SITE INSPECTION REPORT FOR PER- AND POLYFLUOROALKYL SUBSTANCES AT FORT SHERIDAN, LAKE COUNTY, ILLINOIS

Prepared for:

U.S. ARMY

ODCS, G-9, ISE BRAC

Final
November 2023

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LIST OF ACRONYMS AND ABBREVIATIONS

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
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
DI	Deionized
DO	Dissolved Oxygen
DoD	U.S. Department of Defense
DPT	Direct-Push Technology
DQO	Data Quality Objective
DUA	Data Usability Assessment
EBS	Environmental Baseline Survey
ECOS	Environmental Conservation Online System
EIS	Extracted Internal Standard
GPS	Global Positioning System
HDPE	High-Density Polyethylene
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid (GenX)
HQ	Hazard Quotient
ID	Identifier
IDW	Investigation-Derived Waste
IPaC	Information for Planning and Consultation
ISGS	Illinois State Geological Survey
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
Navy	U.S. Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
ORP	Oxidation-Reduction Potential
OSD	Office of the Secretary of Defense
OU	Operable Unit
P.E.	Professional Engineer
P.G.	Professional Geologist
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PDT	Project Delivery Team
PFAS	Per- and Polyfluoroalkyl Substances
PFBA	Perfluorobutanoic Acid

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

PFBS	Perfluorobutane Sulfonate
PFHxA	Perfluorohexanoic Acid
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
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compound
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 three areas of potential interest (AOPIs) at the former Fort Sheridan Army Installation in Lake County, Illinois. 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 three AOPIs. The field investigation at Fort Sheridan was conducted in accordance with the Programmatic Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (Leidos 2022a) and Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). 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), perfluorobutanoic acid (PFBA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (PFNA), perfluorohexanoic acid (PFHxA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) (also known as GenX) (DoD 2023). 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 2023 Office of the Secretary of Defense (OSD) Memorandum (DoD 2023). Since PFAS are a large grouping consisting of thousands of individual chemicals, PFOA, PFOS, PFBA, PFBS, PFNA, PFHxA, PFHxS, and HFPO-DA altogether will be referred to in this report as "Target PFAS."

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 soil, groundwater, surface water, and sediment at all AOPIs where the media were collected. PFAS concentrations exceeded SLs in groundwater at two AOPIs and in surface water at two AOPIs. Concentrations of PFOS, PFOA, PFHxS, and PFBS were detected at concentrations that exceeded SLs. PFBA and PFHxA were detected at concentrations greater than the LODs but less than the 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	
Building 79 Fire Station and Nozzle Spray Area	Yes	No	Further investigation recommended
Buildings 67 and 70 Temporary Fire Station	Yes	Yes	Further investigation recommended
Haley Airfield/Crash Truck Storage	No	No	Further investigation recommended to identify potential source area(s) contributing to the Target PFAS concentration exceeding the SL in surface water samples collected from the Fish Pond at the eastern end of the AOPI

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 Sheridan 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. Fort Sheridan 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 Fort Sheridan PFAS PA (Leidos 2023b), three areas of potential interest (AOPIs) were identified for investigation through multimedia sampling in an SI to determine whether a PFAS release occurred. The entire former Fort Sheridan 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 Fort Sheridan.

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 screening levels (SLs) published in the 2023 Office of the Secretary of Defense (OSD) Memorandum (DoD 2023), 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 Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). The field activities followed site-specific sampling and health and safety protocols, as identified in the Programmatic Accident Prevention Plan (Leidos 2022b) and Fort Sheridan Site Safety and Health Plan (Appendix A of the Fort Sheridan UFP-QAPP Addendum [Leidos 2023a]).

1.2 FORT SHERIDAN DESCRIPTION

Fort Sheridan is a former Army Installation located in Moraine Township of Lake County, Illinois, 25 miles north of Chicago and 18 miles south of the Wisconsin state line along the western shore of Lake Michigan (Figure 1-1). Fort Sheridan is bordered to the west by Sheridan Road, the north by The Jean and John Greene Nature Preserve at McCormick Ravine, the east by Lake Michigan, and the south by Walker Avenue. The installation is surrounded by the communities of Highland Park (south), Highwood (west), and Lake Forest (north). Fort Sheridan was recommended for closure by the BRAC Commission in 1988, including the relocation of the Fourth U.S. Army Headquarters, U.S. Army Recruiting Brigade Midwest, and U.S. Army Recruiting Command Headquarters (USACE 1990). Fort Sheridan was closed on May 28, 1993.

Fort Sheridan consisted of 710 acres; however, much of the land has been transferred to local municipalities. The current land use includes Federal property used by the Army Reserve, U.S. Navy (Navy), and Veterans Administration; recreational areas as part of the Openlands Lakeshore Preserve and Lake Forest County Preserve; and residential communities within the former Fort Sheridan Historical District surrounding the former parade ground in the central region of the property (Leidos 2023b).

During the development of the PA, historical records, interviews, aerial photographic analysis, site reconnaissance, available documentation, and physical evidence were reviewed to determine where PFAS-containing materials may have previously been stored, used, or disposed of (40 CFR §300.420(b)(5)). The evaluated areas include fire stations, fire training areas, landfills, plating operations, wastewater treatment plants (WWTPs), pesticide facilities, vehicle maintenance shops, paint shops, photographic facilities, and laundry facilities. The Fort Sheridan PFAS PA recommended three 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 Fort Sheridan

AOPI Name	Dates of Operation	Size (acres)
Building 79 Fire Station and Nozzle Spray Area	1893 to 1993	1.5
Buildings 67 and 70 Temporary Fire Station	1993	0.65
Haley Airfield/Crash Truck Storage	1953 to 1993	15.82

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 Fort Sheridan. 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 2023 OSD Memorandum (DoD 2023) 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 Fort Sheridan 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 Fort Sheridan, 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

Fort Sheridan is a former Army Installation that consisted of approximately 710 acres while in operation. Fort Sheridan is in Moraine Township, Lake County, Illinois, approximately 25 miles north of Chicago and 18 miles south of the Wisconsin state line along the western shore of Lake Michigan (BRAC 2020). Moraine Township is primarily residential in nature, with developments and the former Fort Sheridan dominating the landscape. Fort Sheridan is bounded by residential areas to the north, and south, as well as light commercial areas that border the facility to the west and Lake Michigan to the east. Figure 2-1 depicts the Fort Sheridan site features, including the site boundary, roads, buildings, topography, and location of the surface water hydrologic features.

2.2 SITE OPERATIONAL HISTORY

Fort Sheridan, initially Camp Highwood, was garrisoned in 1877 and served to maintain civil order following the Great Chicago Fire (1871) and Pullman Strike in Chicago (1886 to 1894). Subsequently, in 1898, Fort Sheridan became a mobilization and training center for the Spanish-American War. Prior to World War I (WWI), Fort Sheridan operated as the nation's first Reserve Officers Training Center, and during WWI, Fort Sheridan operated as an induction and Midwest training center for troops entering the Army and an anti-aircraft/coastal artillery training site (BRAC 2020).

Fort Sheridan operated as one of four Recruit Reception Centers, processing more than 500,000 men and women into the military service pre-War War II (WWII) through the Korean and Vietnam conflicts. Fort Sheridan was the administrative control headquarters for prisoner of war camps in the Midwest. Although Fort Sheridan was designated for closure, the Fort actively supported the Desert Shield and Desert Storm programs by mobilizing active, reserve, and National Guard units (BRAC 2020).

Fort Sheridan served as the logistical base for supplying and maintaining 33 Nike Hercules missile silos for the upper Midwest between 1953 and 1973. In 1975, Fort Sheridan had the largest military and civilian contingent in its history, but by the late 1980s, no regular combat troops were stationed at the Fort. Since the late 1980s, the Fort's functions were administrative, with the Fort serving as headquarters for the Fifth Army, the Army Recruiting Command, and the Fourth Army, providing administrative and logistical support to 74 Army Reserve centers located in Midwestern states (BRAC 2020).

In 1988, Fort Sheridan was recommended for closure by the BRAC Commission, including the relocation of the Fourth U.S. Army Headquarters, U.S. Army Recruiting Brigade Midwest, and U.S. Army Recruiting Command Headquarters (USACE 1990). Fort Sheridan was closed on May 28, 1993.

2.3 DEMOGRAPHICS, PROPERTY TRANSFER, AND LAND USE

Fort Sheridan is bound by three urban residential communities: Lake Forest to the north, Highwood to the west, and Highland Park to the south. According to the 2020 census, the population of Highland Park was estimated at 30,176; the population of Highwood was estimated at 5,074; and the population of Lake Forest was estimated at 19,367, for a combined total of 54,617 (U.S. Census Bureau 2020).

According to the U.S. Census Bureau 2020 data, the population of Lake County, Illinois, was estimated at 714,342 with households totaling 248,684. This included 68.2 percent White, 7.7 percent Black or African American, 9.3 percent Asian, 1.1 percent American Indian or Alaska Native, and <0.1 percent Native

Hawaiian and other Pacific Islanders. The 2020 American Community Survey 5-year estimates document 7.6 percent of the population in Lake County were below the poverty level (U.S. Census Bureau 2020).

As part of the closure process, Fort Sheridan was divided into two administrative Operable Units (OUs) to facilitate property evaluation and transfer. This included the Surplus OU that consisted primarily of the historic district and golf course, and property to be transferred Fed-to-Fed, called the DoD OU. In summary, the property transfers of the total excess are described below:

- August 8, 1991: 206.4 acres within the southeast quadrant and a small area on the central west side were conveyed to the Navy for use as housing and administrative offices
- March 3, 1998: 128.5 acres were conveyed to the Fort Sheridan Joint Planning Committee
- March 30, 1998: 173.8 acres were conveyed to the Lake County Forest Preserve District
- November 18, 1999: 4.4 acres were conveyed to the Fort Sheridan Joint Planning Committee
- February 2, 2000: 0.3 acres were conveyed to the Fort Sheridan Joint Planning Committee
- February 22, 2000: 40.9 acres were conveyed to the Lake County Forest Preserve District
- April 19, 2001: 38.0 acres were conveyed to the Lake County Forest Preserve District
- December 13, 2019: 7.2 acres were conveyed to the Department of Veterans Affairs (cemetery).

Effective in May 1993, the Army Reserve retained 104 acres in the southwest quadrant and the northwestern corner (former Nike site) of the former Fort Sheridan for administrative purposes (Earth Tech 1995). In 1995, through Public Law 104-32, Section 125, Congress directed the Army to transfer approximately 290 acres to the Lake County Forest Preserve District, which occurred in three separate transfers. In total, 252.7 acres were transferred to the Lake County Forest Preserve District (BRAC 2020). In 2007, 77 of the 206 acres conveyed to the Navy were transferred from the Navy to the Openlands Lakeshore Preserve, including Van Horne, Shenck, and Wells Ravines (to the intersection of Patton Road) (KEMRON 2008b). The current land use includes Federal property used by the Army Reserve, Navy, and Veterans Affairs; recreational areas as part of the Openlands Lakeshore Preserve and Lake Forest County Preserve; and residential communities within the former Fort Sheridan Historical District surrounding the former parade ground in the central region of the property.

Current land use includes the Army Reserve 97th Training Brigade, which is responsible for conducting the Command and General Staff Officers' Course at a variety of sites across the United States and Puerto Rico. The 97th Training Brigade primarily serves Reserve Component Majors in completing their Professional Military Education. This encompasses the majority of the Army Reserve property. The Great Lakes Hunt Military Community of Fort Sheridan provides military housing units on the Navy-owned property in the southeastern corner of the Fort (Hunt Companies, Inc. 2022). In the northwestern corner of Fort Sheridan, the U.S. Department of Veterans Affairs operates the 7-acre cemetery (BRAC 2020).

The majority of former Fort Sheridan is outdoor recreational space. The Lake County Forest Preserve encompasses approximately 250 acres, including the historic parade grounds and previous location of Haley Airfield and the golf course. The Openlands Lakeshore Preserve is immediately north of the Navy parcel and occupies 77 acres.

Residential homes within the former Fort Sheridan Historical District surround the historic parade grounds and the Water Tower, which were put on the National Historic Register and designated as National Historic Landmarks in 1984 and 1974, respectively (HMDB 2022).

Army BRAC has been conducting environmental cleanup at Fort Sheridan since 1991. Several former environmental sites, which were addressed by the Army under CERCLA, contain land use controls (LUCs) as a component of the remedy.

LUCs are in place for Landfill 2/Small Arms Range/38-Acre Parcel Fill Area, Landfill 5, Landfills 6 and 7, and Coal Storage Area 3. Protective soil covers preventing exposure to contaminated soils and waste are in place at all sites. However, for remedies to remain protective, institutional controls are required to remain enforced, and the physical integrity of soil caps must be maintained. Five-Year Reviews are completed to document the continued protectiveness of site remedies, with the third Five-Year Review completed in 2018 (CH2M 2018) and the fourth Five-Year Review in progress.

Land use restrictions detailed in the 2001 quitclaim deed state that Landfill 2/Small Arms Range/38-Acre Parcel Fill Area must remain recreational open space, and in the area of Parcel G, no landscaping, utilities, or buildings will be constructed and no surface or subsurface excavation, digging, or drilling will be conducted without consent of the U.S. Army Corps of Engineers (USACE), Louisville District. The deed further recommends ordnance construction support before any permitted surface or subsurface activities within Parcel G.

LUCs in place for Landfill 5 include restricting groundwater use, construction of buildings, and intrusive activities. Residential use is prohibited. LUCs are largely implemented by soil cover, fencing, and signage at Landfill 5. Remedy operations and maintenance (O&M) activities, including inspections, maintenance, and groundwater monitoring, are ongoing at Landfill 5.

LUCs in place for Landfills 6 and 7 include allowing future use as open land and allowing limited use of adjacent areas. The LUCs prohibit residential use, provide an excavation restriction, prevent access to groundwater use, and provide a buffer zone with these LUCs surrounding the landfills (KEMRON 2008a). O&M activities at Landfills 6 and 7 include management of the leachate management system, maintaining the landfill soil cover, controlling the landfill gas collection system and enclosed flare treatment, and monitoring of gas emissions from the landfills and potentially off-post.

LUCs restricting residential use, recreation use, and intrusive activities are in place for Coal Storage Area 3. O&M activities are conducted annually to inspect the site condition; conduct maintenance of the soil cover, if warranted; and confirm LUC enforcement (CH2M 2018).

2.4 TOPOGRAPHY

The topography at Fort Sheridan is relatively flat, with a slope of 2 to 4 degrees to the east, terminating at a bluff running along the lakeshore. The top of the bluff typically ranges from 39 to 69 feet above the Lake Michigan water level and extends the full length of the Fort boundary with the lake. Erosional controls have been placed to stabilize the bluff slope (SAIC 2002). Elevations at Fort Sheridan range from approximately 650 feet above mean sea level (amsl) at the bluff line to up to 695 feet amsl at the western boundary of the Fort.

Six deep ravines (Janes, Hutchinson, Bartlett, Van Horne, Wells, and Shenck) traverse the property from west to east, running generally perpendicular to the shoreline. Bartlett ravine acts as an approximate boundary between the former DoD OU and former Surplus OU, ravines south of Bartlett Ravine are in the former DoD OU, and ravines north of Bartlett Ravine are within the former Surplus OU. Several of the ravines and their tributaries have been used as landfill sites, including Wells Ravine (Landfills 6 and 7), a tributary to Bartlett Ravine (Landfill 5), and a tributary to Janes Ravine (Landfill 1) (SAIC 2001). Aerial photographs and historical maps indicate many ravines and tributaries have been infilled via landfilling. Some previous ravines have been paved over to create parking lots and roads and others still exist as landfills as part of a long-term monitoring program (CH2M 2018). The Lake Michigan bluff and unfilled ravine areas are moderately to densely vegetated (SAIC 2002).

Lake Michigan's average water surface elevation is approximately 579 feet amsl (USACE 2022). The lake level fluctuates approximately 1 foot annually with a high in the early summer and a low in mid-winter. Seasonal cycles typically do not impose adverse effects on the shoreline; however, wave energy is dissipated at more shoreward locations during multiyear periods of lake level rise (SAIC 2002). The surface topography at Fort Sheridan is shown in Figure 2-1.

2.5 GEOLOGY

Fort Sheridan is within the Lake Border Morainic System of the Central Lowlands Physiographic Province, consisting of five narrow, closely spaced moraines running parallel to the Lake Michigan shoreline. Fort Sheridan is located along Highland Park Moraine, the easternmost moraine in southern Lake County (USATHAMA 1990). The Highland Park Moraine trends north to south for 30 miles between the Chicago Plain and the Lake Michigan beach in Cook County (SAIC 2002).

The Highland Park Moraine is composed of unconsolidated glacial till of Pleistocene Age, associated with the Wadsworth Till Member of the Wedron formation, deposited during the Wisconsinan glaciation. The Wadsworth Till is compact and silty, characterized by discontinuous layers of gray sand and gravel (Larsen 1973). Permeability of the glacial till is low, with permeabilities ranging from 1×10^{-8} to 1.2×10^{-7} cm/s (USATHAMA 1990). The unit forms a crescent-shaped wedge that extends through parts of Illinois, Wisconsin, Indiana, and Michigan. It is present under most of southern Lake Michigan (SAIC 2002). Four geologic units of the Wadsworth Till are exposed along the near-vertical coastal bluffs at Fort Sheridan. In addition, the till is present beneath beach sand and is the first material encountered under most of the soils in the area (USATHAMA 1990). The thickness of the till sequence is highly variable depending on the surficial landscape, but approximately 200 feet below ground surface (bgs) beneath Fort Sheridan with thicknesses of 300 to 400 feet in Lake County (USACE 2014).

The regional underlying bedrock unit is Silurian-age dolomite of the Niagaran Series, which is a result of marine deposition 440 million years ago, locally known as the "shallow dolomite aquifer." The Niagaran dolomite is present from approximately 200 to 400 feet bgs at Fort Sheridan (USATHAMA 1990). The Ordovician-age Maquoketa shale is an approximately 100-foot-thick regional aquitard that separates the Silurian dolomite aquifer from deeper bedrock aquifers (USATHAMA 1990).

Much of the natural soils at Fort Sheridan have been removed, disturbed, and/or reworked, though areas of natural soil are still present along the ravines, bluffs, and beaches. Beach sediments consist of mixed sand and gravel. The Natural Resources Conservation Service classifies the former ravine soils and areas of the landfills as Urban Land Orthents. Orthents are recently eroded material stemming from steep terrain and are extremely shallow. The Highland Park Moraine consists of the Ozaukee silt loam, which comprises 90 percent of the soils observed at Fort Sheridan (USDA 2022). The Ozaukee silt-loam is present in ground moraines as loess over silty clay loam till. Permeability within Ozaukee soils is low. Due to the topography at Fort Sheridan, the runoff potential toward ravines and Lake Michigan is high (USDA 2022).

Bluff erosion along Lake Michigan contributes to shoreline erosion. Typically, only sand-sized material remains along the beaches, while the clay and silt from the glacial deposits are transported offshore. Long-term wave erosion of the Highland Park Moraine has resulted in bluffs that form the highest and steepest landscape along the Illinois coast. Maximum bluff height reaches 90 feet. Ravine terminations are visible along the bluff face.

2.6 HYDROGEOLOGY

The Illinois State Geological Survey (ISGS) (Larsen 1973) identified two highly permeable buried sand and gravel aquifers occurring in the western third of Lake County and extending eastward beneath Lake Michigan. The two aquifers exist as one continuous sequence in some portions of Lake County

(Larsen 1973). The buried sand and gravel aquifers are inferred to be derived from braided stream deposits and are predominantly oriented east to west.

One buried sand and gravel aquifer was previously classified as a regional Illinois Class I sand and gravel aquifer, occurring between the glacial sediments of the Wedron group and the dolomite bedrock (Larsen 1973). The sand and gravel aquifer of the Wedron group was encountered at depths between 72 and 160 feet bgs, and underlying carbonate bedrock was encountered at approximately 200 feet bgs. The Silurian dolomite forms the uppermost bedrock aquifer in the vicinity of Fort Sheridan (Larsen 1973). The water quality of the dolomite aquifer is affected by the presence of gas, oil, and hydrogen sulfide.

Regional groundwater flow is east to northeast toward Lake Michigan, except in the vicinity of the ravines, where the gradient trends toward the ravine and then ultimately toward Lake Michigan. A network of 45 piezometers was temporarily installed in November 1984 to evaluate the geological materials underlying Fort Sheridan as part of a sewer system study as well as to determine groundwater flow direction. Groundwater elevations in the piezometer network across Fort Sheridan ranged from 683.97 feet amsl near the main gate to 581.38 feet amsl near the beach. The average horizontal hydraulic gradient calculated in the Phase I RI Report (as referenced in SAIC 2001) was 0.008 ft/ft. These data indicate that local groundwater flow is influenced by the ravines and shallow groundwater flow across Fort Sheridan is toward Lake Michigan (SAIC 1999).

The regional aquifer has been investigated for its capacity to provide Class I drinking water at Fort Sheridan. Groundwater was encountered within the till at depths up to 15 feet bgs, existing in unconfined conditions, with some local perching (USATHAMA 1990). The 1996 groundwater investigation concluded that no Class 1 groundwater resources exist at Fort Sheridan shallower than 49 feet, consistent with earlier investigations. Due to the massive glacial till and clay mix, the shallow aquifer was determined to be discontinuous, did not meet the hydraulic conductivity required for a Class I groundwater resource, was unable to support the necessary yield of a minimum of 150 gallons per day, and is considered a Class II aquifer (USAEC 1996). However, neither the unconsolidated or bedrock aquifers are used as water sources in the vicinity of Fort Sheridan. Fort Sheridan and all neighboring cities and towns obtain drinking water from Lake Michigan. The nearest town using groundwater as a municipal water supply is Lincolnshire, approximately 5 miles southwest of Fort Sheridan. No records documenting the presence of water wells at Fort Sheridan were found in the State of Illinois records (ISGS 2022). However, an Environmental Baseline Survey (EBS) from 1997 indicated a groundwater well with a depth of 211.5 feet bgs was located near the recreational Fish Pond at the northern end of Fort Sheridan. The well was reported to have been installed in the late 1970s and was used to provide water for the Fish Pond (Diversified Technologies 1997). The presence of this well was not confirmed during this SI, and the status is unknown.

2.7 SURFACE WATER HYDROLOGY

Six deep ravines (Wells, Shenck, Janes, Van Horne, Bartlett, and Hutchinson) are present at Fort Sheridan, traversing the property from west to east, running generally perpendicular to the shoreline. Surface water runoff flows into the nearest ravine or into the storm sewer system, ultimately discharging to Lake Michigan. Ravines continue to deepen and widen through surface water erosion, with the exception of the Wells and Bartlett ravines, which were used as waste disposal sites; this altered their original topography (USATHAMA 1990). All ravines are natural ephemeral streams. No perennial streams are present on-Post. A small unnamed pond (Fish Pond) used for recreation is located near the bluff at the northern end of Fort Sheridan east of the former airfield (USATHAMA 1990).

Before 1978, the former WWTP was used for on-Post treatment and discharged its sanitary treated effluent into Lake Michigan (USATHAMA 1990). The WWTP effluent discharge to surface water ceased when the Fort's sanitary sewer system was connected to the North Shore Sanitary District system in 1978 (Project Resources, Inc. 2001). Two infrequently used septic systems, located near the Rod and Gun Club and

Building 901, discharged effluent to surface water Janes Ravine (USATHAMA 1990) but were removed as part of facility closure activities.

2.8 WATER USAGE

Lake Michigan is the source of drinking water at Fort Sheridan and surrounding municipalities. Historically, a water treatment plant on Fort Sheridan provided potable water until BRAC closure in 1993. It was positioned on the lakeshore, with the water intake pipe extending 0.7 miles into the lake from the water plant (Building 29). Water currently is provided by the city of Highland Park, which still obtains its water from Lake Michigan (SAIC 2002).

According to the State of Illinois online well record database, 31 water wells are within a 1-mile radius of Fort Sheridan, 21 of which are used for environmental monitoring (ISGS 2022). The 10 water wells, 6 of which are within 0.5 miles of the Fort Sheridan boundary, range in depth from 10 to 1,753 feet bgs and supply groundwater from bedrock and glacial aquifers. Water wells installed in the dolomite bedrock aquifer can sustain pumping rates in excess of 500 gallons per minute (ISGS 2022). Wells classified as water wells in the State of Illinois online well records database are not further refined to define the water well purpose and may be used for potable, industrial, or agricultural use.

No records documenting the presence of water wells at Fort Sheridan were found in the State of Illinois records (ISGS 2022). However, an EBS from 1997 indicated a groundwater well with a depth of 211.5 feet bgs was located near the recreational Fish Pond at the northern end of Fort Sheridan. The well was reported to have been installed in the late 1970s and was used to provide water for the Fish Pond (Diversified Technologies 1997). The presence of this well was not confirmed during this SI, and the status is unknown.

2.9 ECOLOGICAL PROFILE

Fort Sheridan consists of approximately 700 acres within the Eastern Broadleaf Forest Province dominated by oak-hickory forests. A large portion of the 700 acres of Fort Sheridan was developed for uses and facilities such as barracks, officer's housing, administration buildings, stables, a golf course, a cemetery, weapons ranges, and an airfield. Approximately 100 acres of Fort Sheridan are undeveloped (U.S. Army 1993).

The natural ecosystems at Fort Sheridan (e.g., ravine, prairie, savanna, lakeshore, and freshwater lake) provide rare and diverse habitats for a great variety of wildlife and plant species. For example, Janes Ravine contains one of the last remaining examples of mesic and dry-mesic upland forest (SAIC 2002). The Lake Michigan shore is one of the best remaining examples of open prairie-like vegetation that once occurred along the Lake Michigan bluffs (SAIC 2002, USACE 1990). The remainder of Fort Sheridan that does not contain natural ecosystems is predominantly suburban habitat characterized by mowed lawns among buildings and parking lots. Throughout the Fort Sheridan grounds, a large number of old and stately trees contribute to the aesthetic value of the area, particularly in the historic district. In a 1997 inventory, more than 5,000 trees were documented throughout Fort Sheridan. Almost 900 of those trees had a diameter of greater than 20 inches (U.S. Army 1993). Three nearshore lacustrine wetlands are located along the Lake Michigan shoreline and occupy approximately 10 acres. An approximately 1-acre recreational Fish Pond is present in the northeastern corner of Fort Sheridan near the location of the former runway on what is currently Lake Forest County Preserve land (NWI 2023).

The predominantly suburban habitat at Fort Sheridan supports common "urban" wildlife species. Common birds in the developed areas include the American Robin (*Turdus migratorius*), house sparrow (*Passer domesticus*), and starling (*Sturnus vulgaris*). Common birds found in the undeveloped areas include species such as downy woodpecker (*Picoides pubescens*), cardinal (*Cardinalis cardinalis*), and yellow shafted flicker (*Colaptes auratus*) (U.S. Army 1993). The most common mammals are the gray squirrel (*Sciurus carolinensis*) and raccoon (*Procyon lotor*) (USACE 2007). Additional mammals include whitetail deer (*Odocoileus virginianus*), coyote (*Canis latrans*), possum (*Didelphis marsupialis*), thirteen-lined ground

squirrel (*Citellus tridecemlineatus*), cottontail rabbit (*Sylvilagus floridanus*), and striped skunk (*Mephitis mephitis*) (USACE 2014).

The U.S. Fish and Wildlife Service (USFWS) Environmental Conservation Online System (ECOS) Information for Planning and Consultation (IPaC) tool identified seven federally listed threatened and endangered (T&E) species as potentially occurring on or near Fort Sheridan. These species included one mammal (northern long eared bat [*Myotis septentrionalis*]), two birds (piping plover [*Charadrius melodus*] and red knot [*Calidrus canutus*]), two insects (karner blue butterfly [*Lycaeides melissa* samuelis] and rusty patched bumble bee [*Bombus affinus*]) and two flowering plants (eastern prairie fringed orchid [*Platanthera leucophaea*] and pitcher's thistle [*Cirsium pitcheri*]). The T&E candidate species, the monarch butterfly (*Danaus plexippus*), was also identified by IPaC as potentially occurring at Fort Sheridan (USFWS 2023). The potential for these species to occur does not mean they are present at Fort Sheridan. Federally listed T&E species are not known to reside or nest on Fort Sheridan (USACE 2012). Piping plover (*Charadrius melodus*) have been observed using the beach during spring migrations (Becker 1978). The eastern prairie fringed orchid habitat (e.g., open sandy beaches, wetlands, and forested areas) is present for several of the T&E federally listed T&E species to use Fort Sheridan for at least a portion of their lives. Ten state-listed T&E plants (e.g., small Solomon's seal [*Polygonatum pubescens*], weak bluegrass [*Poa languida*], and purple fringed orchid [*Platanthera psychodes*]) (USAEC 2007) and one state-listed T&E bird (common tern [*Sterna hirundo*]) (USACE 2014) are present in the prairie-like habitat of the ravine systems and beach area.

Fifteen migratory birds of particular concern are identified by the IPaC tool as potentially occurring on or near Fort Sheridan. These birds include species such as the cerulean warbler (*Dendroica cerula*), bald eagle (*Haliaeetus leucocephalus*), American golden-plover (*Pluvialis dominica*), red-headed woodpecker (*Melanerpes erythrocephalus*), and Lesser yellowlegs (*Tringa flavipes*) (USFWS 2023).

2.10 CLIMATE

The climate in northeastern Illinois and southeastern Wisconsin is classified as humid continental, characterized by cold winters and warm summers, with daily, monthly, and yearly fluctuations in temperature and precipitation. Fort Sheridan has well-defined seasons. Average annual rainfall usually ranges from 30 to 40 inches per year, with greater amounts falling between April and August. Snowfall averages approximately 28 inches. Increased runoff can occur in the spring due to snow melt and rain. Frequent changes in temperature, humidity, wind direction, and other meteorological parameters are common due to fronts and cyclonic weather systems, generally from west to east (USATHAMA 1990). Fort Sheridan is also affected by lake effect snowfall in winter and has milder temperatures in winter and summer than further inland areas (USATHAMA 1990). The average temperature in Lake County is 47.6°F (SAIC 2002). Average wind speed for the area is 10.00 miles per hour and is usually out of the west (USATHAMA 1990).

Waves in Lake Michigan typically have short periods (3 to 5 seconds) with nearshore wavelengths ranging from approximately 40 to 80 feet. Storm waves commonly approach the shoreline from the north and northeast and frequently occur during the late fall and early spring (SAIC 2002).

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 for the field investigation activities and procedures used for the Fort Sheridan 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 Fort Sheridan 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 Fort Sheridan was conducted in accordance with the Programmatic UFP-QAPP (Leidos 2022a) and Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). The field activities employed to execute the SI, including any variances or deviations, are described below.

3.2 SAMPLE DESIGN AND RATIONALE

Three AOPIs were investigated during the Fort Sheridan SI to determine the presence or absence of PFAS in the environment. Information inputs from the preliminary CSMs presented on Worksheet #10 of the Fort Sheridan UFP-QAPP Addendum (Leidos 2023a) are the basis for the sample design at each AOPI. All samples were analyzed for the Target PFAS list of perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanoic acid (PFBA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (PFNA), perfluorohexanoic acid (PFHxA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) (also known as GenX).

The general approach for the determination originally proposed in the Fort Sheridan UFP-QAPP Addendum (Leidos 2023a) for the determination of the presence or absence of PFAS at an AOPI consists of collection of three direct-push technology (DPT) groundwater samples, spaced upgradient, within, and downgradient from the suspected release areas; collection of three soil samples from at least three soil borings; and two colocated surface water and sediment samples, if these media were present.

Each location that was sampled, with a unique set of coordinates, was assigned a specific site location: FS-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 FSXXX##-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 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 FS-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 during two mobilizations, April 30 to May 7, 2023, and May 16 to May 17, 2023. 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 Fort Sheridan UFP-QAPP Addendum (Leidos 2023a), with relevant information summarized below.

Sampling activities at Fort Sheridan included collecting surface and subsurface soil samples from soil borings, installing temporary groundwater monitoring wells, conducting one round of groundwater sampling from temporary groundwater monitoring wells, and collecting sediment and surface water samples from AOPIs where these media were present. Samples were analyzed for 26 PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Table B-15 of the DoD Quality Systems Manual (QSM) Version 5.4 (DoD 2021) to determine the presence or absence of PFAS. Fifty-three samples were collected among the 3 AOPIs, including 9 temporary monitoring well groundwater samples, 10 surface soil samples, 26 subsurface soil samples, 4 surface water samples, and 4 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 conducted. 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. Fort Sheridan AOPI SI Sample Collection

AOPI Name	Soil Samples	Groundwater Samples	Surface Water Samples	Sediment Samples
Building 79 Fire Station and Nozzle Spray Area	6 SS / 12 SB	3	2	2
Buildings 67 and 70 Temporary Fire Station	0 SS / 6 SB	3	0	0
Haley Airfield/Crash Truck Storage	4 SS / 8 SB	3	2	2
Total	**10 SS / 26 SB**	**9**	**4**	**4**

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 three AOPIs through Illinois811 "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 (FS-SRC-01, FS-SRC-02, and FS-SRC-03) were collected for PFAS analysis to determine if the water could be used for decontamination. Two fire hydrants were sampled, one on Army Reserve property and one at the North Shore Army Reserve property, and one spigot was sampled inside Building 699 on Army Reserve Property. Water sources were purged for a minimum of 1 minute prior to filling laboratory-supplied Trizma®-preserved high-density polyethylene (HDPE) bottles. PFAS were detected at concentrations greater than the limits of detection (LODs) in all three samples, although the Target PFAS concentrations were less than SLs. In accordance with the Fort Sheridan UFP-QAPP Addendum, the project team considered multiple factors to determine that this onsite source water was the most feasible and cost-effective decontamination water source to accomplish the work without adverse impacts to the project DQOs. Considerations included the lack of PFAS-free source water (based on the three samples collected), limited feasibility of treatment options, and use of PFAS-free deionized (DI) water as a final rinse. As a result, the water from the spigot inside Building 699 was used as the source water for the first and second decontamination steps, as discussed in Section 3.5.

3.4.3 Soil Boring Installation and Sampling

All soil samples were collected in accordance with the procedures outlined in the UFP-QAPP (Leidos 2022a) and Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). QC samples, including, duplicates, rinsate blanks, and MS/MSDs, were also collected.

Soil samples were collected in disposable, PFAS-free Geoprobe® polyvinyl chloride (PVC) liners. If necessary for utility clearance, the top 5 feet of a soil boring were collected with a decontaminated stainless steel hand auger. A manual slide hammer was used on boring FS-B79-03 due to limited drill rig access. Each soil core was logged for lithology in accordance with USACE guidance (ASTM International D2488 [ASTM 2017]) and recorded on a 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. Some subsurface soil samples were collected at only 1-foot intervals based on site conditions (e.g., depth to groundwater, recovery, gravel, fill) 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 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 DI water. Surface restoration matched the surrounding surface (e.g., gravel or grass).

3.4.4 Temporary Monitoring Well Installation and Sampling

Temporary monitoring wells were installed using a DPT drill rig and supporting equipment. Three temporary wells were installed at each AOPI to collect groundwater samples. Temporary wells were installed directly by inserting a PVC screen and riser directly into the DPT soil boring. Temporary monitoring wells were composed of new, 1-inch-diameter, schedule 40 PVC with a 5- or 10-foot screen. 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.

A groundwater sample was collected as a grab sample with a peristaltic pump or bailer 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 $\leq$6°C. Sampling activities were recorded 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 on the groundwater sampling forms (Appendix E). 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.

All temporary monitoring wells were abandoned in accordance with the Programmatic UFP-QAPP (Leidos 2022a) and Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). Temporary monitoring wells were abandoned by removing the PVC casing and backfilling the borehole from the bottom to the surface with bentonite chips. Surface completion matched the surrounding surface (e.g., gravel, grass).

3.4.5 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 Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). 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 by hand with a new, clean nitrile glove and HDPE bag. Sediment

sampling was conducted 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.

3.4.6 Equipment Calibration

A water quality instrument (Horiba Model U-52) used during groundwater and surface water sampling was calibrated each day of use 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.

3.4.7 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 sub-foot accuracy. GPS data were transferred for use in ArcGIS mapping applications during data evaluation and reporting.

3.4.8 Deviations and Field Change Requests

No instances of field modification impacting project DQOs were encountered during the SI fieldwork. The following differences from the planned sample quantities and locations in Tables 17-1 and 18-1, respectively, of the Fort Sheridan UFP-QAPP Addendum (Leidos 2023a) were observed during field activities and summarized in daily field notes (Appendix C):

- The colocated surface water/sediment samples at locations FS-126-05 and FS-126-06 were field adjusted for safe slope access to the pond and to the presence of upstream ditch water, respectively.
- Groundwater was encountered shallower than expected at locations FS-B67-03 and FS-B67-04. The shallow groundwater precluded the collection of a second subsurface soil sample.
- Surface soil samples were not collected at FS-B67-01, FS-B67-02, FS-B67-03, and FS-B67-04 due to the presence of gravel and/or pavement at the soil boring locations.
- A visible groundwater bearing zone was not encountered at location FS-B67-02 so a temporary well was installed at location FS-B67-03 as an alternate location to collect a groundwater sample. Both locations eventually produced groundwater, and samples were collected from both temporary wells.
- The temporary well that was planned at location FS-B79-03 was relocated to FS-B79-05, as a water-bearing zone was not encountered at FS-B79-03 before refusal.

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 Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). 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®) and bulk source water to remove particulate matter and surface film. As presented in Section 3.4.2, use of the onsite bulk source water for the initial decontamination steps was determined appropriate by the project team considering the factors presented in the Fort Sheridan UFP-QAPP Addendum. Following this scrub, the equipment was then rinsed in a separate bin containing bulk source water, and lastly rinsed in a separate bin of PFAS-free DI water. The effectiveness of the decontamination process was confirmed through the collection and analysis of five equipment rinsate blanks; PFAS were not detected at concentrations greater than the LODs in these blanks. 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 and biodegradable detergent (e.g., Liquinox®). Equipment was scrubbed using polyethylene or PVC brushes to remove particulates, rinsed with bulk source water, and then rinsed with PFAS-free DI water.

3.6 DISPOSITION OF FIELD INVESTIGATION-DERIVED WASTE

The IDW generated during the SI at Fort Sheridan included solids (soil, sediment, temporary well construction materials, and Geoprobe® PVC liners) and liquids (decontamination rinse water). These materials were managed in accordance with the IDW Management Plan provided in Appendix B of the Fort Sheridan UFP-QAPP Addendum (Leidos 2023a).

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 C of the Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). Liquid 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., Fort Sheridan), and a telephone number for the generator's point of contact (i.e., the BRAC Environmental Program Manager). 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 C of the Fort Sheridan UFP-QAPP Addendum (Leidos 2023a) 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 drum 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 the drum containing liquid IDW (i.e., wastewater), a 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 Fort Sheridan 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 Fort Sheridan on July 19, 2023 for disposal at Wayne Disposal, Inc, 49350 N I-94 Service Drive, Belleville, MI 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 Fort Sheridan SI field activities (40 CFR §300.420(c)(4)). Additional information on these procedures is presented in the Fort Sheridan UFP-QAPP Addendum (Leidos 2023a).

Merit Laboratory, Inc., located in East Lansing, Michigan, was the analytical laboratory under contract for the analysis of PFAS during the Fort Sheridan 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 conducted 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 laboratory 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 Fort Sheridan SI conforms to the analytical requirements presented in the Programmatic UFP-QAPP (Leidos 2022a) and Fort Sheridan UFP-QAPP Addendum (Leidos 2023a) 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 Fort Sheridan UFP-QAPP Addendum (Leidos 2023a).

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 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 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 percent recovery 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 Fort Sheridan field investigation. The requirements for field QC were established on Worksheet #20 of the Programmatic UFP-QAPP (Leidos 2022a) and Fort Sheridan UFP-QAPP Addendum (Leidos 2023a).

Table 4-1. Frequency of Field QC Samples for Fort Sheridan 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
MS/MSD	1 for every 20 or fewer investigative samples
Reagent Blank	1 per drinking water sampling event; none required for this event

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 2022).

Reported laboratory data were reviewed in accordance with DoD QSM Stage 2B validation guidelines to ensure that the QC results fell within appropriate QC limits for holding times, blank contamination, EISs, calibrations, MS/MSDs, LCSs, and ion ratios. Any data validation qualifiers resulting from outlier QC results were applied, 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 Fort Sheridan in May 2023. 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 Fort Sheridan UFP-QAPP Addendum (Leidos 2023a). Consistent with the data quality requirements established in the Programmatic UFP-QAPP (Leidos 2022a) and Fort Sheridan UFP-QAPP Addendum (Leidos 2023a) 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 provided 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 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 Fort Sheridan UFP-QAPP Addendum (Leidos 2023a) 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 Sheridan SI were set at 90 percent for field sampling and laboratory completeness. Two groundwater samples were re-located due to absence of water when refusal was encountered at the original locations. Four surface soils samples were not collected due to the presence of gravel/asphalt, and two subsurface samples were not collected based on the presence of water at depth. These adjustments to the planned sample quantities were in accordance with the sampling design and protocol in the UFP-QAPP Addendum (Leidos 2023a); therefore, field sampling completeness is 100 percent. Analytical completeness was 100 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. The results that were recommended for exclusion (X) during validation were submitted to the project delivery team (PDT) for evaluation and the determination was made to reject these data; these results were not used during the evaluation of 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 regional screening level (RSL) calculator for soil and the tap water criteria for groundwater, as published in the 2023 OSD Memorandum (DoD 2023). This SI uses the SLs and a target hazard quotient (HQ) of 0.1 to evaluate the Target PFAS concentrations. These SLs (Table 5-1) are used to evaluate the data and determine if future investigation is warranted at each AOPI. SLs for the other PFAS analyzed during this SI currently do not exist.

Table 5-1. Screening Levels from the 2023 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
PFBA	1,800	7,800
PFBS	600	1,900
PFHxA	990	3,200
PFHxS	39	130
PFNA	5.9	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, a summary of analytical results, and a CSM for each AOPI at Fort Sheridan. 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 eight Target PFAS outlined in the 2023 OSD Memorandum (DoD 2023): PFOS, PFOA, PFBA, PFBS, PFNA, PFHxA, PFHxS, and HFPO-DA. Analytical data 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 sampled media. 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 current and reasonably anticipated future 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 the SLs, and no 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 Target PFAS specific.
- ***Incomplete*** – Human exposure pathways are considered incomplete for media where Target PFAS have not been detected at concentrations greater than the LODs.

LUCs are in place at Fort Sheridan for Landfill 2/Small Arms Range/38-Acre Parcel Fill Area, Landfill 5, Landfills 6 and 7, and Coal Storage Area 3 and include the following: prevention of residential or recreational use; groundwater use restrictions; prevention of surface or subsurface excavation digging or drilling and land disturbances, including but not limited to landscaping, utilities, or building construction; no public access by way of a perimeter fence and signage; and preventing ground disturbances. No LUCs are in place at any of the AOPIs evaluated during this SI.

6.2 BUILDING 79 FIRE STATION AND NOZZLE SPRAY AREA AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the Building 79 Fire Station and Nozzle Spray Area AOPI.

6.2.1 AOPI Background

The Building 79 Fire Station and Nozzle Spray Area AOPI is located in the central portion of the Main Installation. The property is occupied by former Building 79, which has been converted to a residence, and grassy areas directly adjacent to Bartlett Ravine.

The Fire Station operated from 1893 to 1993 and served as the facility's primary fire station. Interviewees stated that approximately 50 gallons of aqueous film-forming foam (AFFF) were stored in 5-gallon buckets at the Fire Station. Two or three 5-gallon buckets of AFFF were also kept on three fire trucks parked in the bays at the station. The nozzle spray activities were conducted directly behind Building 79 (Fire Station) in a paved parking lot. The nozzle spray activities were described as blanketing the ground in the uncurbed parking lot with AFFF and dissolving it with water, then flushing the water and AFFF mixture toward the tributary to Bartlett Ravine. These activities were conducted until the Fire Station was closed in 1993.

6.2.2 SI Sampling and Results

Soil, groundwater, surface water, and sediment samples were collected from the Building 79 Fire Station and Nozzle Spray Area AOPI at the following locations (Figure 6-1):

- Eighteen soil samples and two field duplicates were collected from six soil borings. Locations FS-B79-01, FS-B79-02, and FS-B79-05 are within the suspected release area (i.e., adjacent to the footprint of the former fire station and parking lot). Locations FS-B79-03, FS-B79-04, and FS-B79-06 are downgradient from the suspected release area. One surface soil sample and subsurface soil samples were collected from each boring.
- Three groundwater samples and one field duplicate were collected from three temporary monitoring wells (FS-B79-01, FS-B79-02, and FS-B79-05) located within the suspected release area.
- Two colocated surface water and sediment samples and one surface water field duplicate were collected at locations FS-B79-07 and FS-B79-08 from the nearby ravine, downgradient from the suspected release area.

The Target PFAS analytical results for soil, groundwater, surface water, and sediment samples collected at the Building 79 Fire Station and Nozzle Spray Area AOPI are summarized below and presented in Table 6-1 and Figure 6-2.

6.2.2.1 Soil

PFOS, PFOA, PFBA, PFHxA, PFHxS, PFNA, and PFBS were detected in soil at concentrations less than the SLs at the Building 79 Fire Station and Nozzle Spray Area AOPI. PFOS, PFOA, and PFBA were detected in surface soil at all six boring locations. PFOS was detected in subsurface soil at each boring location, including the deepest soil interval at FS-B79-03 (10 to 12 feet bgs) and FS-B79-06 (11 to 12 feet bgs), both downgradient from the suspected release area. PFOA was detected in subsurface soil at four of the six boring locations, including the deepest soil interval at FS-B79-03 (10 to 12 feet bgs). PFBA was detected at estimated concentrations in subsurface soil at location FS-B79-01 at depths of 3 to 4 feet bgs and 13 to 15 feet bgs.

PFHxA was detected in surface soil at all but one boring location (FS-B79-06). PFHxA was detected at estimated concentrations in subsurface soil at FS-B79-01 (3 to 4 feet bgs) and FS-B79-05 (2 to 3 feet bgs).

PFHxS was detected in soil at all but one location (FS-B79-04), which is the easternmost boring downgradient from the suspected release area. PFHxS was only detected at the deepest soil intervals at locations FS-B79-03 and FS-B79-06 (estimated concentration).

PFNA was detected in surface soil at locations FS-B79-01, FS-B79-02, and FS-B79-04 and in subsurface soil (3 to 4 feet bgs) at FS-B79-01 (estimated concentration).

PFBS was detected at estimated concentrations in surface soil at locations FS-B79-01 and FS-B79-02.

HFPO-DA was not detected at concentrations greater than the LOD in any soil samples collected at the Building 79 Fire Station and Nozzle Spray Area AOPI.

6.2.2.2 Groundwater

PFOS, PFOA, PFBA, PFHxA, PFHxS, PFNA, and PFBS were detected in groundwater samples collected at the Building 79 Fire Station and Nozzle Spray Area AOPI. PFOS, PFOA, and PFHxS were detected at concentrations greater than the SLs in groundwater samples collected from within the suspected release area at monitoring well FS-B79-05. PFOS was detected at 150 ng/L, PFOA was detected at 730 ng/L, and PFHxS was detected at 1,300 ng/L, exceeding the SLs of 4, 6, and 39 ng/L, respectively. PFNA, PFBA (estimated), PFHxA, and PFBS were detected at concentrations less than the SLs at FS-B79-05.

PFOS, PFOA (estimated), PFBA, PFHxA, and PFHxS were detected in groundwater samples collected from monitoring well FS-B79-02, also within the suspected release area, at concentrations less than the SLs. PFBA, PFHxA, and PFBS (estimated) were detected at concentrations less than the SLs in monitoring well FS-B79-01. No other Target PFAS were detected in monitoring wells FS-B79-01 or FS-B79-02.

HFPO-DA was not detected at concentrations greater than the LOD in any groundwater samples collected at the Building 79 Fire Station and Nozzle Spray Area AOPI.

6.2.2.3 Surface Water

PFOS, PFOA, PFBA, PFHxA, PFHxS, PFNA, and PFBS were detected in surface water samples collected downgradient from the Building 79 Fire Station and Nozzle Spray Area AOPI. PFOS, PFOA, and PFHxS were detected at concentrations greater than the SLs at both surface water locations. At location FS-B79-07, concentrations of PFOS (27 ng/L), PFOA (10 ng/L), and PFHxS (47 ng/L) exceeded the SLs of 4, 6, and 39 ng/L, respectively. At location FS-B79-08, concentrations of Target PFAS greater than the SLs were PFOS (29 ng/L), PFOA (8.2 ng/L), and PFHxS (47 ng/L).

PFBA (estimated), PFHxA, PFNA (estimated), and PFBS were detected at concentrations less than the SLs at FS-B79-07 and FS-B79-08.

HFPO-DA was not detected at concentrations greater than the LOD in surface water samples collected at the Building 79 Fire Station and Nozzle Spray Area AOPI.

6.2.2.4 Sediment

PFOS, PFOA, PFBA, PFHxA, PFHxS, and PFNA were detected at concentrations less than the SLs in sediment samples collected downgradient from the Building 79 Fire Station and Nozzle Spray Area AOPI. PFOS, PFOA, PFHxA, and PFHxS were detected at both locations FS-B79-07 and FS-B79-08. PFBA and PFNA were detected at estimated concentrations at FS-B79-07.

PFBS and HFPO-DA were not detected at concentrations greater than the LODs in sediment samples collected at the Building 79 Fire Station and Nozzle Spray Area AOPI.

6.2.3 CSM

The Building 79 Fire Station and Nozzle Spray Area AOPI is approximately 1.5 acres. The former Building 79 is approximately 3,500 ft^2. Most of the AOPI consists of grassy landscaped areas surrounding the former Building 79, which is now a residence. The building is bound by Whistler Road to the north,

Ronan Road to the west, other residential buildings to the east, and a grassy area to the south. Surface water is present in Bartlett Ravine at this AOPI. The ravine is south/southwest of the former Building 79.

Shallow subsurface geology in this area is composed of unconsolidated glacial till of Pleistocene Age. The glacial till is compact and silty, characterized by discontinuous layers of gray sand and gravel. Shallow groundwater was visually observed at approximately 9 feet bgs in one soil boring location at the Building 79 Fire Station and Nozzle Spray Area AOPI during this SI.

The primary release mechanism is the potential release of PFAS-containing materials related to historical nozzle spray activities of firefighting foam, including AFFF, to surface soil, which is the source media for potential PFAS contamination. The secondary contaminant migration, 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.

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

The soil exposure pathways for both onsite workers and onsite residents are potentially complete because Target PFAS were detected at concentrations less than the SLs in soil and greater than the SLs in groundwater; however, the soil results indicate no risk, and the groundwater is not currently used. The soil exposure pathways for onsite and offsite residents are considered incomplete because off-AOPI migration of soil is not expected.

Although onsite groundwater is not currently used and drinking water at Fort Sheridan is provided by the city of Highland Park, sourced from Lake Michigan, no restrictions are in place that prevent the use or consumption of groundwater onsite. Since Target PFAS were detected in groundwater at concentrations greater than the SLs, the groundwater exposure pathways for onsite workers and onsite residents are considered complete. Due to the presence of wells (unknown use) within 1 mile of Fort Sheridan, the groundwater exposure pathway for offsite residents is potentially complete.

Target PFAS were detected in surface water at concentrations greater than the SLs, making the onsite surface water and sediment exposure pathways complete. In addition, the surface water and sediment exposure pathways for offsite residents are potentially complete since surface water flows from the AOPI toward Bartlett Ravine and ultimately discharges to nearby Lake Michigan.

Figure 6-3 presents the CSM for the Building 79 Fire Station and Nozzle Spray Area AOPI.

6.2.4 Recommendation

Detected concentrations of Target PFAS in groundwater and surface water samples at the Building 79 Fire Station and Nozzle Spray Area AOPI exceed the SLs; therefore, further investigation is recommended.

Table 6-1. Target PFAS Results and Screening for the Building 79 Fire Station and Nozzle Spray Area AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBA	PFBS	PFHxA	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**7800**	**1900**	**3200**	**130**	**19**	**19**	**13**
FS-B79-01	FSB7901-SS01	SURF	0.00-1.00	05/04/2023	0.055 U	**0.40**	**0.076 J**	**0.45**	**0.71**	**0.40**	**1.3**	**3.7**
	FSB7901-SB02	BORE	3.00-4.00	05/04/2023	0.061 U	**0.067 J**	0.061 U	0.061 U	**0.27**	**0.061 J**	**0.097 J**	**0.11 J**
	FSB7901-SB02FD	BORE	3.00-4.00 (D)	05/04/2023	0.057 U	0.057 U	0.057 U	**0.075 J**	**0.39**	0.057 U	**0.076 J**	**0.18**
	FSB7901-SB03	BORE	13.00-15.00	05/04/2023	0.049 U	**0.056 J**	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U
FS-B79-02	FSB7902-SS01	SURF	0.00-1.00	05/04/2023	0.054 U	**0.18**	**0.074 J**	**0.57**	**5.4**	**0.082 J**	**0.88**	**8.5**
	FSB7902-SB02	BORE	5.00-6.00	05/04/2023	0.051 U	0.051 U	0.051 U	0.051 U	**1.7**	0.051 U	**0.20**	**0.50**
	FSB7902-SB03	BORE	14.00-15.00	05/04/2023	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
FS-B79-03	FSB7903-SS01	SURF	0.00-1.00	05/02/2023	0.060 U	**0.22**	0.060 U	**0.075 J**	0.060 U	0.060 U	**0.21**	**0.33**
	FSB7903-SB02	BORE	4.00-6.00	05/02/2023	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	**0.14**
	FSB7903-SB03	BORE	10.00-12.00	05/02/2023	0.056 U	0.056 U	0.056 U	0.056 U	**0.21**	0.056 U	**0.097 J**	**0.71**
FS-B79-04	FSB7904-SS01	SURF	0.00-1.00	05/03/2023	0.064 U	**0.20**	0.064 U	**0.094 J**	0.064 U	**0.084 J**	**0.24**	**0.45**
	FSB7904-SB02	BORE	4.00-5.00	05/03/2023	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	**0.11 J**
	FSB7904-SB03	BORE	39.00-40.00	05/03/2023	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U
FS-B79-05	FSB7905-SS01	SURF	0.00-1.00	05/02/2023	0.057 U	**0.075 J**	0.057 U	**0.15**	**0.55**	0.057 U	**0.25**	**1.3**
	FSB7905-SB02	BORE	2.00-3.00	05/02/2023	0.051 U	0.051 U	0.051 U	**0.091 J**	**0.58 J-**	0.051 U	**0.31**	**0.70 J-**
	FSB7905-SB02FD	BORE	2.00-3.00 (D)	05/02/2023	0.054 U	0.054 U	0.054 U	**0.079 J**	**0.45**	0.054 U	**0.28**	**0.42**
	FSB7905-SB03	BORE	7.50-8.50	05/02/2023	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U
FS-B79-06	FSB7906-SS01	SURF	0.00-1.00	05/02/2023	0.058 U	**0.15**	0.058 U	0.058 U	0.058 U	0.058 U	**0.094 J**	**0.20**
	FSB7906-SB02	BORE	2.00-3.00	05/03/2023	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	**0.18**
	FSB7906-SB03	BORE	11.00-12.00	05/03/2023	0.048 U	0.048 U	0.048 U	0.048 U	**0.075 J**	0.048 U	0.048 U	**0.40**
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**1800**	**600**	**990**	**39**	**5.9**	**6**	**4**
FS-B79-01	FSB7901-GW01	WELL	20.00-20.00	05/06/2023	0.91 U	**93**	**1.6 J**	**25**	0.91 U	0.91 U	0.91 U	0.91 U
FS-B79-02	FSB7902-GW02	WELL	15.00-15.00	05/06/2023	0.95 U	**13**	0.95 U	**2.1**	**3.9**	0.95 U	**1.5 J**	**3.0**
FS-B79-05	FSB7905-GW03	WELL	13.00-13.00	05/03/2023	0.95 U	**72 J+**	**84**	**190**	**1000**	**1.7 J**	**530**	**120**
	FSB7905-GW03FD	WELL	13.00-13.00	05/03/2023 (D)	0.93 U	**64 J+**	**100**	**230**	**1300**	**2.1**	**730**	**150**

Table 6-1. Target PFAS Results and Screening for the Building 79 Fire Station and Nozzle Spray Area AOPI (Continued)

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBA	PFBS	PFHxA	PFHxS	PFNA	PFOA	PFOS
Surface Water				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**1800**	**600**	**990**	**39**	**5.9**	**6**	**4**
FS-B79-07	FSB7907-SW01	SWTR	0.00-0.00	05/01/2023	0.89 U	**12 J+**	**15**	**15**	**44**	**1.3 J**	**10**	**27**
	FSB7907-SW01FD	SWTR	0.00-0.00	05/01/2023 (D)	0.86 U	**11 J+**	**13**	**14**	**47**	**1.2 J**	**9.4**	**24**
FS-B79-08	FSB7908-SW01	SWTR	0.00-0.00	05/01/2023	0.88 U	**12 J+**	**14**	**14**	**47**	**0.97 J**	**8.2**	**29**
Sediment				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**7800**	**1900**	**3200**	**130**	**19**	**19**	**13**
FS-B79-07	FSB7907-SD01	SEDI	0.00-0.25	05/01/2023	0.26 U	**0.42 J**	0.26 U	**2.1**	**1.8**	**0.26 J**	**1.3**	**9.6**
FS-B79-08	FSB7908-SD01	SEDI	0.00-0.25	05/01/2023	0.33 U	0.33 U	0.33 U	**0.61 J**	**2.1**	0.33 U	**1.0**	**8.8**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL calculator provided in the August 2023 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.

6.3 BUILDINGS 67 AND 70 TEMPORARY FIRE STATION AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the Buildings 67 and 70 Temporary Fire Station AOPI.

6.3.1 AOPI Background

The Buildings 67 and 70 Temporary Fire Station AOPI is located near the western border in the central area of the Main Installation. Buildings 67 and 70 have been demolished, and the property currently consists of a degraded asphalt and gravel parking lot owned and operated by the Army Reserve for vehicle storage and maintenance.

Originally, Buildings 67 and 70 were used as a carpentry shop and pesticide shop, respectively, during the operation of Fort Sheridan. As a part of BRAC closure and property transfer, in 1993, Buildings 67 and 70 operated as a temporary fire station. The buildings stored Army Fire Department equipment for approximately 1 year while awaiting transfer to community fire stations. According to interviews, AFFF was stored in the buildings, but no fire training practices were conducted. Buildings 67 and 70 were demolished in the 2017/2018 time frame. AFFF has been stored and used on the property post-transfer. Therefore, it is possible that PFAS-containing material, including AFFF, was used or stored at this AOPI where vehicle maintenance has been conducted post-transfer.

6.3.2 SI Sampling and Results

Groundwater and soil samples were collected from the Buildings 67 and 70 Temporary Fire Station AOPI at the following locations (Figure 6-4):

- Six subsurface soil samples and one field duplicate were collected from four soil borings (FS-B67-01, FS-B67-02, FS-B67-03, and FS-B67-04). Soil borings FS-B67-01, FS-B67-03, and FS-B67-04 were located within the suspected release area. Boring FS-B67-02 was located downgradient from the suspected release area. Two subsurface soil samples were collected from FS-B67-01 and FS-B67-02. A second subsurface soil sample could not be collected at FS-B67-03 or FS-B67-04 due to shallow groundwater (i.e., less than 4 feet bgs). Surface soil samples were not collected at the Buildings 67 and 70 Temporary Fire Station AOPI due to the presence of asphalt pavement over the entirety of the AOPI.
- Three groundwater samples were collected from three temporary monitoring wells (FS-B67-01, FS-B67-02, and FS-B67-03). Two monitoring wells were located within the suspected release area (FS-B67-01 and FS-B67-03), and one well was located downgradient (FS-B67-02).

Surface water and sediment are not present at this AOPI.

The Target PFAS analytical results for soil and groundwater at the Buildings 67 and 70 Temporary Fire Station AOPI are summarized below and presented in Table 6-2 and Figure 6-5.

6.3.2.1 Soil

PFOS, PFOA, PFBA, PFHxA, PFHxS, and PFBS were detected in soil samples collected at the Buildings 67 and 70 Temporary Fire Station AOPI. PFOS was detected at 15 µg/kg at boring FS-B67-01, which exceeds the 13 µg/kg SL. PFOA, PFHxA, PFHxS, and PFBS (estimated) were detected at concentrations less than the SLs at FS-B67-01. PFBA was detected at an estimated concentration less than the SL at FS-B67-03.

Target PFAS were not detected in soil samples collected at FS-B67-02 or FS-B67-04. PFNA and HFPO-DA were not detected at concentrations greater than the LODs at the Buildings 67 and 70 Temporary Fire Station AOPI.

6.3.2.2 Groundwater

PFOS, PFOA, PFBA, PFHxA, PFHxS, PFBS, and PFNA were detected in groundwater at the Buildings 67 and 70 Temporary Fire Station AOPI, with PFOS, PFOA, PFHxS, and PFBS all exceeding the SLs. The highest concentrations of Target PFAS were detected at FS-B67-03 (within the suspected release area). PFOS was detected at 2,400 ng/L, which exceeds the 4 ng/L SL, and PFOA was detected at 130 ng/L, exceeding the 6 ng/L SL. In addition, PFHxS was detected at 3,900 ng/L and PFBS was detected at 630 ng/L, exceeding the SLs of 39 and 600 ng/L, respectively. In addition, PFBA, PFHxA, and PFNA were detected at concentrations less than the SLs at FS-B67-03.

PFOS, PFOA, and PFHxS exceeded the SLs at FS-B67-01 with detected at 650, 79, and 950 ng/L, respectively. In addition, PFBA, PFHxA, and PFBS were detected at concentrations less than the SLs at FS-B67-01.

PFOA was detected at 7.7 ng/L at FS-B67-02 (downgradient), which exceeds the 6 ng/L SL. In addition, PFOS, PFHxA (estimated), PFHxS, and PFNA were detected at concentrations less than the SLs at the downgradient groundwater sampling location. PFBA results from FS-B67-02 were rejected during data validation (see Appendix G).

HFPO-DA was not detected at concentrations greater than the LOD in any groundwater samples at the Buildings 67 and 70 Temporary Fire Station AOPI.

6.3.3 CSM

The Buildings 67 and 70 Temporary Fire Station AOPI is approximately 0.65 acres. The AOPI currently consists of a degraded asphalt and gravel parking lot surrounded by grassy areas. The grassy areas around the AOPI are surrounded by homes to the north and west and by buildings and First Street to the south and east.

Shallow subsurface geology in this area is composed of unconsolidated glacial till of Pleistocene Age. The glacial till is compact and silty, characterized by discontinuous layers of gray sand and gravel. Groundwater was encountered at approximately 3 to 5 feet bgs at the Buildings 67 and 70 Temporary Fire Station AOPI during this SI. Surface water and sediment are not present at this AOPI.

There is no confirmed release of PFAS at this AOPI; however, interviews indicated AFFF and equipment were stored at Buildings 67 and 70 during the time frame the buildings were used as a temporary fire station. Former Buildings 67 and 70 are located on Army Reserve property, and the area is used for vehicle storage and maintenance. AFFF has been stored and used on the property post-transfer. Therefore, it is possible that PFAS-containing material, including AFFF, was used or stored at this AOPI where vehicle maintenance has been conducted post-transfer. The primary release mechanism is the potential release of PFAS-containing materials related to historical operations (e.g., storage) to surface soil, the source media. The secondary contaminant migration, fate, and transport considerations include downward contaminant migration from surface soil to subsurface soil and groundwater through leaching and percolation.

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

The soil exposure pathways for onsite workers are complete because Target PFAS were detected in soil at concentrations greater than the SLs and no restrictions are in place on intrusive activity at the AOPI. The

soil exposure pathways for onsite and offsite residents are considered incomplete because off-AOPI migration of soil is not expected.

Although onsite groundwater is not currently used and drinking water at Fort Sheridan is provided by the city of Highland Park, sourced from Lake Michigan, no restrictions are in place that prevent the use or consumption of groundwater onsite. Since Target PFAS were detected in groundwater at concentrations greater than the SLs, the groundwater exposure pathways for onsite workers are considered complete. The groundwater exposure pathways for onsite residents are potentially complete because detected concentrations in groundwater at the AOPI exceed the SL and there are nearby residences on the former Fort Sheridan. Due to the presence of wells (unknown use) within 1 mile of Fort Sheridan, the groundwater exposure pathway for offsite residents is potentially complete.

Surface water and sediment are not present at the Buildings 67 and 70 Temporary Fire Station AOPI. Figure 6-6 presents the CSM for the Buildings 67 and 70 Temporary Fire Station AOPI.

6.3.4 Recommendation

Detected concentrations of Target PFAS in soil and groundwater samples at the Buildings 67 and 70 Temporary Fire Station AOPI exceed the SLs; therefore, further investigation is recommended.

Table 6-2. Target PFAS Results and Screening for the Buildings 67 and 70 Temporary Fire Station AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBA	PFBS	PFHxA	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**7800**	**1900**	**3200**	**130**	**19**	**19**	**13**
FS-B67-01	FSB6701-SB02	BORE	1.50-2.50	05/06/2023	0.069 U	0.069 U	0.069 U	0.069 U	**0.91 J+**	0.069 U	0.069 U	**0.86 J+**
	FSB6701-SB02FD	BORE	1.50-2.50 (D)	05/06/2023	0.060 U	0.060 U	0.060 U	0.060 U	**1.1**	0.060 U	0.060 U	**0.85**
	FSB6701-SB03	BORE	4.50-5.50	05/06/2023	0.057 U	0.057 U	**0.10 J**	**0.14**	**1.7**	0.057 U	**0.14**	**15**
FS-B67-02	FSB6702-SB02	BORE	2.50-3.50	05/06/2023	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U
	FSB6702-SB03	BORE	14.00-15.00	05/06/2023	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U
FS-B67-03	FSB6703-SB02	BORE	2.50-3.50	05/05/2023	0.056 U	**0.084 J**	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U
FS-B67-04	FSB6704-SB02	BORE	1.50-2.00	05/06/2023	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**1800**	**600**	**990**	**39**	**5.9**	**6**	**4**
FS-B67-01	FSB6701-GW05	WELL	10.00-10.00	05/06/2023	0.92 U	**200**	**490**	**560**	**950**	0.92 U	**78**	**650**
FS-B67-02	FSB6702-GW06	WELL	15.00-15.00	05/17/2023	0.96 U	R	0.96 U	**9.9 J**	**1.9**	**1.4 J**	**7.7**	**1.7 J**
FS-B67-03	FSB6703-GW10	WELL	10.00-10.00	05/17/2023	0.88 U	**340**	**630**	**730**	**3900**	**2.5**	**130**	**2400**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL calculator provided in the August 2023 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.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.
R = After consultation with the PDT, the analyte was rejected due to serious deficiencies in the ability to analyze the sample and/or meet QC criteria. The presence or absence of the analyte cannot be verified.

6.4 HALEY AIRFIELD/CRASH TRUCK STORAGE AOPI

The following subsections describe the background, sampling results, CSM, and recommendation for the Haley Airfield/Crash Truck Storage AOPI.

6.4.1 AOPI Background

The Haley Airfield/Crash Truck Storage AOPI is in the northwesternmost area of the Main Installation, where the former Haley Airfield and runway were located. The property is currently a recreational area as part of Lake County Forest Preserve.

Building 126 was a crash truck storage building located west of the airport hangar (Building 117) and functioned as a single bay Fire Station/emergency response building for the Haley Airfield. The building was constructed in 1959 and used until the airfield closure in the 1980s (Diversified Technologies 1997). The building has since been demolished. No evidence of any aircraft crash response, fire training, or nozzle testing in this area was found; however, due to the time of operation, it is likely AFFF was stored in Building 126.

6.4.2 SI Sampling and Results

Soil, groundwater, surface water, and sediment samples were collected from the Haley Airfield/Crash Truck Storage AOPI at the following locations (Figure 6-7):

- Twelve soil samples and two field duplicates were collected from four soil borings: FS-126-01 located within the suspected release area, and FS-126-02, FS-126-03, and FS-126-04 downgradient from the suspected release area. One surface soil sample and two subsurface soil samples were collected from each boring.
- Three groundwater samples were collected from three temporary monitoring wells (FS-126-01, FS-126-02, and FS-126-03). FS-126-01 was within the suspected release area and temporary monitoring wells FS-126-02 and FS-126-03 were located downgradient.
- Two colocated surface water and sediment samples and one QC field duplicate were collected downgradient from the suspected release area, one from the former airport drainage ditch (FS-126-06) and one at the edge of the Fish Pond located at the eastern end of the AOPI (FS-126-05).

The Target PFAS analytical results for soil, groundwater, surface water, and sediment at the Haley Airfield/Crash Truck Storage AOPI are summarized below and presented in Table 6-3 and Figure 6-8.

6.4.2.1 Soil

PFOS, PFBA, PFOA, PFHxS, and PFNA were detected at concentrations less than the SLs in soil samples collected at the Haley Airfield/Crash Truck Storage AOPI. Four of the Target PFAS (PFOS, PFOA, PFHxS [estimated], and PFNA [estimated]) were detected at FS-126-01 (within the suspected release area) in shallow subsurface soil (i.e., 4 to 5 feet bgs) only. PFOS, PFOA, and PFHxS (estimated) were detected in shallow subsurface soil at FS-126-02 (downgradient); however, PFOS, PFBA, PFOA, and PFNA (estimated) were also detected in surface soil at the sample location.

PFOS was detected in both surface soil and shallow subsurface soil at FS-126-03, while PFOA and PFHxS were also detected in surface soil. In addition, PFOS was detected in surface soil at boring location FS-126-04. Target PFAS were not detected in any other soil samples.

PFBS, PFHxA, and HFPO-DA were not detected at concentrations greater than the LOD in soil at the Haley Airfield/Crash Truck Storage AOPI.

6.4.2.2 Groundwater

PFOS, PFOA, PFBA, PFHxA, PFHxS, and PFBS were detected at concentrations less than the SLs in groundwater at the Haley Airfield/Crash Truck Storage AOPI. Six of the Target PFAS (PFOS, PFBA, PFOA [estimated], PFHxA [estimated], PFHxS, and PFBS) were detected at FS-126-03 (downgradient).

PFBA, PFHxS and PFBS were detected in groundwater downgradient from the suspected release area at FS-126-02, while only PFBS (estimated) and PFBA were detected at FS-126-01 (within the suspected release area). PFNA and HFPO-DA were not detected at concentrations greater than the LODs in groundwater at the AOPI.

6.4.2.3 Surface Water

PFOS, PFOA, PFBA, PFHxA, PFHxS, PFBS, and PFNA were detected in surface water samples collected at the Haley Airfield/Crash Truck Storage AOPI. PFOS was detected at 10 ng/L in the surface water sample collected at the Fish Pond (FS-126-05), which exceeds the 4 ng/L SL. PFOA, PFBA, PFHxA, PFHxS, PFBS, and PFNA (estimated) were detected at concentrations less than the SLs at FS-126-05.

PFOS, PFOA, PFBA, PFHxA, PFHxS, and PFBS were detected at concentrations less than the SLs in surface water samples collected from the remaining airport drainage ditch at FS-126-06. HFPO-DA was not detected at concentrations greater than the LOD in surface water at the AOPI.

6.4.2.4 Sediment

PFOS was detected at concentrations less than the SL in sediment samples collected from both FS-126-05 and FS-126-06. PFOA, PFBA, PFHxA, PFHxS, PFBS, PFNA, and HFPO-DA were not detected at concentrations greater than the LODs in sediment samples collected at the Haley Airfield/Crash Truck Storage AOPI.

6.4.3 CSM

The Haley Airfield/Crash Truck Storage AOPI is approximately 15.82 acres. The AOPI is currently open grassy land. The AOPI is surrounded by trees to the north and south, Lake Michigan to the east, and the former installation border to the west. Surface water at this AOPI generally flows toward the Fish Pond at the eastern end of the AOPI near Lake Michigan. An airport drainage ditch (open swale) remains at the site and discharges into the Fish Pond.

Shallow subsurface geology in this area is composed of unconsolidated glacial till of Pleistocene Age. The glacial till is compact and silty, characterized by discontinuous layers of gray sand and gravel. Groundwater was encountered between approximately 8 and 18 feet bgs at the Haley Airfield/Crash Truck Storage AOPI during this SI.

No evidence has been found of any aircraft crash response, fire training, or nozzle testing in this area; however, due to the time of operation, it is likely AFFF was stored in Building 126. The primary release mechanism is the potential release of PFAS-containing materials related to historical releases of firefighting foam, including AFFF, to surface soil. The secondary contaminant migration, fate, and transport considerations include downward contaminant migration from surface soil to subsurface soil and groundwater through leaching and percolation, and from surface soil to surface water through overland flow/runoff.

Based on the mixed land use at the former Fort Sheridan and the recreational use at this AOPI, the human receptors considered in the CSM are onsite workers with the potential to work at the AOPI, onsite recreators (including on the AOPI), onsite residents living on the former Fort Sheridan, and offsite residents living in the vicinity of the former Fort Sheridan (off-post). Although current land use at this AOPI is recreational

and a residential pathway does not currently exist at the AOPI, onsite residents are evaluated for the potential migration (i.e., groundwater) to residents on-post at the former Fort Sheridan.

The soil exposure pathways for onsite workers are potentially complete because Target PFAS were detected at concentrations less than the SLs and there are no restrictions on intrusive activity at the AOPI. Onsite recreators are expected to potentially contact surface soil but not subsurface soil; therefore, the surface soil pathway is potentially complete for onsite recreators. The soil exposure pathways for onsite and offsite residents are considered incomplete because off-AOPI migration of soil is not expected.

Although onsite groundwater is not currently used and drinking water at Fort Sheridan is provided by the city of Highland Park, sourced from Lake Michigan, no restrictions are in place that prevent the use or consumption of groundwater onsite. Since Target PFAS were detected in groundwater at concentrations less than the SLs, the onsite groundwater exposure pathways are potentially complete. Due to the presence of wells (unknown use) within 1 mile of Fort Sheridan, the groundwater exposure pathway for offsite residents is considered potentially complete.

Target PFAS were detected in surface water at concentrations greater than the SLs, making the surface water and sediment exposure pathways complete for onsite workers and recreators. The surface water and sediment exposure pathways for onsite and offsite residents are potentially complete because surface water has the potential to migrate from the AOPI to other areas within the former Fort Sheridan and to offsite residents (i.e., off-post).

Figure 6-9 presents the CSM for the Haley Airfield/Crash Truck Storage AOPI.

6.4.4 Recommendation

Detected concentrations of one Target PFAS (PFOS) exceeded the SL in the surface water sample collected at the eastern end of the Haley Airfield/Crash Truck Storage AOPI. The sample was collected at the Fish Pond, which collects surface water runoff from the surrounding areas including the AOPI. Due to limited sampling data in the eastern portion of the AOPI and the uncertainty of potential discharge sources into the Fish Pond, further investigation of potential sources within the AOPI and surrounding area is recommended.

Table 6-3. Target PFAS Results and Screening for the Haley Airfield/Crash Truck Storage AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBA	PFBS	PFHxA	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**7800**	**1900**	**3200**	**130**	**19**	**19**	**13**
FS-126-01	FS12601-SS01	SURF	0.00-1.00	05/05/2023	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U
	FS12601-SB02	BORE	4.00-5.00	05/05/2023	0.054 U	0.054 U	0.054 U	0.054 U	**0.058 J**	**0.062 J**	**0.16**	**0.89**
	FS12601-SB03	BORE	8.50-9.50	05/05/2023	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
FS-126-02	FS12602-SS01	SURF	0.00-1.00	05/04/2023	0.047 U	**0.20**	0.047 U	0.047 U	0.047 U	**0.075 J**	**0.15**	**0.32**
	FS12602-SB02	BORE	7.00-8.00	05/04/2023	0.047 U	0.047 U	0.047 U	0.047 U	**0.087 J**	0.047 U	**0.14**	**0.27**
	FS12602-SB03	BORE	17.00-18.00	05/04/2023	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U
FS-126-03	FS12603-SS01	SURF	0.00-1.00	05/04/2023	0.048 U	0.048 U	0.048 U	0.048 U	**0.049 J**	0.048 U	**0.083 J**	**0.37**
	FS12603-SB02	BORE	4.00-5.00	05/04/2023	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U	**0.083 J**
	FS12603-SB03	BORE	6.50-7.50	05/04/2023	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U
	FS12603-SB03FD	BORE	6.50-7.50 (D)	05/04/2023	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
FS-126-04	FS12604-SS01	SURF	0.00-1.00	05/05/2023	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	**0.15**
	FS12604-SB02	BORE	3.00-4.00	05/05/2023	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U	0.048 U
	FS12604-SB02FD	BORE	3.00-4.00 (D)	05/05/2023	0.046 U	0.046 U	0.046 U	0.046 U	0.046 U	0.046 U	0.046 U	0.046 U
	FS12604-SB03	BORE	14.00-15.00	05/05/2023	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**1800**	**600**	**990**	**39**	**5.9**	**6**	**4**
FS-126-01	FS12601-GW07	WELL	15.00-15.00	05/05/2023	0.93 U	**3.0**	**1.1 J**	0.93 U	0.93 U	0.93 U	0.93 U	0.93 U
FS-126-02	FS12602-GW08	WELL	22.00-22.00	05/05/2023	0.98 U	**6.6**	**9.3**	0.98 U	**2.4**	0.98 U	0.98 U	0.98 U
FS-126-03	FS12603-GW09	WELL	10.00-10.00	05/05/2023	0.89 U	**5.1**	**6.7**	**1.0 J**	**9.9**	0.89 U	**1.4 J**	**2.4**
Surface Water				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**1800**	**600**	**990**	**39**	**5.9**	**6**	**4**
FS-126-05	FS12605-SW01	SWTR	0.00-0.00	05/01/2023	0.88 U	**5.2**	**3.0**	**5.2**	**6.2**	**0.98 J**	**2.4**	**10**
FS-126-06	FS12606-SW01	SWTR	0.00-0.00	05/01/2023	0.89 U	**3.5**	**3.0**	**3.5**	**3.6**	0.89 U	**1.6 J**	**3.0**
Sediment				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**7800**	**1900**	**3200**	**130**	**19**	**19**	**13**
FS-126-05	FS12605-SD01	SEDI	0.00-0.50	05/01/2023	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	**0.26**
	FS12605-SD01FD	SEDI	0.00-0.50 (D)	05/01/2023	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	**0.17**
FS-126-06	FS12606-SD01	SEDI	0.00-0.50	05/04/2023	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	**0.34**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL calculator provided in the August 2023 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.

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 Fort Sheridan to further evaluate PFAS-related releases and identify the presence or absence of Target PFAS.

Target PFAS were detected at concentrations greater than the LODs in 9 surface soil samples and 12 subsurface samples, with 1 Target PFAS detection greater than the soil SL (PFOS at the Buildings 67 and 70 Temporary Fire Station AOPI). Target PFAS were detected at concentrations greater than the LODs in groundwater samples collected from all nine temporary wells installed during this SI. Concentrations of PFOS, PFOA, PFBS, and PFHxS exceeded the SLs in groundwater samples at two of the AOPIs: the Building 79 Fire Station and Nozzle Spray Area AOPI and the Buildings 67 and 70 Temporary Fire Station AOPI. Target PFAS were detected at concentrations greater than the LODs in all surface water and sediment samples collected during this SI, including concentrations greater than the SLs in surface water samples at two AOPIs: the Building 79 Fire Station and Nozzle Spray Area AOPI and the Buildings 67 and 70 Temporary Fire Station AOPI. 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.

There is a complete soil exposure pathway for onsite workers at one AOPI (Buildings 67 and 70 Temporary Fire Station) where Target PFAS were detected at concentrations greater than the SLs in soil. Exposure pathways for other onsite receptors, including workers, recreators, and/or residents at the three AOPIs, are potentially complete or incomplete. The soil exposure pathways for offsite residents are incomplete because migration of soil off-AOPI is not expected.

There are complete groundwater exposure pathways for onsite receptors at two AOPIs, including onsite workers and residents at the Building 79 Fire Station and Nozzle Spray Area AOPI and onsite workers at the Buildings 67 and 70 Temporary Fire Station AOPI, because Target PFAS were detected in groundwater at concentrations greater than the SLs. Exposure pathways for other onsite receptors at the three AOPIs are potentially complete. The groundwater exposure pathways for offsite residents are potentially complete for all three AOPIs due to potential off-post migration of groundwater.

There are complete surface water and sediment exposure pathways at two AOPIs, including onsite workers and residents at the Building 79 Fire Station and Nozzle Spray Area AOPI and onsite workers and recreators at the Haley Airfield/Crash Truck Storage AOPI, because Target PFAS were detected at concentrations greater than the SLs. The exposure pathway for one additional onsite receptor (resident) at the Haley Airfield/Crash Truck Storage AOPI is potentially complete as no residents are currently at the AOPI. The

surface water and sediment exposure pathways are potentially complete for offsite residents at these two AOPIs due to the potential for off-post migration.

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 three AOPIs are recommended for further investigation or evaluation:

- Building 79 Fire Station and Nozzle Spray Area
- Buildings 67 and 70 Temporary Fire Station
- Haley Airfield/Crash Truck Storage.

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	
Building 79 Fire Station and Nozzle Spray Area	Exceeds SL	Detected	Exceeds SL	Detected	SLs exceeded in groundwater and surface water; further investigation recommended.
Buildings 67 and 70 Temporary Fire Station	Exceeds SL	Exceeds SL	–	–	SLs exceeded in soil and groundwater; further investigation recommended.
Haley Airfield/Crash Truck Storage	Detected	Detected	Exceeds SL	Detected	Further investigation recommended to identify potential Army source area(s) within or near the AOPI contributing to the Target PFAS concentration exceeding the SL in surface water samples collected from the Fish Pond at the eastern end of the AOPI. Current soil and groundwater data on the eastern side of the AOPI are limited.

– Not Collected

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FIGURES

FS-126-05 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	0.88 U
PFBA (ng/L)	5.2
PFBS (ng/L)	3
PFHxA (ng/L)	5.2
PFHxS (ng/L)	6.2
PFNA (ng/L)	0.98 J
PFOA (ng/L)	2.4
PFOS (ng/L)	10

FS-126-06 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	0.89 U
PFBA (ng/L)	3.5
PFBS (ng/L)	3
PFHxA (ng/L)	3.5
PFHxS (ng/L)	3.6
PFNA (ng/L)	0.89 U
PFOA (ng/L)	1.6 J
PFOS (ng/L)	3

FS-126-03 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	0.89 U
PFBA (ng/L)	5.1
PFBS (ng/L)	6.7
PFHxA (ng/L)	1.0 J
PFHxS (ng/L)	9.9
PFNA (ng/L)	0.89 U
PFOA (ng/L)	1.4 J
PFOS (ng/L)	2.4

FS-126-02 (GW)	
Analyte	22 ft.
HFPO-DA or GenX (ng/L)	0.98 U
PFBA (ng/L)	6.6
PFBS (ng/L)	9.3
PFHxA (ng/L)	0.98 U
PFHxS (ng/L)	2.4
PFNA (ng/L)	0.98 U
PFOA (ng/L)	0.98 U
PFOS (ng/L)	0.98 U

FS-126-01 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	0.93 U
PFBA (ng/L)	3
PFBS (ng/L)	1.1 J
PFHxA (ng/L)	0.93 U
PFHxS (ng/L)	0.93 U
PFNA (ng/L)	0.93 U
PFOA (ng/L)	0.93 U
PFOS (ng/L)	0.93 U

FS-B79-02 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	0.95 U
PFBA (ng/L)	13
PFBS (ng/L)	0.95 U
PFHxA (ng/L)	2.1
PFHxS (ng/L)	3.9
PFNA (ng/L)	0.95 U
PFOA (ng/L)	1.5 J
PFOS (ng/L)	3

FS-B79-01 (GW)	
Analyte	20 ft.
HFPO-DA or GenX (ng/L)	0.91 U
PFBA (ng/L)	93
PFBS (ng/L)	1.6 J
PFHxA (ng/L)	25
PFHxS (ng/L)	0.91 U
PFNA (ng/L)	0.91 U
PFOA (ng/L)	0.91 U
PFOS (ng/L)	0.91 U

FS-B79-07 (SW)		
Analyte	0 ft.	0 ft.(D)
HFPO-DA or GenX (ng/L)	0.89 U	0.86 U
PFBA (ng/L)	12 J+	11 J+
PFBS (ng/L)	15	13
PFHxA (ng/L)	15	14
PFHxS (ng/L)	44	47
PFNA (ng/L)	1.3 J	1.2 J
PFOA (ng/L)	10	9.4
PFOS (ng/L)	27	24

FS-B79-08 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	0.88 U
PFBA (ng/L)	12 J+
PFBS (ng/L)	14
PFHxA (ng/L)	14
PFHxS (ng/L)	47
PFNA (ng/L)	0.97 J
PFOA (ng/L)	8.2
PFOS (ng/L)	29

Screening Levels from the August 2023 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA or GenX)	6	23
Perfluorobutanoic acid (PFBA)	1800	7800
Perfluorobutanesulfonic acid (PFBS)	600	1900
Perfluorohexanoic acid (PFHxA)	990	3200
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	5.9	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

FS-B67-02 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	0.96 U
PFBA (ng/L)	R
PFBS (ng/L)	0.96 U
PFHxA (ng/L)	9.9 J
PFHxS (ng/L)	1.9
PFNA (ng/L)	1.4 J
PFOA (ng/L)	7.7
PFOS (ng/L)	1.7 J

FS-B79-05 (GW)		
Analyte	13 ft.	13 ft.(D)
HFPO-DA or GenX (ng/L)	0.95 U	0.93 U
PFBA (ng/L)	72 J+	64 J+
PFBS (ng/L)	84	100
PFHxA (ng/L)	190	230
PFHxS (ng/L)	1000	1300
PFNA (ng/L)	1.7 J	2.1
PFOA (ng/L)	530	730
PFOS (ng/L)	120	150

FS-B67-01 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	0.92 U
PFBA (ng/L)	200
PFBS (ng/L)	490
PFHxA (ng/L)	560
PFHxS (ng/L)	950
PFNA (ng/L)	0.92 U
PFOA (ng/L)	78
PFOS (ng/L)	650

FS-B67-03 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	0.88 U
PFBA (ng/L)	340
PFBS (ng/L)	630
PFHxA (ng/L)	730
PFHxS (ng/L)	3900
PFNA (ng/L)	2.5
PFOA (ng/L)	130
PFOS (ng/L)	2400

Lake Michigan
Fish Pond
Hutchinson Ravine
Mid Army Loop Drain
Spoil Loop Drain
James Ravine
Sheridan Ravine
Haley Army Airfield
Building 126 Crash Truck Storage
Building 79 Fire Station
Building 79 Nozzle Spray Area
Building 67 and 70 Temporary Fire Station

Sources:
Background Imagery:
Google Earth Imagery, Landsat/Copernicus 7/14/2018 & 6/14/2021

Legend
- Installation Boundary
- Area of Potential Interest
- U.S. Army Reserve Property
- U.S. Navy Property
- Historic Building
- Stream
- Haley Army Airfield
- DPT Groundwater Sample/Soil Boring (8)
- Soil Boring (6)
- Surface Water/Sediment (4)
- Groundwater Flow Direction
- Surface Water Flow Direction

Note:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
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.

R = After consultation with the PDT, the analyte was rejected due to serious deficiencies in the ability to analyze the sample and/or meet QC criteria. The presence or absence of the analyte cannot be verified.
U = The analyte was analyzed for, but was not detected above, the associated numerical value.

The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the August 2023 OSD Memorandum for Tap Water and Soil using an HQ = 0.1. Highlighted values indicate an exceedance of the Screening Level.

0 400 800
SCALE: 1" = 800'

IL STATE PLANE EAST (NAD83)

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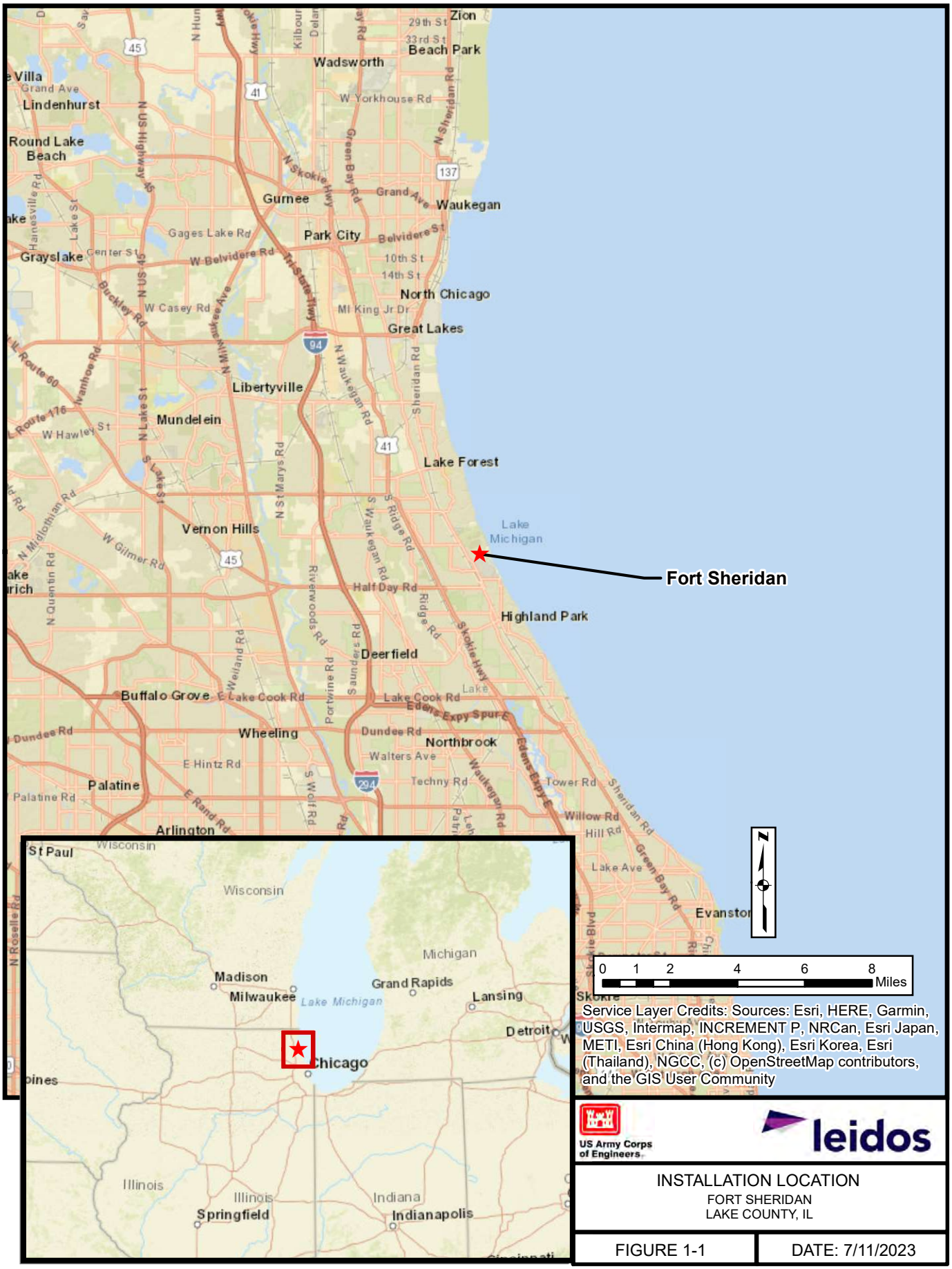
SUMMARY OF TARGET PFAS IN GROUNDWATER AND SURFACE WATER
FORT SHERIDAN
LAKE COUNTY, IL

FIGURE ES-1 | DATE: 11/27/2023

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\SI\Fig ES-1 Sitewide GW SW Sheridan Results.mxd


Fort Sheridan
Lake Michigan
Zion
Beach Park
Wadsworth
Lindenhurst
Round Lake Beach
Gurnee
Waukegan
Park City
Grayslake
North Chicago
Great Lakes
Libertyville
Mundelein
Lake Forest
Vernon Hills
Highland Park
Deerfield
Buffalo Grove
Wheeling
Northbrook
Palatine
Arlington
Evanston
Skokie
St Paul
Wisconsin
Michigan
Madison
Milwaukee
Grand Rapids
Lansing
Detroit
Chicago
Illinois
Springfield
Indiana
Indianapolis
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
US Army Corps of Engineers
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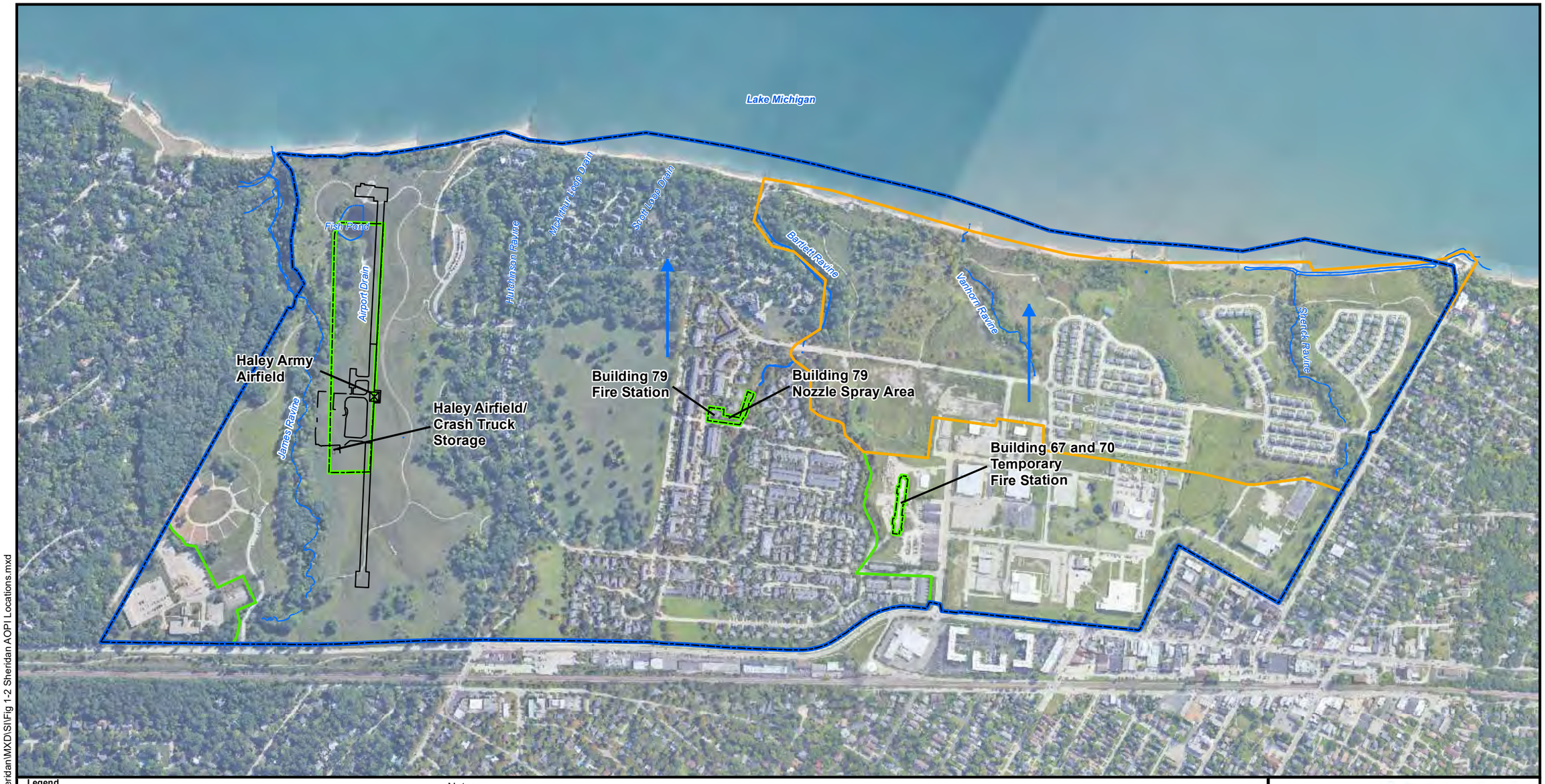
INSTALLATION LOCATION
FORT SHERIDAN
LAKE COUNTY, IL
FIGURE 1-1
DATE: 7/11/2023



Legend

- Installation Boundary
- Area of Potential Interest
- U.S. Army Reserve Property
- U.S. Navy Property
- Historic Building
- Stream
- Haley Army Airfield
- Groundwater Flow Direction

Notes:

Google Earth Imagery, Landsat/Copernicus 7/14/2018 & 6/14/2021

IL STATE PLANE EAST (NAD83)

0 400 800

SCALE: 1" = 800'

US Army Corps of Engineers

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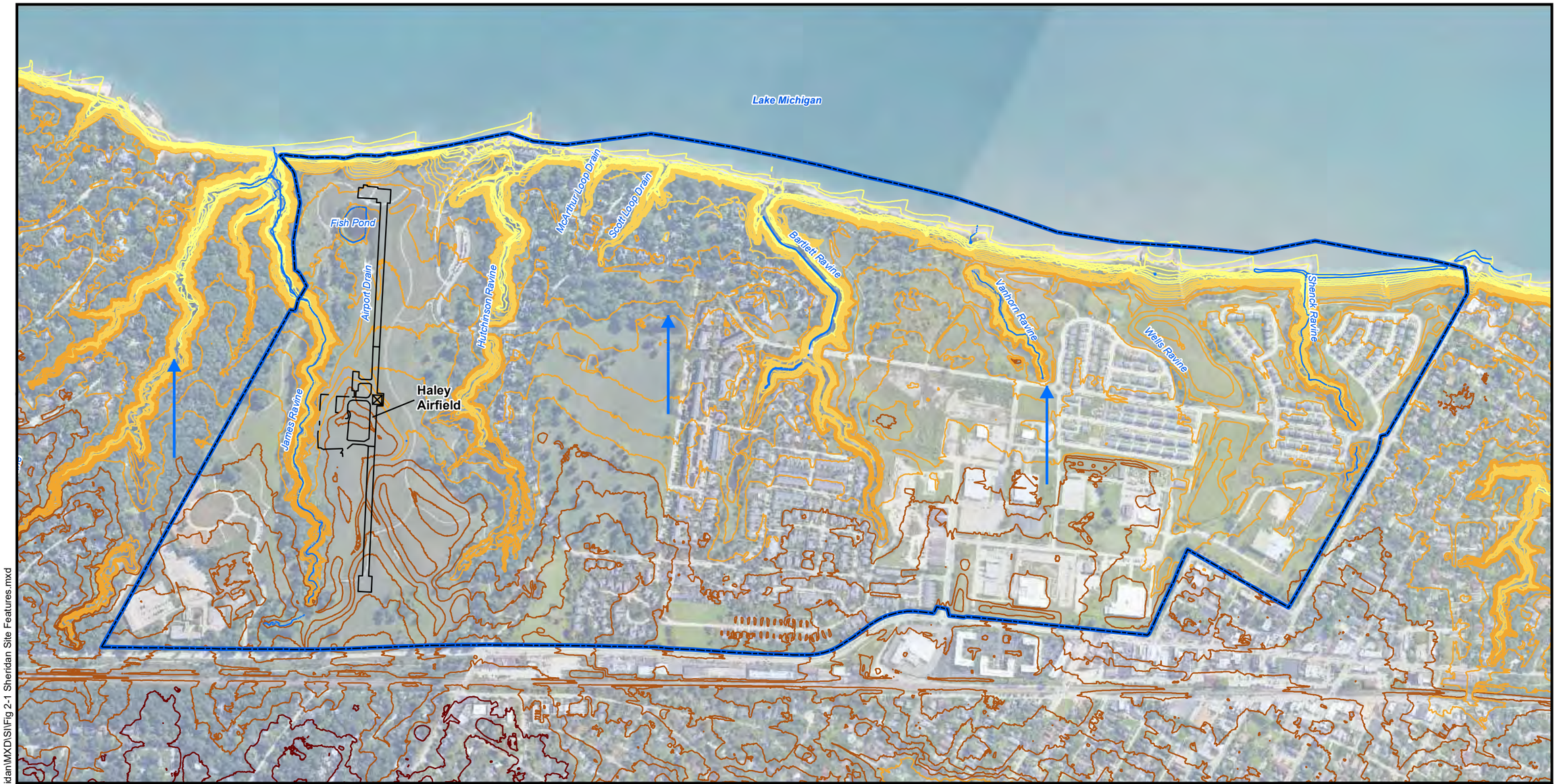
AOPI LOCATIONS

FORT SHERIDAN
LAKE COUNTY, IL

FIGURE 1-2 | DATE: 11/27/2023

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\SI\Fig 1-2 Sheridan AOPI Locations.mxd



Legend

- Installation Boundary
- Stream/Surface Water
- Groundwater Flow Direction

Elevation

- 580 - 610
- 610 - 640
- 640 - 670
- 670 - 700
- 700 - 730

Notes:
Google Earth Imagery, Landsat/Copernicus 7/14/2018 & 6/14/2021

IL STATE PLANE EAST (NAD83)

0 400 800

SCALE: 1" = 800'

US Army Corps of Engineers

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SITE FEATURES
FORT SHERIDAN
LAKE COUNTY, IL

FIGURE 2-1 | DATE: 8/22/2023

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\SI\Fig 2-1 Sheridan Site Features.mxd

Legend

- Area of Potential Interest
- Historic Building
- Stream
- DPT Groundwater Sample/Soil Boring (3)
- Soil Boring (3)
- Surface Water/Sediment (2)
- Groundwater Flow Direction
- Surface Water Flow Direction

Sources:
Background Imagery: ESRI World Imagery (Vivid/Mazar, 3/10/2022)
Groundwater flow arrows based on Site Investigation Report Former Ordnance Motor Repair Area, IT Corp Sept. 2001

IL STATE PLANE EAST (NAD83)

0 100 200

SCALE: 1 inch = 100 feet

US Army Corps of Engineers

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Building 79 Fire Station and Nozzle Spray Area AOPI Sample Locations
FORT SHERIDAN
LAKE COUNTY, IL

FIGURE 6-1 | DATE: 7/11/2023

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\SI\Fig 6-1 BLDG 79 FS NS AOPI Sample Locations.mxd

The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the August 2023 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 August 2023 OSD Memo

Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA or GenX)	6	23
Perfluorobutanoic acid (PFBA)	1800	7800
Perfluorobutanesulfonic acid (PFBS)	600	1900
Perfluorohexanoic acid (PFHxA)	990	3200
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	5.9	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

FS-B79-02 (GW)

Analyte	15 ft.
HFPO-DA or GenX (ng/L)	0.95 U
PFBA (ng/L)	13
PFBS (ng/L)	0.95 U
PFHxA (ng/L)	2.1
PFHxS (ng/L)	3.9
PFNA (ng/L)	0.95 U
PFOA (ng/L)	1.5 J
PFOS (ng/L)	3

FS-B79-02 (SO)

Analyte	0 ft.	5-6 ft.	14-15 ft.
HFPO-DA or GenX (µg/kg)	0.054 U	0.051 U	0.050 U
PFBA (µg/kg)	0.18	0.051 U	0.050 U
PFBS (µg/kg)	0.074 J	0.051 U	0.050 U
PFHxA (µg/kg)	0.57	0.051 U	0.050 U
PFHxS (µg/kg)	5.4	1.7	0.050 U
PFNA (µg/kg)	0.082 J	0.051 U	0.050 U
PFOA (µg/kg)	0.88	0.2	0.050 U
PFOS (µg/kg)	8.5	0.5	0.050 U

FS-B79-01 (GW)

Analyte	20 ft.
HFPO-DA or GenX (ng/L)	0.91 U
PFBA (ng/L)	93
PFBS (ng/L)	1.6 J
PFHxA (ng/L)	25
PFHxS (ng/L)	0.91 U
PFNA (ng/L)	0.91 U
PFOA (ng/L)	0.91 U
PFOS (ng/L)	0.91 U

FS-B79-01 (SO)

Analyte	0 ft.	3-4 ft.	3-4 ft.(D)	13-15 ft.
HFPO-DA or GenX (µg/kg)	0.055 U	0.061 U	0.057 U	0.049 U
PFBA (µg/kg)	0.4	0.067 J	0.057 U	0.056 J
PFBS (µg/kg)	0.076 J	0.061 U	0.057 U	0.049 U
PFHxA (µg/kg)	0.45	0.061 U	0.075 J	0.049 U
PFHxS (µg/kg)	0.71	0.27	0.39	0.049 U
PFNA (µg/kg)	0.4	0.061 J	0.057 U	0.049 U
PFOA (µg/kg)	1.3	0.097 J	0.076 J	0.049 U
PFOS (µg/kg)	3.7	0.11 J	0.18	0.049 U

FS-B79-07 (SW)

Analyte	0 ft.	0 ft.(D)
HFPO-DA or GenX (ng/L)	0.89 U	0.86 U
PFBA (ng/L)	12 J+	11 J+
PFBS (ng/L)	15	13
PFHxA (ng/L)	15	14
PFHxS (ng/L)	44	47
PFNA (ng/L)	1.3 J	1.2 J
PFOA (ng/L)	10	9.4
PFOS (ng/L)	27	24

FS-B79-07 (SD)

Analyte	0 ft.
HFPO-DA or GenX (µg/kg)	0.26 U
PFBA (µg/kg)	0.42 J
PFBS (µg/kg)	0.26 U
PFHxA (µg/kg)	2.1
PFHxS (µg/kg)	1.8
PFNA (µg/kg)	0.26 J
PFOA (µg/kg)	1.3
PFOS (µg/kg)	9.6

FS-B79-04 (SO)

Analyte	0 ft.	4-5 ft.	39-40 ft.
HFPO-DA or GenX (µg/kg)	0.064 U	0.055 U	0.051 U
PFBA (µg/kg)	0.2	0.055 U	0.051 U
PFBS (µg/kg)	0.064 U	0.055 U	0.051 U
PFHxA (µg/kg)	0.094 J	0.055 U	0.051 U
PFHxS (µg/kg)	0.064 U	0.055 U	0.051 U
PFNA (µg/kg)	0.084 J	0.055 U	0.051 U
PFOA (µg/kg)	0.24	0.055 U	0.051 U
PFOS (µg/kg)	0.45	0.11 J	0.051 U

FS-B79-06 (SO)

Analyte	0 ft.	2-3 ft.	11-12 ft.
HFPO-DA or GenX (µg/kg)	0.058 U	0.057 U	0.048 U
PFBA (µg/kg)	0.15	0.057 U	0.048 U
PFBS (µg/kg)	0.058 U	0.057 U	0.048 U
PFHxA (µg/kg)	0.058 U	0.057 U	0.048 U
PFHxS (µg/kg)	0.058 U	0.057 U	0.075 J
PFNA (µg/kg)	0.058 U	0.057 U	0.048 U
PFOA (µg/kg)	0.094 J	0.057 U	0.048 U
PFOS (µg/kg)	0.2	0.18	0.4

FS-B79-08 (SW)

Analyte	0 ft.
HFPO-DA or GenX (ng/L)	0.88 U
PFBA (ng/L)	12 J+
PFBS (ng/L)	14
PFHxA (ng/L)	14
PFHxS (ng/L)	47
PFNA (ng/L)	0.97 J
PFOA (ng/L)	8.2
PFOS (ng/L)	29

FS-B79-08 (SD)

Analyte	0 ft.
HFPO-DA or GenX (µg/kg)	0.33 U
PFBA (µg/kg)	0.33 U
PFBS (µg/kg)	0.33 U
PFHxA (µg/kg)	0.61 J
PFHxS (µg/kg)	2.1
PFNA (µg/kg)	0.33 U
PFOA (µg/kg)	1
PFOS (µg/kg)	8.8

FS-B79-03 (SO)

Analyte	0 ft.	4-6 ft.	10-12 ft.
HFPO-DA or GenX (µg/kg)	0.060 U	0.054 U	0.056 U
PFBA (µg/kg)	0.22	0.054 U	0.056 U
PFBS (µg/kg)	0.060 U	0.054 U	0.056 U
PFHxA (µg/kg)	0.075 J	0.054 U	0.056 U
PFHxS (µg/kg)	0.060 U	0.054 U	0.21
PFNA (µg/kg)	0.060 U	0.054 U	0.056 U
PFOA (µg/kg)	0.21	0.054 U	0.097 J
PFOS (µg/kg)	0.33	0.14	0.71

FS-B79-05 (GW)

Analyte	13 ft.	13 ft.(D)
HFPO-DA or GenX (ng/L)	0.95 U	0.93 U
PFBA (ng/L)	72 J+	64 J+
PFBS (ng/L)	84	100
PFHxA (ng/L)	190	230
PFHxS (ng/L)	1000	1300
PFNA (ng/L)	1.7 J	2.1
PFOA (ng/L)	530	730
PFOS (ng/L)	120	150

FS-B79-05 (SO)

Analyte	0 ft.	2-3 ft.	2-3 ft.(D)	7.5-8.5 ft.
HFPO-DA or GenX (µg/kg)	0.057 U	0.051 U	0.054 U	0.055 U
PFBA (µg/kg)	0.075 J	0.051 U	0.054 U	0.055 U
PFBS (µg/kg)	0.057 U	0.051 U	0.054 U	0.055 U
PFHxA (µg/kg)	0.15	0.091 J	0.079 J	0.055 U
PFHxS (µg/kg)	0.55	0.58 J-	0.45	0.055 U
PFNA (µg/kg)	0.057 U	0.051 U	0.054 U	0.055 U
PFOA (µg/kg)	0.25	0.31	0.28	0.055 U
PFOS (µg/kg)	1.3	0.70 J-	0.42	0.055 U

Note:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
GW = Groundwater, SW = Surface water, 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.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.

Building 79 Fire Station
Building 79 Nozzle Spray Area
FS-B79-01
FS-B79-02
FS-B79-03
FS-B79-04
FS-B79-05
FS-B79-06
FS-B79-07
FS-B79-08

Legend
- Area of Potential Interest
- Historic Building
- Stream
- DPT Groundwater Sample/Soil Boring (3)
- Soil Boring (3)
- Surface Water/Sediment (2)
- Groundwater Flow Direction
- Surface Water Flow Direction

Sources:
Background Imagery: ESRI World Imagery (Vivid/Mazar, 3/10/2022)
Groundwater flow arrows based on Site Investigation Report Former Ordnance Motor Repair Area, IT Corp Sept. 2001

IL STATE PLANE EAST (NAD83)
0 100 200
SCALE: 1 inch = 100 feet

US Army Corps of Engineers
leidos

Building 79 Fire Station and Nozzle Spray Area AOPI Sample Results
FORT SHERIDAN
LAKE COUNTY, IL

FIGURE 6-2 | DATE: 11/27/2023

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\SI\Fig 6-2 BLDG 79 FS NS AOPI Sample Results.mxd

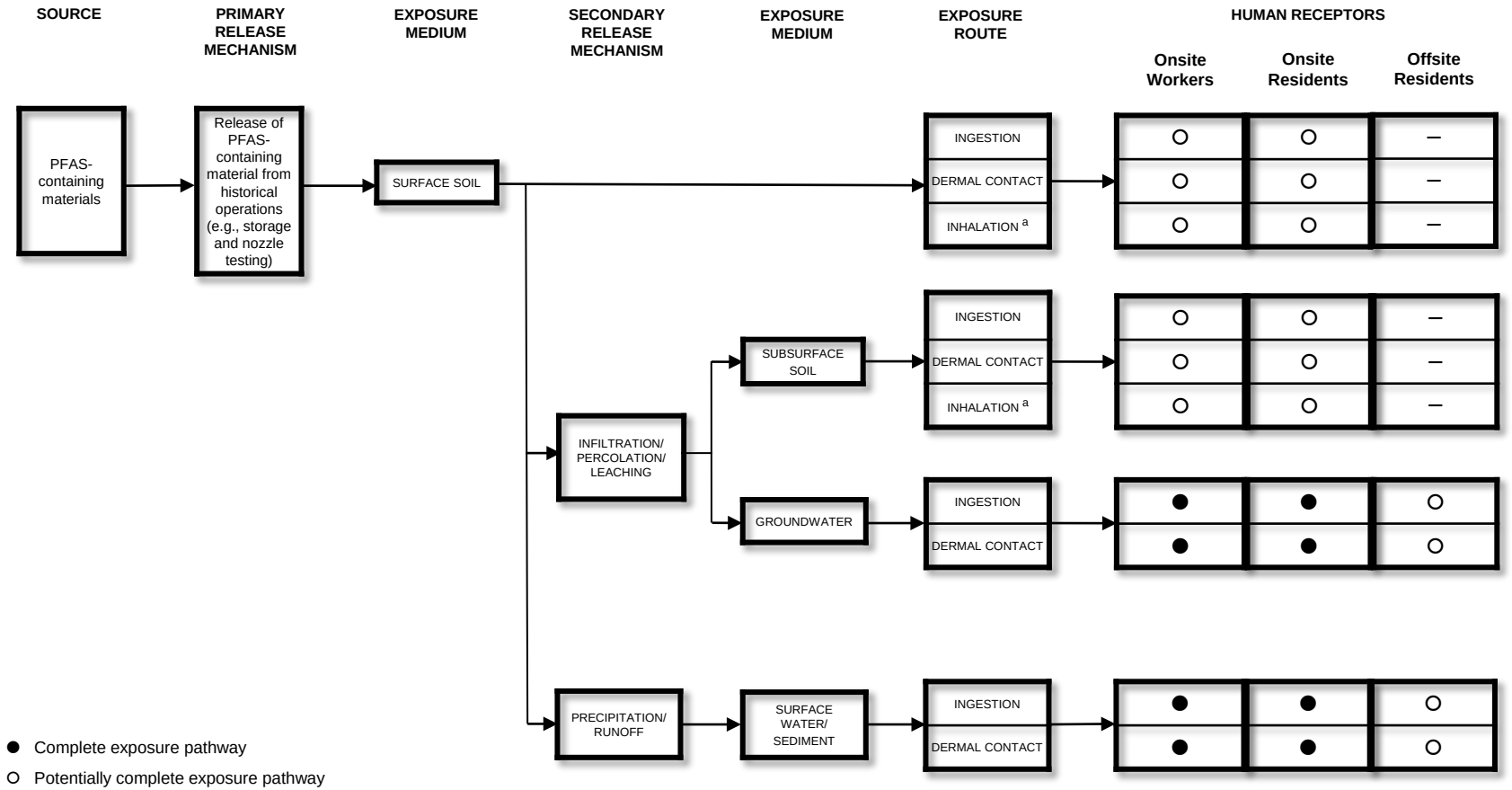
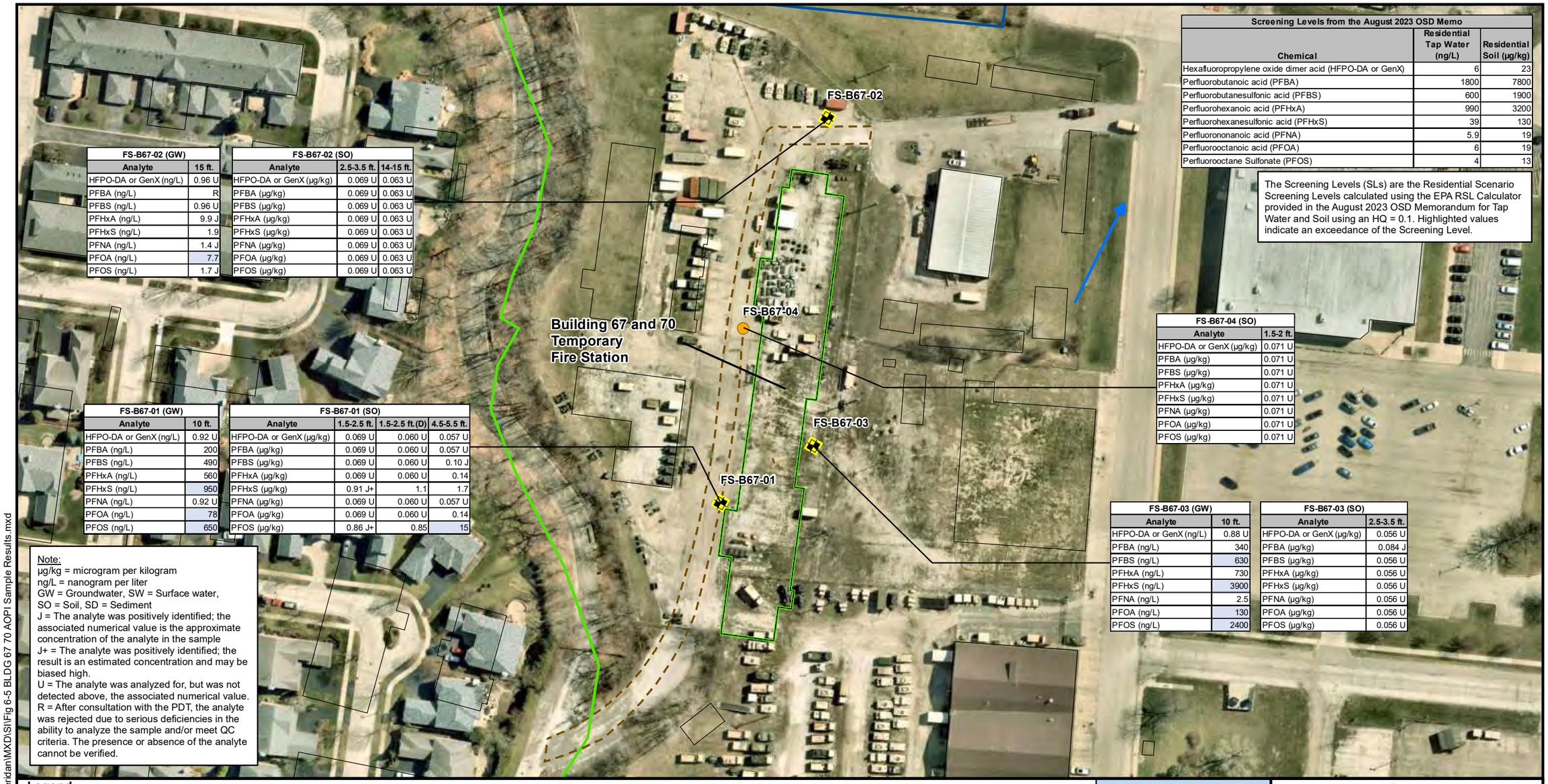


Figure 6-3. Human Health CSM for Building 79 Fire Station and Nozzle Spray Area AOPI


FS-B67-02
FS-B67-04
Building 67 and 70
Temporary
Fire Station
FS-B67-03
FS-B67-01
Sources:
Background Imagery: ESRI World Imagery (Vivid/Mazar, 3/10/2022)
Groundwater flow arrows based on Site Investigation Report Former Ordnance Motor Repair Area, IT Corp Sept. 2001
Legend
Area of Potential Interest
U.S. Army Reserve Property
U.S. Navy Property
Historic Building
Former Road
DPT Groundwater Sample/Soil Boring (3)
Soil Boring (1)
Groundwater Flow Direction
IL STATE PLANE EAST (NAD83)
0
100
200
SCALE: 1 inch = 100 feet
US Army Corps of Engineers
leidos
Buildings 67 and 70 Temporary Fire Station AOPI Sample Locations
FORT SHERIDAN
LAKE COUNTY, IL
FIGURE 6-4
DATE: 11/27/2023
F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\SI\Fig 6-4 BLDG 67 70 AOPI Sample Locations.mxd



FS-B67-02 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	0.96 U
PFBA (ng/L)	R
PFBS (ng/L)	0.96 U
PFHxA (ng/L)	9.9 J
PFHxS (ng/L)	1.9
PFNA (ng/L)	1.4 J
PFOA (ng/L)	7.7
PFOS (ng/L)	1.7 J

FS-B67-02 (SO)		
Analyte	2.5-3.5 ft.	14-15 ft.
HFPO-DA or GenX (µg/kg)	0.069 U	0.063 U
PFBA (µg/kg)	0.069 U	0.063 U
PFBS (µg/kg)	0.069 U	0.063 U
PFHxA (µg/kg)	0.069 U	0.063 U
PFHxS (µg/kg)	0.069 U	0.063 U
PFNA (µg/kg)	0.069 U	0.063 U
PFOA (µg/kg)	0.069 U	0.063 U
PFOS (µg/kg)	0.069 U	0.063 U

Screening Levels from the August 2023 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA or GenX)	6	23
Perfluorobutanoic acid (PFBA)	1800	7800
Perfluorobutanesulfonic acid (PFBS)	600	1900
Perfluorohexanoic acid (PFHxA)	990	3200
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	5.9	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 August 2023 OSD Memorandum for Tap Water and Soil using an HQ = 0.1. Highlighted values indicate an exceedance of the Screening Level.

FS-B67-04 (SO)	
Analyte	1.5-2 ft.
HFPO-DA or GenX (µg/kg)	0.071 U
PFBA (µg/kg)	0.071 U
PFBS (µg/kg)	0.071 U
PFHxA (µg/kg)	0.071 U
PFHxS (µg/kg)	0.071 U
PFNA (µg/kg)	0.071 U
PFOA (µg/kg)	0.071 U
PFOS (µg/kg)	0.071 U

FS-B67-01 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	0.92 U
PFBA (ng/L)	200
PFBS (ng/L)	490
PFHxA (ng/L)	560
PFHxS (ng/L)	950
PFNA (ng/L)	0.92 U
PFOA (ng/L)	78
PFOS (ng/L)	650

FS-B67-01 (SO)			
Analyte	1.5-2.5 ft.	1.5-2.5 ft.(D)	4.5-5.5 ft.
HFPO-DA or GenX (µg/kg)	0.069 U	0.060 U	0.057 U
PFBA (µg/kg)	0.069 U	0.060 U	0.057 U
PFBS (µg/kg)	0.069 U	0.060 U	0.10 J
PFHxA (µg/kg)	0.069 U	0.060 U	0.14
PFHxS (µg/kg)	0.91 J+	1.1	1.7
PFNA (µg/kg)	0.069 U	0.060 U	0.057 U
PFOA (µg/kg)	0.069 U	0.060 U	0.14
PFOS (µg/kg)	0.86 J+	0.85	15

FS-B67-03 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	0.88 U
PFBA (ng/L)	340
PFBS (ng/L)	630
PFHxA (ng/L)	730
PFHxS (ng/L)	3900
PFNA (ng/L)	2.5
PFOA (ng/L)	130
PFOS (ng/L)	2400

FS-B67-03 (SO)	
Analyte	2.5-3.5 ft.
HFPO-DA or GenX (µg/kg)	0.056 U
PFBA (µg/kg)	0.084 J
PFBS (µg/kg)	0.056 U
PFHxA (µg/kg)	0.056 U
PFHxS (µg/kg)	0.056 U
PFNA (µg/kg)	0.056 U
PFOA (µg/kg)	0.056 U
PFOS (µg/kg)	0.056 U

Note:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
GW = Groundwater, SW = Surface water,
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.
U = The analyte was analyzed for, but was not detected above, the associated numerical value.
R = After consultation with the PDT, the analyte was rejected due to serious deficiencies in the ability to analyze the sample and/or meet QC criteria. The presence or absence of the analyte cannot be verified.

Legend

- Area of Potential Interest
- U.S. Army Reserve Property
- U.S. Navy Property
- Historic Building
- Former Road
- DPT Groundwater Sample/Soil Boring (3)
- Soil Boring (1)
- Groundwater Flow Direction

Note:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
GW = Groundwater, SW = Surfacewater,

Sources:
Background Imagery:
Google Earth Imagery, Landsat/Copernicus 7/14/2018 & 6/14/2021
Groundwater flow arrows based on Site Investigation Report Former Ordnance Motor Repair Area, IT Corp Sept. 2001

IL STATE PLANE EAST (NAD83)

0 100 200

SCALE: 1 inch = 100 feet

US Army Corps of Engineers

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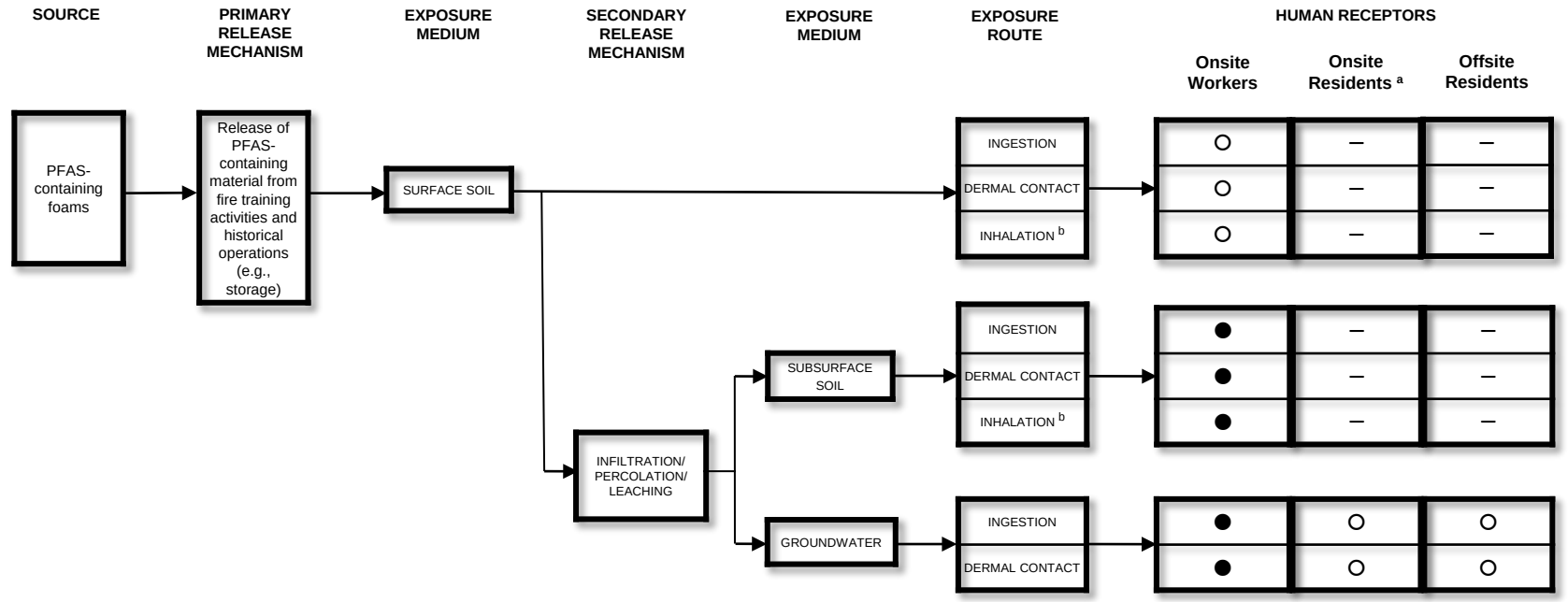
Buildings 67 and 70 Temporary Fire Station AOPI Sample Results
FORT SHERIDAN
LAKE COUNTY, IL

FIGURE 6-5 | DATE: 11/27/2023

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXDs\Fig 6-5 BLDG 67 70 AOPI Sample Results.mxd



● Complete exposure pathway

○ Potentially complete exposure pathway

— Incomplete exposure pathway

[a] Presently no residential pathway exists at this AOPI. However, onsite residents are evaluated for the potential migration (i.e., groundwater) to residents within the former installation boundaries.

[b] Inhalation of PFAS is considered potentially complete because no toxicity information is available for the inhalation route.

Figure 6-6. Human Health CSM for Buildings 67 and 70 Temporary Fire Station AOPI

Legend

- Area of Potential Interest
- Historic Building
- Stream
- Haley Army Airfield
- Groundwater Flow Direction
- DPT Groundwater Sample/Soil Boring (3)
- Soil Boring (1)
- Surface Water/Sediment (2)
- Surface Water Flow Direction

Sources:
Background Imagery:
Google Earth Imagery, Landsat/Copernicus 7/14/2018 & 6/14/2021
Groundwater flow arrows based on Site Investigation Report

IL STATE PLANE EAST (NAD83)

0 430 860
SCALE: 1 inch = 400 feet

US Army Corps of Engineers.

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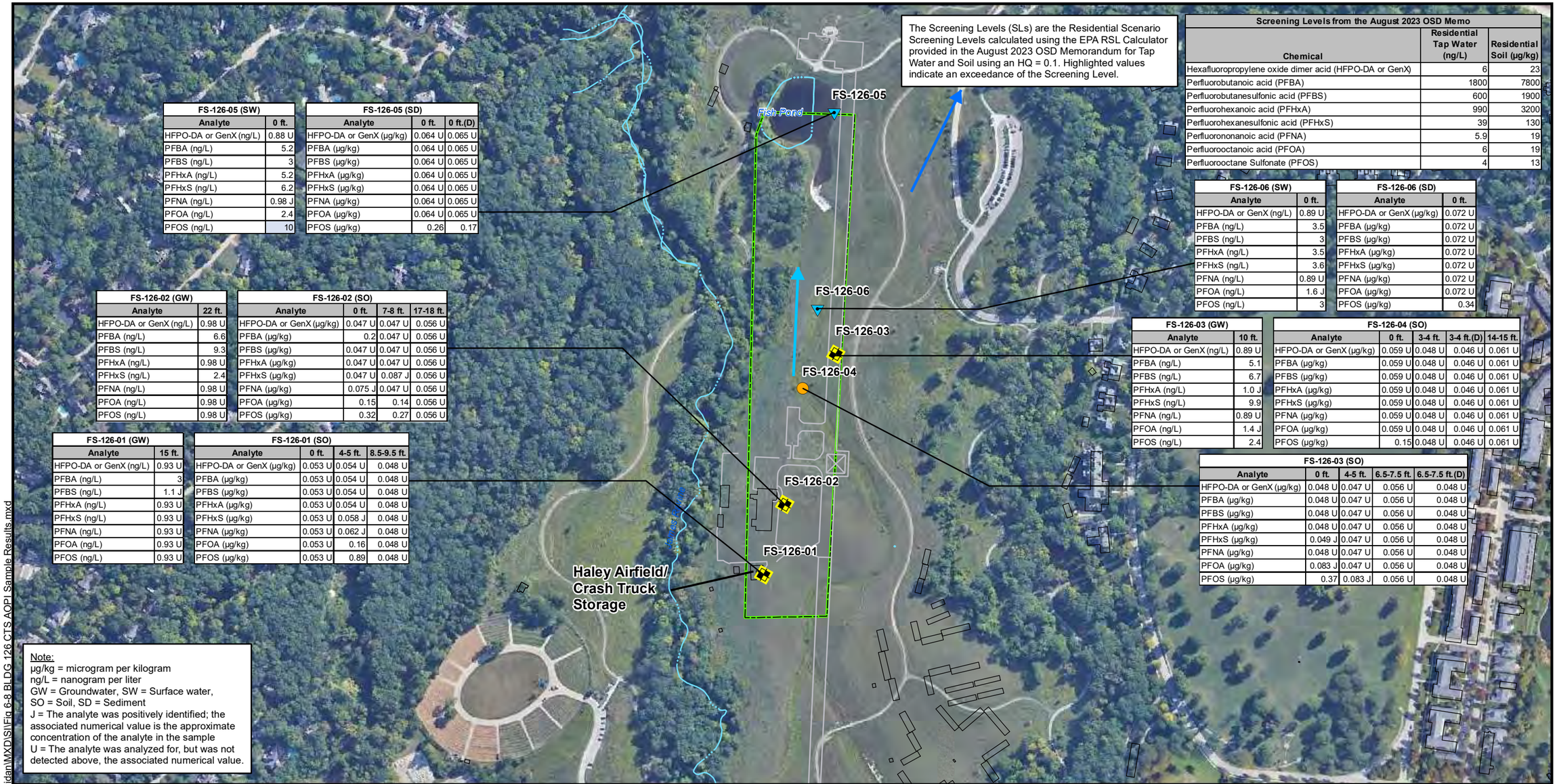
Haley Airfield/Crash Truck Storage
AOPI Sample Locations
FORT SHERIDAN
LAKE COUNTY, IL

FIGURE 6-7 | DATE: 8/22/2023

F:\ARMY_BRAC_PFAS\FL_Sheridan\MXD\SI\Fig 6-7 BLDG 126 CTS AOPI Sample Locations.mxd



The Screening Levels (SLs) are the Residential Scenario Screening Levels calculated using the EPA RSL Calculator provided in the August 2023 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 August 2023 OSD Memo		
Chemical	Residential Tap Water (ng/L)	Residential Soil (µg/kg)
Hexafluoropropylene oxide dimer acid (HFPO-DA or GenX)	6	23
Perfluorobutanoic acid (PFBA)	1800	7800
Perfluorobutanesulfonic acid (PFBS)	600	1900
Perfluorohexanoic acid (PFHxA)	990	3200
Perfluorohexanesulfonic acid (PFHxS)	39	130
Perfluorononanoic acid (PFNA)	5.9	19
Perfluorooctanoic acid (PFOA)	6	19
Perfluorooctane Sulfonate (PFOS)	4	13

FS-126-05 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	0.88 U
PFBA (ng/L)	5.2
PFBS (ng/L)	3
PFHxA (ng/L)	5.2
PFHxS (ng/L)	6.2
PFNA (ng/L)	0.98 J
PFOA (ng/L)	2.4
PFOS (ng/L)	10

FS-126-05 (SD)		
Analyte	0 ft.	0 ft.(D)
HFPO-DA or GenX (µg/kg)	0.064 U	0.065 U
PFBA (µg/kg)	0.064 U	0.065 U
PFBS (µg/kg)	0.064 U	0.065 U
PFHxA (µg/kg)	0.064 U	0.065 U
PFHxS (µg/kg)	0.064 U	0.065 U
PFNA (µg/kg)	0.064 U	0.065 U
PFOA (µg/kg)	0.064 U	0.065 U
PFOS (µg/kg)	0.26	0.17

FS-126-06 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	0.89 U
PFBA (ng/L)	3.5
PFBS (ng/L)	3
PFHxA (ng/L)	3.5
PFHxS (ng/L)	3.6
PFNA (ng/L)	0.89 U
PFOA (ng/L)	1.6 J
PFOS (ng/L)	3

FS-126-06 (SD)	
Analyte	0 ft.
HFPO-DA or GenX (µg/kg)	0.072 U
PFBA (µg/kg)	0.072 U
PFBS (µg/kg)	0.072 U
PFHxA (µg/kg)	0.072 U
PFHxS (µg/kg)	0.072 U
PFNA (µg/kg)	0.072 U
PFOA (µg/kg)	0.072 U
PFOS (µg/kg)	0.34

FS-126-02 (GW)	
Analyte	22 ft.
HFPO-DA or GenX (ng/L)	0.98 U
PFBA (ng/L)	6.6
PFBS (ng/L)	9.3
PFHxA (ng/L)	0.98 U
PFHxS (ng/L)	2.4
PFNA (ng/L)	0.98 U
PFOA (ng/L)	0.98 U
PFOS (ng/L)	0.98 U

FS-126-02 (SO)			
Analyte	0 ft.	7-8 ft.	17-18 ft.
HFPO-DA or GenX (µg/kg)	0.047 U	0.047 U	0.056 U
PFBA (µg/kg)	0.2	0.047 U	0.056 U
PFBS (µg/kg)	0.047 U	0.047 U	0.056 U
PFHxA (µg/kg)	0.047 U	0.047 U	0.056 U
PFHxS (µg/kg)	0.047 U	0.087 J	0.056 U
PFNA (µg/kg)	0.075 J	0.047 U	0.056 U
PFOA (µg/kg)	0.15	0.14	0.056 U
PFOS (µg/kg)	0.32	0.27	0.056 U

FS-126-03 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	0.89 U
PFBA (ng/L)	5.1
PFBS (ng/L)	6.7
PFHxA (ng/L)	1.0 J
PFHxS (ng/L)	9.9
PFNA (ng/L)	0.89 U
PFOA (ng/L)	1.4 J
PFOS (ng/L)	2.4

FS-126-04 (SO)				
Analyte	0 ft.	3-4 ft.	3-4 ft.(D)	14-15 ft.
HFPO-DA or GenX (µg/kg)	0.059 U	0.048 U	0.046 U	0.061 U
PFBA (µg/kg)	0.059 U	0.048 U	0.046 U	0.061 U
PFBS (µg/kg)	0.059 U	0.048 U	0.046 U	0.061 U
PFHxA (µg/kg)	0.059 U	0.048 U	0.046 U	0.061 U
PFHxS (µg/kg)	0.059 U	0.048 U	0.046 U	0.061 U
PFNA (µg/kg)	0.059 U	0.048 U	0.046 U	0.061 U
PFOA (µg/kg)	0.059 U	0.048 U	0.046 U	0.061 U
PFOS (µg/kg)	0.15	0.048 U	0.046 U	0.061 U

FS-126-01 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	0.93 U
PFBA (ng/L)	3
PFBS (ng/L)	1.1 J
PFHxA (ng/L)	0.93 U
PFHxS (ng/L)	0.93 U
PFNA (ng/L)	0.93 U
PFOA (ng/L)	0.93 U
PFOS (ng/L)	0.93 U

FS-126-01 (SO)			
Analyte	0 ft.	4-5 ft.	8.5-9.5 ft.
HFPO-DA or GenX (µg/kg)	0.053 U	0.054 U	0.048 U
PFBA (µg/kg)	0.053 U	0.054 U	0.048 U
PFBS (µg/kg)	0.053 U	0.054 U	0.048 U
PFHxA (µg/kg)	0.053 U	0.054 U	0.048 U
PFHxS (µg/kg)	0.053 U	0.058 J	0.048 U
PFNA (µg/kg)	0.053 U	0.062 J	0.048 U
PFOA (µg/kg)	0.053 U	0.16	0.048 U
PFOS (µg/kg)	0.053 U	0.89	0.048 U

FS-126-03 (SO)				
Analyte	0 ft.	4-5 ft.	6.5-7.5 ft.	6.5-7.5 ft.(D)
HFPO-DA or GenX (µg/kg)	0.048 U	0.047 U	0.056 U	0.048 U
PFBA (µg/kg)	0.048 U	0.047 U	0.056 U	0.048 U
PFBS (µg/kg)	0.048 U	0.047 U	0.056 U	0.048 U
PFHxA (µg/kg)	0.048 U	0.047 U	0.056 U	0.048 U
PFHxS (µg/kg)	0.049 J	0.047 U	0.056 U	0.048 U
PFNA (µg/kg)	0.048 U	0.047 U	0.056 U	0.048 U
PFOA (µg/kg)	0.083 J	0.047 U	0.056 U	0.048 U
PFOS (µg/kg)	0.37	0.083 J	0.056 U	0.048 U

Note:
µg/kg = microgram per kilogram
ng/L = nanogram per liter
GW = Groundwater, SW = Surface water, SO = Soil, SD = Sediment
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 was not detected above, the associated numerical value.

Legend
- Area of Potential Interest
- Historic Building
- Stream
- Haley Army Airfield
- Groundwater Flow Direction
- DPT Groundwater Sample/Soil Boring (3)
- Soil Boring (1)
- Surface Water/Sediment (2)
- Surface Water Flow Direction

Sources:
Background Imagery:
Google Earth Imagery, Landsat/Copernicus 7/14/2018 & 6/14/2021
Groundwater flow arrows based on Site Investigation Report Former Ordnance Motor Repair Area, IT Corp Sept. 2001

IL STATE PLANE EAST (NAD83)

0 430 860
1 inch = 400 feet SCALE

US Army Corps of Engineers
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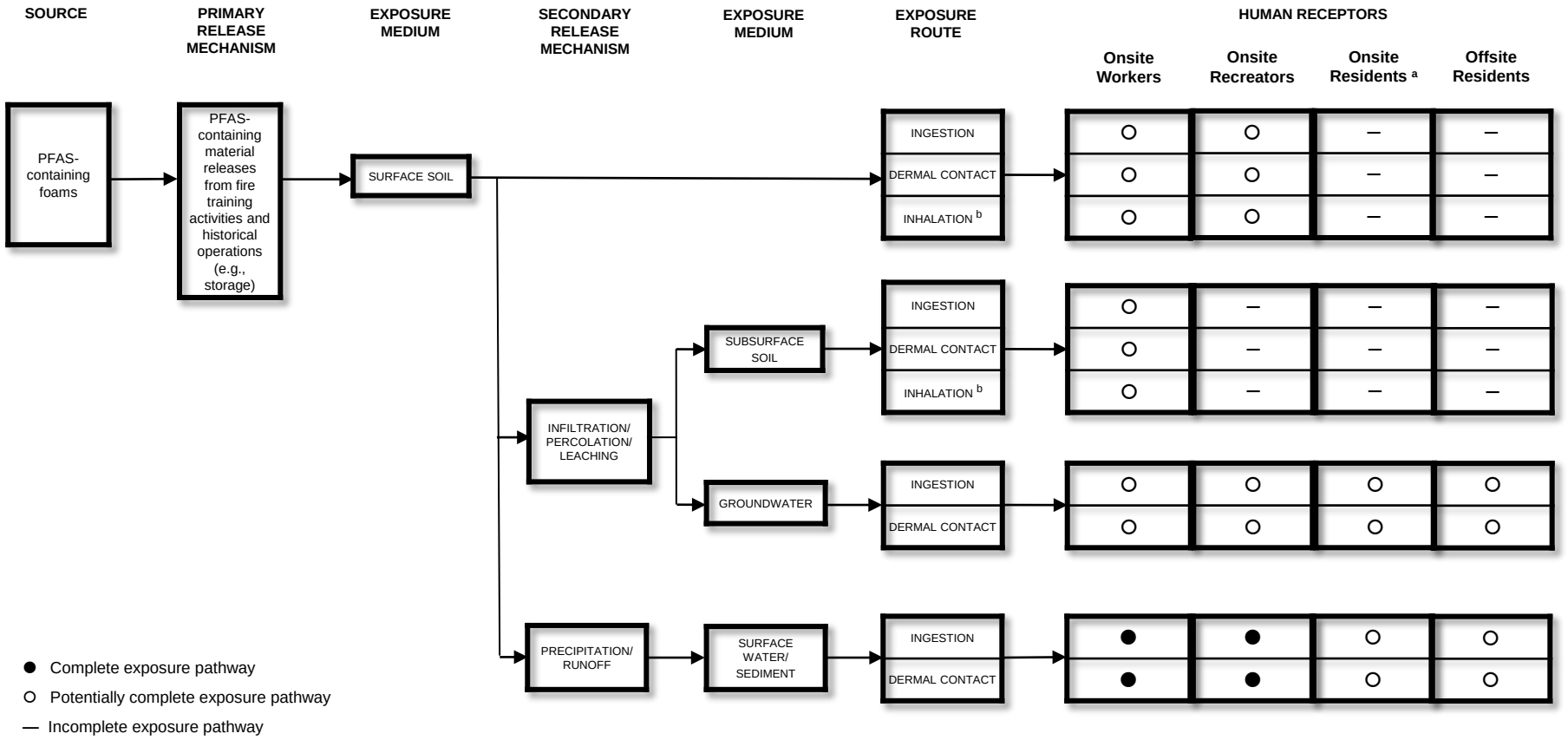
Haley Airfield/Crash Truck Storage AOPI Sample Results
FORT SHERIDAN
LAKE COUNTY, IL

FIGURE 6-8 | DATE: 11/27/2023

F:\ARMY_BRAC_PFASIFI_Sheridan\MXD\SI\Fig 6-8 BLDG 126 CTS AOPI Sample Results.mxd



[a] Presently no residential pathway exists at this AOPI, as the land use is currently recreational. However, onsite residents are evaluated for the potential migration (i.e., groundwater and surface water) to residents within the former installation boundaries.

[b] Inhalation of PFAS is considered potentially complete because no toxicity information is available for the inhalation route.

Figure 6-9. Human Health CSM for Haley Airfield/Crash Truck Storage AOPI