or disposed of, or areas where known or suspected releases to the environment occurred. Based on recommendations from the PA, soil, groundwater, sediment, and/or surface water samples were collected from the six AOPIs. The field investigation at FBH was conducted in accordance with the Programmatic Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). Samples collected during this SI were analyzed for PFAS using procedures compliant with the DoD Quality Systems Manual (QSM) Version 5.4, Table B-15 (DoD 2021) and the laboratory standard operating procedure (SOP).

To determine if future investigation was warranted at each AOPI, this SI followed established USEPA guidance and DoD policy and guidance for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) (also known as GenX) (DoD 2022). Samples collected during this SI were compared to risk screening levels (SLs) established as the residential scenario SLs calculated using the USEPA regional screening level (RSL) calculator for soil and the tap water criteria for groundwater and published in the 2022 Office of the Secretary of Defense (OSD) Memorandum (DoD 2022a). Since PFAS are a large grouping consisting of thousands of individual chemicals, PFOA, PFOS, PFBS, PFNA, PFHxS, and HFPO-DA altogether will be referred to in this report as “Target PFAS.”

Conceptual site models (CSMs) were developed during the PA and then updated for each AOPI where Target PFAS were detected at concentrations greater than the limit of detection (LOD). The updated CSMs detail site geological conditions; determine primary and secondary release mechanisms; identify potential human receptors; and detail complete, potentially complete, and incomplete exposure pathways for current and reasonably anticipated future exposure scenarios. Target PFAS were detected in at least one medium at all six AOPIs. PFAS concentrations exceeded SLs in soil at two AOPIS, in groundwater at five of the AOPIs, and in surface water and/or sediment at two AOPIs. Concentrations of PFOS, PFOA, PFHxS, and PFNA were detected at concentrations that exceeded SLs. HFPO-DA was not detected at any AOPI. Figure ES-1 depicts the facility-wide map of AOPIs and Target PFAS groundwater and surface water results, including the distribution of SL exceedances and proximity to facility boundaries.

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

Table ES-1. Summary of AOPIs and Recommendations for Further Investigation

AOPI Name	Exceedance of SLs		Recommendation
	Groundwater	Soil	
West Landfill FTA	No	No	Further investigation not recommended*
Building 810 FTA	Yes	Yes	Further investigation recommended
Building 33 Gas Station	Yes	No	Further investigation recommended
Fire Station No. 1	Yes	Yes	Further investigation recommended
Fire Station No. 2	Yes	No	Further investigation recommended
Fire Station No. 2 FTA	Yes	No	Further investigation recommended

*Additional off-AOPI/upgradient investigation may be warranted to determine the source of SL exceedances in surface water collected downgradient from the West Landfill FTA AOPI. Data from samples collected at the AOPI did not identify a potential source.
Note: Highlighted values indicate AOPIs with a recommendation for further investigation.

1. INTRODUCTION

The U.S. Army (Army) is conducting Preliminary Assessments (PAs, 40 Code of Federal Regulations [CFR] §300.420(b)) and Site Inspections (SIs, 40 CFR §300.420(c)) to investigate the presence or release of per- and polyfluoroalkyl substances (PFAS), by investigating the use, storage, or disposal of PFAS at multiple Base Realignment and Closure (BRAC) installations, nationwide. This SI is focused on the former Fort Benjamin Harrison (FBH) Army Installation, and was conducted 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 (DERP, 10 U.S.C. §2701 et seq.); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300); Army and U.S. Department of Defense (DoD) policy and guidance; and U.S. Environmental Protection Agency (USEPA) guidance. FBH is not on the National Priorities List (NPL), and the Army is responsible for compliance with CERCLA in accordance with Executive Order 12580, as amended.

Based on results of the FBH PFAS PA (Leidos 2023), multiple areas of potential interest (AOPIs) were identified for investigation through multimedia sampling in an SI to determine whether a PFAS release occurred. FBH is located in Lawrence Township, Marion County, Indiana, as shown in Figure 1-1. The entirety of the former FBH is referred to as the "site," "facility," or "installation" throughout this document. Any references to "offsite" refer to areas that are outside the original boundary of FBH.

1.1 SCOPE AND OBJECTIVES

The overall objective of the SI is to determine the presence or absence of PFAS at each AOPI. This SI Report uses findings from the PA in conjunction with soil, groundwater, surface water, and sediment sampling data 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 Office of the Secretary of Defense (OSD) screening levels (SLs) published in the 2022 OSD Memorandum (DoD 2022a), and documentation of the investigation results. This SI was conducted in accordance with the Programmatic Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). The field activities followed site-specific sampling and health and safety protocols, as identified in the Programmatic Accident Prevention Plan (Leidos 2022a) and the FBH Site Safety and Health Plan (Appendix A of the FBH UFP-QAPP Addendum [Leidos 2022b]).

1.2 FBH DESCRIPTION

FBH is a former Army facility located in central Indiana, in Marion County. FBH is bounded by residential areas and farmland to the north, northeast, and southwest, as well as light industrial areas that border the former facility to the west and southeast (Leidos 2023). FBH was placed on the DoD BRAC List in 1991 with property disposal and reuse activities initiated following closure in October 1995 (U.S. Army 2020). Since closure in 1995, nearly 1,632 acres have been transferred to the State of Indiana for parks and a golf course, and the remaining acreage has primarily been transferred to the Fort Harrison Reuse Authority (FHRA) for mixed use, including commercial and recreational uses. A 138-acre parcel was retained by the Army (the FBH U.S. Army Reserve Center in the southeastern part of the installation), and a 60-acre landfill, undergoing post-closure certification, is anticipated for transfer to the Indiana Department of Natural Resources (DNR) (Leidos 2023, U.S. Army 2020).

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)). The evaluated areas include fire stations, fire training areas (FTAs), landfills, plating operations, wastewater treatment plants (WWTPs), pesticide facilities, vehicle maintenance shops, paint shops, and photographic processing facilities. The FBH PFAS PA recommended six AOPIs for further investigation in an SI due to known or potential historical PFAS-containing material use, storage, or disposal. The AOPIs, as well as the dates of operation and sizes of each area, are presented in Table 1-1 and illustrated in Figure 1-2.

Table 1-1. List of AOPIs at FBH

AOPI Name	Dates of Operation	Size (acres)
West Landfill FTA	1941-mid-1970s	2.83
Building 810 FTA	1980-1995	2.53
Building 33 Gas Station	Unknown to FBH closure (1995)	1.58
Fire Station No. 1	Unknown to FBH closure (1995)	0.35
Fire Station No. 2	Unknown to FBH closure (1995)	0.2
Fire Station No. 2 FTA	Unknown to FBH closure (1995)	0.5

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 FBH. 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 outlined in the 2022 OSD Memorandum (DoD 2022a) 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 updated conceptual site models (CSMs).
- ***Section 7. Conclusions and Recommendations***—This section summarizes the SI conclusions and presents recommendations for the FBH AOPIs.
- ***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 Field Summary Notes
  - Appendix B. Photograph Log
  - Appendix C. Task Team Activity Log Sheets
  - Appendix D. Boring Logs
  - Appendix E. Sampling Forms and Calibration Logs
  - Appendix F. Investigation-Derived Waste (IDW) Documents
  - Appendix G. Data Usability Assessment (DUA)
  - Appendix H. Data Presentation Tables.

2. ENVIRONMENTAL SETTING

This section provides general information about FBH, including the site location, operational 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

FBH is a former Army Installation that consisted of approximately 2,501 acres while in operation. FBH is located in Lawrence Township, Marion County, Indiana, approximately 12 miles northeast of downtown Indianapolis. Lawrence Township is primarily residential in nature, with developments and Fort Harrison State Park dominating the landscape. FBH is bounded by residential areas and farmland to the north, northeast, and southwest, as well as light industrial areas that border the facility to the west and southeast (Leidos 2023). Figure 2-1 depicts the FBH site features, including the site boundary, roads, buildings, topography, and location of the surface water hydrologic features.

2.2 SITE OPERATIONAL HISTORY

FBH was created by an act of the U.S. Congress in 1903. Initially established as an infantry regiment post, FBH became a World War I (WWI) training camp for officers and engineers. During the years between WWI and World War II (WWII), the Army used FBH as a training center for military personnel and civilians. From 1941 to 1945, the Installation became the site of an induction center for military draftees, home to several Army schools, a prisoner of war camp, an Army disciplinary barracks, and a 1,000-bed hospital. In 1947, FBH was officially declared "United States Army surplus." In October 1948, FBH was relinquished to the 10th Air Force for use as an air base; however, the facilities were inadequate for this type of use. In April 1950, command of FBH was returned to the Army, and FBH was reactivated as the Army Finance Center. Gates-Lord Hall was completed in February 1957 to house the new Adjutant General and Finance Schools.

Activities that followed the opening of the Army Finance Center can be characterized as administration and training. In 1980, FBH was recognized and designated as the U.S. Army Soldier Support Center, responsible for personnel service support, including finance, religion, legal aid, music, public affairs, morale, welfare, and recreation (U.S. Army 2020). Historical investigations at FBH have identified more than 100 buildings with historical and military significance (HLA 1993).

In 1991, FBH was placed on the DoD BRAC List that directed the closure of FBH, the realignment of the Soldier Support Center to Fort Jackson, and the retention of the DoD Finance and Accounting Service Indianapolis Center as a General Services Administration (GSA) stand-alone facility (Building 1) (U.S. Army 2020). Property disposal and reuse activities of 17 parcels were initiated following closure in October 1995 (U.S. Army 2020).

2.3 DEMOGRAPHICS, PROPERTY TRANSFER, AND LAND USE

FBH is bounded by residential areas and farmland to the north, northeast, and southwest, as well as light industrial areas that border the former facility to the west and southeast. In 2019, the U.S. census reported a population of 125,195 for Lawrence Township (U.S. Census Bureau 2019).

Since closure in 1995, nearly 1,632 acres have been transferred to the State of Indiana for parks and a golf course, 73 acres associated with Building 1 has been transferred through GSA to Defense Finance Accounting Service, and the majority of the remaining acreage has primarily been transferred to FHRA for mixed use, including commercial and recreational uses. A 138-acre parcel was retained by the U.S. Army

(the FBH U.S. Army Reserve Enclave in the southeastern part of FBH), and a 60-acre landfill, undergoing post-closure certification, is anticipated for transfer to the Indiana DNR (U.S. Army 2020).

Following closure in 1995, FBH transferred Building 1 to the Defense Finance and Accounting Service through GSA. The State of Indiana received parcels for the 230-acre golf course in 1995, Eugene Burns Park in 2005, and Fort Harrison State Park (1,393 acres) in 2011. Nine conveyances of property were made to FHRA from 1996 to 2007, totaling 622 acres. The city of Lawrence received 3.3 acres in 1997. The city of Lawrence was the recipient of previous transfers prior to base closure, including the East Landfill in the 1970s. In 2002, 1.5 acres were conveyed to financial institutions.

The Lawrence Village Senior Residence (Army and Air Force Exchange Service [AAFES] Gas Station at Building 33) has an environmental restrictive covenant that was recorded in 2011 to ensure a sub-slab vapor mitigation system was installed during building construction and that groundwater use restrictions are in place due to the presence of metals and petroleum at the site.

2.4 TOPOGRAPHY

The landscape at FBH consists of moderately sloping terraces that rise from nearly level bottomland along Fall Creek and its tributaries to nearly level uplands. Fall Creek and its tributaries have eroded the landscape to form the sloping terraces and incised steep-walled ravines. Surface elevations across FBH range from 732 feet above National Geodetic Vertical Datum (NGVD) of 1992 along the northern boundary of the facility to 870 feet above NGVD of 1992 at the southern boundary (SAIC 1998). The surface topography at FBH is shown in Figure 2-1.

2.5 GEOLOGY

The surficial geology at FBH consists of recent and Pleistocene unconsolidated deposits that unconformably overlie Middle Devonian and Silurian limestone and dolomite bedrock units. The unconsolidated deposits are generally made up of two units: the Martinsville Formation (alluvium, silts, sands, and gravels) and the Trafalgar Formation (Kansan-, Illinoisan-, and Wisconsinian-age glaciofluvial and glacial till deposits). The till is generally a mixture of gravel, sand, and silt in a clayey matrix. The unconsolidated deposits reach their maximum thickness in bedrock valleys that were scoured during periods of glaciation and later filled with deposits from glacial meltwater. Bedrock valleys filled with remnant deposits of these glacial meltwater streams have been identified in the vicinity of FBH along Fall Creek (SAIC 1998). The unconsolidated till deposits at FBH are classified as three units (deep, middle, and shallow). The deep unit is assumed to be generally 100 to 150 feet thick. The middle and shallow units are found in the top 50 to 70 feet below ground surface (bgs) (USGS 1999).

The top of bedrock at FBH lies at approximately 150 to 250 feet bgs. Silurian-aged bedrock underlies the surficial deposits in the northwestern portion of FBH. These sedimentary rock units consist of white/gray limestone, tan dolomite, and blue shale, and exceed 150 feet in thickness. Devonian-aged bedrock, which lies beneath surficial deposits in the remainder of FBH, consists of white/blue limestone, tan dolomite, and blue/black shale. The regional dip of these two bedrock formations is to the southwest at approximately 0.27 degrees or 25 feet per mile.

The soil types found at FBH are grouped into three categories (bottomland, terrace, and upland) based on their physiographic location. Bottomland soil is found primarily in the northern portion of FBH along the floodplain of Fall Creek. The bottomland soil is a well-drained soil with medium- to coarse-grained texture, moderate permeability, and low runoff. Terrace soil is found primarily in the central portion of FBH on upland till plains, outwash plains, and terraces and are formed from glacial till and glacial outwash materials. The terrace soil is well-drained with moderately coarse-grained materials near the surface over moderately fine-grained material that changes abruptly to sand and gravel at 2 to 6 feet bgs. Upland soil, found near the southern and eastern boundaries of FBH, are poorly drained to well-drained soil types with

moderately fine-grained surface and subsurface materials. Upland soil slopes are generally in the 0 to 2 percent range; however, some upland soil slopes exceed 25 percent. These steeper slopes have a high potential for erosion and place severe limitations on the use of these areas (SAIC 1998).

2.6 HYDROGEOLOGY

The unconsolidated till at FBH is primarily fine grained (some sand and gravel in a clay/silt matrix) and tends to limit groundwater movement. Within the fine-grained till units are discontinuous coarse-grained layers. These coarse-grained layers, predominantly sand or gravel, act as aquifers within the area. All coarse-grained layers within the shallow till unit are identified as the shallow aquifer, all coarse-grained layers in the middle till unit are identified as the middle aquifer, and the sand and gravel layer in the deep till unit is identified as the Fall Creek aquifer. In 1998, the U.S. Geological Survey (USGS) measured groundwater levels from a network of 24 monitoring wells over a wide geographic range. Depths to water ranged from 2.65 to 25.02 feet below top of casing (btoc) in the shallow aquifer, 9.96 to 45.22 feet btoc in the middle aquifer, and 72.71 to 98.49 feet btoc in the Fall Creek aquifer (USGS 1999).

Groundwater in the vicinity of FBH that is suitable as a drinking water supply is obtained both from the deep, unconsolidated sand and gravel deposits and the underlying bedrock. The primary groundwater flow direction within these formations is northwest toward Fall Creek (Figure 2-2). However, groundwater in the northern portion of FBH flows from the relatively higher water level area at Geist Reservoir, located to the northeast of FBH, toward Fall Creek.

A bedrock aquifer lies just beneath the glacial-outwash aquifer at an average depth of 170 to 250 feet bgs. Wherever the bedrock aquifer system occurs, the highest yield of water usually occurs within the first 100 feet of bedrock. Due to the sand and gravel lenses that overlie the bedrock aquifer, springs and seeps are common throughout FBH (SAIC 1998).

2.7 SURFACE WATER HYDROLOGY

FBH lies primarily in the Lower Fall Creek Watershed (CBBEL 2009). Surface drainage from FBH is primarily to the northwest, ultimately entering Fall Creek. Four major streams (Fall Creek, Lawrence Creek, Mud Creek, and Indian Creek) and three intermittent streams (Camp Creek, Fort Branch, and Schoen Creek) constitute the surface drainage system. Stormwater runoff from FBH is discharged to these streams via storm sewers and/or overland flow. Three reservoirs (Delaware Lake, New Lake, and Duck Pond) have been constructed at the former facility. These three reservoirs are stocked with fish and are designated as fishing and recreational areas. Geist Reservoir stores supplies of emergency drinking water to the city of Indianapolis and surrounding communities and is located approximately 1.5 miles upstream of FBH (SAIC 1998). The surface water features at FBH are presented in Figure 2-1.

2.8 WATER USAGE

Two well field protection areas (WFPAs), the Geist WFPA and the Lawrence WFPA, are located in the northern and southwestern portions of FBH, respectively (CBBEL 2009). Two public water supply systems, the Indianapolis Water Company (now Citizens Energy Group) and the City of Lawrence Water Company, draw their drinking water from the aquifers that underlie FBH (SAIC 1998). Citizens Energy Group withdraws its water supply from White River, Fall Creek, Eagle Creek Reservoir, and six well fields located along Fall Creek, including the Lawrence and Geist Well Fields (The Indianapolis Public Library 2021). The city of Lawrence withdraws its drinking water from well fields that yield water from both the glacial till and bedrock aquifers (SAIC 1998).

Supply wells drilled into the thick alluvial and glacial outwash material along Fall Creek are the best producers, with well yields up to 500 gallons per minute. Water levels in wells completed in the glacial till

aquifer range from 13 to 21 feet bgs, and water levels in wells completed in the bedrock aquifer range from 103 to 134 feet bgs (SAIC 1998).

The Environmental Data Resources, Inc. (EDR) report identified 100 well records located within 1 mile of FBH, which include monitoring wells or methane monitoring wells associated with landfills (EDR 2021). Data in the EDR report were verified using the Indiana DNR Water Well Record Database (Indiana DNR 2021). Only 49 wells were reported in the Indiana DNR dataset; however, methane wells and monitoring wells associated with the Army-owned sanitary landfill located on FBH were not reported. The records reviews and related activities did not identify residential/private wells in the area. Additional verification may be required to confirm that no residential wells exist on-post or downgradient from FBH. Multiple public water supply wells were identified in the area of FBH, as described below:

- Three public water supply wells are located in the northeastern portion of FBH and are used for public water supply by the city of Lawrence. These three wells were registered with the State of Indiana as significant water withdrawal facilities in 1986, prior to the closure and transfer of FBH. FBH transferred these potable supply wells to the city of Lawrence upon closure in 1995.
- Eleven public water supply wells are located to the northeast (offsite) of FBH and are used for public water supply by the city of Lawrence and Citizens Energy Group. These 11 wells were registered with the State of Indiana as significant water withdrawal facilities in the late 1980s and early 1990s.
- Four public water supply wells are located to the southwest (offsite) of FBH and are used for public water supply by the city of Lawrence. These four wells were registered by the city of Lawrence in 1984 as significant water withdrawal facilities.
- One well in the southeastern portion of FBH and three surface water intakes in Delaware Lake in the north-central portion of FBH are used for irrigation by the Fort Golf Course. These wells/intakes were registered as significant water withdrawal facilities in 1986.

2.9 ECOLOGICAL PROFILE

Environmentally sensitive areas at FBH include various wetlands, habitat areas for the endangered Indiana bat (*Myotis sodalis*), several species of state-listed endangered species, sites of archaeological investigations, historically significant buildings, and the site of a private cemetery (U.S. Army 2020).

Approximately 1,069 acres at FBH are covered by woodland (USAEC 1994). Dominant species of trees in the woodlands include red oak (*Quercus rubra*), green ash (*Fraxinus pennsylvanica*), sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), black walnut (*Juglans nigra*), and cottonwood (*Populus* spp.). Developed areas are covered with lawn grasses and various ornamental and shade trees, including tulip (*Liriodendron tulipifera*), sweet gum (*Liquidambar* spp.), Ohio buckeye (*Aesculus glabra*), and several varieties of crabapple trees. Freshwater forested shrub wetlands are present along Fall Creek and the southern end of New Lake (NWI 2023). The three man-made reservoirs (Delaware Lake, New Lake, and Duck Pond) are open water wetlands (USAEC 1994).

Primary game species at FBH include the fox squirrel (*Sciurus niger*), whitetail deer (*Odocoileus virginianus*), bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaida macroura*). FBH contains significant parcels of floodplain and upland forest tasks and is considered an important bird area. Summer counts and surveys for breeding birds often exceed 80 species (Audubon 2023). Common species of birds include the American Robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), Carolina chickadee (*Poecile carolinensis*), and red-bellied woodpecker (*Melanerpes carolinus*). Birds that are commonly seen in the riparian area include the wood thrush (*Hylocichla mustelina*), cerulean warbler (*Dendroica cerulea*), prothonotary warbler (*Protonotaria citrea*), Acadian flycatcher (*Empidonax wrightii*), and Louisiana waterthrush (*Parkesia motacilla*) (Audubon 2023). In addition, the riparian habitat supports

a significant great blue heron (*Ardea herodias*) rookery (Hankins 2022). Game fish found in the man-made lakes include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), crappie (*Pomoxis annularis*), bullhead (*Ameiurus* spp.), and trout (*Salvelinus namaycush*) (USAEC 1994).

The U.S. Fish and Wildlife Service Environmental Conservation Online System Information for Planning and Consultation (IPaC) tool identified two federally listed threatened and endangered (T&E) bat species as potentially occurring on or near FBH. These species include the Indiana bat (*M. sodalis*) and the northern long eared bat (*Myotis septentrionalis*). The T&E candidate species, the monarch butterfly (*Danaus plexippus*), was also identified by IPaC as potentially occurring at FBH (USFWS 2023). Summer nursery roosts of the Indiana bat using the undeveloped forests areas of FBH have been identified (CDM 2003). In addition, the host plant of the monarch butterfly, milkweed, is present at FBH.

Eleven migratory birds of particular concern are identified by the iPaC tool as potentially occurring on or near FBH. These birds include species such as the cerulean warbler (*D. cerula*), bald eagle (*Haliaeetus leucocephalus*), black-billed cuckoo (*Coccyzus erythropthalmus*), red-headed woodpecker (*Melanerpes erythrocephalus*), and lesser yellowlegs (*Tringa flavipes*) (USFWS 2023).

2.10 CLIMATE

The average temperature at FBH is 50.5°F, which is slightly lower than the Indiana average temperature of 51.8°F and the national average temperature of 54.5°F. The annual rainfall amount is 40.28 inches with 75.94 days of 0.1 inches or more of precipitation. USGS estimates annual aquifer recharge in the vicinity of FBH ranges from approximately 3.5 to 6.5 inches per year (IGS 2021). The annual snowfall amount is 23.43 inches with 21.54 days of 1 inch or more of snow. Average wind speed for the area is 16.97 miles per hour (USA.com 2021).

3. FIELD INVESTIGATION ACTIVITIES

This section provides field procedures followed during the implementation of the SI (40 CFR §300.420(c)(4)(i)). The principal guidance documents used for the FBH SI were consistent with the requirements presented in the *Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances* (U.S. Army 2018).

3.1 SITE INSPECTION DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) were developed to define the problem at the AOPIs, identify the necessary decisions, specify decision-making rules and the level of confidence necessary to resolve the problem, identify the number of samples necessary to support the decision, and obtain agreement from the decision makers before the sampling program was initiated. The FBH sample locations were determined based on current site conditions (i.e., groundwater flow direction), presence of site media (e.g., sediment and surface water may not be sampled at a given site), historical data (e.g., suspected location of PFAS release), and historical activities (e.g., remedial activities, disposal of potentially contaminated materials). The project stakeholders concurred that selected sampling schemes would be representative of site conditions prior to initiation of field investigation activities. The field investigation at FBH was conducted in accordance with the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). The field activities employed to execute the Programmatic UFP-QAPP and FBH UFP-QAPP Addendum, including any variances or deviations, are described below.

3.2 SAMPLE DESIGN AND RATIONALE

Six AOPIs were investigated during the FBH SI to determine the presence or absence of PFAS in the environment. Information inputs from the preliminary CSMs presented on Worksheet #10 of the FBH UFP-QAPP Addendum (Leidos 2022b) are the basis for sample design at each AOPI. All samples were analyzed for the Target PFAS list of perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) (also known as GenX).

The general approach for determining the presence or absence of PFAS at an AOPI consisted of collection of two direct-push technology (DPT) groundwater samples, one each within and downgradient from the AOPI; collection of three soil samples from three soil borings; and one co-located surface water and sediment sample, if these media were present. Due to the limited historical information on groundwater flow direction at the Fire Station No. 1 AOPI, temporary monitoring wells were installed for groundwater sample collection and water level measurements to collect additional data on groundwater flow.

Each location that was sampled, with a unique set of coordinates, was assigned a specific site location: FBH-XXX-##.

Where:

- XXX = abbreviation for the AOPI being sampled
- ## = the sequential number of each sample location within the AOPI.

Each sample that was collected received a unique sample number, related to the site identifier (ID) above, in the format of FHXXX##-ZZzz.

Where:

- XXX = abbreviation for the AOPI being sampled
- ## = the sequential number of each sample location within the AOPI

- ZZ = sample media (i.e., GW = groundwater from DPT location, TW = groundwater from temporary monitoring well, SS = surface soil, SB = subsurface soil, SW = surface water, SD = sediment)
- zz = the sequence number for the sample at the location.

QA/QC samples were denoted according to the sample type. Rinsate blanks, field duplicates, and matrix spike (MS) and matrix spike duplicate (MSD) samples were denoted by appending "RB," "FD," "MS," and "MSD," respectively, to the parent sample ID. Field blanks and potable/source water blanks were named using the format of FBH-YYyy.

Where:

- YY = FB (field blank) or SRC (source blank)
- yy = sequential number of each type of blank sample collected.

3.3 FIELD INVESTIGATION ACTIVITIES

SI field activities were conducted from August 22 to August 30, 2022. The locations and methods of sample collection during the SI are described in the following sections. Sampling procedures adhered to the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b), with relevant information summarized below.

Sampling activities at FBH included collecting surface and subsurface soil samples from soil borings, installing temporary groundwater monitoring wells, conducting one round of groundwater sampling from the DPT locations and temporary monitoring wells, and collecting sediment and surface water samples where these media were present. Samples were analyzed for 26 PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) procedures compliant with DoD Quality Systems Manual (QSM) Version 5.4, Table B-15 (DoD 2021) to determine the presence of absence of Target PFAS. Sixty-nine samples were collected among the 6 AOPIs, including 10 DPT groundwater samples, 3 temporary monitoring well groundwater samples, 17 surface soil samples, 34 subsurface soil samples, 2 surface water samples, and 3 sediment samples. A breakdown of samples collected at each AOPI is provided in Table 3-1. Prior to beginning sampling, site reconnaissance and utility clearance were performed. Sampling was completed at one AOPI before moving to the next AOPI when feasible. Any variances in sampling procedure, such as moving a location or sample point elimination, were discussed with the project team and communicated in daily field summary emails (Appendix A). Field procedures and any variances are discussed in the following sections. Photographs of SI field activities are provided in Appendix B.

Table 3-1. FBH AOPI SI Sample Collection

AOPI Name	Soil Samples	Groundwater Samples	Surface Water Samples	Sediment Samples
West Landfill FTA	3 SS / 6 SB	2	1	2
Building 810 FTA	3 SS / 6 SB	2	0	0
Building 33 Gas Station	3 SS / 6 SB	2	0	0
Fire Station No. 1	3 SS / 6 SB	3	1	1
Fire Station No. 2	2 SS / 4 SB	2	0	0
Fire Station No. 2 FTA	3 SS / 6 SB	2	0	0
Total	**17 SS / 34 SB**	**13**	**2**	**3**

SS = Surface soil sample
SB = Subsurface soil sample

3.4 FIELD PROCEDURES

The following sections describe the field activities and procedures for utility clearance, bulk source water sampling, soil boring installation and abandonment, sampling for each medium, equipment calibration, and

location survey. Specific details regarding each of these activities are documented on Task Team Activity Log Sheets that are provided in Appendix C.

Because many materials routinely used during environmental investigations can potentially contain PFAS, the field crew conducted SI activities in accordance with the PFAS sampling standard operating procedure (SOP) in Appendix A of the Programmatic UFP-QAPP (Leidos 2022a). Procedures include requirements for equipment, containers, handling, and sampling, including PFAS-specific requirements, to ensure that sample contamination does not occur during collection and transport.

3.4.1 Utility Clearance

Prior to initiating intrusive activities, the field manager coordinated underground utility clearances for the six AOPIs through Army Reserve Enclave Civil Engineering and Indiana811 "Call Before You Dig." As part of the utility clearance process, individual utility companies were consulted (as needed), and each area was visually inspected to verify that utilities had been marked. The field manager looked for signs of unidentified utilities (including overhead utilities) and completed a Subsurface Clearance Checklist prior to initiating intrusive operations. Prior to conducting powered drilling within 25 feet of known or suspected subsurface utilities, the boreholes were excavated using a low-impact technique (i.e., hand auger) to a minimum of 5 feet bgs. Geophysical surveys were also conducted to assist in identifying and avoiding underground utilities.

3.4.2 Bulk Source Water Sampling

Prior to beginning work, three bulk source water samples (FBH-SRC-01, FBH-SRC-02, and FBH-SRC-03) were collected for PFAS analysis to determine if the source water was PFAS-free and could be used for drilling and decontamination. Two locations were sampled onsite from the city of Lawrence municipal water supply: an Army Reserve spigot and a fire hydrant. One location offsite was sampled from Indiana America Water, which had published PFAS detections in 2021. Water sources were purged for a minimum of 1 minute prior to filling laboratory-supplied Trizma®-preserved high-density polyethylene (HDPE) bottles. Detectable concentrations of multiple PFAS were detected in all three samples.

Treated and verified PFAS-free water was brought from offsite in an HDPE tote for implementation of the SI and was used as a decontamination water source during field sampling.

3.4.3 Soil Boring Installation and Sampling

All soil samples were collected in accordance with the procedures outlined in the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). QC samples, including, duplicates, rinsate blanks, and MS/MSDs, were also collected.

Soil samples were collected in disposable, PFAS-free Geoprobe® acetate liners. If necessary for utility clearance, the top 5 feet of a soil boring were collected with a decontaminated stainless steel hand auger. Each soil core was logged for lithology in accordance with U.S. Army Corps of Engineers (USACE) guidance (ASTM International D2488 [2017]) and recorded on a soil boring log (boring logs are provided in Appendix D). All soil sample intervals were homogenized in disposable HDPE bags prior to placing the soil into laboratory supplied HDPE sample bottles. Sample bottles were labeled and sealed in zip-lock bags and placed on wet ice for cooling to ≤6°C. Additional details on protocols for obtaining soil samples are outlined on Worksheet #18 and the Leidos SOP "Soil Sampling" provided in the Programmatic UFP-QAPP (Leidos 2022a).

Surface soil samples were collected from the 0- to 1-foot bgs interval. Surface soil samples were not collected from soil borings located in gravel, asphalt, or concrete unless native soil was identified below

the material in sufficient volume for collection of an analytical sample. Surface soil sample depths did not exceed 1 foot bgs.

A maximum of two subsurface soil samples were collected from each soil boring. During the advancement of the soil borings, continuous soil cores were collected for recording lithology and documenting visual observations. Subsurface soil samples were collected as grab samples from 2-foot intervals, and the interval from which the sample was collected was recorded on the boring log. Samples for laboratory analysis were biased toward organic-rich zones, as PFAS may sorb to organics. If evidence of discernibly organic material was not observed, the first subsurface soil sample was collected from the central interval within the soil boring. A second subsurface soil sample was collected immediately above the water table to evaluate the potential for leaching. In the event groundwater or bedrock was encountered at less than 5 feet bgs, only one subsurface soil sample was collected (immediately above the water table).

Soil borings were abandoned following sample collection by backfilling the borehole with bentonite chips. Bentonite chips were hydrated using PFAS-free water. Surface restoration matched the surrounding surface (e.g., concrete or grass).

3.4.4 Temporary Monitoring Well Installation and Sampling

Temporary monitoring well installations were performed using DPT drill rigs and supporting equipment. Three temporary wells were installed at the Fire Station No. 1 AOPI to collect groundwater samples and groundwater elevation data to evaluate groundwater flow direction. Temporary wells were installed directly by inserting a polyvinyl chloride (PVC) screen and riser directly into the DPT soil boring through the drilling rods. Temporary monitoring wells were composed of new, 1-inch-diameter, schedule 40 PVC with a 5-foot screened section or stainless steel with a 3-foot screened section. The construction materials were supplied new from the manufacturer and delivered by the subcontracted drilling company. All PVC screens, casings, and fittings conform to National Sanitation Foundation/American National Standards Institute Standard 14 for potable water usage. The screened section was set at a depth to intercept the water table. Filter packs were not installed.

Static water level measurements were collected to the nearest 0.01 foot. A groundwater sample was collected as a grab sample with a peristaltic pump when sufficient water entered the well. QC samples, including equipment blanks, duplicates, and MS/MSDs were also collected. Samples were collected in laboratory-supplied HDPE bottles. Sample bottles were labeled, sealed in zip-lock bags, and placed on wet ice for cooling to ≤6°C. Sampling activities were recorded on the Task Team Activity Log Sheets completed daily and compiled in Appendix C.

All temporary monitoring wells were abandoned in accordance with the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). Temporary monitoring wells were abandoned by removing the PVC or stainless steel casing and backfilling the borehole from the bottom to the surface with bentonite pellets, chips, or slurry. Surface completion matched the surrounding surface (e.g., concrete, asphalt, grass).

3.4.5 DPT Groundwater Sampling

General protocols for obtaining DPT groundwater samples are outlined in USEPA's Groundwater Sampling and Monitoring with Direct Push Technologies (USEPA 2005). All DPT groundwater samples were collected in accordance with the procedures outlined in the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). QC samples, including equipment blanks, duplicates, and MS/MSDs, were also collected.

Grab groundwater samples were collected using a peristaltic pump and tubing assembly inserted through the DPT stainless steel 3-foot screen sampler. No PFAS-containing materials were used to collect DPT

groundwater samples. New tubing was used for each DPT groundwater sampling location, and the stainless steel screen sampler was decontaminated between each sample location. Samples were collected in laboratory-supplied HDPE bottles. All samples were collected and handled while wearing clean, non-powdered, disposable nitrile gloves. Sample bottles were labeled and sealed in zip-lock bags and placed on wet ice for cooling to ≤6°C. New, clean nitrile gloves were donned prior to each new sample collection on the Task Team Activity Log Sheets completed daily and compiled in Appendix C. If sufficient volume was present, water quality parameters (pH, temperature, conductivity, dissolved oxygen [DO], oxidation-reduction potential [ORP], and turbidity) was measured and recorded. In addition, observations of the physical appearance and odor (if any) of the purge water (e.g., organic or sulfide odors, black precipitates) was recorded.

3.4.6 Surface Water and Sediment Sampling

All sediment/surface water samples were collected in accordance with the procedures outlined in the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). QC samples, including equipment blanks, duplicates, and MS/MSDs, were also collected.

Surface water samples were collected directly from the selected locations by submerging the laboratory-supplied HDPE sample bottles just below the water surface, being careful to avoid sediment agitation. Following sample collection, a calibrated Horiba Model U-52 was used to collect water quality parameters (i.e., temperature, specific conductivity, pH, DO, turbidity, and ORP).

Following the collection of surface water samples, sediment samples were collected directly from the selected locations from 0 to 6 inches bgs using a decontaminated stainless steel hand auger or scoop. Sediment sampling was performed after surface water sampling to avoid sediment in the surface water sample. Sediment samples were homogenized in disposable HDPE bags prior to placing the sediment into laboratory-supplied HDPE sample containers. Sample containers were labeled, sealed in zip-lock bags, and placed on wet ice for cooling to ≤6°C. Observation and measurements taken during surface water and sediment sampling were recorded on the sediment/surface water sampling forms provided in Appendix E.

3.4.7 Equipment Calibration

A water quality instrument (Horiba Model U-52) used during groundwater sampling was calibrated daily per Worksheet #24 of the Programmatic UFP-QAPP (Leidos 2022a) against known standards in accordance with the manufacturer's instructions and documented on the calibration logs provided in Appendix E.

3.4.8 Location Survey

Environmental sample locations and notable site features were located and mapped using a portable Trimble global positioning system (GPS) unit capable of achieving ± 3 feet accurate results. GPS data were transferred for use in ArcGIS mapping applications during data evaluation and reporting.

Temporary wells installed to collect groundwater elevation data were surveyed using a rotary laser and tripod placed on a flat surface. Elevations were measured to the nearest ±0.01 foot vertically and recorded on a Task Team Activity Log Sheet (Appendix C).

3.4.9 Deviations and Field Change Requests

No instances of field modification impacting project DQOs were encountered during the SI fieldwork. The following two differences from the planned sample quantities and locations in Tables 17-1 and 18-1, respectively, of the FBH UFP-QAPP Addendum (Leidos 2022b) were observed during field activities and summarized for USACE in daily field notes:

- A surface soil sample was not able to be collected at location FBH-FS2-02 due to the presence of pavement and gravel at the ground surface. While this was a change from the planned sample

quantities, it is not a deviation from the procedures in the FBH UFP-QAPP Addendum (Leidos 2022b), which specified samples of pavement and saturated soils would not be collected. Conversely, a surface soil sample was able to be collected at location FBH-FS2-01, as the boring was installed in soil, not concrete as anticipated.

- Only one subsurface soil sample was collected at locations FBH-FS2-01 and FBH-FS2-02. A second subsurface soil sample was not able to be collected at any of these locations, as groundwater was encountered at a depth at or less than 5 feet bgs. While this was a change from the planned sample quantities, it is not a deviation from the procedures in the FBH UFP-QAPP Addendum (Leidos 2022b), which specified that if groundwater was encountered at less than 5 feet bgs, only one subsurface soil sample would be collected (immediately above the water table).
- At sample location FBH-B33-03, limestone gravel fill was encountered from the surface to a depth of 5 feet bgs. The first subsurface soil sample was collected from a 1-foot interval from 5 to 6 feet bgs, and the second sample was collected from the interval above the water table from 6 to 8 feet bgs.
- No surface water sample was able to be collected at location FBH-WFT-05, north of the West Landfill FTA AOPI where the drainage feature was observed, because the location was dry.
- The temporary well that was planned at location FBH-FS1-02 was relocated to FBH-FS1-04, as a water-bearing zone was not encountered at FBH-FS1-02 before refusal at less than 20 feet bgs.
- Some sample locations were minorly modified because of utility clearance and access limitations. The locations were generally shifted 5 to 10 feet and no more than 25 feet. The adjusted sample locations are shown in the figures in Section 6.

3.5 DECONTAMINATION PROCEDURES

To ensure that chemical analysis results reflected the actual concentrations at sample locations, the non-dedicated, reusable equipment used in sampling activities was rigorously cleaned and decontaminated between sample locations in accordance with the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). The non-disposable sampling equipment used to conduct sampling activities (e.g., drilling rods, water level meters) was decontaminated before sampling activities began, between locations, between sampling events, and after sampling activities were completed. Decontamination guidelines followed the direction provided in the March 2020 Interstate Technology & Regulatory Council fact sheet that discusses site characterization considerations (ITRC 2020) and PFAS decontamination procedures described by the Michigan Department of Environmental Quality (MDEQ 2018). Wastewater generated from decontamination activities was handled as IDW.

The decontamination process included an initial scrub with a laboratory-grade, phosphate-free, biodegradable detergent (e.g., Liquinox®) to remove particulate matter and surface film. Following this scrub, the equipment was then rinsed twice in separate bins containing bulk source water. Decontaminated sampling equipment was wrapped in thin sheets of HDPE to prevent subsequent contamination if being stored and not used immediately.

Decontamination of downhole drill rig equipment was completed prior to use, between locations, and after final use before departing the site. Non-dedicated tools and rods were scrubbed in a temporary containment structure with bulk source water/biodegradable detergent (e.g., Liquinox®). Equipment was scrubbed using polyethylene or PVC brushes to remove particulates and then rinsed with PFAS-free water.

3.6 DISPOSITION OF FIELD INVESTIGATION-DERIVED WASTE

The IDW generated during the SI at FBH included solids (soil, sediment, temporary well construction materials, and Geoprobe® acetate liners) and liquids (decontamination rinse water). These materials were

managed in accordance with the IDW Management Plan provided in Appendix B of the FBH UFP-QAPP Addendum (Leidos 2022b).

All containers used to hold any amount of IDW (including temporary containers) were properly labeled as soon as they were filled in accordance with the IDW Management Plan, provided in Appendix B of the FBH UFP-QAPP Addendum (Leidos 2022b). Liquid wastes were contained in aboveground tanks, and solid wastes were ultimately placed in United Nations-approved, 55-gallon drums for storage, transport, and disposal. Permanent labels for the drums included a unique container number, a description of the contents (i.e., soil or wastewater), the fill date, the source location, the generator's name (i.e., FBH), and a telephone number for the generator's point of contact (i.e., the FBH BRAC Environmental Coordinator). Each bucket or carboy used to temporarily store liquid IDW was marked "Nonpotable Water" or "Decontamination Waste" to comply with requirements of the IDW Management Plan included in Appendix B of the FBH UFP-QAPP Addendum (Leidos 2022b) and Occupational Safety and Health Administration hazard communication standards.

The contents of the solid IDW drums were sampled for characterization and profiling. A solid waste sample was composited by collecting aliquots from the solid waste drums using a decontaminated stainless steel hand auger. The solids were homogenized in an HDPE plastic bag and then placed into laboratory-supplied sample containers. For drums containing liquid IDW (i.e., wastewater), a composite sample was collected using a peristaltic pump and new HDPE tubing and pumping directly into sample bottles. It was determined that toxicity characteristic leaching procedure (TCLP) pesticides and TCLP herbicides would be of no concern and the potential existed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. Therefore, both solid and liquid IDW were analyzed for TCLP VOCs, TCLP SVOCs, and TCLP metals. In addition, the certified waste hauler required the analysis of polychlorinated biphenyls (PCBs), pH, flashpoint, cyanide, sulfide, and paint filter test (solid IDW only).

No IDW from FBH was characterized as hazardous. Containerized waste was disposed of in accordance with applicable state and Federal Resource Conservation and Recovery Act regulations. The licensed and certified waste hauler (US Ecology) removed the drums containing IDW waste from FBH on January 10, 2023, for disposal at US Ecology's Michigan Disposal Waste Treatment Plant (liquid IDW) and Wayne Disposal, Inc. (solid IDW), both located at 49350 N. I-94 Service Dr, Bellville, Michigan, 48111. Soiled personal protective equipment (PPE) was bagged and disposed of as municipal waste. Copies of the waste manifests and certificates of disposal are provided in Appendix F.

4. DATA ANALYSIS AND QUALITY ASSURANCE SUMMARY

This section summarizes the QA/QC program and laboratory chemical analysis program implemented as part of the FBH SI field activities (40 CFR §300.420(c)(4)). Additional information on these procedures is presented in the FBH UFP-QAPP Addendum (Leidos 2022b).

Merit Laboratory, Inc., located in East Lansing, Michigan, was the analytical laboratory under contract for the analysis of PFAS during the FBH SI field activities. Sections 4.1 through 4.4 summarize sample handling procedures, laboratory analytical methods, data QA/QC, data reporting and validation, and sample QA/QC. A QA summary of the analytical data is presented in Section 4.5. Appendix G provides the DUA that details the quality and usability of the SI analytical data and the process performed to evaluate the data for compliance with established QC criteria.

4.1 SAMPLE HANDLING PROCEDURES

A critical aspect of sample collection and analysis protocols is the maintenance of strict chain-of-custody (CoC) procedures, which include tracking and documentation during sample collection, shipment, and laboratory processing. The Sample Manager was responsible for sample custody until the samples were properly packaged, documented, and released to the commercial carrier. The laboratory was responsible for sample custody thereafter in accordance with approved procedures.

4.1.1 Chain-of-Custody Record

CoC forms were used to document the traceability and integrity of all samples from the point of collection to the laboratory by maintaining a record of sample collection, shipment, and receipt by the laboratory. A CoC form was filled out and was signed and dated by each sample custodian.

Shipping containers were sealed with custody tape. Sealed coolers were transported to the commercial carrier for overnight delivery to the laboratory. The air bill number, written on the CoC form, acted as the custody documentation while the sealed coolers were in the possession of the commercial carrier. The CoC form was placed in a resealable plastic bag and taped to the inside lid of the cooler.

When the possession of samples was transferred, the individual relinquishing the samples and the individual receiving the samples signed, dated, and noted the time of transferal on the CoC. This record represents the official documentation for all transferal of sample custody until the samples arrived at the laboratory.

4.1.2 Laboratory Sample Receipt

All samples received by the Laboratory Sample Custodian or designee were checked for proper preservation (e.g., pH, temperature of coolant blank above 2°C or below 6°C); integrity (e.g., leaking, broken bottles); and proper, complete, and accurate documentation and ID of the samples. The temperature of the coolant blank was noted. No insufficiencies and/or discrepancies were noted.

Samples received at the laboratory were logged into the laboratory computer database. Initial entries included field sample number, date of receipt, and analyses required. As samples were received, they were assigned a laboratory sample ID number. The sample custodian labeled each container with its sample ID number, and the samples then were transferred to their designated storage areas.

Samples received by the laboratory were considered to be physical evidence and were handled according to USEPA procedural safeguards. In addition, all data generated from the sample analyses, including all associated calibrations, method blanks, and other supporting QC analyses, were identified with the project name, project number, and sample delivery group (SDG) designation. All data were maintained under the proper custody. The laboratory provided complete security for samples, analyses, and data.

4.2 LABORATORY ANALYTICAL METHODS

The chemical analysis program for the FBH SI conforms to the analytical requirements presented in the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b) for the chemical analysis of field investigation samples. All samples were analyzed for PFAS using LC/MS/MS procedures compliant with DoD QSM Version 5.4, Table B-15 (DoD 2021) and the laboratory SOP.

4.3 DATA QUALITY ASSURANCE/QUALITY CONTROL

This section presents the QA/QC procedures applied during sampling and laboratory analysis. This discussion includes laboratory QA/QC (Section 4.3.1) and field QA/QC (Section 4.3.2) procedures. Details on the results of the QC samples (field and laboratory) are presented in the DUA included in Appendix G.

4.3.1 Laboratory Quality Assurance/Quality Control

Samples were analyzed for PFAS using LC/MS/MS in compliance with DoD QSM Version 5.4, Table B-15 (DoD 2021). QC checks included holding times, method blanks, calibration standards, extracted internal standards (EISs), laboratory control samples (LCSs), MS/MSDs, and detection limits. The acceptance criteria and laboratory SOP are provided in the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b).

Method Blanks—Method blanks were used to monitor the possibility of laboratory-induced contamination by running a volume of approved reagent water through the entire analytical scheme (i.e., extraction, concentration, analysis). Blank requirements are specified in the DoD QSM Version 5.4, Table B-15 (DoD 2021) and the laboratory SOP.

Matrix Spike/Matrix Spike Duplicates—Additional sample volume was collected from select field sample locations to evaluate accuracy and precision using MS/MSD analyses. MS/MSDs are aliquots of environmental samples to which known concentrations of certain target analytes have been added before sample preparation, cleanup, and determinative procedures have been implemented (SW846 Chapter One). Accuracy was expressed as the percent recovery (%R) of each added compound. Precision was expressed as the relative percent difference (RPD) between the MS and the MSD results. MS/MSD samples were collected and analyzed at a frequency of 1 for every 20 samples of similar matrix received at the laboratory.

Laboratory Control Samples—LCSs were analyzed to evaluate the accuracy of the analysis in the absence of sample matrix impacts. A known concentration of select compounds were added to the LCS. The spiked samples were analyzed in the same manner as the environmental samples. Accuracy was expressed as the %R of each added compound. An LCS was analyzed with each SDG.

4.3.2 Field Quality Assurance/Quality Control

Table 4-1 summarizes the frequency of field QC samples that were collected during the FBH field investigation. The requirements for field QC were established on Worksheet #20 of the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b).

Table 4-1. Frequency of Field QC Samples for FBH Field Investigation

QC Sample	Frequency
Field Blank	1 per water source used as final rinse of equipment
Source Water Blank	1 per bulk rinse water source
Equipment Rinsate Blank	1 for every 10 or fewer investigative samples
Field Duplicate	1 for every 10 or fewer investigative samples
Reagent Blank	1 per drinking water sampling event; none required for this event
MS/MSD	1 per every 20 or fewer investigative samples

4.4 DATA REPORTING AND VALIDATION

The Leidos QA Manager or designee initiated a validation of the analytical data packages. One hundred percent of the data were validated using objective criteria taken from the requirements of the Programmatic UFP-QAPP (Leidos 2022a) and DoD QSM Version 5.4 (DoD 2021) and qualified in accordance with the DoD Data Validation Guidelines Module 3 (DoD 2020) and the revised table for sample qualification in the presence of blank contamination (DoD 2022b).

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, and a data validation report, as previously described, was prepared. In addition, 10 percent of the data were validated in accordance with DoD QSM Stage 3 guidelines, and analytical results were checked and recalculated from raw data.

Equipment rinsate blanks and field blanks were associated with the corresponding environmental samples. These blanks were evaluated following the same criteria as method blanks, and the associated environmental samples were appropriately qualified as needed. After the data validation for the project was completed, a project DUA (Appendix G) was prepared.

4.5 QUALITY ASSURANCE SUMMARY

A comprehensive QA/QC program was implemented during the sampling event at FBH in August 2022. Samples and associated QC samples (e.g., field duplicates, equipment rinsate blanks, source water blanks, MSs, MSDs) were collected and analyzed for PFAS using methods specified in the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b). Consistent with the data quality requirements established in the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b) and DQOs, all sample data and associated QC data were evaluated during the review and validation process. Individual sample results were qualified, as necessary, to designate usability of the data toward meeting project objectives. Data qualifiers were applied based on deviations from the measurement performance criteria in the Programmatic UFP-QAPP (Leidos 2022a). Results of the validation are found in the DUA (Appendix G). The analyses associated with each data quality indicator are summarized below, with details of the results of the QC checks provided in the DUA (Appendix G).

4.5.1 Precision

Precision was evaluated by the analysis of MS/MSDs and field duplicate samples and the RPD between the duplicate spike results.

4.5.2 Accuracy

Bias introduced due to blank contamination (in method, instrument, or field blanks) and any impact on accuracy were evaluated during validation. Analytical accuracy was measured through the use of LCSs, MS/MSDs, isotope dilution standards, initial and continuing calibration, and target compound quantitation requirements.

4.5.3 Sensitivity

Sensitivity requirements were evaluated against minimum required limits of quantitation (LOQs) and limits of detection (LODs) in the Programmatic UFP-QAPP (Leidos 2022a).

4.5.4 Representativeness

Representativeness was satisfied by ensuring that the Programmatic UFP-QAPP (Leidos 2022a) and FBH UFP-QAPP Addendum (Leidos 2022b) protocols were followed, appropriate sampling techniques were used, established analytical procedures were implemented, and analytical holding times of the samples were not exceeded.

4.5.5 Comparability

Comparability was achieved by using consistent, documented, and UFP-QAPP-approved methods and meeting project accuracy and precision objectives.

4.5.6 Completeness

Completeness measures the amount of valid data obtained from the sampling and analysis effort. For analytical data to be usable, each data point must be validated and meet criteria without significant non-conformance. The DQOs for the FBH SI were set at 90 percent for field sampling and laboratory completeness. Field sampling completeness was 94.7 percent due to three soil samples and one surface water sample that could not be collected for reasons consistent with the sampling protocol described in the FBH UFP-QAPP Addendum. One surface soil was not collected due to the presence of pavement at the sampling location, two subsurface soil samples were not collected because shallow groundwater was encountered, and one surface water sample was not collected because no water was present at the sampling location. Analytical completeness was impacted by 9 data points qualified as X of 2,028 total data points for primary and field duplicate samples; therefore, analytical completeness was 99.6 percent.

4.5.7 Data Usability Assessment

Data that have been qualified as estimated (J, J+, J-, UJ) during validation indicate accuracy, precision, or sensitivity QC measurements may have exceeded criteria, but the results are considered valid. Nine data points were recommended for exclusion (X) during validation; these data and the reason for exclusion were presented to the project delivery team (PDT) for evaluation (see Attachment G.1 for the Notice of Deficiency used to document the outlier data). The PDT determined data were to be rejected (R), and the results were not used during the evaluation of project objectives. None of the rejected data were for Target PFAS that are compared to SLs in this SI. All other results are usable for evaluating project objectives. The complete DUA is presented in Appendix G.

5. SITE INSPECTION SCREENING LEVELS

Detected concentrations of the Target PFAS in samples collected during this SI are compared to residential scenario SLs calculated using the USEPA RSL calculator for soil and the tap water criteria for groundwater and a target hazard quotient (HQ) of 0.1, as published in the 2022 OSD Memorandum (DoD 2022). This SI uses the SLs and a target HQ of 0.1 to evaluate the Target PFAS concentrations. These SLs (Table 5-1) are used in this SI Report to evaluate the data and determine if further investigation is warranted at each AOPI.

Table 5-1. Screening Levels from the 2022 OSD Memorandum

Chemical	Residential Tap Water HQ = 0.1 (ng/L or ppt)	Residential Soil HQ = 0.1 (µg/kg or ppb)
HFPO-DA	6	23
PFBS	601	1,900
PFHxS	39	130
PFNA	6	19
PFOA	6	19
PFOS	4	13

Note: The residential tap water SLs are used to evaluate groundwater and surface water data. The residential soil SLs are used to evaluate soil and sediment data. The surface water and sediment data are qualitatively evaluated against the SLs. Laboratory results are reported to two significant figures.

6. SITE INSPECTION RESULTS

This section presents the background, summary of analytical results, and the CSM for each AOPI at FBH where Target PFAS were detected. Sampled media and QA/QC samples were analyzed for the list of 26 PFAS specified in the Programmatic UFP-QAPP (Leidos 2022a). The sample results discussed below by AOPI focus on the six Target PFAS outlined in the 2022 OSD Memorandum (DoD 2022a): PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA. Analytical data presentation tables for all PFAS analyzed using approved methods are provided in Appendix H.

6.1 CONCEPTUAL SITE MODELS

The preliminary CSMs developed for each AOPI during the PA were further refined for each AOPI where Target PFAS were detected at concentrations greater than the LOD in soil, groundwater, surface water, or sediment. Based on the SI sample results, CSMs presented for each AOPI represent 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 CSMs evaluate ingestion, dermal contact, and inhalation exposure routes for human receptors. The exposure pathways are evaluated as complete, potentially complete, or incomplete in the CSMs presented in figures in each AOPI-specific CSM section. 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 are 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, surface water, or sediment or if SLs have been exceeded along the 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 AOPI 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 specific to Target PFAS.
- ***Incomplete*** – Human exposure pathways are considered incomplete for media where Target PFAS have not been detected at concentrations greater than the LODs.

An environmental covenant is in place at the Building 33 Gas Station AOPI restricting groundwater use, as discussed further in Section 6.4.

6.2 WEST LANDFILL FTA AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the West Landfill FTA AOPI.

6.2.1 AOPI Background

The West Landfill FTA is located to the east and upgradient of the West Landfill in the western portion of FBH. The property occupied by the West Landfill FTA is currently owned by the Army with a pending transfer to Indiana DNR.

The area of the West Landfill FTA is currently heavily shrubby and wooded. During operation of the West Landfill FTA, the site was a maintained grass and dirt field. Activities consisted of burning 10 to 20 gallons of fuel oil ignited in a large metal trough two or three times per training period with three periods annually. The remaining fuel was recorded to have been allowed to burn off (Weston 1992). It is unknown how the fuel was extinguished; water and/or foam may have been used for fire training activities.

Documented dates of operation are unknown. However, based on the aerial photographic analysis, the area shown in the 1992 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) Enhanced PA (Weston 1992) correlates with an area on the eastern side of the West Landfill that appears to be cleared of brush and trees from 1941 until the mid-1970s.

No sampling has been previously documented to have been performed at the West Landfill FTA.

6.2.2 SI Sampling and Results

Soil, groundwater, surface water, and sediment samples were collected from the West Landfill FTA AOPI at the following locations (Figure 6-1):

- Nine soil samples and one field duplicate were collected from three soil borings (locations FBH-WFT-02, FBH-WFT-03, and FBH-WFT-04). A surface soil sample and two subsurface soil samples were collected from each boring.
- Two groundwater samples and one field duplicate were collected from two DPT groundwater locations (FBH-WFT-01 and FBH-WFT-02).
- Co-located surface water and sediment samples and field duplicates were collected from location FBH-WFT-06 downgradient from the AOPI. A sediment sample was also collected downstream from the AOPI at location FBH-WFT-05; however, surface water could not be collected at this location because the ditch was dry.

The Target PFAS analytical results for soil, groundwater, surface water, and sediment collected at the West Landfill FTA AOPI are summarized below and presented in Table 6-1 and Figure 6-2.

6.2.2.1 Soil

PFOS, PFOA, and PFNA were detected at estimated concentrations in surface soil samples collected at locations FBH-WFT-03 and FBH-WFT-04. PFOS was also detected at an estimated concentration in the surface soil sample at location FBH-WFT-02. All Target PFAS concentrations in soil were less than the SLs. PFBS, PFHxS, and HFPO-DA were not detected at concentrations greater than the LODs.

6.2.2.2 Groundwater

PFOS and PFBS were detected in groundwater samples at estimated concentrations less than the SLs in one DPT groundwater sample and field duplicate collected at location FBH-WFT-02. PFAS, PFNA, PFHxS, and HFPO-DA were not detected at concentrations greater than the LODs in groundwater samples.

6.2.2.3 Surface Water

PFOS, PFOA, and PFHxS were detected at estimated concentrations greater than the SLs in the surface water sample and field duplicate collected at location FBH-WFT-06. PFOS was detected at an estimated concentration of 99 ng/L (98 ng/L in the field duplicate), exceeding the SL of 4 ng/L. PFOA was detected at an estimated concentration of 6.5 ng/L in the field duplicate, exceeding the SL of 6 ng/L. PFHxS was detected at an estimated concentration of 63 ng/L (62 ng/L in the field duplicate), exceeding the SL of 39 ng/L.

PFBS was detected at concentrations less than the SLs in the surface water sample and field duplicate collected at location FBH-WFT-06. PFNA and HFPO-DA were not detected at concentrations greater than the LODs in surface water.

6.2.2.4 Sediment

PFOS was detected at estimated concentrations less than the SLs from the sediment samples (and field duplicate) collected at locations FBH-WFT-05 and FBH-WFT-06. PFHxS was detected at estimated concentrations less than the SL in the sample and field duplicate collected at FBH-WFT-06. PFBS, PFOA, PFNA, and HFPO-DA were not detected at concentrations greater than the LODs in the sediment samples.

6.2.3 CSM

The West Landfill FTA AOPI is approximately 2.83 acres. The ground surface elevation of the West Landfill FTA is 830 to 835 feet above mean sea level (amsl). The area is heavy wooded and shrubby, with land steeply sloping to the west of the AOPI toward an unnamed tributary to Lawrence Creek that separates the FTA from the West Landfill. Shallow subsurface geology at the West Landfill FTA is composed of glacial till deposits with shallow groundwater between 5 and 15 feet bgs that flows to the west/northwest.

Due to the fire training activities that were conducted in the mid-1970s, the surface soil at the West Landfill FTA is the source media for potential PFAS contamination. Details regarding specific aqueous film-forming foam (AFFF) releases were not discovered during the PA through research and personnel interviews. Because the FBH Fire Department stored and used AFFF and/or fluorinated protein foams, these materials were possibly used during fire training activities. The primary release mechanism is the potential release of PFAS-containing materials to surface soils related to historical operations at the West Landfill FTA. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation, and precipitation/runoff to surface water and sediment. Surface water and sediment are present to the north and west of the West Landfill FTA AOPI.

Based on the mixed land use at the former FBH, the human receptors considered in the CSM are onsite workers with the potential to work at the AOPI, onsite residents living on the former FBH, and offsite residents living in the vicinity of the former FBH (off-post). Proposed land use at this AOPI is recreational; an on-AOPI residential pathway does not currently exist. However, onsite residents are evaluated for the potential migration (i.e., groundwater and surface water) to residents on-post at the former FBH.

The soil exposure pathways for onsite workers are potentially complete because Target PFAS were detected at concentrations less than the SLs. No off-AOPI migration of soil is expected. The groundwater exposure pathways are potentially complete for all receptors because Target PFAS were detected in groundwater and the potential exists for migration. Drinking water for onsite and offsite receptors is obtained from multiple significant water withdrawal wells on FBH. Estimated concentrations of PFOS, PFOA, and PFHxS exceeded SLs downstream from surface water runoff from the West Landfill FTA AOPI (FBH-WFT-06). However, two factors support the conclusion that the concentrations of Target PFAS in surface water at this location are not a result of a release at the West Landfill FTA: 1) no concentrations of Target PFAS exceeded the SLs in soil or groundwater within the AOPI, and 2) sample location FBH-WFT-06 is located in a ditch that collects water from other areas of the site, including the West Landfill. Because of the downstream SL exceedances in surface water, the surface water and sediment pathways are considered potentially complete at the AOPI. Figure 6-3 presents the CSM for the West Landfill FTA AOPI.

6.2.4 Recommendation

Detected concentrations of Target PFAS in soil and groundwater at the West Landfill FTA AOPI were less than the SLs; therefore, further investigation is not recommended at the AOPI. Estimated concentrations of PFOS, PFOA, and PFHxS in surface water exceeded the SLs at one location downstream from the AOPI. Since a PFAS source was not identified at the AOPI, further investigation of a potential upstream source may be warranted.

Table 6-1. Target PFAS Results and Screening for the West Landfill FTA AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
FBH-WFT-02	FHWFT02-SS01	SURF	0.00-1.00	08/28/2022	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ	**0.095 J**
	FHWFT02-SB02	BORE	6.00-8.00	08/28/2022	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ
	FHWFT02-SB03	BORE	11.00-13.00	08/28/2022	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ
FBH-WFT-03	FHWFT03-SS01	SURF	0.00-1.00	08/28/2022	0.051 UJ	0.051 UJ	0.051 UJ	**0.094 J**	**0.19 J**	**0.27 J**
	FHWFT03-SS01FD	SURF	0.00-1.00 (D)	08/28/2022	0.057 UJ	0.057 UJ	0.057 UJ	**0.099 J**	**0.17 J**	**0.21 J**
	FHWFT03-SB02	BORE	8.00-10.00	08/28/2022	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ
	FHWFT03-SB03	BORE	15.00-17.00	08/28/2022	0.048 UJ	0.048 UJ	0.048 UJ	0.048 UJ	0.048 UJ	0.048 UJ
FBH-WFT-04	FHWFT04-SS01	SURF	0.00-1.00	08/28/2022	0.054 UJ	0.054 UJ	0.054 UJ	**0.089 J**	**0.079 J**	**0.23 J**
	FHWFT04-SB02	BORE	5.00-7.00	08/28/2022	0.050 UJ	0.050 UJ	0.050 UJ	0.050 UJ	0.050 UJ	0.050 UJ
	FHWFT04-SB03	BORE	9.80-11.80	08/28/2022	0.045 UJ	0.045 UJ	0.045 UJ	0.045 UJ	0.045 UJ	0.045 UJ
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
FBH-WFT-01	FHWFT01-GW01	PNCH	35.00-35.00	08/30/2022	1.6 UJ	1.6 UJ	1.6 UJ	1.6 UJ	1.6 UJ	1.6 UJ
FBH-WFT-02	FHWFT02-GW01	PNCH	19.00-19.00	08/28/2022	0.92 UJ	**5 J**	0.92 UJ	0.92 UJ	0.92 UJ	**0.98 J+**
	FHWFT02-GW01FD	PNCH	19.00-19.00	08/28/2022 (D)	0.92 UJ	**4.9 J**	0.92 UJ	0.92 UJ	0.92 UJ	**1 J+**
Surface Water				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
FBH-WFT-06	FHWFT06-SW01	SWTR	0.00-0.00	08/27/2022	0.95 UJ	**6.4 J**	**63 J+**	0.95 UJ	**6 J**	**99 J**
	FHWFT06-SW01FD	SWTR	0.00-0.00	08/27/2022 (D)	0.85 UJ	**6.6 J**	**62 J**	0.85 UJ	**6.5 J**	**98 J**
Sediment				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
FBH-WFT-05	FHWFT05-SD01	SEDI	0.00-0.50	08/27/2022	0.065 UJ	0.065 UJ	0.065 UJ	0.065 UJ	0.065 UJ	**0.39 J**
FBH-WFT-06	FHWFT06-SD01	SEDI	0.00-0.50	08/27/2022	0.054 UJ	0.054 UJ	**0.068 J**	0.054 UJ	0.054 UJ	**0.50 J**
	FHWFT06-SD01FD	SEDI	0.00-0.50 (D)	08/27/2022	0.051 UJ	0.051 UJ	**0.084 J**	0.051 UJ	0.051 UJ	**0.60 J**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
Highlighted values indicate an exceedance of the SL.
(D) = Field duplicate sample.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
J+ = The analyte was positively identified; the result is an estimated concentration and may be biased high.
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte.

6.3 BUILDING 810 FTA AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the Building 810 FTA AOPI.

6.3.1 AOPI Background

The Building 810 FTA was located adjacent to Building 810 on the southern side of Shafter Road in the northern portion of FBH. The AOPI property is part of Fort Harrison State Park owned by Indiana DNR. Shafter Road was relocated and is now farther north than when the Building 810 area was operational. The AOPI is currently a grassy field that slopes upward to the south.

Prior to use as an FTA, the area was the location of the Building 810 WWTP and the site of suspected buried lithium bromide drums that may have contained pesticides. In 1980, the WWTP was closed and the former sedimentation tank areas and other locations within the fenced area were used for fire training (HLA 1998). Exact dates of operation as an FTA are unknown; however, as the WWTP was closed in 1980, the FTA was likely active from 1980 until 1995.

Fire training exercises were conducted by igniting fuel on old car bodies or in 55-gallon drum halves partially filled with water, which were placed on top of the old treatment tanks. According to site personnel interviews conducted during the 1992 USATHAMA Enhanced PA (Weston 1992), the fuel was consumed during burning and little to no drainage of fuel from the area occurred. It is unknown how the fuel was extinguished, and water and/or foam may have been used for fire training activities.

Sampling has been previously completed at the Building 810 site as solid waste management unit FBH #11 as part of WWTP closure. Metals, VOCs, SVOCs, PCBs, pesticides, herbicides, and total petroleum hydrocarbons were detected in soil and sediment samples. Metals, VOCs, SVOCs, and pesticides were detected in groundwater samples. Two metals (sodium and lead) exceeded background concentrations in surface and subsurface soil samples, respectively. Sodium concentrations were also elevated in downgradient groundwater samples. Based on the human health risk assessment, concentrations of constituents detected at the WWTP did not pose a significant health risk, and the Army recommended no further action at the site (HLA 1998).

6.3.2 SI Sampling and Results

Groundwater and soil samples were collected from the Building 810 FTA AOPI at the following locations (Figure 6-4):

- Nine soil samples and one field duplicate were collected from three soil borings within the AOPI (FBH-810-01, FBH-810-02, and FBH-810-03), including one surface soil sample and two subsurface soil sample at each boring. Location FBH-810-01 is located in the northwestern corner of the AOPI, and FBH-810-02 and FBH-810-03 are at locations of the two former sedimentation tanks used during fire training exercises.
- DPT groundwater samples were collected from two locations: FBH-810-01 at the northwestern (downgradient) corner of the AOPI, and FBH-810-02 at the location of one of the former sedimentation tanks used during fire training exercises.

The Target PFAS analytical results for soil and groundwater at the Building 810 FTA AOPI are summarized below and presented in Table 6-2 and Figure 6-5.

6.3.2.1 Soil

PFOS, PFOA, PFNA, and PFHxS were detected at concentrations greater than the LODs in soil samples, including one exceedance of the SL for PFOS. PFOS was detected in all three surface soil samples and in

three subsurface samples at two locations (FBH-810-02 and FBH-810-03). The estimated concentration of PFOS in the sample collected from 16 to 18 feet bgs at FBH-810-02 (25 µg/kg) exceeded the SL of 13 µg/kg. PFOA was detected at estimated concentrations less than the SL in all three surface soil samples and in the four subsurface samples collected at FBH-810-02 and FBH-810-03. PFHxS was detected at estimated concentrations less than the SL in one surface soil sample (FBH-810-02) and four subsurface samples at two locations (FBH-WFT-02 and FBH-WFT-03). PFNA was detected at estimated concentrations less than the SL in the surface and subsurface soil samples at one location (FBH-WFT-02).

PFBS and HFPO-DA were not detected at concentrations greater than the LODs in soil samples.

6.3.2.2 Groundwater

PFOS, PFOA, PFNA, PFHxS, and PFBS were detected at concentrations greater than the LOD in groundwater samples, and concentrations of PFOS, PFOA, and PFNA exceeded the SLs in at least one of the two samples. Estimated PFOS concentrations exceeded the SL of 4 ng/L at FBH-810-01 (37 ng/L) and FBH-810-02 (310 ng/L). Estimated concentrations of PFOA exceeded the SL of 6 ng/L at FBH-810-01 (11 ng/L) and FBH-810-02 (24 ng/L). The estimated concentration of PFNA exceeded the SL of 6 ng/L at FBH-810-02 (6.6 ng/L) and was less than the SL at FBH-810-01. Estimated concentrations of PFHxS and PFBS were detected in both groundwater samples at concentrations less than SLs.

HFPO-DA was not detected at concentrations greater than the LODs in groundwater.

6.3.3 CSM

The Building 810 FTA AOPI is approximately 2.53 acres. The ground surface elevation of the Building 810 FTA is 755 feet amsl. The area south of the AOPI slopes steeply upward to 795 feet amsl. The area is a grass field that is part of Fort Harrison State Park.

Shallow subsurface geology at the Building 810 FTA AOPI is composed of glacial till deposits with shallow groundwater between 13 and 19 feet bgs that flows to the northwest based on historical investigation data (HLA 1998).

Due to the fire training activities that were conducted, the surface soil at the Building 810 FTA is the source media for potential PFAS contamination. Details regarding specific AFFF releases were not discovered during the PA through research and personnel interviews. Because the FBH Fire Department had documented use of foam in the 1980s and 1990s, these materials were likely used during fire training activities. The primary release mechanism is the potential release of PFAS-containing materials to surface soils related to historical operations at the Building 810 FTA AOPI. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation. Surface water is not present at the AOPI. The closest surface water body, Lawrence Creek, is present to the east of the AOPI.

Based on the mixed land use at the former FBH, the human receptors considered in the CSM are onsite workers with the potential to work at the AOPI, onsite residents living on the former FBH, and offsite residents living in the vicinity of the former FBH (off-post). Current land use at this AOPI is recreational; an on-AOPI residential pathway does not currently exist. However, onsite residents are evaluated for the potential migration (i.e., groundwater) to residents on-post at the former FBH.

The subsurface soil ingestion and dermal contact exposure pathways are considered complete for onsite workers because Target PFAS were detected at concentrations greater than the SLs. Surface soil pathways are considered potentially complete because Target PFAS were detected below the SLs. No off-AOPI migration of soil is expected. The groundwater exposure pathways for onsite workers are considered complete because Target PFAS were detected above the SLs. Groundwater exposure pathways for the other

receptors are potentially complete due to the potential for migration. Figure 6-6 presents the CSM for the Building 810 FTA AOPI.

6.3.4 Recommendation

Detected (estimated) concentrations of Target PFAS in subsurface soil and groundwater samples at the Building 810 FTA AOPI exceed the SLs; therefore, further investigation is recommended.

Table 6-2. Target PFAS Results and Screening for the Building 810 FTA AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
FBH-810-01	FH81001-SS01	SURF	0.00-1.00	08/28/2022	0.049 UJ	0.049 UJ	0.049 UJ	0.049 UJ	**0.071 J**	**0.11 J**
	FH81001-SB02	BORE	5.00-7.00	08/28/2022	0.049 UJ	0.049 UJ	0.049 UJ	0.049 UJ	0.049 UJ	0.049 UJ
	FH81001-SB03	BORE	11.00-13.00	08/28/2022	0.062 UJ	0.062 UJ	0.062 UJ	0.062 UJ	0.062 UJ	0.062 UJ
	FH81001-SB03FD	BORE	11.00-13.00 (D)	08/28/2022	0.063 UJ	0.063 UJ	0.063 UJ	0.063 UJ	0.063 UJ	0.063 UJ
FBH-810-02	FH81002-SS01	SURF	0.00-1.00	08/29/2022	0.053 UJ	0.053 UJ	**0.23 J**	**1.4 J+**	**1.8 J+**	**1.5 J**
	FH81002-SB02	BORE	1.00-3.00	08/29/2022	0.054 UJ	0.054 UJ	**0.92 J**	**1.7 J**	**2.9 J**	**9.8 J**
	FH81002-SB03	BORE	16.00-18.00	08/29/2022	0.052 UJ	0.052 UJ	**2.5 J**	**0.11 J**	**0.48 J**	**25 J**
FBH-810-03	FH81003-SS01	SURF	0.00-1.00	08/29/2022	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ	**0.11 J**	**0.14 J**
	FH81003-SB02	BORE	5.00-7.00	08/29/2022	0.045 UJ	0.045 UJ	**0.11 J**	0.045 UJ	**0.21 J**	0.045 UJ
	FH81003-SB03	BORE	15.00-17.00	08/29/2022	0.046 UJ	0.046 UJ	**0.12 J**	0.046 UJ	**0.41 J**	**0.071 J**
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
FBH-810-01	FH81001-GW01	PNCH	20.00-20.00	08/28/2022	0.91 UJ	**2.8 J**	**9.4 J+**	**3.7 J**	**11 J**	**37 J**
FBH-810-02	FH81002-GW01	PNCH	23.00-23.00	08/29/2022	0.91 UJ	**5.2 J**	**34 J**	**6.6 J**	**24 J**	**310 J**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
Highlighted values indicate an exceedance of the SL.
(D) = Field duplicate sample.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
J+ = The analyte was positively identified; the result is an estimated concentration and may be biased high.
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte.

6.4 BUILDING 33 GAS STATION AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the Building 33 Gas Station AOPI.

6.4.1 AOPI Background

The Building 33 Gas Station, also known as the AAFES Gas Station at Building 33, was located at Building 33 on the corner of Hawkins and Birtz Roads and operated from the 1950s until FBH closure in 1995. Gasoline was stored in underground storage tanks (USTs) and sold to private vehicle owners. The gas station has been demolished and the USTs have been removed since FBH closure. The AOPI property is currently an apartment complex owned by the Lawrence Village Senior Residence, LLC.

During use as a gas station, several spills were documented at the facility. Two gasoline spills, one on August 5, 1979, and the second on October 25, 1979, released 15 and 10 gallons of gasoline, respectively, due to a failure of the float vent valve on the vapor recovery system. At the direction of the FBH Fire Department, the areas of the spills were flushed. On November 5, 1988, foam was applied to a gasoline spill at the Building 33 Gas Station and runoff from the road was diked with sand. Spill Recovery of Indiana conducted the cleanup, and an estimated 100 gallons were recovered (Weston 1992, Sverdrup 1997). On December 6, 1988, a fuel line was broken during digging operations, releasing 20 to 50 gallons of gasoline. Sand was dumped for diking purposes, the FBH Fire Department applied foam as a precaution, and all material was recovered with a vacuum truck (Sverdrup 1997). It is unknown whether the foam used at the site contained PFAS. The USTs were removed in 1995 as part of installation closure activities, and removal and environmental sampling activities were documented in the Building 33 Closure Report (Sverdrup 1997).

An environmental covenant is in place restricting groundwater use and with mitigation requirements due to vapor intrusion associated with the former property use as a petroleum fuel station.

6.4.2 SI Sampling and Results

Soil and groundwater samples were collected from the Building 33 Gas Station AOPI at the following locations (Figure 6-7):

- Nine soil samples and one field duplicate were collected from three soil borings (FBH-B33-01, FBH-B33-02, and FBH-B33-03), each with one surface soil sample and two subsurface soil samples. Soil borings were placed in locations to attempt to capture potential foam discharge areas based on the spill reports. FBH-B33-01 was placed northwest of the AOPI, and FBH-B33-02 and FBH-B33-03 were placed in the northwestern portions of the AOPI limits.
- DPT groundwater samples were collected from two locations: FBH-B33-01 downgradient from the AOPI and FBH-B33-02 within the AOPI.

The Target PFAS analytical results for soil and groundwater at the Building 33 Gas Station AOPI are summarized below and presented in Table 6-3 and Figure 6-8.

6.4.2.1 Soil

PFOS was detected at estimated concentrations less than the SL in 8 of the 10 soil samples, including all surface soil samples. PFOA was detected at estimated concentrations less than the SL in all samples at FBH-B33-01 and the surface soil sample at FBH-B33-03. PFNA was detected at estimated concentrations less than the SL in surface soil at FBH-B33-01 and FBH-B33-03. PFHxS was detected at estimated concentrations less than the SL in all samples at FBH-B33-01 and the subsurface soil samples at FBH-B33-02. PFBS and HFPO-DA were not detected at concentrations greater than the LODs in soil.

6.4.2.2 Groundwater

PFOS, PFOA, PFNA, PFHxS, and PFBS were detected in both groundwater samples, with estimated concentrations of PFOS and PFOA exceeding the SLs. PFOS was detected at estimated concentrations greater than the SL of 4 ng/L at FBH-B33-01 (14 ng/L) and FBH-B33-02 (36 ng/L). PFOA was detected at estimated concentrations greater than the SL of 6 ng/L at FBH-B33-01(10 ng/L) and FBH-B33-02 (32 ng/L). PFHxS, PFNA, and PFBS were detected in both groundwater samples at concentrations less than the SLs. HFPO-DA was not detected at concentrations greater than the LODs in groundwater.

6.4.3 CSM

The Building 33 Gas Station AOPI is approximately 1.58 acres. The ground surface elevation of the former Building 33 Gas Station is 855 feet amsl and is generally flat. Surface water flow is to the west. Storm drains are present along the northern and western portions of the AOPI adjacent to the roads that flow to an outfall west of the site.

Shallow subsurface geology at the AOPI is composed of glacial till deposits with shallow groundwater between 15 and 20 feet bgs that flows to the northwest based on historical investigation data (Sverdrup 1997).

Due to the spill cleanup activities that were conducted using foam that may have contained PFAS, the surface soil at the AOPI is the source medium for potential PFAS contamination. The primary release mechanism is the potential release of PFAS-containing materials to surface soils related to historical operations at the Building 33 Gas Station. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation. Surface water is not present at the AOPI.

Based on the mixed land use at the former FBH, the human receptors considered in the CSM are onsite workers with the potential to work at the AOPI, onsite residents living on the former FBH, and offsite residents living in the vicinity of the former FBH (off-post). Current land use at this AOPI includes residential use.

The soil exposure pathways for onsite workers and onsite residents are potentially complete because Target PFAS were detected at concentrations less than the SLs in surface and subsurface soil. No off-AOPI migration of soil is expected. Concentrations of target PFAS in groundwater exceeded the SLs. However, an environmental covenant is in place restricting groundwater use at the former Building 33 Gas Station based on historical petroleum contamination from fueling operations. Since the groundwater use restrictions are based on non-PFAS constituents and the potential for migration exists, all of the groundwater exposure pathways are considered potentially complete. Figure 6-9 presents the CSM for the Building 33 Gas Station AOPI.

6.4.4 Recommendation

Detected concentrations of Target PFAS in both groundwater samples at the Building 33 Gas Station AOPI exceed the SLs; therefore, further investigation is recommended.

Table 6-3. Target PFAS Results and Screening for the Building 33 Gas Station AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
FBH-B33-01	FHB3301-SS01	SURF	0.00-1.00	08/26/2022	0.053 UJ	0.053 UJ	**0.068 J**	**0.16 J**	**0.39 J**	**3.3 J**
	FHB3301-SS01FD	SURF	0.00-1.00 (D)	08/26/2022	0.053 UJ	0.053 UJ	**0.076 J**	**0.18 J**	**0.39 J**	**3.5 J**
	FHB3301-SB02	BORE	4.00-6.00	08/26/2022	0.052 UJ	0.052 UJ	**3.5 J**	0.052 UJ	**1.3 J**	**0.57 J**
	FHB3301-SB03	BORE	8.00-10.00	08/26/2022	0.057 UJ	0.057 UJ	**0.27 J**	0.057 UJ	**0.092 J**	**0.26 J**
FBH-B33-02	FHB3302-SS01	SURF	0.00-1.00	08/24/2022	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ	0.053 UJ	**0.12 J**
	FHB3302-SB02	BORE	6.00-8.00	08/26/2022	0.051 UJ	0.051 UJ	**0.087 J**	0.051 UJ	0.051 UJ	**0.84 J**
	FHB3302-SB03	BORE	12.00-14.00	08/26/2022	0.051 UJ	0.051 UJ	**0.22 J**	0.051 UJ	0.051 UJ	**1.0 J**
FBH-B33-03	FHB3303-SS01	SURF	0.00-1.00	08/24/2022	0.056 UJ	0.056 UJ	0.056 UJ	**0.11 J**	**0.16 J**	**0.58 J**
	FHB3303-SB02	BORE	5.00-6.00	08/26/2022	0.059 UJ	0.059 UJ	0.059 UJ	0.059 UJ	0.059 UJ	0.059 UJ
	FHB3303-SB03	BORE	6.00-8.00	08/26/2022	0.050 UJ	0.050 UJ	0.050 UJ	0.050 UJ	0.050 UJ	0.050 UJ
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
FBH-B33-01	FHB3301-GW01	PNCH	15.00-15.00	08/27/2022	0.91 UJ	**2 J**	**5.7 J**	**1.3 J**	**10 J**	**14 J**
FBH-B33-02	FHB3302-GW01	PNCH	15.00-15.00	08/27/2022	0.91 UJ	**7.8 J**	**32 J**	**2.3 J**	**32 J**	**36 J**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
Highlighted values indicate an exceedance of the SL.
(D) = Field duplicate sample.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte.

6.5 FIRE STATION NO. 1 AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the Fire Station No. 1 AOPI.

6.5.1 AOPI Background

Fire Station No. 1 was located in the central portion of FBH that operated from prior to WWII to installation closure in 1995. Fire Station No. 1 consisted of a brick, two-engine bay structure and a hose house to the south of the fire station. Fire Station No. 1 is currently owned by Alternative Health Enterprise, LLC and is zoned for commercial land use.

6.5.2 SI Sampling and Results

Soil and groundwater samples were collected from the Fire Station No. 1 AOPI at the following locations (Figure 6-10):

- Nine soil samples and one QC duplicate were collected from three soil borings (FBH-FS1-02, FBH-FS1-03, and FBH-FS1-04). A surface soil sample and two subsurface soil samples were collected from each boring location. The borings at FBH-WFT-02 and FBH-WFT-03 were located northeast of the Fire Station No. 1. FBH-FS1-04 was located near the former hose house.
- Three groundwater samples were collected from temporary monitoring wells FBH-FS1-01, FBH-FS1-03, and FBH-FS1-04.
- Co-located surface water and sediment samples were collected from a location downgradient from the suspected release area (FBH-FS1-05).

The Target PFAS analytical results for soil, groundwater, surface water, and sediment samples collected at the Fire Station No. 1 AOPI are summarized below and presented in Table 6-4 and Figure 6-11.

6.5.2.1 Soil

PFOS, PFOA, PFHxS, PFNA, and PFBS were detected at estimated concentrations greater than the LOD in at least one sample from each of the three soil borings, with estimated concentrations of PFOS exceeding the SL at locations FBH-FS1-03 and FBH-FS1-04. PFOS was detected in 9 of the 10 samples, and estimated concentrations exceeded the SL of 13 µg/kg at locations FBH-FS1-03 (maximum concentration of 76 µg/kg from 8 to 10 feet bgs) and FBH-FS1-04 (maximum concentration of 140 µg/kg from 9 to 11 feet bgs). PFOA was detected at concentrations less than the SL in 8 of the 10 soil samples and not detected at concentrations greater than the LOD in the two subsurface soil samples at FBH-FS1-02. PFHxS was detected in 8 of the 10 soil samples and not detected at concentrations greater than the LOD in two samples at FBH-FS1-02. PFNA was detected at concentrations greater than the LOD but less than the SL at locations FBH-FS1-03 and FBH-FS1-04, and not detected at concentrations greater than the LOD at location FBH-FS1-02. PFBS was detected at concentrations greater than the LOD but less than the SL in two soil samples collected from the bottom depths at locations FBH-FS1-03 and FBH-FS1-04. HFPO-DA was not detected at concentrations greater than the LODs.

6.5.2.2 Groundwater

PFOS, PFOA, PFHxS, PFNA, and PFBS were detected at estimated concentrations greater than the LOD in groundwater samples collected from at least one of the three temporary wells. PFOS concentrations exceeded the SL of 4 ng/L in all three samples, at estimated concentrations of 89 ng/L (FBH-FS1-01), 2,500 ng/L (FBH-FS1-03), and 1,700 ng/L (FBH-FS1-04). PFOA concentrations exceeded the SL of 6 ng/L in all three samples, at estimated concentrations of 17 ng/L (FBH-FS1-01), 620 ng/L (FBH-FS1-03), and 1,400 ng/L (FBH-FS1-04). PFNA was detected in one sample, with a concentration exceeding the SL of 6 ng/L at FBH-FS1-03 (13 ng/L). PFHxS was detected in all three wells, with concentrations exceeding the

SL of 39 ng/L at FBH-FS-03 (5,700 ng/L) and FBH-FS1-04 (7,500 ng/L). PFBS was detected at FBH-FS1-01 and FBH-FS1-03, but concentrations did not exceed the SL. HFPO-DA was not detected at concentrations greater than the LOD.

6.5.2.3 Surface Water

PFOS was detected at an estimated concentration of 14 ng/L, which exceeds the SL of 4 ng/L. PFHxS, PFBS, and PFOA were detected at concentrations greater than the LODs but did not exceed the SLs. PFNA and HFPO-DA were not detected at concentrations greater than the LODs.

6.5.2.4 Sediment

PFOS was detected at an estimated concentration of 47 µg/kg, which exceeds the SL of 13 µg/kg. PFHxS, PFBS, PFNA, and PFOA were detected at concentrations greater than the LODs but less than the SLs. HFPO-DA was not detected at concentrations greater than the LOD.

6.5.3 CSM

The Fire Station No. 1 AOPI was approximately 0.35 acres. It consists of the former fire station building surrounded by a paved parking lot and grass lawns. The ground surface elevation of Fire Station No. 1 is 840 feet amsl and slopes to a creek at 815 feet amsl associated with Hawthorne Pond to the east.

No sampling has been previously documented at Fire Station No. 1. Shallow subsurface geology at Fire Station No. 1 is composed of glacial till deposits with shallow groundwater at approximately 10 to 20 feet bgs. Groundwater flow direction based on water levels collected during this SI is estimated to be toward the southeast.

Fire Station No. 1 was identified as an AOPI following review of documents indicating the FBH Fire Department used foam during spill response activities. It is unknown whether the foam referenced in spill documents contained PFAS, but AFFF used during the period of operation likely contained PFAS. It is unknown where foam was stored, but it was likely stored at the fire station and/or on the fire truck for emergency response operations.

The primary release mechanism is the potential release of PFAS-containing materials to surface soils related to historical operations at Fire Station No. 1. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation. Surface water and sediment are present to the east of Fire Station No. 1.

Based on the mixed land use at the former FBH, the human receptors considered in the CSM are onsite workers with the potential to work at the AOPI, onsite residents living on the former FBH, and offsite residents living in the vicinity of the former FBH (off-post). Current land use at this AOPI is recreational; an on-AOPI residential pathway does not currently exist. However, onsite residents are evaluated for the potential migration (i.e., groundwater and surface water) to residents on-post at the former FBH.

Drinking water for on- and off-post receptors is obtained in part from multiple significant water withdrawal wells on FBH. The groundwater, soil, sediment, and surface water are considered to be complete exposure pathways for onsite workers because Target PFAS were detected at concentrations greater than the SLs. Soil is not expected to migrate off the AOPI. However, due to the potential for migration of groundwater and surface water, the exposure pathways for onsite and offsite residents are considered potentially complete. Figure 6-12 presents the CSM for the Fire Station No. 1 AOPI.

6.5.4 Recommendation

Detected concentrations of Target PFAS in soil, groundwater, surface water, and sediment exceed the SLs; therefore, further investigation is recommended.

Table 6-4. Target PFAS Results and Screening for the Fire Station No. 1 AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
FBH-FS1-02	FHFS102-SS01	SURF	0.00-1.00	08/23/2022	0.057 UJ	0.057 UJ	0.057 UJ	0.057 UJ	**0.13 J**	**0.46 J**
	FHFS102-SB02	BORE	10.00-12.00	08/23/2022	0.052 UJ	0.052 UJ	**0.074 J**	0.052 UJ	0.052 UJ	**0.44 J**
	FHFS102-SB03	BORE	16.50-18.50	08/23/2022	0.052 UJ	0.052 UJ	0.052 UJ	0.052 UJ	0.052 UJ	0.052 UJ
FBH-FS1-03	FHFS103-SS01	SURF	0.00-1.00	08/23/2022	0.056 UJ	0.056 UJ	**1.2 J**	**1.2 J**	**1.2 J**	**18 J**
	FHFS103-SB02	BORE	8.00-10.00	08/23/2022	0.060 UJ	0.060 UJ	**1.3 J**	**0.38 J**	**0.57 J**	**76 J**
	FHFS103-SB03	BORE	13.00-15.00	08/23/2022	0.052 UJ	**0.097 J**	**6.9 J**	0.052 UJ	**0.75 J**	**15 J**
FBH-FS1-04	FHFS104-SS01	SURF	0.00-1.00	08/23/2022	0.056 UJ	0.056 UJ	**0.86 J**	**0.85 J**	**1.1 J**	**16 J**
	FHFS104-SS01FD	SURF	0.00-1.00 (D)	08/23/2022	0.055 UJ	0.055 UJ	**0.78 J**	**0.71 J**	**1.1 J**	**13 J**
	FHFS104-SB02	BORE	9.00-11.00	08/23/2022	0.052 UJ	0.052 UJ	**4.6 J**	**0.11 J**	**0.73 J**	**140 J**
	FHFS104-SB03	BORE	13.25-15.25	08/23/2022	0.051 UJ	**0.17 J**	**13 J**	**0.063 J**	**2.3 J**	**98 J**
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
FBH-FS1-01	FHFS101-TW01	WELL	11.00-11.00	08/24/2022	0.93 U	**1.1 J**	**22 J-**	0.93 U	**17 J-**	**89 J**
FBH-FS1-03	FHFS103-TW01	WELL	20.00-20.00	08/24/2022	0.93 U	**430**	**5700 J**	**13**	**620 J**	**2500 J**
FBH-FS1-04	FHFS104-TW01	WELL	16.50-16.50	08/24/2022	0.93 UJ	420 UJ	**7500 J**	5.9 UJ	**1400 J**	**1700 J**
Surface Water				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
FBH-FS1-05	FHFS105-SW01	SWTR	0.00-0.00	08/27/2022	0.87 UJ	**3.6 J**	**6.1 J**	0.87 UJ	**1.4 J**	**14 J+**
Sediment				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
FBH-FS1-05	FHFS105-SD01	SEDI	0.00-0.50	08/27/2022	0.059 UJ	**0.10 J**	**5.8 J**	**0.27 J**	**1.2 J**	**47 J**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
Highlighted values indicate an exceedance of the SL.
(D) = Field duplicate sample.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
J+ = The analyte was positively identified; the result is an estimated concentration and may be biased high.
J- = The analyte was positively identified; the result is an estimated concentration and may be biased low.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte.

6.6 FIRE STATION NO. 2 AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the Fire Station No. 2 AOPI.

6.6.1 AOPI Background

Fire Station No. 2 at Building 116 is located in the southeastern portion of FBH that is currently owned and operated by the Army Reserve Enclave. Building 116 was built in approximately 1941 based on aerial imagery. The original purpose of Building 116 and the starting date of operation of Fire Station No. 2 are unknown, but the site was operational during the 1970s and 1980s. The facility has not been used as a fire station by the Army Reserve Enclave post-closure in 1995.

6.6.2 SI Sampling and Results

Soil and groundwater samples were collected from the Fire Station No. 2 AOPI at the following locations (Figure 6-13):

- Six soil samples and one field duplicate were collected from three soil borings. FBH-FS2-01 was located downgradient from the suspected release area, FBH-FS2-02 was located in an area suspected to be adjacent to the former bay doors, and FBH-FS2-03 was located in the southeastern corner of the suspected release area. No surface soil sample was collected at FBH-FS2-02 due to the presence of pavement and gravel. Due to the encounter of shallow groundwater, only one subsurface soil sample was collected at locations FBH-FS2-01 and FBH-FS2-02.
- DPT groundwater samples and one field duplicate were collected from soil boring locations, FBH-FS2-01 and FBH-FS2-02.

The Target PFAS analytical results for the soil and groundwater samples collected at the Fire Station No. 2 AOPI are summarized below and presented in Table 6-5 and Figure 6-14.

6.6.2.1 Soil

PFOS was detected at estimated concentrations less than the SL in the surface soil at FBH-FS2-01 and in subsurface soil sample at FBH-FS2-03 (1 to 3 feet bgs). PFOA was detected at estimated concentrations less than the SL in the subsurface soil (3 to 5 feet bgs) at FBH-FS2-02. PFBS, PFHxS, PFNA, and HFPO-DA were not detected at concentrations greater than the LODs in soil.

6.6.2.2 Groundwater

PFOS exceeded the SL of 4 ng/L at FBH-FS2-01, at concentrations of 120 ng/L in the sample and 150 ng/L in the field duplicate. PFOS was detected at an estimated concentration less than the SL at FBH-FS2-02. PFOA concentrations exceeded the SL in the field duplicate sample at FBH-FS2-01 (6.1 ng/L) and at FBH-FS2-02 (estimated 25 ng/L). PFOA was detected at concentrations less than the SL in the regular sample collected at FBH-FS2-01. PFHxS and PFBS were detected at both locations at concentrations less than the SLs. HFPO-DA and PFNA were not detected at concentrations greater than the LODs in groundwater.

6.6.3 CSM

Fire Station No. 2 was identified as an AOPI following review of records indicating the FBH Fire Department used foam in response activities to spills. It is unknown whether the foam referenced in spill documents contained PFAS, but AFFF used during the period of operation likely contained PFAS. It

is unknown where foam was stored, but it was likely stored at the fire station and/or on the fire truck for emergency response operations.

The ground surface elevation of Fire Station No. 2 is 855 feet amsl. No sampling has been previously documented at Fire Station No. 2. Shallow subsurface geology at Fire Station No. 1 is composed of glacial till deposits with shallow groundwater at approximately 8 to 18 feet bgs. Groundwater flow direction at this AOPI is assumed to be to the northwest based on the general groundwater gradient in the area; however, surveys were not performed during this SI to confirm the direction.

The primary release mechanism is the potential release of PFAS-containing materials to surface soils related to historical operations at Fire Station No. 2. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation. Surface water and sediment are not present at Fire Station No. 2. Drinking water for onsite and offsite receptors is obtained from multiple significant water withdrawal wells on FBH.

Based on the mixed land use at the former FBH, the human receptors considered in the CSM are onsite workers with the potential to work at the AOPI, onsite residents living on the former FBH, and offsite residents living in the vicinity of the former FBH (off-post). Current land use at this AOPI is industrial (Army Reserve); an on-AOPI residential pathway does not currently exist. However, onsite residents are evaluated for the potential migration (i.e., groundwater) to residents on-post at the former FBH.

Target PFAS were detected in soil at concentrations less than the SLs. Therefore, the soil exposure pathways are potentially complete for onsite workers. Soil is not expected to migrate off the AOPI. The groundwater exposure pathways for onsite workers are considered complete because Target PFAS were detected at concentrations greater than the SLs. The groundwater exposure pathways for onsite and offsite residents are potentially complete due to the potential for migration. Figure 6-15 presents the CSM for the Fire Station No. 2 AOPI.

6.6.4 Recommendation

Detected concentrations of Target PFAS groundwater at the Fire Station No. 2 AOPI exceed the SLs; therefore, further investigation is recommended.

Table 6-5. Target PFAS Results and Screening for the Fire Station No. 2 AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
FBH-FS2-01	FHFS201-SS01	SURF	0.00-1.00	08/25/2022	0.056 UJ	0.056 UJ	0.056 UJ	0.056 UJ	0.056 UJ	**0.072 J**
	FHFS201-SB02	BORE	2.00-4.60	08/25/2022	0.058 UJ	0.058 UJ	0.058 UJ	0.058 UJ	0.058 UJ	0.058 UJ
FBH-FS2-02	FHFS202-SB01	BORE	3.00-5.00	08/24/2022	0.061 UJ	0.061 UJ	0.061 UJ	0.061 UJ	**0.075 J**	0.061 UJ
	FHFS202-SB01FD	BORE	3.00-5.00 (D)	08/24/2022	0.060 UJ	0.060 UJ	0.060 UJ	0.060 UJ	**0.067 J**	0.060 UJ
FBH-FS2-03	FHFS203-SS01	SURF	0.00-1.00	08/25/2022	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ
	FHFS203-SB02	BORE	1.00-3.00	08/25/2022	0.062 UJ	0.062 UJ	0.062 UJ	0.062 UJ	0.062 UJ	**0.11 J**
	FHFS203-SB03	BORE	3.00-5.00	08/25/2022	0.059 UJ	0.059 UJ	0.059 UJ	0.059 UJ	0.059 UJ	0.059 UJ
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
FBH-FS2-01	FHFS201-GW01	PNCH	8.00-8.00	08/25/2022	0.97 U	**1.7 J**	**15**	0.97 U	**3.8**	**120**
	FHFS201-GW01FD	PNCH	8.00-8.00	08/25/2022 (D)	0.93 U	**2.3**	**22**	0.93 U	**6.1**	**150**
FBH-FS2-02	FHFS202-GW01	PNCH	11.50-11.50	08/25/2022	0.95 UJ	**3.8 J**	**15 J**	0.95 UJ	**25 J**	**3.2 J**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
Highlighted values indicate an exceedance of the SL.
(D) = Field duplicate sample.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte.

6.7 FIRE STATION NO. 2 FTA AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the Fire Station No. 2 FTA AOPI.

6.7.1 AOPI Background

Fire Station No. 2 FTA was a grassy field south of Fire Station No. 2 at Building 116 in the southeastern portion of FBH. Fire Station No. 2 FTA is currently owned and operated by the Army Reserve Enclave. The dates of operation of the FTA are unknown, but interviews indicated that fire department personnel used the area to the east and southeast of Building 107 (across the street from Building 116) for fire training activities. The exact dates of operation are unknown. The facility has not been used as an FTA by the Army Reserve Enclave post-closure in 1995.

6.7.2 SI Sampling and Results

Soil and groundwater samples were collected from the Fire Station No. 2 FTA AOPI at the following locations (Figure 6-13):

- Nine soil samples and one field duplicate were collected from three soil borings. FBH-FT2-01 and FBH- FT2-02 were located within the central portion of the suspected release area, and FBH-FT2-03 was located downgradient from the suspected release location. A surface soil sample and two subsurface soil samples were collected at each boring location.
- DPT grab groundwater samples were collected from two locations within the central portion of the AOPI at FBH-FT2-01 and FBH-FT2-02.

The Target PFAS analytical results for soil and groundwater samples collected at the Fire Station No. 2 FTA AOPI are summarized below and presented in Table 6-6 and Figure 6-14. Surface water and sediment are not present at this AOPI.

6.7.2.1 Soil

PFOA and PFOS were detected at estimated concentrations less than the SL in all three surface soil samples (FBH-FT2-01, FBH- FT2-02, and FBH- FT2-03) and two subsurface samples at location FBH-FT2-03. PFNA was detected at estimated concentrations less than the SL in all three surface soil samples (FBH-FT2-01, FBH-FT2-02, and FBH- FT2-03). PFHxS and PFBS were detected at estimated concentrations less than the SLs in all three samples at FBH-FT2-03. HFPO-DA was not detected at concentrations greater than the LOD in soil.

6.7.2.2 Groundwater

PFOS, PFOA, PFNA, PFHxS, and PFBS were detected at estimated concentrations in one or both wells. PFOS estimated concentrations exceeded the SL of 4 ng/L at FBH-FT2-01 (13 ng/L) and FBH-FT2-02 (100 ng/L). PFOA was detected at estimated concentrations in both samples, exceeding the SL of 6 ng/L at FBH-FT2-02 (15 ng/L). PFHxS was detected at estimated concentrations in both samples, exceeding the SL of 39 ng/L at FBH-FT2-02 (83 ng/L). PFNA was detected at an estimated concentration less than the SL at FBH-FS2-01. PFBS was detected at an estimated concentration less than the SL at FBH-FS2-02. HFPO-DA was not detected at concentrations greater than the LOD in groundwater.

6.7.3 CSM

The Fire Station No. 2 FTA AOPI is approximately 0.54 acres. It consists of the grassy field along the southeastern property boundary at FBH. The ground surface elevation of Fire Station No. 2 FTA is 855 feet amsl. Surface water and sediment are not present at the AOPI.

No sampling has been previously documented at the Fire Station No. 2 FTA. Shallow subsurface geology at Fire Station No. 2 is composed of glacial till deposits with shallow groundwater at approximately 15 to 20 feet bgs. Groundwater flow direction is unknown; however, it is assumed the groundwater flows to the northwest based on general groundwater gradient and historical site-wide data.

Fire Station No. 2 FTA was identified as an AOPI following interviews that documented fire training in this area. Additional records reviews document that the FBH Fire Department used foam in response activities to spills. It is unknown whether the foam referenced in spill documents contained PFAS, but AFFF used during the period of operation likely contained PFAS. It is unknown where foam was stored, but it was likely stored at the fire station and/or on the fire truck for emergency response operations and may have been use in fire training activities.

The primary release mechanism is the potential release of PFAS-containing materials to surface soils related to historical operations at Fire Station No. 2. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation. Surface water and sediment are not present at Fire Station No. 2 FTA.

Based on the mixed land use at the former FBH, the human receptors considered in the CSM are onsite workers with the potential to work at the AOPI, onsite residents living on the former FBH, and offsite residents living in the vicinity of the former FBH (off-post). Current land use at this AOPI is industrial (Army Reserve); an on-AOPI residential pathway does not currently exist. However, onsite residents are evaluated for the potential migration (i.e., groundwater) to residents on-post at the former FBH.

Target PFAS were detected in soil at concentrations less than the SLs. Therefore, the soil exposure pathways are potentially complete for onsite workers. Soil is not expected to migrate off the AOPI. The groundwater exposure pathways for onsite workers are considered complete because Target PFAS were detected at concentrations greater than the SLs. The groundwater exposure pathways for onsite and offsite residents are potentially complete due to the potential for migration. Figure 6-16 presents the CSM for the Fire Station No. 2 FTA AOPI.

6.7.4 Recommendation

Detected concentrations of Target PFAS in groundwater at the Fire Station No. 2 FTA AOPI exceed the SLs; therefore, further investigation is recommended.

Table 6-6. Target PFAS Results and Screening for the Fire Station No. 2 FTA AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
FBH-FT2-01	FHFT201-SS01	SURF	0.00-1.00	08/26/2022	0.056 UJ	0.056 UJ	0.056 UJ	**0.11 J**	**0.13 J**	**0.20 J**
	FHFT201-SB02	BORE	2.00-4.00	08/26/2022	0.058 UJ	0.058 UJ	0.058 UJ	0.058 UJ	0.058 UJ	0.058 UJ
	FHFT201-SB03	BORE	4.00-6.00	08/26/2022	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ	0.054 UJ
FBH-FT2-02	FHFT202-SS01	SURF	0.00-1.00	08/25/2022	0.060 UJ	0.060 UJ	0.060 UJ	**0.075 J**	**0.11 J**	**0.27 J**
	FHFT202-SB02	BORE	3.00-5.00	08/25/2022	0.056 UJ	0.056 UJ	0.056 UJ	0.056 UJ	0.056 UJ	0.056 UJ
	FHFT202-SB03	BORE	5.00-7.00	08/25/2022	0.056 UJ	0.056 UJ	0.056 UJ	0.056 UJ	0.056 UJ	0.056 UJ
	FHFT202-SB03FD	BORE	5.00-7.00 (D)	08/25/2022	0.057 UJ	0.057 UJ	0.057 UJ	0.057 UJ	0.057 UJ	0.057 UJ
FBH-FT2-03	FHFT203-SS01	SURF	0.00-1.00	08/26/2022	0.056 UJ	**0.17 J**	**1.9 J**	**0.36 J**	**0.72 J**	**5.8 J**
	FHFT203-SB02	BORE	2.00-4.00	08/26/2022	0.056 UJ	**0.29 J**	**9.6 J**	0.056 UJ	**0.42 J**	**1.3 J**
	FHFT203-SB03	BORE	4.50-6.50	08/26/2022	0.054 UJ	**0.40 J**	**3.0 J**	0.054 UJ	**0.11 J**	**0.067 J**
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
FBH-FT2-01	FHFT201-GW01	PNCH	18.00-18.00	08/29/2022	0.9 UJ	0.9 UJ	**1 J**	**1.3 J**	**1.9 J**	**13 J**
FBH-FT2-02	FHFT202-GW01	PNCH	18.00-18.00	08/26/2022	0.9 UJ	**3.9 J**	**83 J**	0.9 UJ	**15 J**	**100 J**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
Highlighted values indicate an exceedance of the SL.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte.

7. CONCLUSIONS AND RECOMMENDATIONS

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 multimedia sampling at AOPIs 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, surface water, and sediment sampling data for each AOPI to determine whether Target PFAS have been released to the environment and whether a release has affected or may affect specific human health targets.

Before the SI sampling, a preliminary CSM was developed in the PA for each AOPI based on an evaluation of existing records, personnel interviews, and site reconnaissance. The preliminary CSMs identified potential human receptors and exposure pathways for groundwater and surface water that is 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. All AOPIs were sampled during the SI at FBH 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 at all six AOPIs. Concentrations of PFOS, PFOA, PFNA, and/or PFHxS exceeded the SLs in one or more medium at five of the AOPIs: Building 810 FTA (soil and groundwater), Building 33 Gas Station (groundwater), Fire Station No. 1 (soil, groundwater, surface water, and sediment), Fire Station No. 2 (groundwater), and Fire Station No. 2 Training Area (groundwater). PFBS was detected at a concentration less than the SL at every AOPI, and HFPO-DA was not detected at a concentration greater than the LOD at any AOPI.

The CSMs were updated for each AOPI where Target PFAS were detected at concentrations greater than the LODs. The updated CSMs detail site geological conditions; determine primary and secondary release mechanisms; identify potential human receptors; and detail complete, potentially complete, and incomplete exposure pathways for current and reasonably anticipated future exposure scenarios. The soil and groundwater exposure pathways for onsite receptors are complete or potentially complete at all AOPIs due to Target PFAS detections or exceedances of the SLs. The groundwater exposure pathways for offsite residents are potentially complete because groundwater wells located on the former FBH are used for drinking water for offsite receptors. The onsite receptor exposure pathways are considered complete at the Fire Station No. 1 AOPI and potentially complete at the West Landfill FTA AOPI; exposure pathways for offsite receptors are potentially complete at both AOPIs.

SI sampling results were compared to the OSD risk-based SLs presented in Section 5 to determine if further investigation is warranted at each AOPI, 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 each AOPI. The following five AOPIs are recommended for further investigation or evaluation:

- Building 810 FTA
- Building 33 Gas Station
- Fire Station No. 1
- Fire Station No. 2
- Fire Station No. 2 FTA.

In addition, Target PFAS were detected at concentrations greater than the SLs in surface water downstream from the West Landfill FTA AOPI where other surface waters converge. Since a source area was not encountered at the West Landfill FTA AOPI, and complete surface water exposure pathways exist, further investigation of other areas upstream of the surface water exceedance may be warranted to identify a source.

Table 7-1. Summary of Target PFAS Detected and Recommendations

AOPI	Detection of HFPO-DA, PFBS, PFHxS, PFNA, PFOS, and/or PFOA				Recommendation and Rationale
	Groundwater	Soil	Surface Water	Sediment	
West Landfill FTA	Detected	Detected	Off-AOPI exceeds SL	Detected	SLs not exceeded within AOPI; further investigation not recommended at this time. Additional off-AOPI/upgradient investigation may be warranted for surface water.
Building 810 FTA	Exceeds SL	Exceeds SL	–	–	SLs exceeded in groundwater and soil; further investigation recommended.
Building 33 Gas Station	Exceeds SL	Detected	–	–	SLs exceeded in groundwater; further investigation recommended.
Fire Station No. 1	Exceeds SL	Exceeds SL	Exceeds SL	Exceeds SL	SLs exceeded in groundwater, surface water, sediment, and soil; further investigation recommended.
Fire Station No. 2	Exceeds SL	Detected	–	–	SLs exceeded in groundwater; further investigation recommended.
Fire Station No. 2 FTA	Exceeds SL	Detected	–	–	SLs exceeded in groundwater; further investigation recommended.

Note: Highlighted cells are recommended for further investigation
– Not Collected
ND = Not Detected

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FIGURES

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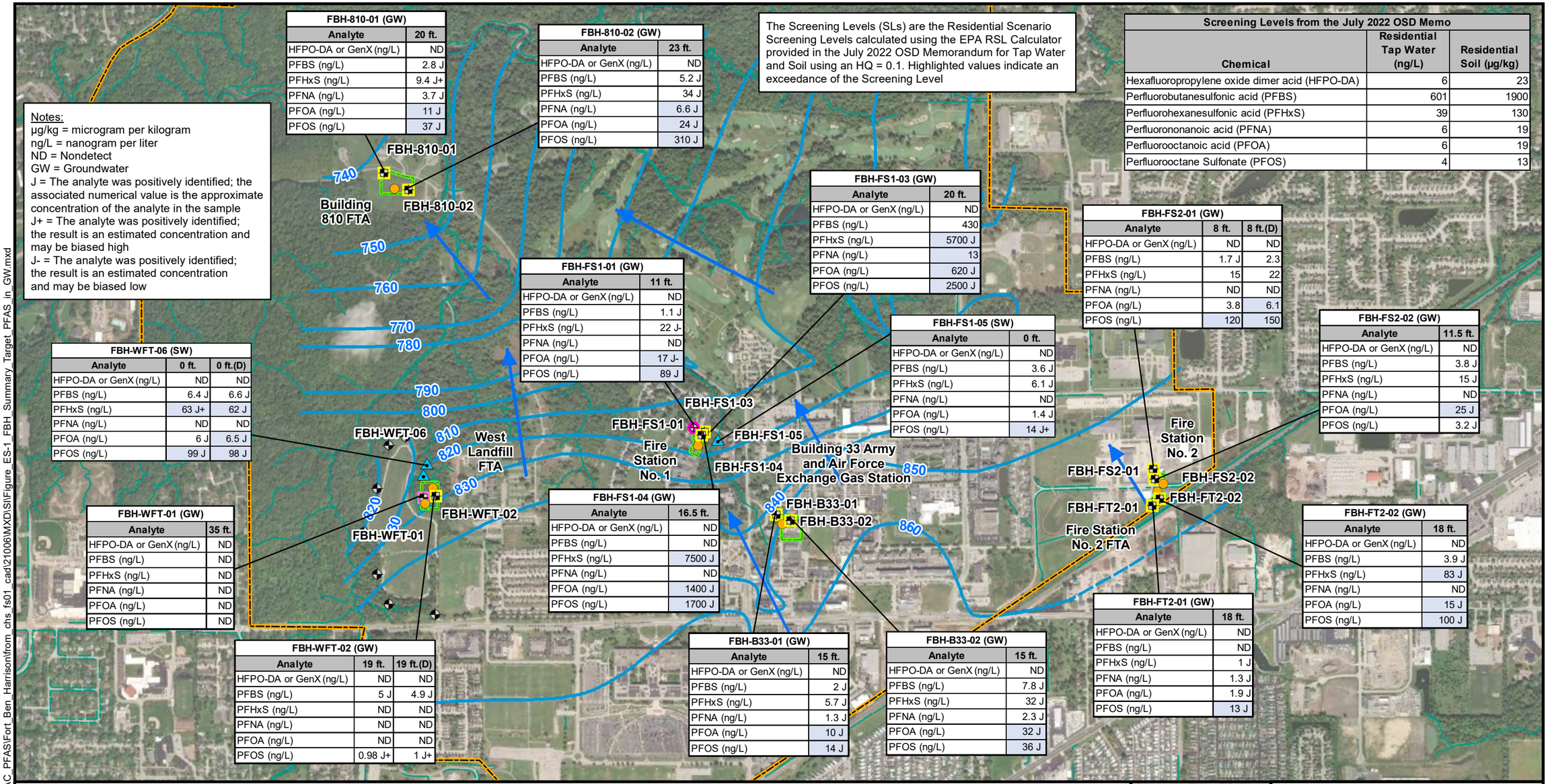


Notes:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
ND = Nondetect
GW = Groundwater
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
J+ = The analyte was positively identified; the result is an estimated concentration and may be biased high
J- = The analyte was positively identified; the result is an estimated concentration and may be biased low

The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water and Soil using an HQ = 0.1. Highlighted values indicate an exceedance of the Screening Level

Screening Levels from the July 2022 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA)	6	23
Perfluorobutanesulfonic acid (PFBS)	601	1900
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	6	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

FBH-810-01 (GW)	
Analyte	20 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	2.8 J
PFHxS (ng/L)	9.4 J+
PFNA (ng/L)	3.7 J
PFOA (ng/L)	11 J
PFOS (ng/L)	37 J

FBH-810-02 (GW)	
Analyte	23 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	5.2 J
PFHxS (ng/L)	34 J
PFNA (ng/L)	6.6 J
PFOA (ng/L)	24 J
PFOS (ng/L)	310 J

FBH-FS1-01 (GW)	
Analyte	11 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	1.1 J
PFHxS (ng/L)	22 J-
PFNA (ng/L)	ND
PFOA (ng/L)	17 J-
PFOS (ng/L)	89 J

FBH-FS1-03 (GW)	
Analyte	20 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	430
PFHxS (ng/L)	5700 J
PFNA (ng/L)	13
PFOA (ng/L)	620 J
PFOS (ng/L)	2500 J

FBH-FS1-05 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	3.6 J
PFHxS (ng/L)	6.1 J
PFNA (ng/L)	ND
PFOA (ng/L)	1.4 J
PFOS (ng/L)	14 J+

FBH-FS2-01 (GW)		
Analyte	8 ft.	8 ft.(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	1.7 J	2.3
PFHxS (ng/L)	15	22
PFNA (ng/L)	ND	ND
PFOA (ng/L)	3.8	6.1
PFOS (ng/L)	120	150

FBH-FS2-02 (GW)	
Analyte	11.5 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	3.8 J
PFHxS (ng/L)	15 J
PFNA (ng/L)	ND
PFOA (ng/L)	25 J
PFOS (ng/L)	3.2 J

FBH-WFT-06 (SW)		
Analyte	0 ft.	0 ft.(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	6.4 J	6.6 J
PFHxS (ng/L)	63 J+	62 J
PFNA (ng/L)	ND	ND
PFOA (ng/L)	6 J	6.5 J
PFOS (ng/L)	99 J	98 J

FBH-FS1-04 (GW)	
Analyte	16.5 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	7500 J
PFNA (ng/L)	ND
PFOA (ng/L)	1400 J
PFOS (ng/L)	1700 J

FBH-B33-01 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	2 J
PFHxS (ng/L)	5.7 J
PFNA (ng/L)	1.3 J
PFOA (ng/L)	10 J
PFOS (ng/L)	14 J

FBH-B33-02 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	7.8 J
PFHxS (ng/L)	32 J
PFNA (ng/L)	2.3 J
PFOA (ng/L)	32 J
PFOS (ng/L)	36 J

FBH-FT2-01 (GW)	
Analyte	18 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	1 J
PFNA (ng/L)	1.3 J
PFOA (ng/L)	1.9 J
PFOS (ng/L)	13 J

FBH-FT2-02 (GW)	
Analyte	18 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	3.9 J
PFHxS (ng/L)	83 J
PFNA (ng/L)	ND
PFOA (ng/L)	15 J
PFOS (ng/L)	100 J

FBH-WFT-01 (GW)	
Analyte	35 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOA (ng/L)	ND
PFOS (ng/L)	ND

FBH-WFT-02 (GW)		
Analyte	19 ft.	19 ft.(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	5 J	4.9 J
PFHxS (ng/L)	ND	ND
PFNA (ng/L)	ND	ND
PFOA (ng/L)	ND	ND
PFOS (ng/L)	0.98 J+	1 J+

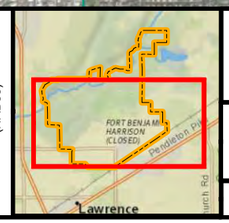
Legend

- Streams
- Groundwater Contours (ft)
- Inferred Groundwater Contours (ft)
- Localized groundwater flow direction
- Areas of Potential Interest (AOPI)
- Installation Boundary
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (11)
- Soil Boring (7)
- Surface Water/Sediment (3)
- Temporary Well (1)
- Existing Monitoring Well

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, Hydrologic Features, and Topographic Contours from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 500 1,000 2,000 Feet

IN STATE PLANE EAST N (NAD83)



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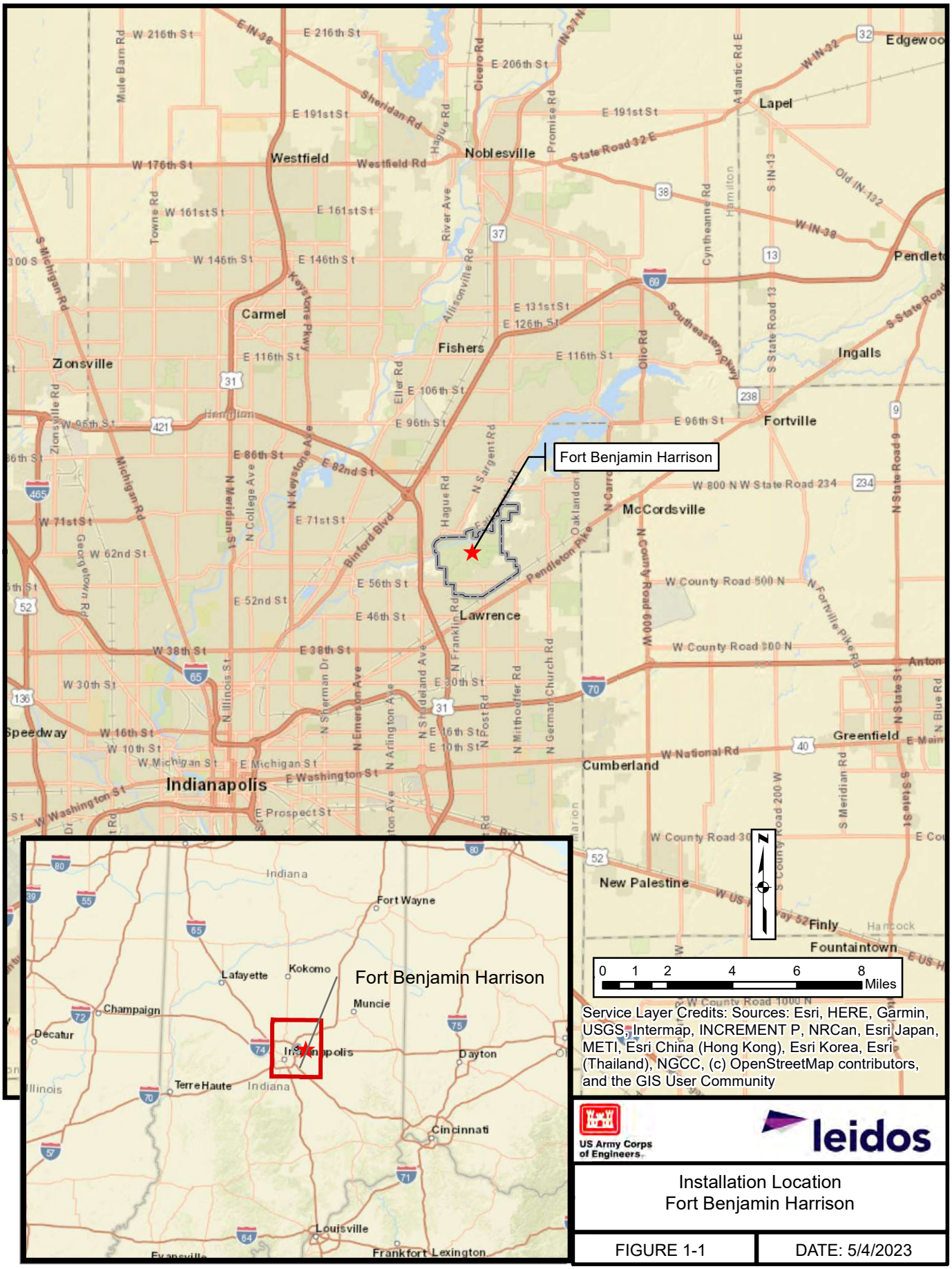
Summary of Target PFAS in Groundwater and Surface Water
Fort Benjamin Harrison

FIGURE ES-1 | DATE: 5/8/2023


Fort Benjamin Harrison
Indianapolis
Carmel
Fishers
Noblesville
Westfield
Lawrence
McCordsville
Fortville
Ingalls
Lapel
Zionsville
Speedway
Cumberland
Greenfield
New Palestine
Finly
Fountaintown
Anton
Pendleton
Edgewoo
Indiana
Fort Wayne
Lafayette
Kokomo
Champaign
Decatur
Muncie
Dayton
Terre Haute
Cincinnati
Louisville
Frankfort
Lexington
0 1 2 4 6 8
Miles
Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
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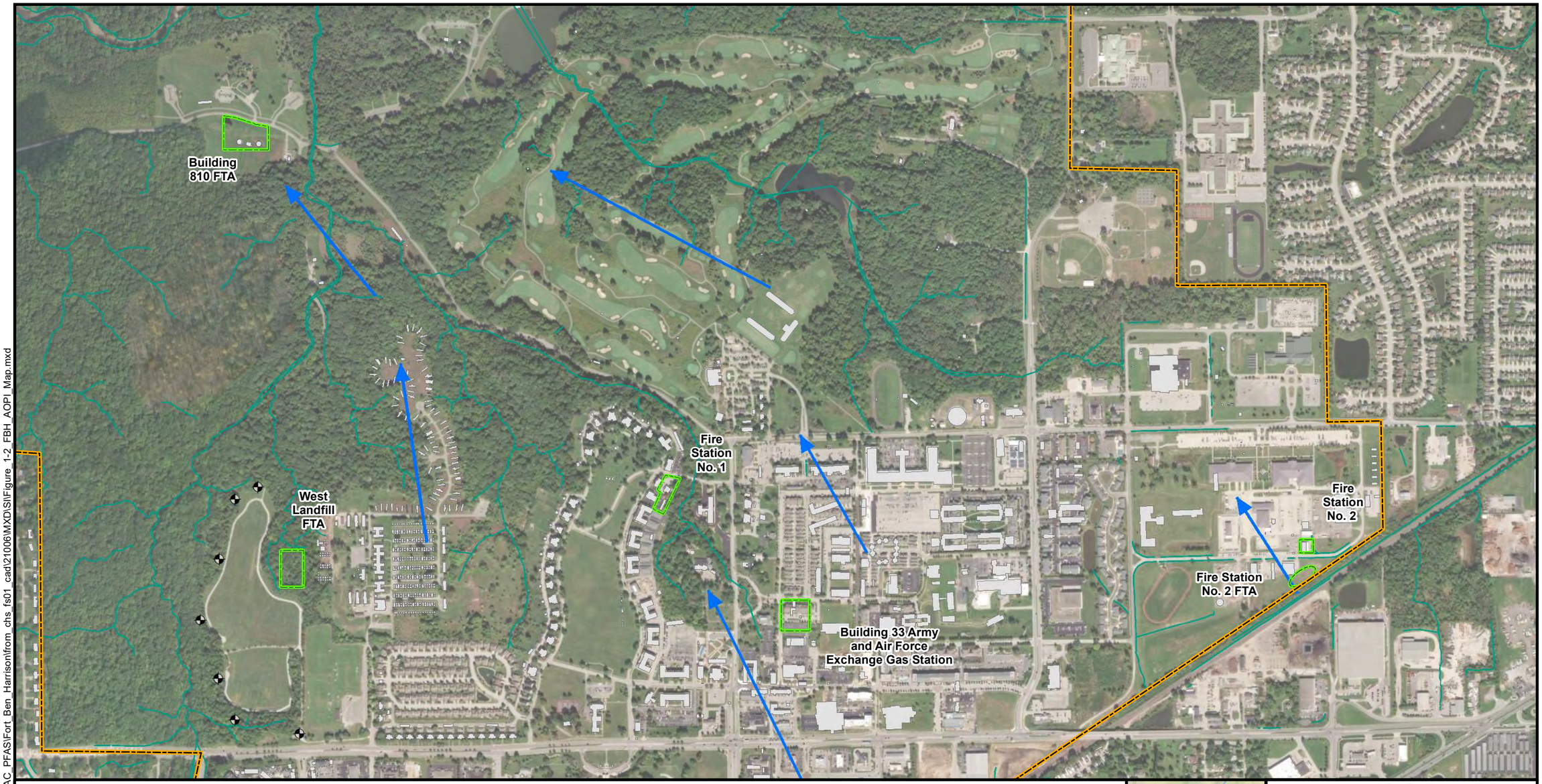
Installation Location
Fort Benjamin Harrison
FIGURE 1-1
DATE: 5/4/2023



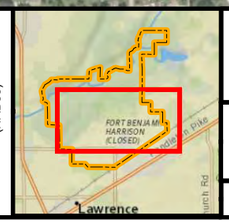
Legend

- Streams
- Localized groundwater flow direction
- Areas of Potential Interest (AOPI)
- Installation Boundary
- Buildings
- Existing Monitoring Well

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, Hydrologic Features, and Topographic Contours from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 500 1,000 2,000 Feet

IN STATE PLANE EAST (NAD83)



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AOPI Locations
Fort Benjamin Harrison

FIGURE 1-2 | DATE: 5/4/2023

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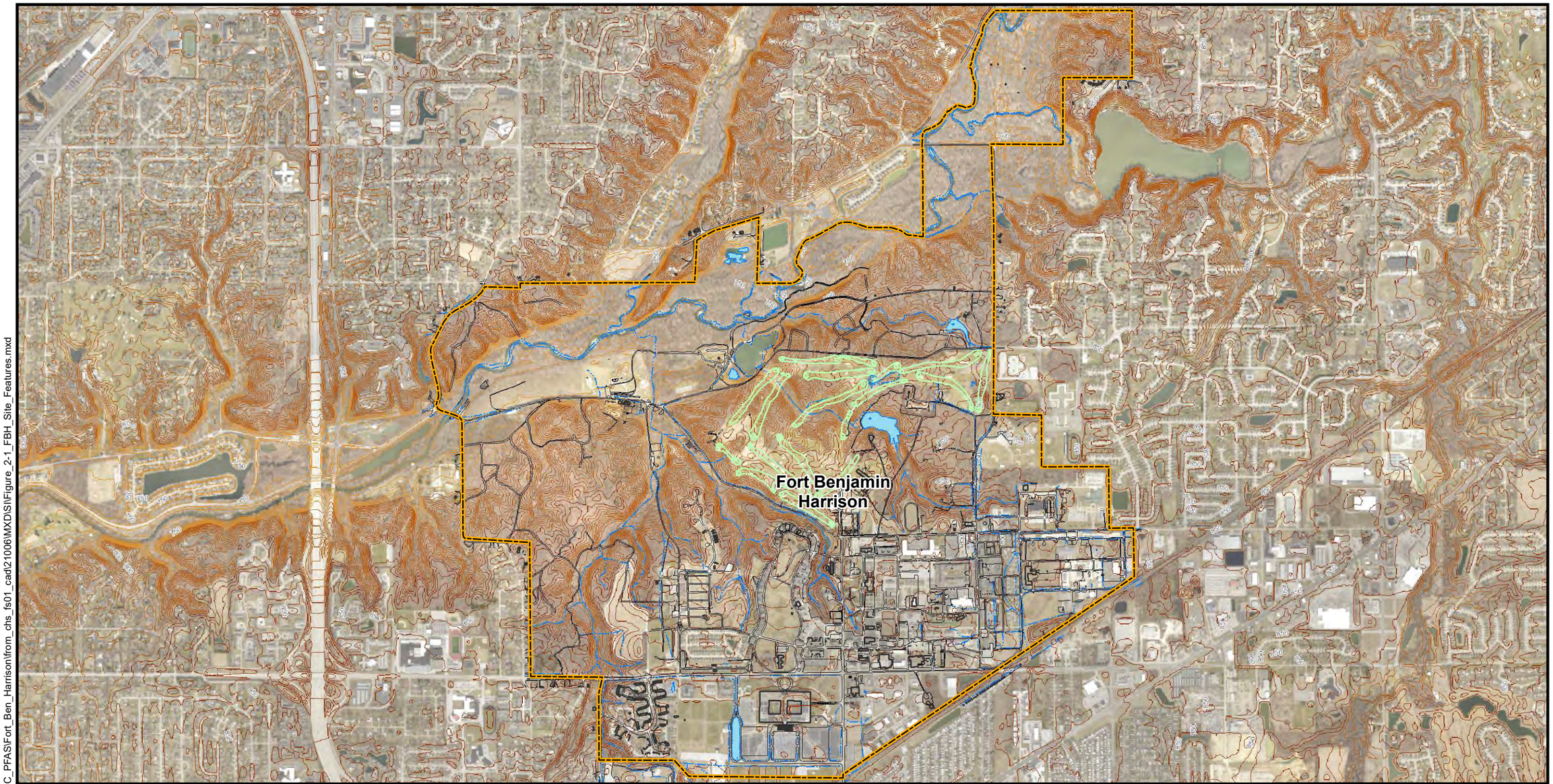

Legend

- Roads
- Buildings
- Golf Course
- Surface Water Feature
- Surface Water
- Installation Boundary

10-foot Contours	Depressions
310 - 510	310 - 510
511 - 610	511 - 610
611 - 675	611 - 675
676 - 720	676 - 720
721 - 770	721 - 770
771 - 825	771 - 825
826 - 890	826 - 890
891 - 1250	891 - 1250

Sources:
Base map feature leidos CAD archives.
Topographic Contours USGS and Indiana DNR (https://gis.in.gov/ArcGIS/rest/services)
National Hydrography Dataset – USGS TNM (https://hydro.nationalmap.gov/arcgis/rest/services)
2021 Aerial Photography State of Indiana (https://xmaps.indy.gov/arcgis/services)

0 0.25 0.5 1 Miles

IN STATE PLANE EAST (NAD83)

US Army Corps of Engineers

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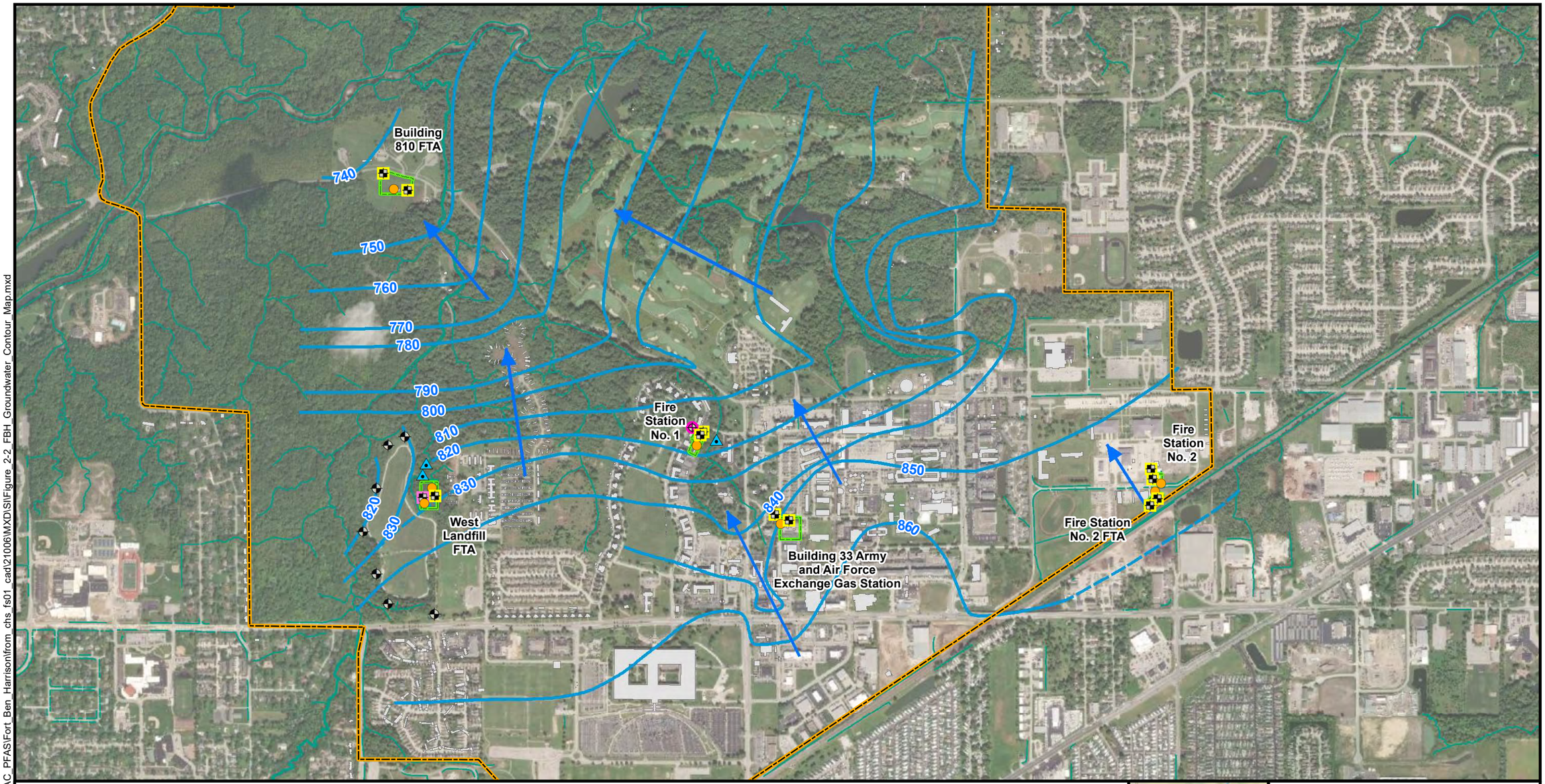
Site Features
Fort Benjamin Harrison

FIGURE 2-1 | DATE: 5/4/2023

C:\Data\Civil_Transfer\GIS\BRAC_PFAS\Fort_Ben_Harrison\from_chs_fs01_cad\21006\MXD\SI\Figure_2-1_FBH_Site_Features.mxd



C:\Data\Civil_Transfer\GIS\BRAC_PFAS\Fort_Ben_Harrison\from_chs_fs01_cad\21006\MXD\SI\Figure_2-2_FBH_Groundwater_Contour_Map.mxd

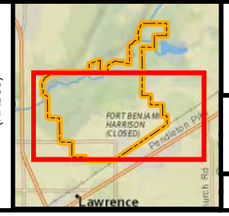
Legend

- Streams
- Groundwater Contours (ft)
- Inferred Groundwater Contours (ft)
- Localized groundwater flow direction
- Areas of Potential Interest (AOPI)
- Installation Boundary
- Buildings
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (11)
- Soil Boring (7)
- Surface Water/Sediment (3)
- Temporary Well (1)
- Existing Monitoring Well

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, Hydrologic Features, and Topographic Contours from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 500 1,000 2,000 Feet

IN STATE PLANE EAST N (NAD83)



US Army Corps of Engineers

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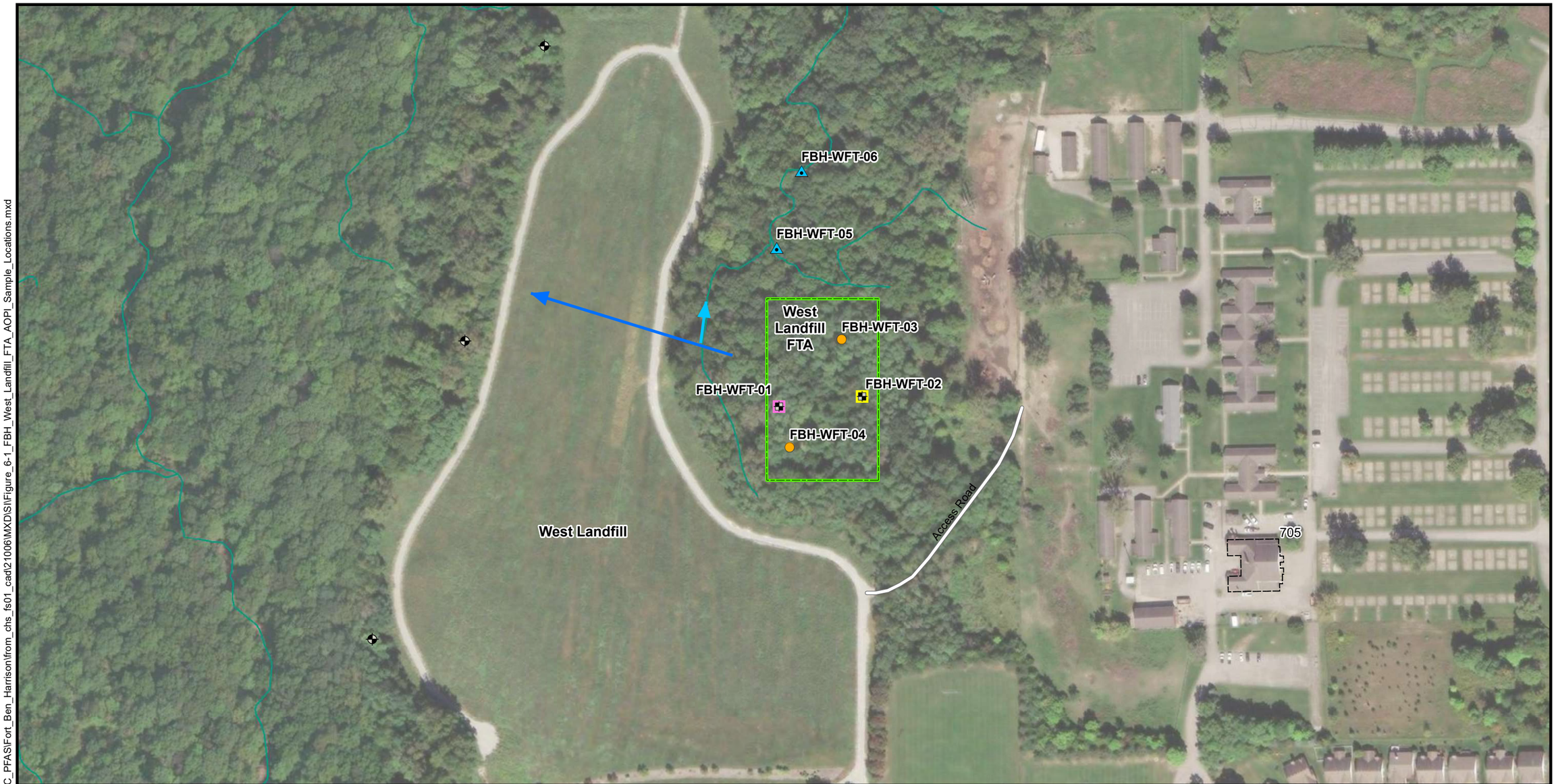
Groundwater Contours
Fort Benjamin Harrison

FIGURE 2-2 | DATE: 5/4/2023



C:\Data\Civil_Transfer\GIS\BRAC_PFAS\Fort_Ben_Harrison\from_chs_fs01_cad\21006\MXD\SI\Figure_6-1_FBH_West_Landfill_FTA_AOPI_Sample_Locations.mxd

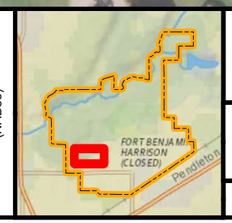
Legend

- Streams
- Surface Water Flow Direction
- Localized groundwater flow direction
- Structure
- Areas of Potential Interest (AOPI)
- Installation Boundary
- Existing Monitoring Well (3)
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)
- Surface Water/Sediment (2)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, and Hydrologic Features from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST (NAD83)



US Army Corps of Engineers

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West Landfill FTA AOPI
Sample Locations
Fort Benjamin Harrison

FIGURE 6-1 | DATE: 5/5/2023

FBH-WFT-06 (SW)		
Analyte	0 ft.	0 ft.(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	6.4 J	6.6 J
PFHxS (ng/L)	63 J+	62 J
PFNA (ng/L)	ND	ND
PFOA (ng/L)	6 J	6.5 J
PFOS (ng/L)	99 J	98 J

FBH-WFT-06 (SD)		
Analyte	0 ft.	0 ft.(D)
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	0.068 J	0.084 J
PFNA (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND
PFOS (µg/kg)	0.5 J	0.6 J

FBH-WFT-05 (SD)	
Analyte	0 ft.
HFPO-DA or GenX (µg/kg)	ND
PFBS (µg/kg)	ND
PFHxS (µg/kg)	ND
PFNA (µg/kg)	ND
PFOA (µg/kg)	ND
PFOS (µg/kg)	0.39 J

FBH-WFT-01 (GW)	
Analyte	35 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOA (ng/L)	ND
PFOS (ng/L)	ND

FBH-WFT-04 (SO)			
Analyte	0 ft.	5-7 ft.	9.8-11.8 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	0.089 J	ND	ND
PFOA (µg/kg)	0.079 J	ND	ND
PFOS (µg/kg)	0.23 J	ND	ND

FBH-WFT-03 (SO)				
Analyte	0 ft.	0 ft.(D)	8-10 ft.	15-17 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND	ND
PFNA (µg/kg)	0.094 J	0.099 J	ND	ND
PFOA (µg/kg)	0.19 J	0.17 J	ND	ND
PFOS (µg/kg)	0.27 J	0.21 J	ND	ND

FBH-WFT-02 (SO)			
Analyte	0 ft.	6-8 ft.	11-13 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	0.095 J	ND	ND

FBH-WFT-02 (GW)		
Analyte	19 ft.	19 ft.(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	5 J	4.9 J
PFHxS (ng/L)	ND	ND
PFNA (ng/L)	ND	ND
PFOA (ng/L)	ND	ND
PFOS (ng/L)	0.98 J+	1 J+

The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water and Soil using an HQ = 0.1. Highlighted values indicate an exceedance of the Screening Level

Screening Levels from the July 2022 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA)	6	23
Perfluorobutanesulfonic acid (PFBS)	601	1900
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	6	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

FBH-WFT-06
FBH-WFT-05
West Landfill FTA
FBH-WFT-03
FBH-WFT-01
FBH-WFT-02
FBH-WFT-04
West Landfill
Access Road
705

Notes:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
ND = Nondetect
GW = Groundwater, SW = Surfacewater,
SO = Soil, SD = Sediment
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
J+ = The analyte was positively identified; the result is an estimated concentration and may be biased high

Legend
- Streams
- Surface Water Flow Direction
- Localized groundwater flow direction
- Structure
- Areas of Potential Interest (AOPI)
- Installation Boundary
- Existing Monitoring Well (3)
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)
- Surface Water/Sediment (2)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, and Hydrologic Features from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST (NAD83)

FORT BENJAMIN HARRISON (CLOSED)
Pendleton

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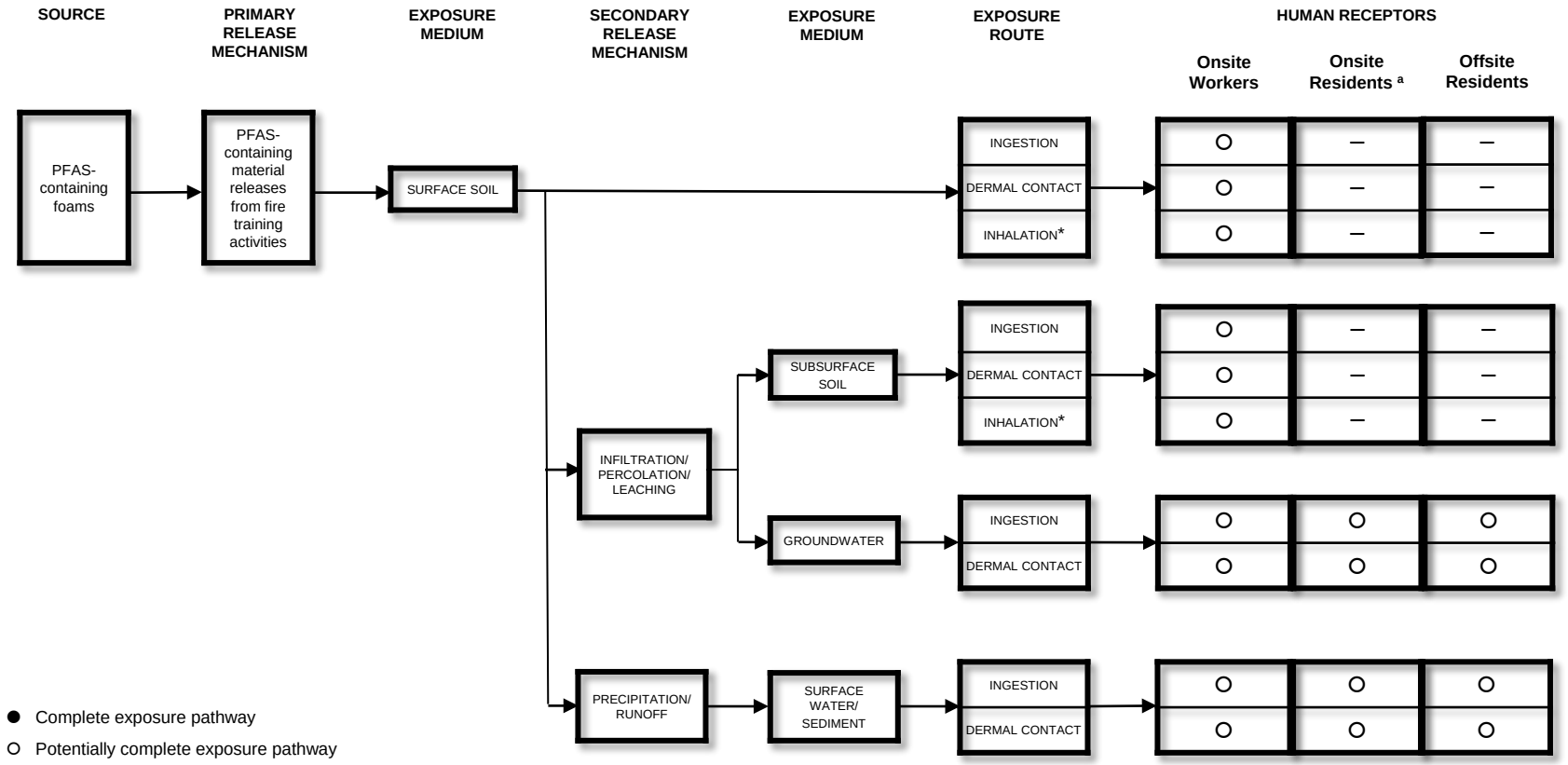
West Landfill FTA AOPI
Sample Results
Fort Benjamin Harrison

FIGURE 6-2 | DATE: 5/4/2023

C:\Data\Civil_Transfer\GIS\BRAC_PFAS\Fort_Ben_Harrison\from_chs_fs01_cad\21006\MXD\S\Figure_6-2_FBH_West_Landfill_FTA_AOPI_Sample_Results.mxd



[a] Proposed land use at this AOPI is recreational; presently no residential pathway exists. However, onsite residents are evaluated for the potential migration (i.e., groundwater and surface water) to residents on the former FBH.

* Inhalation of PFAS is considered potentially complete because no toxicity information is available for the inhalation route

Figure 6-3. Human Health CSM for West Landfill FTA AOPI

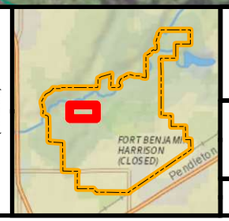
Legend

- Streams
- Surface Water Flow Direction
- Localized groundwater flow direction
- Structure
- Areas of Potential Interest (AOPI)
- Installation Boundary
- DPT Groundwater Sample/Soil Boring (2)
- Soil Boring (1)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, and Hydrologic Features, from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC)
and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST (NAD83)



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Building 810 FTA AOPI
Sample Locations
Fort Benjamin Harrison

FIGURE 6-4 | DATE: 5/4/2023

C:\Data\Civil_Transfer\GIS\BRAC_PFAS\Fort_Ben_Harrison\from_chs_fs01_cad\21006\MXD\SI\Figure_6-4_FBH_810_FTA_AOPI_Sample_Locations.mxd

FBH-810-01 (SO)				
Analyte	0 ft.	5-7 ft.	11-13 ft.	11-13 ft.(D)
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND	ND
PFOA (µg/kg)	0.071 J	ND	ND	ND
PFOS (µg/kg)	0.11 J	ND	ND	ND

FBH-810-01 (GW)	
Analyte	20 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	2.8 J
PFHxS (ng/L)	9.4 J+
PFNA (ng/L)	3.7 J
PFOA (ng/L)	11 J
PFOS (ng/L)	37 J

The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water and Soil using an HQ = 0.1. Highlighted values indicate an exceedance of the Screening Level

Screening Levels from the July 2022 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
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Perfluorobutanesulfonic acid (PFBS)	601	1900
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	6	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

FBH-810-01

Building 810 FTA

Shafter Road

Lawrence Creek

FBH-810-03

810

FBH-810-02

Final Sedimentation Tank (later Fire Training Area)

Final Sedimentation Tank (later Fire Training Area)

FBH-810-02 (SO)			
Analyte	0 ft.	1-3 ft.	16-18 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	0.23 J	0.92 J	2.5 J
PFNA (µg/kg)	1.4 J+	1.7 J	0.11 J
PFOA (µg/kg)	1.8 J+	2.9 J	0.48 J
PFOS (µg/kg)	1.5 J	9.8 J	25 J

FBH-810-02 (GW)	
Analyte	23 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	5.2 J
PFHxS (ng/L)	34 J
PFNA (ng/L)	6.6 J
PFOA (ng/L)	24 J
PFOS (ng/L)	310 J

FBH-810-03 (SO)			
Analyte	0 ft.	5-7 ft.	15-17 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	0.11 J	0.12 J
PFNA (µg/kg)	ND	ND	ND
PFOA (µg/kg)	0.11 J	0.21 J	0.41 J
PFOS (µg/kg)	0.14 J	ND	0.071 J

Notes:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
ND = Nondetect
GW = Groundwater,SO = Soil
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
J+ = The analyte was positively identified; the result is an estimated concentration and may be biased high

Legend
- Streams
- Surface Water Flow Direction
- Localized groundwater flow direction
- Structure
- Areas of Potential Interest (AOPI)
- Installation Boundary
- DPT Groundwater Sample/Soil Boring (2)
- Soil Boring (1)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, and Hydrologic Features, from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST (NAD83)

FORT BENJAMIN HARRISON (CLOSED) Pendleton

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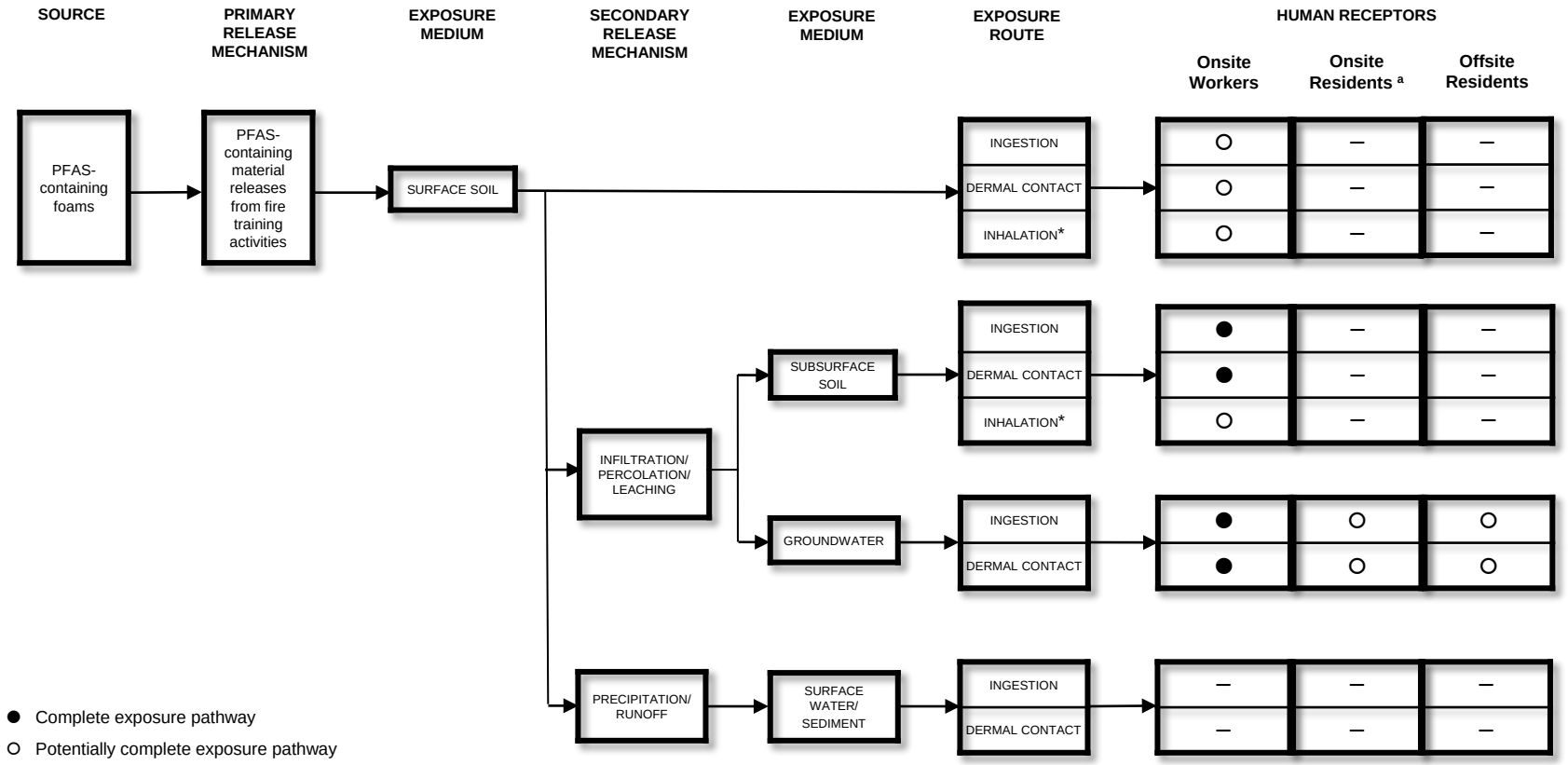
Building 810 FTA AOPI
Sample Results
Fort Benjamin Harrison

FIGURE 6-5 | DATE: 5/5/2023

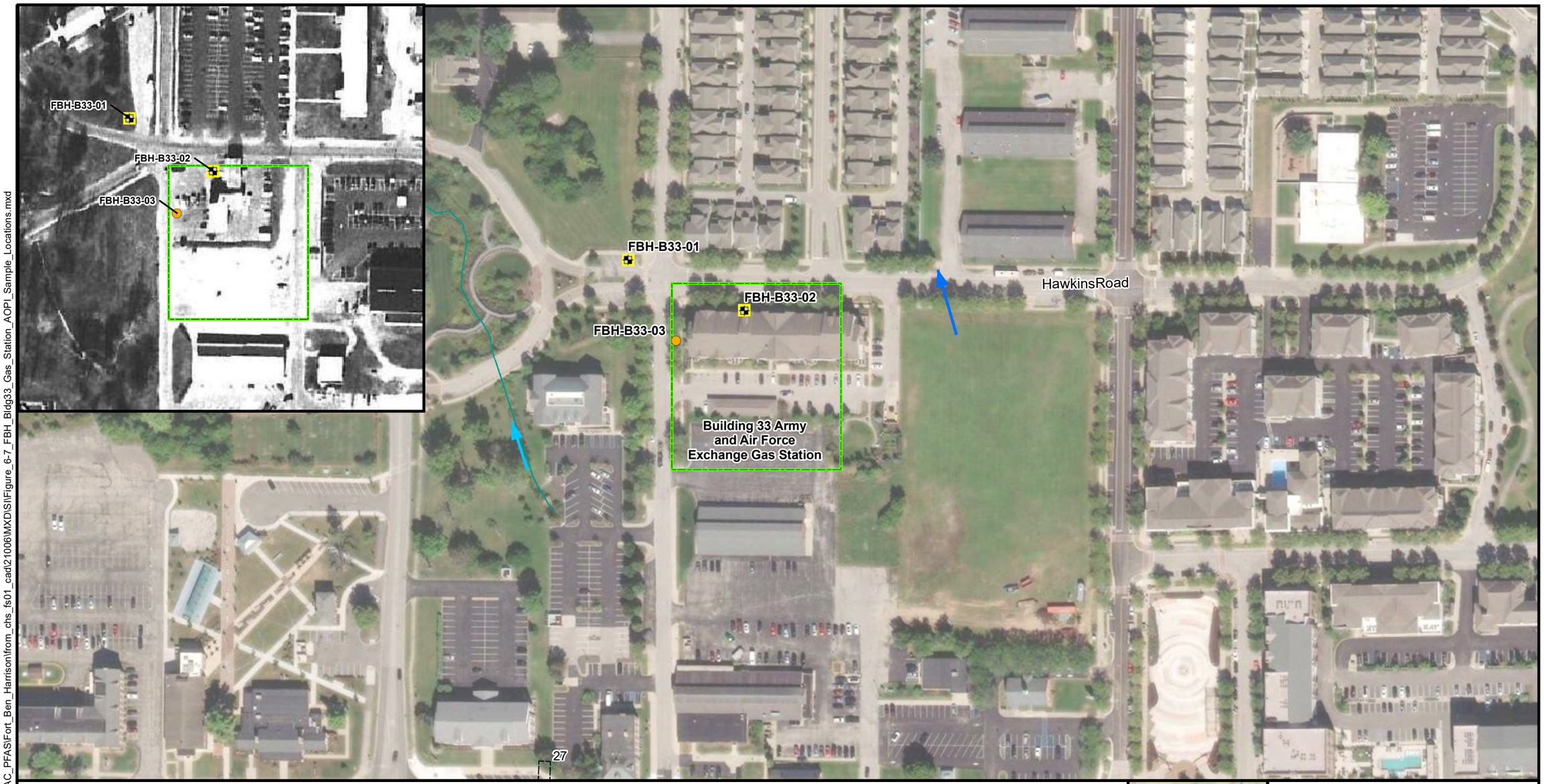
C:\Data\Civil_Transfer\GIS\BRAC_PFAS\Fort_Ben_Harrison\from_chs_fs01_cad\21006\MXD\SI\Figure_6-5_FBH_810_FTA_AOPI_Smaple_Results.mxd



[a] Current land use at this AOPI is recreational; presently no residential pathway exists. However, onsite residents are evaluated for the potential migration (i.e., groundwater and surface water) to residents on the former FBH.

* Inhalation of PFAS is considered potentially complete because no toxicity information is available for the inhalation route

Figure 6-6. Human Health CSM for Building 810 FTA AOPI



C:\Data\Civil_Transfer\GIS\BRAC_PFAS\Fort_Ben_Harrison\from_chs_fs01_cad\21006\MXD\SI\Figure_6-7_FBH_Bldg33_Gas_Station_AOPI_Sample_Locations.mxd

Legend

- Streams
- Surface Water Flow Direction
- Localized groundwater flow direction
- Structure
- Areas of Potential Interest (AOPI)
- Installation Boundary
- DPT Groundwater Sample/Soil Boring (2)
- Soil Boring (1)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, and Hydrologic Features, from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC)
and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST (NAD83)

US Army Corps of Engineers

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Building 33 Gas Station AOPI
Sample Locations
Fort Benjamin Harrison

FIGURE 6-7 | DATE: 5/5/2023

FBH-B33-01 (SO)				
Analyte	0 ft.	0 ft.(D)	4-6 ft.	8-10 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	ND
PFHxS (µg/kg)	0.068 J	0.076 J	3.5 J	0.27 J
PFNA (µg/kg)	0.16 J	0.18 J	ND	ND
PFOA (µg/kg)	0.39 J	0.39 J	1.3 J	0.092 J
PFOS (µg/kg)	3.3 J	3.5 J	0.57 J	0.26 J

FBH-B33-01 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	2 J
PFHxS (ng/L)	5.7 J
PFNA (ng/L)	1.3 J
PFOA (ng/L)	10 J
PFOS (ng/L)	14 J

Screening Levels from the July 2022 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA)	6	23
Perfluorobutanesulfonic acid (PFBS)	601	1900
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	6	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water and Soil using an HQ = 0.1. Highlighted values indicate an exceedance of the Screening Level

FBH-B33-01

FBH-B33-02

FBH-B33-03

Building 33 Army and Air Force Exchange Gas Station

HawkinsRoad

FBH-B33-02 (SO)			
Analyte	0 ft.	6-8 ft.	12-14 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	0.087 J	0.22 J
PFNA (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	0.12 J	0.84 J	1 J

FBH-B33-02 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	7.8 J
PFHxS (ng/L)	32 J
PFNA (ng/L)	2.3 J
PFOA (ng/L)	32 J
PFOS (ng/L)	36 J

FBH-B33-03 (SO)			
Analyte	0 ft.	5-6 ft.	6-8 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	0.11 J	ND	ND
PFOA (µg/kg)	0.16 J	ND	ND
PFOS (µg/kg)	0.58 J	ND	ND

27

Notes:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
ND = Nondetect
GW = Groundwater,SO = Soil
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

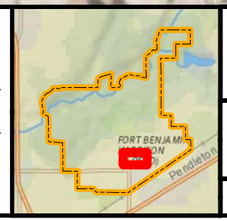
Legend

- Streams
- Surface Water Flow Direction
- Localized groundwater flow direction
- Structure
- Areas of Potential Interest (AOPI)
- Installation Boundary
- DPT Groundwater Sample/Soil Boring (2)
- Soil Boring (1)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, and Hydrologic Features, from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST (NAD83)



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Building 33 Gas Station AOPI
Sample Results
Fort Benjamin Harrison

FIGURE 6-8 | DATE: 5/4/2023

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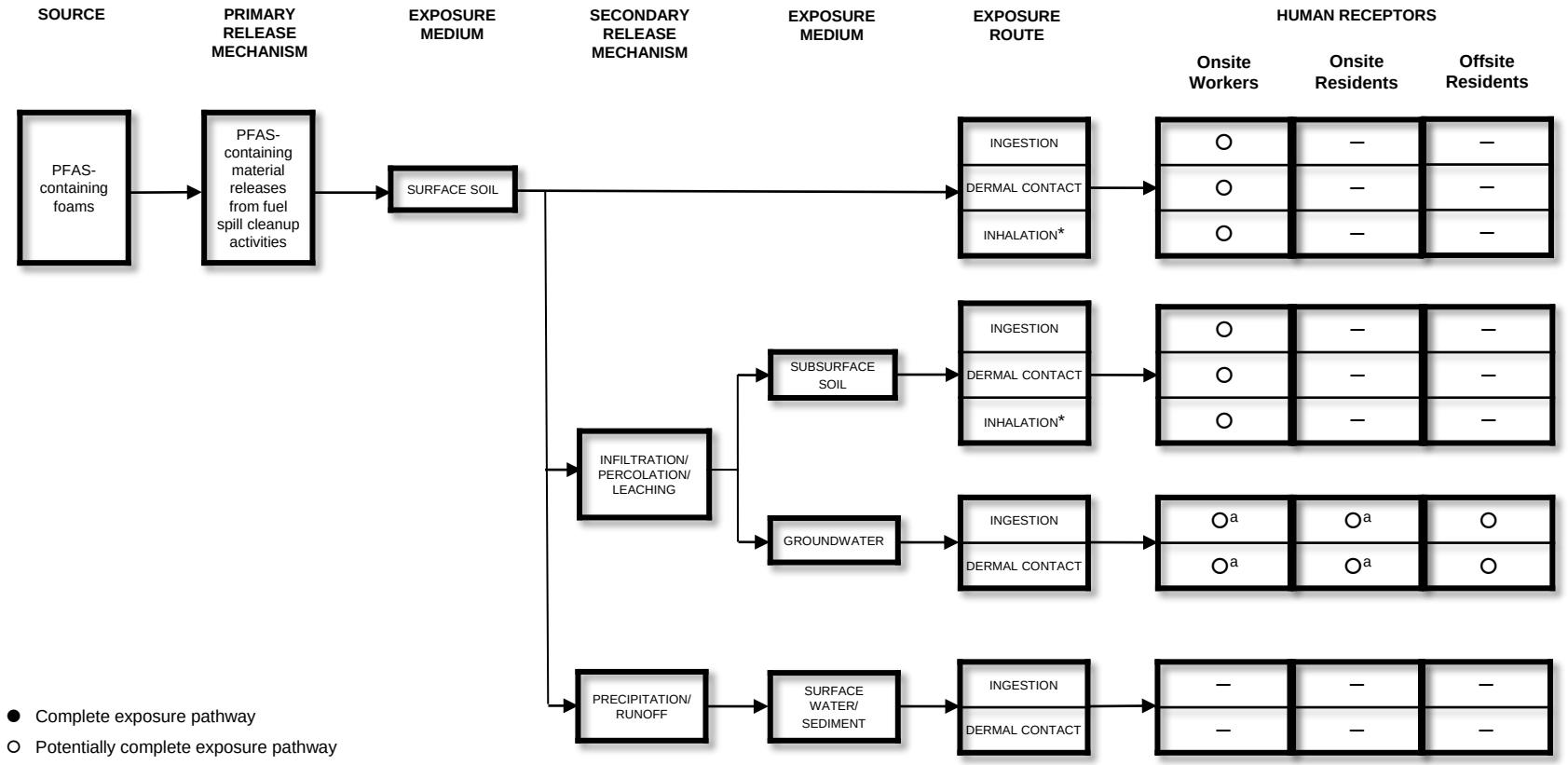

Figure 6-9. Human Health CSM for Building 33 Gas Station AOPI

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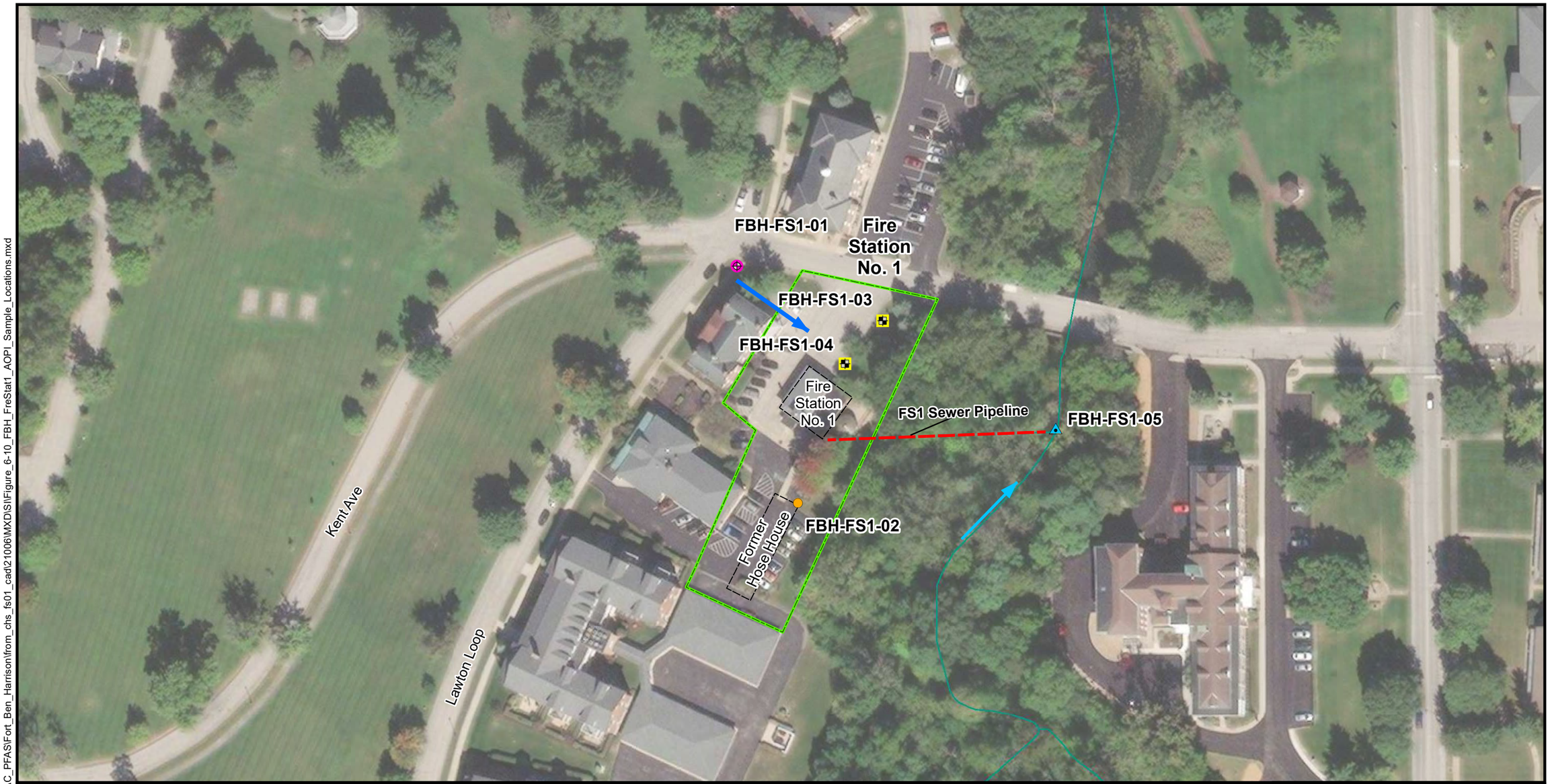

Legend

- Streams
- Surface Water Flow Direction
- Localized groundwater flow direction
- Structure
- Areas of Potential Interest (AOPI)
- Sewer Pipe FS1
- Installation Boundary
- DPT Groundwater Sample/Soil Boring (2)
- Soil Boring (1)
- Surface Water/Sediment (1)
- Temporary Well (1)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, and Hydrologic Features, from
State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST (NAD83)

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Fire Station No.1 AOPI
Sample Locations
Fort Benjamin Harrison

FIGURE 6-10 | DATE: 5/4/2023

The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water and Soil using an HQ = 0.1. Highlighted values indicate an exceedance of the Screening Level

Screening Levels from the July 2022 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA)	6	23
Perfluorobutanesulfonic acid (PFBS)	601	1900
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	6	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

FBH-FS1-01 (GW)	
Analyte	11 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	1.1 J
PFHxS (ng/L)	22 J-
PFNA (ng/L)	ND
PFOA (ng/L)	17 J-
PFOS (ng/L)	89 J

FBH-FS1-03 (SO)			
Analyte	0 ft.	8-10 ft.	13-15 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	0.097 J
PFHxS (µg/kg)	1.2 J	1.3 J	6.9 J
PFNA (µg/kg)	1.2 J	0.38 J	ND
PFOA (µg/kg)	1.2 J	0.57 J	0.75 J
PFOS (µg/kg)	18 J	76 J	15 J

FBH-FS1-03 (GW)	
Analyte	20 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	430
PFHxS (ng/L)	5700 J
PFNA (ng/L)	13
PFOA (ng/L)	620 J
PFOS (ng/L)	2500 J

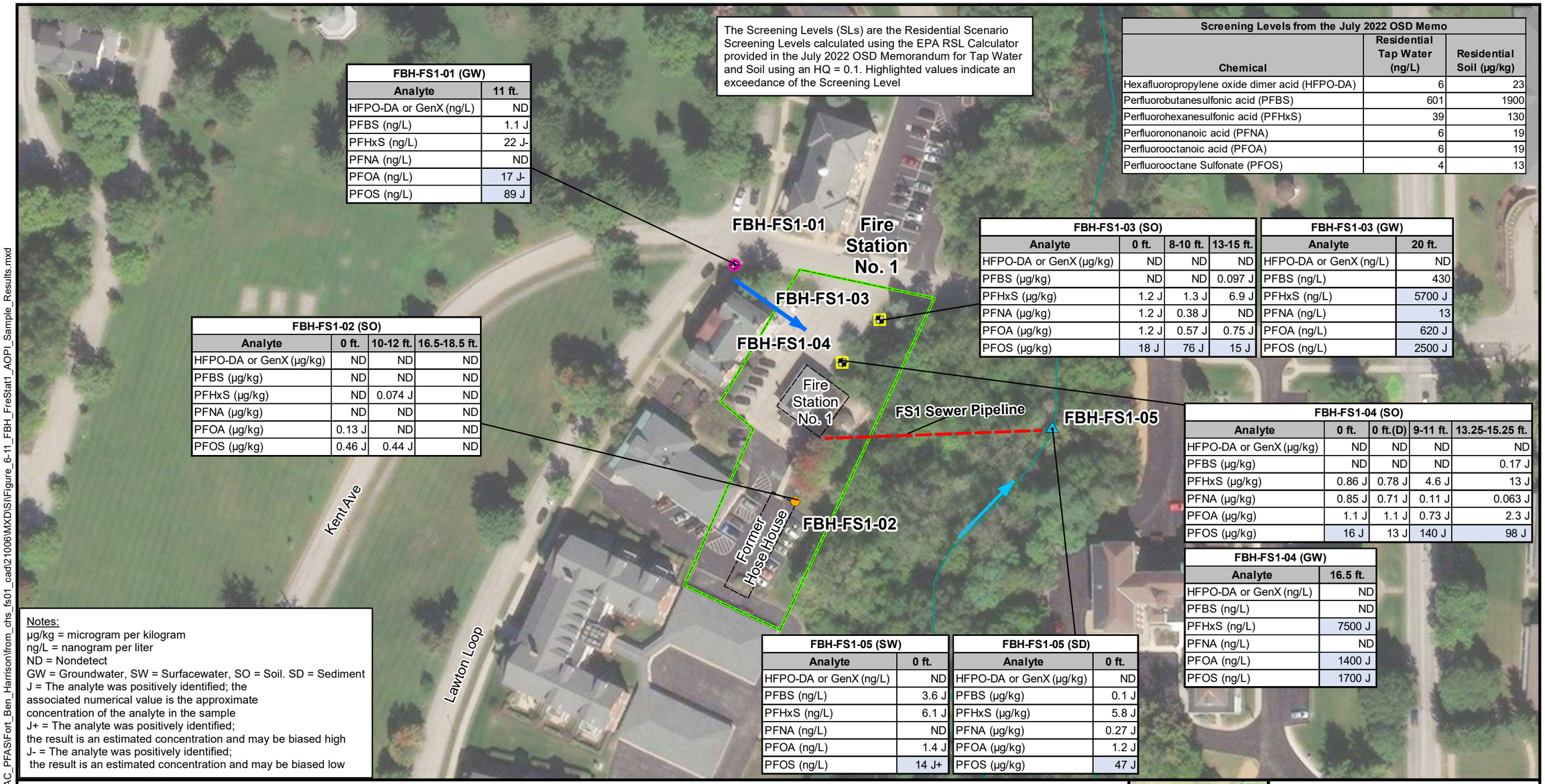
FBH-FS1-02 (SO)			
Analyte	0 ft.	10-12 ft.	16.5-18.5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	0.074 J	ND
PFNA (µg/kg)	ND	ND	ND
PFOA (µg/kg)	0.13 J	ND	ND
PFOS (µg/kg)	0.46 J	0.44 J	ND

FBH-FS1-04 (SO)				
Analyte	0 ft.	0 ft.(D)	9-11 ft.	13.25-15.25 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	0.17 J
PFHxS (µg/kg)	0.86 J	0.78 J	4.6 J	13 J
PFNA (µg/kg)	0.85 J	0.71 J	0.11 J	0.063 J
PFOA (µg/kg)	1.1 J	1.1 J	0.73 J	2.3 J
PFOS (µg/kg)	16 J	13 J	140 J	98 J

FBH-FS1-04 (GW)	
Analyte	16.5 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	7500 J
PFNA (ng/L)	ND
PFOA (ng/L)	1400 J
PFOS (ng/L)	1700 J

FBH-FS1-05 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	3.6 J
PFHxS (ng/L)	6.1 J
PFNA (ng/L)	ND
PFOA (ng/L)	1.4 J
PFOS (ng/L)	14 J+

FBH-FS1-05 (SD)	
Analyte	0 ft.
HFPO-DA or GenX (µg/kg)	ND
PFBS (µg/kg)	0.1 J
PFHxS (µg/kg)	5.8 J
PFNA (µg/kg)	0.27 J
PFOA (µg/kg)	1.2 J
PFOS (µg/kg)	47 J



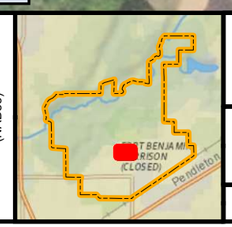
Notes:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
ND = Nondetect
GW = Groundwater, SW = Surfacewater, SO = Soil. SD = Sediment
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
J+ = The analyte was positively identified; the result is an estimated concentration and may be biased high
J- = The analyte was positively identified; the result is an estimated concentration and may be biased low

Legend
- Streams
- Surface Water Flow Direction
- Localized groundwater flow direction
- Structure
- Areas of Potential Interest (AOPI)
- Sewer Pipe FS1
- Installation Boundary
- DPT Groundwater Sample/Soil Boring (2)
- Soil Boring (1)
- Surface Water/Sediment (1)
- Temporary Well (1)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Parcel Boundaries, and Hydrologic Features, from State of Indiana (https://xmaps.indy.gov/arcgis/services).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST N (NAD83)



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Fire Station No.1 AOPI
Sample Results
Fort Benjamin Harrison

FIGURE 6-11 | DATE: 5/4/2023

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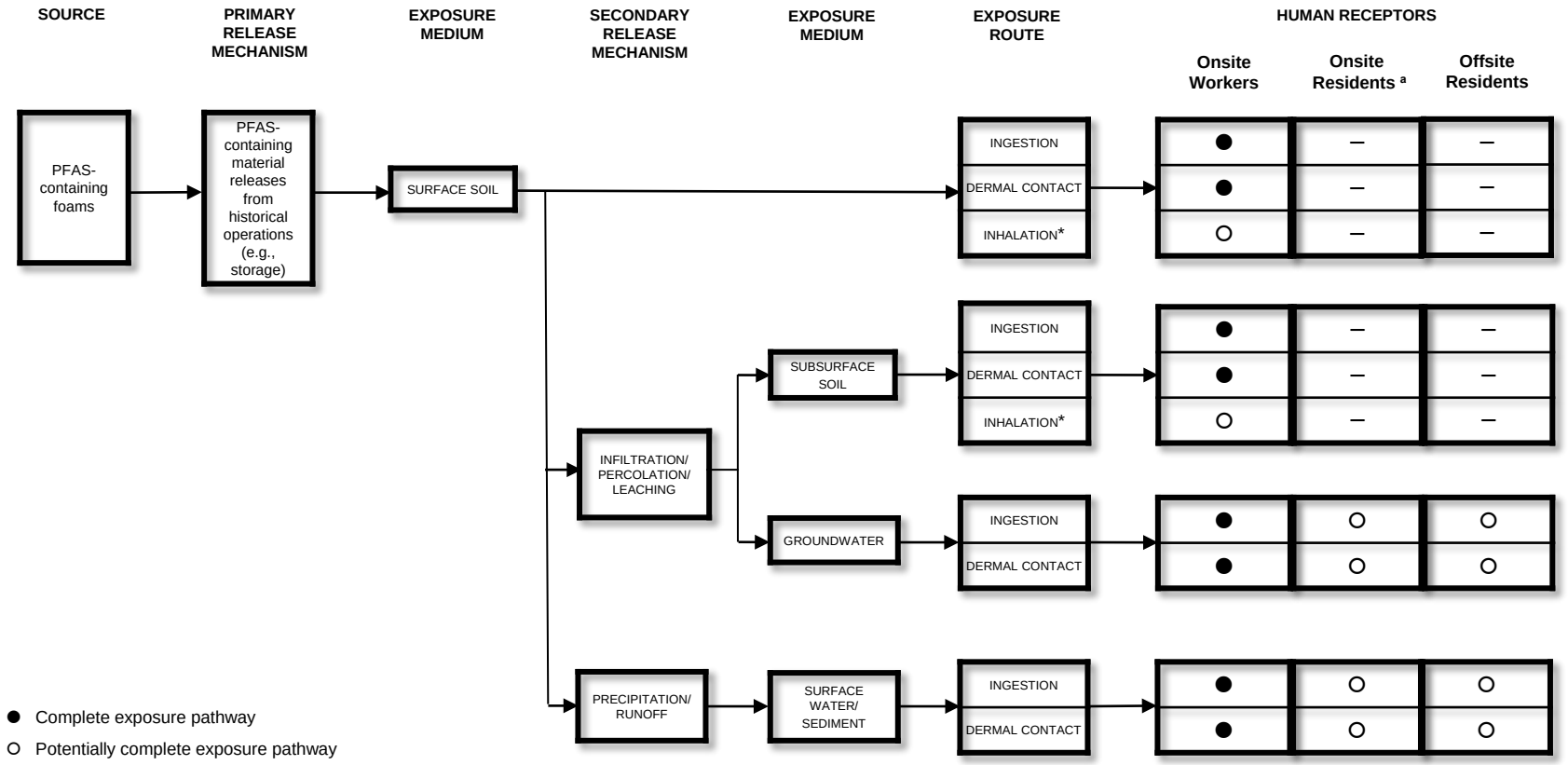
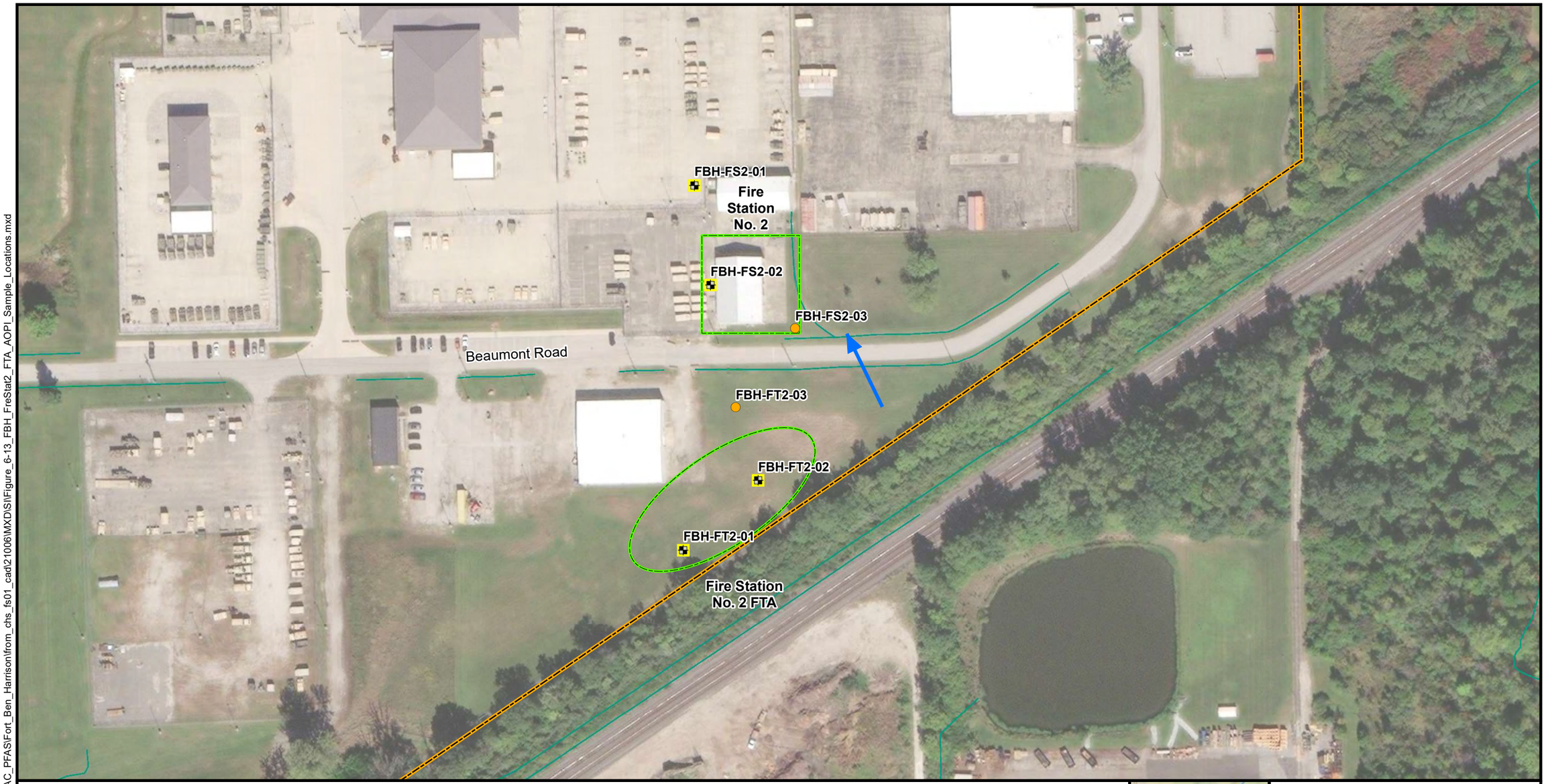


[a] Current land use at this AOPI is mixed; presently no residential pathway exists. However, onsite residents are evaluated for the potential migration (i.e., groundwater and surface water) to residents on the former FBH.

* Inhalation of PFAS is considered potentially complete because no toxicity information is available for the inhalation route

Figure 6-12. Human Health CSM for Fire Station No. 1 AOPI



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Legend

- Streams
- Localized groundwater flow direction
- Areas of Potential Interest (AOPI)
- Installation Boundary
- DPT Groundwater Sample/Soil Boring (4)
- Soil Boring (2)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

N
IN STATE PLANE EAST (NAD83)

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Fire Station No.2 and FTA AOPIs
Sample Locations
Fort Benjamin Harrison

FIGURE 6-13 | DATE: 5/5/2023

FBH-FS2-01 (SO)		
Analyte	0 ft.	2-4.6 ft.
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND
PFOS (µg/kg)	0.072 J	ND

FBH-FS2-01 (GW)		
Analyte	8 ft.	8 ft.(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	1.7 J	2.3
PFHxS (ng/L)	15	22
PFNA (ng/L)	ND	ND
PFOA (ng/L)	3.8	6.1
PFOS (ng/L)	120	150

FBH-FS2-02 (SO)		
Analyte	3-5 ft.	3-5 ft.(D)
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOA (µg/kg)	0.075 J	0.067 J
PFOS (µg/kg)	ND	ND

FBH-FS2-02 (GW)	
Analyte	11.5 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	3.8 J
PFHxS (ng/L)	15 J
PFNA (ng/L)	ND
PFOA (ng/L)	25 J
PFOS (ng/L)	3.2 J

FBH-FS2-03 (SO)			
Analyte	0 ft.	1-3 ft.	3-5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	0.11 J	ND

The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water and Soil using an HQ = 0.1. Highlighted values indicate an exceedance of the Screening Level

Screening Levels from the July 2022 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA)	6	23
Perfluorobutanesulfonic acid (PFBS)	601	1900
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	6	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

FBH-FT2-03 (SO)			
Analyte	0 ft.	2-4 ft.	4.5-6.5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	0.17 J	0.29 J	0.4 J
PFHxS (µg/kg)	1.9 J	9.6 J	3 J
PFNA (µg/kg)	0.36 J	ND	ND
PFOA (µg/kg)	0.72 J	0.42 J	0.11 J
PFOS (µg/kg)	5.8 J	1.3 J	0.067 J

FBH-FT2-02 (SO)				
Analyte	0 ft.	3-5 ft.	5-7 ft.	5-7 ft.(D)
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND	ND
PFNA (µg/kg)	0.075 J	ND	ND	ND
PFOA (µg/kg)	0.11 J	ND	ND	ND
PFOS (µg/kg)	0.27 J	ND	ND	ND

FBH-FT2-02 (GW)	
Analyte	18 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	3.9 J
PFHxS (ng/L)	83 J
PFNA (ng/L)	ND
PFOA (ng/L)	15 J
PFOS (ng/L)	100 J

FBH-FT2-01 (SO)			
Analyte	0 ft.	2-4 ft.	4-6 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	0.11 J	ND	ND
PFOA (µg/kg)	0.13 J	ND	ND
PFOS (µg/kg)	0.2 J	ND	ND

FBH-FT2-01 (GW)	
Analyte	18 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	1 J
PFNA (ng/L)	1.3 J
PFOA (ng/L)	1.9 J
PFOS (ng/L)	13 J

FBH-FS2-01
Fire Station No. 2
FBH-FS2-02
FBH-FS2-03
Beaumont Road
FBH-FT2-03
FBH-FT2-02
FBH-FT2-01
Fire Station No. 2 FTA

Notes:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
ND = Nondetect
GW = Groundwater, SO = Soil
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

Legend
- Streams
- Localized groundwater flow direction
- Areas of Potential Interest (AOPI)
- Installation Boundary
- DPT Groundwater Sample/Soil Boring (4)
- Soil Boring (2)

Sources:
Background Imagery: ESRI World Imagery (Vivid/Maxar,11/2021).
Groundwater contours and flow arrows based on January 31, 1997 water level measurements (SAIC) and April 1999 West Landfill contours (Ellis Environmental).

0 100 200 400 Feet

IN STATE PLANE EAST (NAD83)

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Fire Station No.2 and FTA AOPIs
Sample Results
Fort Benjamin Harrison

FIGURE 6-14 | DATE: 5/5/2023

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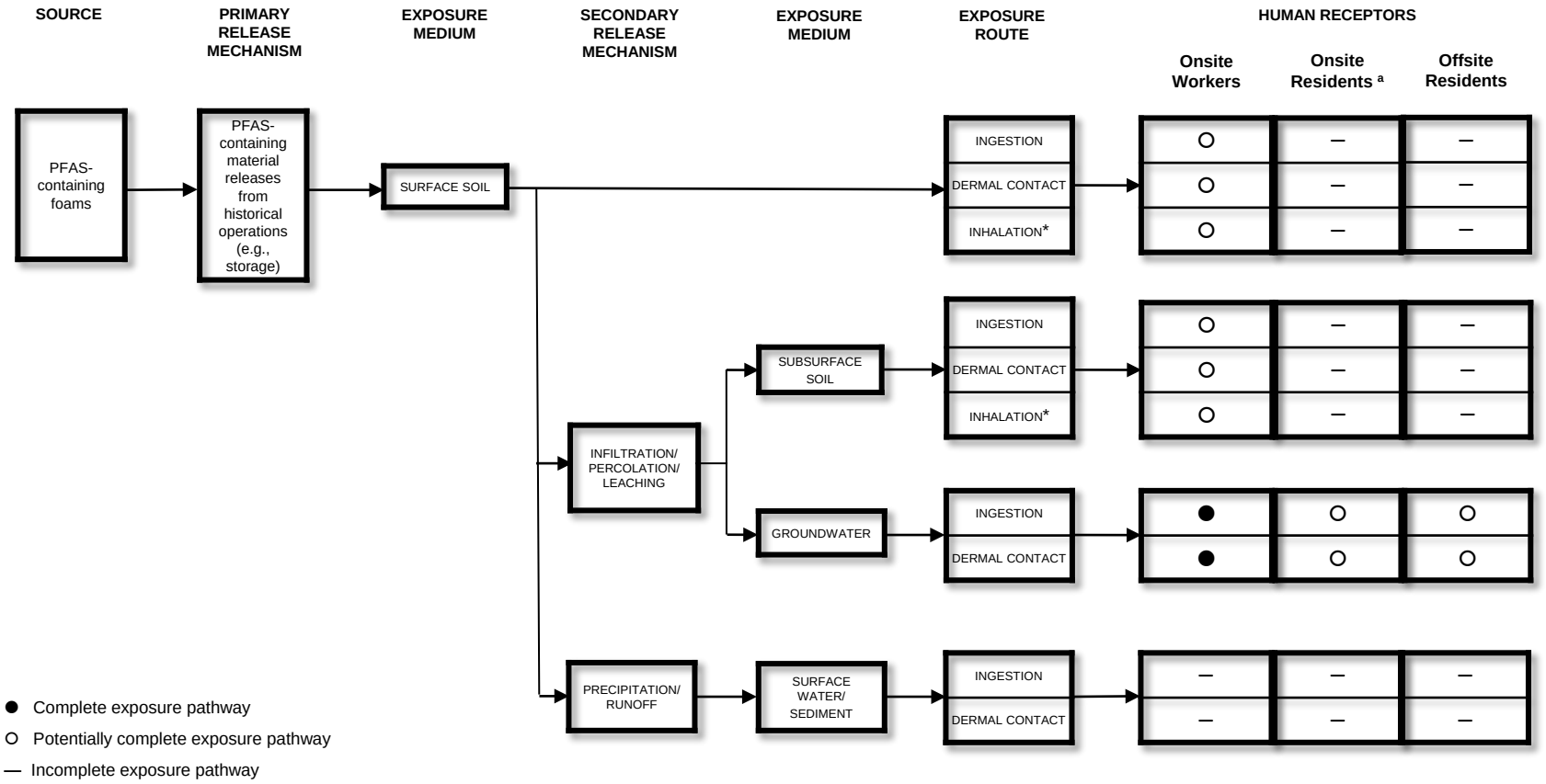
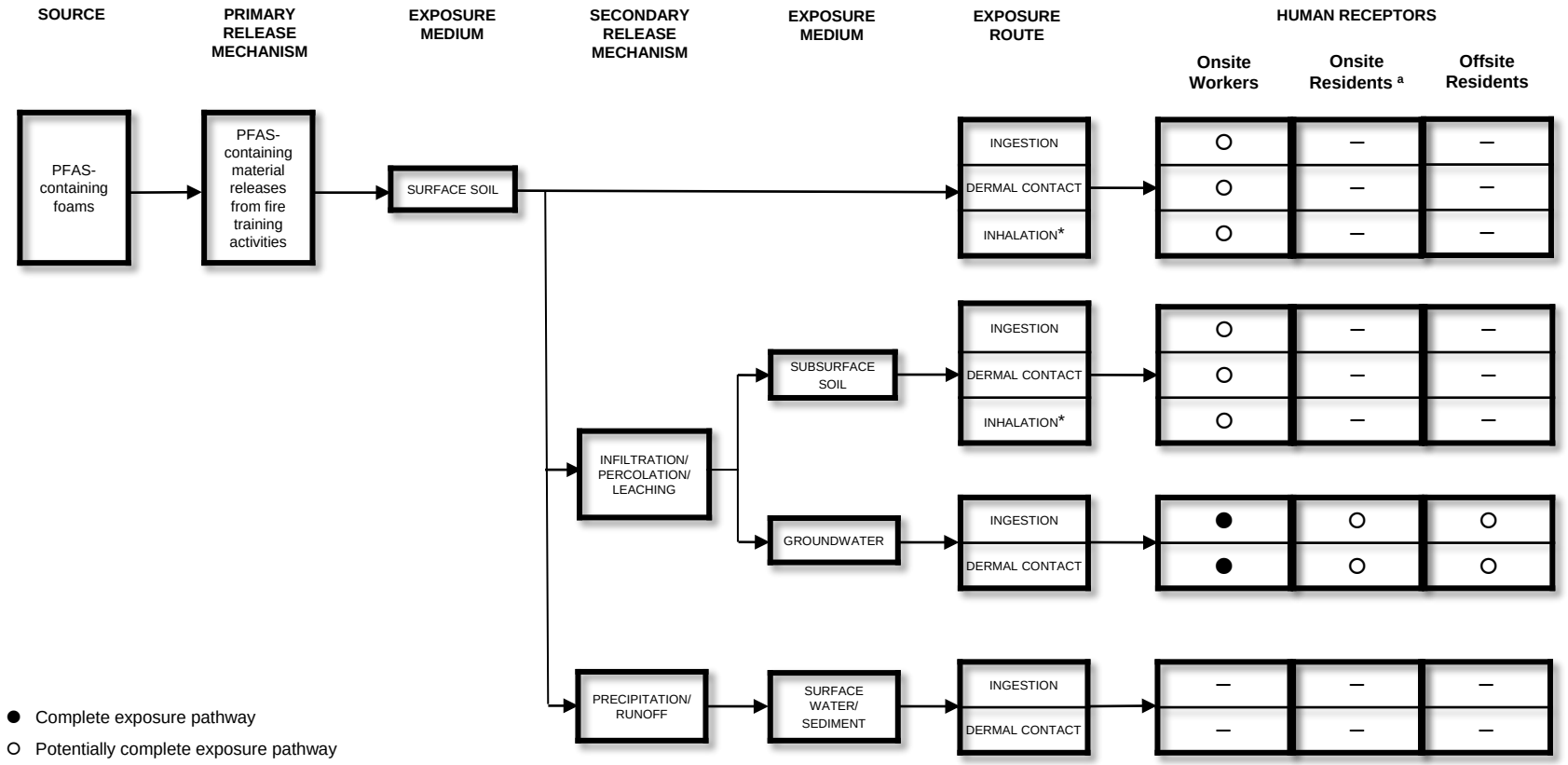


[a] Current land use at this AOPI is industrial (Army Reserve); presently no residential pathway exists. However, onsite residents are evaluated for the potential migration (i.e., groundwater and surface water) to residents on the former FBH.

* Inhalation of PFAS is considered potentially complete because no toxicity information is available for the inhalation route

Figure 6-15. Human Health CSM for Fire Station No. 2 AOPI



[a] Current land use at this AOPI is industrial (Army Reserve); presently no residential pathway exists. However, onsite residents are evaluated for the potential migration (i.e., groundwater and surface water) to residents on the former FBH.

* Inhalation of PFAS is considered potentially complete because no toxicity information is available for the inhalation route

Figure 6-16. Human Health CSM for Fire Station No. 2 FTA AOPI