PRELIMINARY ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES AT FORT SHERIDAN, LAKE COUNTY, ILLINOIS

Prepared for:

U.S. ARMY

ODCS, G-9, ISE BRAC

Final

September 2023

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Contract Number W912DR-18-D-0003
Delivery Order Number W912DR21F0140

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Final
September 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
AST	Aboveground Storage Tank
BRAC	Base Realignment and Closure
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
CGSOC	Command and General Staff Officers' Course
COI	Constituent of Interest
CSM	Conceptual Site Model
DERP	Defense Environmental Restoration Program
DoD	U.S. Department of Defense
ECOS	Environmental Conservation Online System
EDR	Environmental Data Resources, Inc.
ESE	Environmental Science and Engineering
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid
IEPA	Illinois Environmental Protection Agency
IPaC	Information for Planning and Consultation
ISGS	Illinois State Geological Survey
LHA	Lifetime Health Advisory
LUC	Land Use Control
Navy	U.S. Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	National Resources Conservation Service
NSSD	North Shore Sanitary District
O&M	Operations and Maintenance
OSD	Office of the Secretary of Defense
OU	Operable Unit
OWS	Oil/Water Separator
P.E.	Professional Engineer
P.G.	Professional Geologist
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonate
PFHpA	Perfluoroheptanoic Acid
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
ppb	Parts per Billion
ppt	Parts per Trillion
PMP	Project Management Professional
PWS	Public Water Supply

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

QA	Quality Assurance
REM	Registered Environmental Manager
RfD	Reference Dose
RI	Remedial Investigation
RSL	Regional Screening Level
SAIC	Science Applications International Corporation
SDS	Safety Data Sheet
SDWA	Safe Drinking Water Act
SI	Site Inspection
T&E	Threatened and Endangered
U.S.C.	United States Code
UCMR3	Third Unregulated Contaminant Monitoring Rule
UCMR5	Fifth Unregulated Contaminant Monitoring Rule
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
WWI	World War I
WWII	World War II
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

The objective of a Preliminary Assessment (PA) is to identify areas of potential interest (AOPIs) based on whether use, storage, or disposal of potential per- and polyfluoroalkyl substances (PFAS)- containing materials, including aqueous film-forming foam (AFFF), occurred in accordance with the 2018 *Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances* (U.S. Army 2018). A PA for PFAS-containing materials with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) and its ammonium salt ("GenX" chemicals) was completed for the Base Realignment and Closure (BRAC) property at the former Fort Sheridan to assess potential PFAS release areas and exposure pathways. The entire Fort Sheridan, which is in Lake County, Illinois, was selected for closure under BRAC. The completion of this PA included the execution of the following tasks:

- Conducted a kickoff meeting with the BRAC Office and the U.S. Army Corps of Engineers (USACE) on June 24, 2021, to present all parties' preliminary knowledge of the former Fort Sheridan to provide information to guide the PA and site visit.
- Reviewed available records (e.g., aerial photography, historical maps, technical reports, previous studies, investigations) from online sources (i.e., Internet-based searches), environmental investigations and/or regulatory programs (e.g., the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]), and internal Army documents from the Administrative Record. In addition, an Environmental Data Resources, Inc. (EDR) Report for the former Fort Sheridan and any listed sites within and up to a 2-mile search distance was conducted.
- Conducted a 3-day site visit from February 7 to 9, 2022, to identify potential sources of PFAS and gather information for developing conceptual site models (CSMs) at AOPIs.
- Interviewed individuals with historical and present-day knowledge of operations on the BRAC property.
- Identified AOPIs and developed preliminary CSMs for pathways of potential PFAS in soil, groundwater, surface water, and sediment.

In conducting the PA of the BRAC property at the former Fort Sheridan, three AOPIs were identified where a potential for release of PFAS exists resulting from site operational history. AOPIs were identified at potential PFAS-release locations on the BRAC property only.

Based on the potential PFAS releases at the AOPIs, the potential for exposure to PFAS contamination in soil exists. In addition, a potential future on-post groundwater exposure pathway exists because no groundwater use restrictions are in place. Given the findings of this PA, the AOPIs presented warrant further evaluation in a Site Inspection (SI).

1. INTRODUCTION

The U.S. Army (Army) conducted this Preliminary Assessment (PA) to investigate the potential presence of per- and polyfluoroalkyl Substances (PFAS) at the former Fort Sheridan 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 Code of Federal Regulations [CFR] Part 300), and guidance documents developed by the U.S. Environmental Protection Agency (USEPA) and the Department of the Army. The former Fort Sheridan, which is herein referred to as 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.

The purpose of this PFAS PA is to identify locations that are areas of potential interest (AOPIs) on Fort Sheridan based on the use, storage and/or disposal of potential PFAS-containing materials, in accordance with the *Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances* (U.S. Army 2018). The PA was conducted in general accordance with 40 CFR §300.420(b) and the *Guidance for Performing Preliminary Assessments Under CERCLA* (USEPA 1991) and the Army *Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances* (U.S. Army 2018). This report presents findings from research conducted to assess past use of materials containing PFAS and identify areas where these materials were stored, handled, used, or disposed of at Fort Sheridan.

The entirety of the former Fort Sheridan property was evaluated for this PFAS PA, including Army-owned property as well as previously transferred property. Fort Sheridan is located in Lake County, Illinois, as shown in Figure 1-1.

1.1 PFAS BACKGROUND INFORMATION

PFAS are a group of synthetic compounds that have been manufactured and used extensively worldwide since the 1950s for a variety of purposes. PFAS are stable, man-made fluorinated organic chemicals that repel oil, grease, and water. Common industrial uses of PFAS include paints, varnishes, sealants, hydraulic fluid, surfactants, and firefighting foams. PFAS include both per- and polyfluorinated compounds. Perfluorinated compounds, such as perfluorobutane sulfonate (PFBS), perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA, or Gen X) are a subset of PFAS with completely fluorinated carbon chains, while polyfluorinated compounds have at least one carbon chain atom that is not fully fluorinated. These six PFAS compounds together, and for the purposes of this PA, are referred to in this report as "Target PFAS."

Fort Sheridan was evaluated for all potential use, storage, and/or disposal of PFAS-containing materials. There are a variety of PFAS-containing materials used in relation to current and historical Army operations. However, the use, storage, and/or disposal of aqueous film-forming foam (AFFF) is the most common potential source of PFAS chemicals at U.S. Department of Defense (DoD) facilities. As such, this section is organized to summarize the AFFF-related sources first followed by all of the remaining potential PFAS-containing materials. AFFF is used as a firefighting agent to suppress petroleum hydrocarbons fires and vapors. Firefighting foams like AFFF were developed in the 1960s (ITRC 2020a), but AFFF did not see widespread DoD use until the early 1970s. Older fire training facilities often were unlined and not constructed to prevent infiltration of firefighting foams and combustion products leaching into the subsurface. Large quantities of AFFF have been released into the environment as a result of fire training exercises, fire responses, fire suppression system activations, and tank and pipeline leaks/spills.

Other potential PFAS sources considered include installation storage warehouses, metal plating activities, some pesticide use, automobile maintenance shops, photographic processing facilities, laundry/water-proofing facilities, car washes, stormwater or sanitary sewer components, and biosolid application areas.

Many PFAS are highly soluble in water and have low volatility due to their ionic nature. The specific gravity/relative density for PFOS and PFOA is 1.8 (ITRC 2020b). Long-chain perfluorinated compounds have low vapor pressure and are expected to persist in aquatic environments. These compounds do not readily degrade by most natural processes. They are thermally, chemically, and biologically stable, and are resistant to biodegradation, atmospheric photooxidation, direct photolysis, and hydrolysis. The structure of these compounds increases their resistance to degradation; the carbon-fluorine bond is one of the strongest in nature, and the fluorine atoms shield the carbon backbone.

When PFAS are released to the environment, they can readily migrate into soil, groundwater, surface water, and sediment. Once in the environment, the compounds are persistent and may continue to migrate through airborne transport, surface water, groundwater, and/or biologic uptake. The amount of PFAS entering the environment depends on the type and amount of the PFAS material that was released, where and when it was used, the type of soil, and other factors. If private or public wells are located nearby, they potentially could be affected by PFAS. Similarly, surface water features may be impacted and may convey PFAS to downgradient receptors.

Of the thousands of PFAS, some are considered precursor compounds (typically polyfluoroalkyl substances). Precursor compounds can abiotically or biotically transform into PFOS and PFOA. PFOS and PFOA are referred to as terminal PFAS, meaning no further degradation products will form from them (ITRC 2020c).

1.2 PURPOSE AND OBJECTIVES

The purpose of a PA under the NCP is to "1) eliminate from further consideration those sites that pose no threat to public health or the environment; 2) determine if there is any potential need for removal action; 3) set priorities for Site Inspections (SIs); and 4) gather existing data to facilitate evaluation for the release pursuant to the Hazard Ranking System, if warranted." (40 CFR §300.420(b)(1)).

The primary objective of the PA is to identify and evaluate locations at Fort Sheridan where PFAS-containing materials were used, stored, or disposed of, resulting in a potential release of PFAS to the environment, and conduct an initial assessment of possible migration pathways of potential contamination.

1.3 PFAS REGULATORY OVERVIEW AND SCREENING CRITERIA

In May 2016, USEPA issued lifetime health advisories (LHAs) for PFOA and PFOS under the Safe Drinking Water Act (SDWA). To provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOS and PFOA in drinking water, USEPA established an LHA level for PFOS and PFOA (individually or combined) of 70 ng/L parts per trillion (ppt) (USEPA 2016).

In October 2019, the Office of the Secretary of Defense (OSD) issued guidance on investigation of PFOS, PFOA, and PFBS at DoD restoration sites. The OSD guidance provided risk screening levels for PFOS, PFOA, and PFBS in groundwater, tap water, and soil, based on the USEPA regional screening level (RSL) calculator for residential and industrial reuse and using the oral reference dose of 2E-05 mg/kg-day. These screening levels are used during the SI to determine if further investigation in a Remedial Investigation (RI) is warranted.

In April 2021, USEPA released an updated toxicity assessment for PFBS. USEPA developed chronic (0.0003 mg/kg-day) and subchronic (0.001 mg/kg-day) oral reference doses (RfDs) for PFBS as part of USEPA's toxicity assessment. The RSL for PFBS was previously calculated using the RfD of 0.02 mg/kg-day. New toxicity values resulted in revisions to the RSLs for PFBS in May 2021 (USEPA 2021).

In September 2021, OSD issued a revision to *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD 2021). The revised memorandum accounts for the updated PFBS screening levels attributable to USEPA's reassessment of PFBS toxicity in 2021. Based on USEPA research, the RSLs for PFOS and PFOA are calculated using an RfD of 2E-05 mg/kg-day. The RSL for PFBS is calculated using an RfD of 3E-04 mg/kg-day. When multiple PFAS are encountered at a site, a 0.1 factor is applied to the screening level when it is based on noncarcinogenic endpoints.

In May 2022, based on continued evaluation of Target PFAS by the Agency for Toxic Substances and Disease Registry and the USEPA Office of Water, USEPA provided new screening levels for PFOA, PFOS, PFNA, PFHxS, and HFPO-DA.

In July 2022, OSD issued a policy memorandum adopting these new screening levels to be used during the SI phase to determine whether further investigation in a RI is warranted. The screening levels for Target PFAS are listed in Table 1-1. This revised guidance is in effect as of July 2022 and is applicable to investigating PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA at DoD restoration sites, including Base Realignment and Closure (BRAC) sites (DoD 2022). Currently, no legally enforceable Federal standards exist for PFAS in groundwater, surface water, soil, or sediment.

Table 1-1. Project Action Limits from the 2022 OSD Memorandum

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

Note: The Residential Tap Water PALs are used to evaluate groundwater and surface water data. The Residential Soil PALs are used to evaluate soil and sediment data.

The Army's strategy is to continue to assess and investigate potential releases and implement necessary response actions in accordance with CERCLA to ensure that no human health-based exposures are above the CERCLA risk-based values in drinking water. Therefore, sites where human exposure to contaminated drinking water exists will be addressed first and as quickly as possible to eliminate the exposure, and then will be subsequently prioritized and sequenced to conduct the investigations and response actions necessary to characterize and, if necessary, remediate the source of PFAS contamination (U.S. Army 2018).

1.4 PA METHODOLOGY

The PA for Fort Sheridan included a site visit, aerial photographic analysis, records review, and interviews that were conducted in accordance with the methods detailed in the Programmatic PA Work Plan (Leidos 2021). The Programmatic PA Work Plan outlines the approach and methodology for conducting the PFAS PA. As detailed in the Programmatic PA Work Plan, the PA activities focused on ascertaining and documenting the following information regarding PFAS history and use, storage, or disposal at Fort Sheridan:

- On-post fire training activities
- Use of PFAS-based AFFF in fire suppression systems or other systems
- AFFF stored, used, and/or disposed of at buildings and crash sites
- Activities or use of materials that are likely to contain PFAS, such as metal plating operations
- Wastewater treatment plants (WWTPs) and landfills that may have received PFAS-containing materials
- Studies conducted to assess environmental impacts at the facility

- Potential PFAS use at parcels post transfer
- Potential off-post sources that may impact Fort Sheridan.

The data gathered during PA activities are summarized in Section 3.

1.5 REPORT ORGANIZATION

The contents of this PA Report are summarized below:

- ***Section 2. Site Background***—This section presents site-specific information related to site operational history and discusses the environmental setting. Demographics, land use, topography, geology, hydrogeology, hydrology, groundwater, potable wells, ecological receptors, and climate are described.
- ***Section 3. PA Analysis***—This section provides observations and results from the PA site visit, aerial photography analysis, records review, and interviews.
- ***Section 4. Summary of PA Data***—This section provides an overview of the data collected during the PA for the different potential PFAS sources.
- ***Sections 5. Summary of PA Results***—This section synthesizes all of the data gathered from the PA activities and determines whether each area evaluated during the PA is an AOPI or was not retained as an AOPI.
- ***Section 6. Conclusions***—This section presents the conclusions of the PA.
- ***Section 7. References—***This section lists the references that were used in the preparation of this report.
- ***Appendices***—Appendices A through F include data from field activities or related assessments:
  - Appendix A. Fort Sheridan Kickoff Meeting Minutes
  - Appendix B. Documents/Sources Reviewed During PA
  - Appendix C. Aerial Photographs
  - Appendix D. Site Visit Photographs
  - Appendix E. Questionnaire Responses and Interview Notes
  - Appendix F. Environmental Data Resources, Inc. (EDR) Report.

2. SITE BACKGROUND

2.1 SITE LOCATION

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 (BRAC 2020). 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 Ave (Figure 1-1). Fort Sheridan is surrounded by the communities of Highland Park (south), Highwood (west), and Lake Forest (north). Fort Sheridan consisted of 710 acres; however, much of the land has been transferred as detailed in Section 2.3. Figure 2-1 depicts the current Fort Sheridan site features and land use.

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 (1886-1894). 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 Headquarters, Fourth U.S. Army; U.S. Army Recruiting Brigade Midwest; and Headquarters, U.S. Army Recruiting Command (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 was 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 largely of the

historic district and golf course, and property to be transferred Fed-to-Fed, called the DoD OU (Figure 2-2). 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 conveyed to the U.S. Navy (Navy) for use as housing and administrative offices
- March 3, 1998: 128.5 acres conveyed to the Fort Sheridan Joint Planning Committee
- March 30, 1998: 173.8 acres conveyed to the Lake County Forest Preserve District
- November 18, 1999: 4.4 acres conveyed to the Fort Sheridan Joint Planning Committee
- February 2, 2000: 0.3 acres conveyed to the Fort Sheridan Joint Planning Committee
- February 22, 2000: 40.9 acres conveyed to the Lake County Forest Preserve District
- April 19, 2001: 38.0 acres conveyed to the Lake County Forest Preserve District
- December 13, 2019: 7.2 acres conveyed to the Department of Veterans Affairs (cemetery).

Effective in May 1993, the Army Reserve retained 104 acres in the southwest quadrant and the northwest corner (former Nike site) of the former Fort Sheridan for administrative purposes (Earth Tech 1995). In 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 (CGSOC) 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 the airstrip and 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).

Environmental cleanup has been ongoing at Fort Sheridan since the early 1990s. Several former environmental sites, which were addressed by the Army under CERCLA, contain land use controls (LUCs) as a component of the remedy (CH2M 2018).

Land use controls 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).

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. In the area of Parcel G, no 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. In addition, activities related to landscaping and utility work require USACE approval. The deed further recommends ordnance construction support before any permitted surface or subsurface activities within Parcel G (CH2M 2018).

Land use controls in place for Landfill 5 include restricting groundwater use, construction of buildings, and intrusive activities. Residential use is prohibited. Land use controls 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 (CH2M 2018).

Land use controls 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.

Land use controls 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; perform maintenance of the soil cover, if warranted; and confirm land use control 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 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 2002a). 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 2002a).

Lake Michigan's average water surface elevation of 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 2002a).

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 Lake Chicago Plain and the Lake Michigan beach in Cook County (SAIC 2002a).

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 silty, gray 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 2002a). 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 (NRCS) 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 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 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 (SAIC 2000) was 0.008 ft/ft. These data indicate that local groundwater flow is influenced by the ravines and that 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 nor 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. Only one groundwater well is documented to be present at Fort Sheridan; installed in the late 1970s to a depth of 211.5 feet bgs, the well is used only to provide water for the recreational fish pond at the northern end of Fort Sheridan (Diversified Technologies 1997b). This well is not found in the State of Illinois well records (ISGS 2022).

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 (NSSD) 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 2002a).

According to State of Illinois online well record database, 31 water wells are located 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 in 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.

The State of Illinois does not have any records documenting the presence of water wells at Fort Sheridan (ISGS 2022); however, historical records indicate that a 200 ft groundwater well may be present in the vicinity of the fish pond at the northern portion of Fort Sheridan (Diversified Technologies 1997b). The current status of this well is unknown.

Figure 2-3 illustrates wells from the State of Illinois online well record database present within a 4-mile radius of Fort Sheridan. These wells include water wells, monitoring wells, engineering test wells, and stratigraphic test wells.

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 2002a). 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 2002a, 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, many 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. One approximately 1-acre recreational fishing 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*) (USAEC 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 2012a). 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, 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 2002a). 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 2002a).

3. PA ANALYSIS

The primary components of the PA are records reviews, analysis of aerial photographs, a site visit, and interviews. The following sections summarize the methods used and activities conducted during the Fort Sheridan PA. The reference to "on-post" refers to property that has been or still is owned by the Army. Any references to "off-post" refers to areas that have never been owned by the Army.

3.1 RECORDS REVIEW

Prior to the records review, site visit, and interviews, a kickoff meeting was held between BRAC, USACE, and Leidos on June 24, 2021. The purpose of the kickoff meeting was to present all parties' preliminary knowledge of Fort Sheridan to inform the PFAS PA and site visit. The kickoff meeting minutes are presented in Appendix A.

The PA team conducted preliminary research prior to the site visit to determine if any of the following activities were conducted at Fort Sheridan, which may indicate whether there was use, storage, or disposal of PFAS-containing materials during operations at Fort Sheridan:

- On-post fire training
- Use of PFAS-based AFFF in fire suppression systems or other systems
- AFFF used, stored, or disposed of at buildings and emergency response sites
- Activities or materials used that are likely to include PFAS-containing materials
- Studies conducted to assess the environmental impacts of PFAS-containing materials
- Review of potential off-post sources.

The PA team completed a records review of available environmental investigations conducted under CERCLA. The review included internal Army documents, which included inspection reports, regulatory correspondence, Fort Sheridan maps, and a Community Environmental Response Facilitation Act (CERFA) report. Table 3-1 lists the documents reviewed that are relevant to the evaluation of AOPIs in this PA. A complete list of documents reviewed is included in Appendix B.

The records review included a combination of Internet-based searches and reviews of aerial photography, historical maps, technical reports, previous studies, and investigations available online. In addition, an EDR report was generated and is included in Appendix F. An EDR report includes search results from a variety of environmental, state, city, and other publicly available databases for up to 2 miles surrounding a referenced property.

Table 3-1. Summary of Relevant Records Reviewed

Document Title	Author	Date	Relevance
Environmental Survey Plans and Final Sampling Analysis Plan, Fort Sheridan	USATHAMA	July 1990	Information on AOPIs, geology, and hydrogeology
Final Environmental Impact Statement	USACE	October 1990	Information on buildings and areas for transfer
Transfer of Certain Properties at Fort Sheridan, Illinois	U.S. Army	September 1991	Proper transfer and responsibility of landfills
DF RI/RA Report	ESE	June 1992	Site evaluation
Community Environmental Response Facilitation Act (CERFA) Report	Earth Technology	April 1994	History of Fort Sheridan information
BRAC Clean Up Plan, Fort Sheridan	Earth Tech	November 1995	Buildings and environmental sites

Table 3-1. Summary of Relevant Records Reviewed (Continued)

Document Title	Author	Date	Relevance
Fort Sheridan Landfills 6 and 7 Leachate Sampling and Miscellaneous Investigations – October 1996	ESE	February 1997	Landfills 6 and 7 operation and use
Fort Sheridan Historic District Lease Parcel Environmental Baseline Survey	Diversified Technologies	June 1997	Parcel transfer and environmental survey
Fort Sheridan Golf Course Transfer and Cemetery Parcels Environmental Baseline Survey	Diversified Technologies	December 1997	Parcel transfer and environmental survey
Phase III Technical Plan Addendum Remedial Investigation/Baseline Risk Assessment Report, DOD Operable Unit, Fort Sheridan, Illinois	SAIC	May 2000	Information on Landfill 7
Remedial Investigation/Baseline Risk Assessment Report Addendum DOD Operable Unit Fort Sheridan, Illinois	USACE	April 2001	Information on AOPIs
Environmental Baseline Survey: Navy Property	Project Resources Inc.	May 2001	Hydrogeology and surface hydrology information; Post transfer property use
Fort Sheridan Feasibility Study: DoD Operable Unit	SAIC	May 2002	History, topography, geology, and ecology information on Fort Sheridan
Initial Five-Year Review Report, Fort Sheridan, Illinois	Kemron Environmental Services	September 2008	Land use controls
Third Five-Year Review Report, Fort Sheridan, Illinois	CH2M	2018	Land use controls
Illinois Environmental Protection Agency Website	IEPA	Accessed November 11, 2021	History and summary of Fort Sheridan and PFAS regulatory information
http://www.airfields-freeman.com/IL/Airfields_IL_Chicago_N.htm#haley	Paul Freeman	Accessed December 2021	History and operational activities at Haley Army Airfield
Legacy Base Realignment and Closure Installations Conveyance Progress Reports	BRAC	October 2020	Property use and transfer information

Information gathered during the records reviews helped identify data gaps and enabled elimination of several areas based on their historical use. Data gaps associated with facility operations and the use, storage, or disposal of PFAS-containing materials contributed to a conservative approach for identifying AOPIs. However, areas with little potential to result in a PFAS release, such as residential buildings, medical clinics, cafeterias, and recreational areas, were eliminated from further evaluation early on in the PA process.

Areas identified to have potentially used, stored, or disposed of or had the potential for a release of PFAS-containing materials, including AFFF, were further evaluated.

3.2 AERIAL PHOTOGRAPHIC ANALYSIS

The PA included review of 16 historical aerial photographs, 10 historical topographic maps EDR provided spanning from 1900 through 2012 (Appendix C), and 21 additional photographs available at https://historicaerials.com spanning from 1939 through 2017. Seven additional aerial photographs from the 2002 Janes Ravine Analysis from 1943 to 1990 were used for interpretation. The aerial photographs were

analyzed to identify potential activities or developments that may suggest the potential use, storage, or disposal of PFAS-containing materials, including AFFF (e.g., evidence of fire training activities, such as fire pits or burn scars). No conclusions on AFFF use or storage were drawn from the aerial photograph review at Fort Sheridan. The aerial photography analysis is summarized as follows:

- 1900 – Few buildings and roads.
- 1928 – More buildings, and barracks have been constructed.
- 1939 – No active construction within the Fort Sheridan boundary, roads visible, and ravines heavily vegetated. Roads cut across Hutchinson and Bartlett Ravines. Land clearing is evident in the southwestern and eastern corners of Fort Sheridan and where the runway would be. The fish pond at the northeastern corner of Fort Sheridan has not been created. The water treatment plant appears to exist, but the WWTP plant does not.
- 1943 – Rifle range evident via land clearing in the northeastern corner of Fort Sheridan. The water treatment plant and WWTP are visible. The runway and fish pond do not exist.
- 1946 – Many buildings were constructed between 1939 and 1946. The area of land clearing in the southwest has been covered by buildings. Buildings are mainly uniform in shape and size, except for some longer buildings (northeastern corner) and one cross-shaped building (southeastern corner). Ravines are still vegetated.
- 1949 – A 38-acre parcel fill area is present. Runway does not exist.
- 1951-1952 – The partial aerial photographs only show the southeastern portion of Fort Sheridan. More uniformly shaped buildings and roads have been constructed. Landfills 3 and 4 are partially cleared. Parking lot behind Building 79 (Fire Station) present. Tributary to Bartlett Ravine extends to the parking lot.
- 1954 – Runway has been constructed.
- 1961 – Runway has been expanded and finished.
- 1962 – The runway has been constructed. The fish pond has not been constructed. A parking lot was constructed near the present-day cemetery. Roads and buildings east of the parade grounds have been constructed. Ravines have been partially filled.
- 1970 – Fish pond is present. The runway terminates slightly past the fish pond. Navy Family Housing has been constructed in the southeastern corner.
- 1972 – Contouring associated with the golf course evident. Ravines have been further filled, especially the ravines containing Landfills 6 and 7, and construction in the southeastern corner of small buildings has occurred.
- 1980 – The runway appears poorly maintained based on vegetation overgrowth. WWTP has been demolished. Extensive land clearing on Landfill 7.
- 1981 – Many concrete structures constructed near the present-day cemetery. The runway has been shortened, leaving a strip in the middle of the previous runway for helipad operations. The ravine containing Landfills 6 and 7 has been completely filled.
- 1988 – A ‘Y’ shaped building was constructed in addition to many parking lots. Another square building was constructed over a previous baseball diamond. Uniform buildings in the southwestern corner of the boundary were demolished and replaced by a V-shaped building.
- 1993 – Runway fully demolished except for the helipad and associated buildings.

- 1994 – Concrete structures have been removed from the site of the present-day cemetery.
- 1998 and 1999 – The partial aerial photographs show more new construction by the present-day cemetery. Parking lot behind Building 79 (Fire Station) has been excavated.
- 2002 – The runway and helipad have been completely demolished; however, the hangar building still exists. More ravines have been filled and more uniformly built structures in the town of Fort Sheridan exist. Homes in the Navy Military Housing have been constructed. Two small, connected, ponds are present on a portion of Landfills 3 and 4. Active construction in the area behind Building 79 (Fire Station). Vegetation razed from the tributary to Bartlett Ravine and two houses constructed; one house is within the footprint of the parking lot.
- 2005 – Two more houses constructed behind Building 79 along the newly paved Towers Keep Road.
- 2007 – Construction of new roads in the southeast.
- 2009 – Many new uniform buildings have been constructed in the southeastern corner of the Fort. The buildings associated with the runway have been demolished and the area appears disturbed (no grass). Vegetation has grown back along the tributary to Bartlett Ravine (behind Building 79).
- 2010 – Grass has been planted in the fields near the runway.
- 2011, 2012, and 2014 – Minimal changes.
- 2015 – Fish pond appears smaller.
- 2017 and 2019 – Disturbed ground near fish pond with minimal changes.

3.3 PA SITE VISIT

Prior to the site visit, the PA team corresponded with the Highwood Historical Society, Highland Park Public Library, Kemron, and the Army Reserve to gain access to facilities, review historical documents, and identify interviewees. The Fort Sheridan site visit was conducted from February 7 to 9, 2022. The PA site visit included a site walk and visual inspection of all readily accessible areas at Fort Sheridan to identify potential sources of PFAS and gather information for developing CSMs at AOPIs. The PA site visit included a visit to the Highland Park and Lake Forest Fire Departments and interviews were conducted with fire department personnel regarding historical fires and current fire response procedure. A former fireman serving at Fort Sheridan, participated in a site walk, identifying the location of operations related to the fire stations. Access routes were assessed in consideration for SI sampling at AOPIs, including in residential neighborhoods. Appendix D contains photographs from the PA site visit.

3.4 SUMMARY OF INTERVIEWS

Prior to the site visit, interviews were conducted with a former firefighter at Fort Sheridan and a pilot stationed at Fort Sheridan from 1972 to 1974, both of whom completed PA questionnaires focused on the current and previous use of the property (Appendix E). A post-site visit interview was conducted with a pilot stationed at Fort Sheridan from 1972 to 1974. The primary goal of the interviews/questionnaire was to identify whether PFAS-containing materials, including AFFF, are used on-post; however, no current uses were identified. The former firefighter indicated that AFFF was used in fire training activities at Fort Sheridan and is currently used by the surrounding fire departments (Highland Park and Lake Forest) during firefighting activities. Table 3-2 summarizes the interviews conducted and the pertinent information provided.

Table 3-2. Interviews Conducted for PA

Title	Date	Information Provided
Highland Park Fireman and previous Fort Sheridan Fireman	January 13, 2022	This individual worked as a Lieutenant Fireman at Fort Sheridan post-transfer from 1995 to 1998. Since 1999, he became a member of the Highland Park Fire Department. He provided the following information: • Two Fire Stations were used by Fort Sheridan during his time at the Fort. Fire Station 1 (Building 79) and a temporary Fire Station occupied for 1 year, immediately before transfer of fire operations to Highwood Fire Department in 1999. The temporary Fire Station was housed in the conjoined Buildings 67 and 70. • Building 79 was constructed in 1893 and converted into a family home after transfer of firefighting activities to the local municipality. • Buildings 67 and 70 have been demolished but would be on present-day Army Reserve property. Building 67 was previously used as a carpentry shop and Building 70 was used for pesticide storage. • One FTA was used in the parking lot behind Fire Station 1, near a tributary of Bartlett Ravine. • AFFF was stored at Fire Station 1 in 5-gallon buckets; approximately 5 to 6 buckets were stored on-post at one time. AFFF was disposed of by transferring to Fort McCoy at the time of closure. • AFFF was not purchased to use in fire training activities. AFFF used in fire training activities was close to expiring or had expired. • Fire trucks were equipped with 2 to 3 5-gallon buckets of AFFF. • Fire suppression systems containing AFFF or equipped with proportioners for distributing AFFF were not present in any Fort Sheridan building. • The parking lot to the east (now a playground) was used to park personnel vehicles and not used for fire training activities. • The Highland Park Fire Station currently uses AFFF in training activities, as did the previous Highwood Fire Station. • Chrome or metal plating operations were not conducted at Fort Sheridan.
Administrative GS 11 for the 4th Army Headquarters Mobilization/Deployment Plans Branch and U.S. Recruiting Command	January 19, 2022	• Metal plating activities were not conducted at Fort Sheridan. • Does not remember any fires or fire training.
Former Army Pilot	March 1, 2022	• Operated as a pilot at Fort Sheridan from 1972 to 1974. • Provided photographs of the aircraft hangar and associated buildings. • Was not aware of any aircraft crashes or fires that occurred outside of his time at Fort Sheridan.

4. SUMMARY OF PA DATA

4.1 PREVIOUS PFAS INVESTIGATIONS

In 2012, USEPA published the Third Unregulated Contaminant Monitoring Rule (UCMR3), which required nationwide public water systems (i.e., waterworks) to sample for a list of 30 unregulated contaminants, including 6 PFAS relevant to this PA (PFOS, PFOA, PFBS, PFNA, perfluoroheptanoic acid [PFHpA], and PFHxS). As part of the USEPA UCMR3 sampling, the Highland Park water treatment facility was sampled in 2013. The six PFAS sampled were not detected in the Highland Park water (Highland Park 2023). USEPA published the Fifth Unregulated Contaminant Monitoring Rule (UCMR5) in 2021, which expanded the list to 29 PFAS and included more public water systems serving populations less than 10,000 (USEPA 2023). As part of the UCMR5 sampling, the cities of Highland Park and Highwood community water systems are proposed for sampling in 2024 and 2025 (Highland Park 2023, Highwood 2023).

The Illinois Environmental Protection Agency (IEPA) conducted a state-wide evaluation for 18 PFAS to investigate the prevalence and occurrence of PFAS in finished drinking water at all public water supplies (PWSs) throughout Illinois. Samples were collected from 1,428 locations, including the Highland Park and Highwood PWSs (south of Fort Sheridan) on November 18, 2020, and January 19, 2021. PFAS were not detected. PFOS and PFOA were detected at concentrations of 2.5 and 2.3 ng/L, respectively, in the sample collected from the Lake Forest PWS (north of Fort Sheridan) on April 19, 2021.

The city of Highland Park tested for 18 PFAS in October 2020. PFAS were not detected in the Highland Park PWS water samples (Highland Park 2023). The Army has not conducted any site-specific PFAS investigations at Fort Sheridan prior to this PA. The Navy is concurrently completing a PFAS investigation for their parcel at Fort Sheridan.

4.2 EVALUATED SITES

During the PA records reviews, interviews, aerial photographic analysis, and site reconnaissance, the PA team investigated available documentation and physical evidence for areas having a potential historical PFAS release. The sites evaluated include fire stations; fire training areas; landfills; plating operations; WWTPs, pesticide facilities, vehicle maintenance shops, which used car washes and engine lubricants; paint shops; and photographic processing facilities, as shown in Figure 4-1 and described in the following sections.

4.2.1 AFFF Use, Storage, and Disposal

The PA included searching for evidence of current or historical AFFF use, storage, or disposal at Fort Sheridan. Documentation specifying the use of AFFF at Fort Sheridan during Army ownership and operation was not identified during the records reviews or aerial photographic analysis. However, historical AFFF storage and use was identified during the personnel interviews. The PA did not identify any known current AFFF use or storage. The areas identified as potential areas of historical AFFF usage and/or storage at Fort Sheridan for evaluation in this PA include:

- Building 79 (former Fire Station) and parking area
- Building 202 – Fire Station Administrative Building
- Conjoined Building 67 and 70
- Building 538 – Former Fire Station
- Building 126 (crash truck storage).

The former Fire Station (Building 79) and corresponding parking lot used as a Nozzle Spray Area were identified during the PA interviews. The Fire Station was constructed in 1893 and operated until 1993. It

was originally built as a two-story, 3,900 ft^2 concrete and brick building with two overhead doors on the northern side and a personnel door on the southern side (Diversified Technologies 1997a). According to the former firefighter, approximately 50 gallons of AFFF were stored in 5-gallon buckets at the Fire Station. In addition, two or three 5-gallon buckets were kept on each of three firetrucks parked in the bays at the station. Post transfer, the Fire Station was converted into a residential single-family dwelling.

According to the former firefighter, nozzle spray testing activities were conducted directly behind the Fire Station (Building 79) in the parking lot. During the site visit, the former firefighter confirmed the previous location of the parking lot and stated that it stretched to the tributary to Bartlett Ravine. He also stated that the parking lot was un-curbed. The former firefighter noted that the parking lot to the east (now a playground) was used to park personnel vehicles and not used for fire training activities.

The former firefighter described the nozzle spray testing activities as blanketing the ground with AFFF and dissolving it with water, flushing the water and AFFF mixture toward the drainage ditch that serves as a tributary to Bartlett Ravine. Sanitary sewer maps indicate two manholes within/close to the parking lot area (Manholes 1690 and 1671). Sanitary sewer manholes originally flowed to the Fort's WWTP until 1978. Wastewater treatment activities were transferred to NSSD in 1978 with minor revisions to the sewer system (primarily the installation of pumping stations). No evidence was found that AFFF was discharged purposefully to the Fire Station sanitary sewer system, which would have ended at the Fort Sheridan WWTP prior to 1978, or Landfill 7, where WWTP sludge was disposed of.

The former firefighter stated nozzle testing and spray activities using AFFF during his employment were standard procedure and suggested that these practices were also conducted prior to his employment.

Building 202 was used as administrative record storage, fire equipment (records) storage, and administrative offices for the Fire Station. Interviewees did not indicate that active fire equipment and/or AFFF were stored at the building. Building 202 was constructed in 1934 as a gasoline station, converted to a dry cleaner facility, and began use as an administrative building in 1988. No information pertaining to AFFF use or storage at Building 202 was found as part of this PA.

The former firefighter provided information about the temporary Fire Station located in the conjoined Buildings 67 and 70. Pre-transfer, the Building 67 portion of the building was used as a carpentry shop and the Building 70 half was used as pesticide storage. The buildings were located near Bartlett Ravine on the present-day Army Reserve property. The former firefighter indicated that no fire training practices were performed, however AFFF was stored in conjoined Buildings 67 and 70. This combined building structure was demolished approximately 1 year post-transfer when fire response operations were transferred to the Highwood Fire Department in 1993/1994. No information was located to determine whether spills occurred at the temporary Fire Station or whether AFFF was discharged during nozzle testing.

During records review, a historical Fire Station in Building 538 was identified; however, Building 538 was not used as a Fire Station after approximately 1962. It is unlikely AFFF was stored in this building, since the operational time period pre-dates the development and DoD use of AFFF.

One crash truck storage building (Building 126), located west of the airport hangar (Building 117), functioned as a single bay Fire Station for Fort Sheridan/Haley Army Airfield (Haley Airfield). Building 126 was constructed in 1959 and used as a fire/emergency response center for Haley Airfield until airfield closure in 1977 (Diversified Technologies 1997b). It is unknown if the crash truck continued to be used when the airfield was converted to a helipad. Building 126 was a concrete floor building with two bays, each with overhead doors. One bay had a floor drain, which was cleaned via hydrojetting in 1995. No evidence of any aircraft crash response, fire training, or nozzle testing was found to have been conducted in this area; however, due to the time of operation, AFFF may have been stored in Building 126. The yard area outside Building 126 was also used as a pesticide and fertilizer mixing area for the golf course (Diversified Technologies 1997b). A former pilot at Fort Sheridan from 1972 to 1974, stated that the only

crash that occurred during this time was one in Lake Michigan. In addition, he was not aware of any fire training activities at Haley Airfield.

Building 117 functioned as an aircraft hangar for Haley Airfield and was constructed in 1953 along with a 3,100-foot east-west oriented runway (U.S. Army 1977). Light aircraft used Haley Airfield until 1977, when the airfield was converted to a helipad and used until 1993. All fixed wing flights ceased operation on July 1, 1997. Eight floor drains and two sets of three catch basins were located in the northeastern and northwestern portions of Building 117. Three attached outbuildings on the northern side of Building 117 were also present during operation. Hangar doors were located on the eastern and western sides of Building 117 to allow aircraft entry and exist. During investigations, significant cracks were identified in the concrete floor (Diversified Technologies 1997b). No documentation was found to indicate that the hangar was equipped with an AFFF suppression system or that AFFF was stored at the hangar.

During the PA site visit, the PA team noted that all structures of the airfield have been removed except the airport drainage ditch. The airport drainage ditch discharges into the fish pond at the eastern end of the airfield, near Lake Michigan, which was dug between 1962 and 1970 based on aerial photographs. A groundwater well was historically used to supply water to the fish pond. QST Environmental catalogued and sampled the well in 1997 (Diversified Technologies 1997b). During the PA site visit, the PA team identified that the airport drain ran east-west from the historical location of the airport hangar to the fish pond. The drainage ditch was partially lined with concrete blocking to prevent erosion and is currently a drainage path for the open grass land of the Lake County Forest Preserve. During the PA site visit, ice was observed in some areas of the airport drain, indicating that the drainage ditch has water periodically during the year. The fish pond was filled with water.

Due to the operational time period of the airfield and helipad, AFFF may have been stored in the crash truck and Building 126. No aboveground storage tanks (ASTs) or underground storage tanks (USTs) at the airfield were used for AFFF storage and no buildings with AFFF fire suppression systems were identified.

4.2.2 Metal Plating Operations

No current or historical chromium or other metal plating operations were identified at Fort Sheridan.

4.2.3 Wastewater Treatment Plants

Sanitary wastewater was treated on-post from 1918 until November 1978, when the Fort's sanitary sewer was connected to the NSSD sewer system (Project Resources Inc. 2001). The Fort Sheridan WWTP was located on Lake Michigan, north of Landfill 7 and south of the former Coastal Artillery Corps firing point location (SAIC 2002b). During active operation, Fort Sheridan obtained an NPDES permit to discharge effluent treated sewage directly into Lake Michigan. No evidence was located as part of this PA that indicates the WWTP received PFAS waste streams.

The WWTP included a bar screen, grit chamber, primary sedimentation basins, partial flume, siphon dosing chambers, trickling filters, secondary settling basins, gas chlorinators, contact tanks, sludge digestion tanks, and sludge drying beds. The sludge drying beds were located at the base of a bluff on Lake Michigan's beach. Sludge was landfilled in Landfill 7 or mixed with soil and used as fertilizer on-post by housing residents (SAIC 2002b). Fort Sheridan was granted a National Pollutant Discharge Elimination System (NPDES) permit for operation of its WWTP and for discharging its effluent into Lake Michigan. All parts of the WWTP and sludge drying beds have been demolished.

Since 1978, the Fort Sheridan sanitary sewer system has consisted of a network of gravity collection mains, force mains, and small lift stations, which transport sewage to a central lift station located on the Lake Michigan shoreline near the terminus of Bartlett Ravine. From this lift station, sanitary sewage flows through approximately 4.5 miles of sewer lines from Fort Sheridan to the NSSD sewer system in Highland Park, which conveys sanitary sewage to the Clavey Road Treatment Plant (BRAC 2020).

4.2.4 Landfills

This section describes the eight former landfills and fill areas at Fort Sheridan. The majority of landfills were located in the six major ravines (Janes, Hutchinson, Bartlett, Van Horne, Wells, and Schenck) at Fort Sheridan. The ravines trend east to west, beginning roughly 0.5 miles from Lake Michigan and terminating along the bluff line, and are approximately 30 to 50 feet deep. Prior to landfilling, large storm drains were installed at the bottom of some ravines to allow stormwater to pass under landfills and roads to Lake Michigan (USATHAMA 1990). Many portions of the ravines that were used for historical landfilling are present day parking lots. The eight former landfills and fill areas are described below:

- ***Landfill 1 – 1940 to 1962:*** Located in a branch of Janes Ravine in the northwestern corner of Fort Sheridan, encompassing approximately 3 acres. Landfill 1 received general refuse, and open burning occurred before soil cover was completed (USATHAMA 1990). A paved parking lot and part of Buildings 900 and 902 cover Landfill 1 and are used as vehicle maintenance areas. A storm sewer crosses the landfill and discharges to Janes Ravine south of the Landfill (Diversified Technologies 1997b).
- ***Landfill 2 – Prior to WWII:*** Located in the northeastern corner of Fort Sheridan. Operated prior to WWII and mostly received rubble (U.S. Army 1999). A small arms firing range was constructed over Landfill 2. The area showed extensive activity between 1967 and 1972 (unknown) and potentially housed an ammunition burn area (Diversified Technologies 1997b).
- ***Landfill 3 – 1940s to mid-1960s:*** Located between Ronan Road and Bartlett Ravine, encompassing approximately 2.5 acres. Received general and domestic refuse (USATHAMA 1990). Open burning occurred. No indication that hazardous wastes were disposed of. Landfill 3 is underlain by a 48-inch storm drain. Currently, Landfill 3 is vegetated and contains a small pond.
- ***Landfill 4 – mid-1960s to 1967:*** Located in a northern branch of Bartlett Ravine, west of Landfill 3, encompassing approximately 1 acre. Currently, Landfill 4 is vegetated and contains a small pond. Landfill 4 received construction debris. A 36-inch storm sewer that transports surface drainage from Fort Sheridan underlies Landfill 4, and continues under Landfill 3, where the diameter of the storm sewer increases to 48 inches.
- ***Landfill 5 – Prior to 1952:*** Located in the southern branch of Bartlett Ravine south of Landfills 3 and 4. Currently, Landfill 5 is a paved parking lot (CH2M 2018) and houses Buildings 378 and 133. The western side of the site is the Army Reserve property and the eastern side is Navy Property. The Army Reserve uses the area for vehicle and equipment storage and shop activities. The Navy portion is vacant. Landfill 5 received industrial and general refuse. During previous investigations, slag, coal, and cinders were excavated. A 15-inch storm drain underlies Landfill 5.
- ***Landfill 6 – 1960s:*** Located within a branch of Wells Ravine, west of Patten Road and east of Landfill 7. Landfill 6 received industrial and domestic wastes, specifically from demolition of many WW11 barracks in the 1960s. No information was found to indicate that hazardous wastes were disposed of at this landfill (USATHAMA 1990). Landfill 6 is currently vegetated and has some graveled areas. A 36-inch storm sewer that transports stormwater from Highwood and Fort Sheridan passes under Landfill 6. Landfill 6 is located partially on Army Reserve and Navy properties.
- ***Landfill 7 – 1940 to July 1, 1979:*** Located within a branch of Wells Ravine, east of Patten Road and next to Landfill 6, encompassing approximately 7.9 acres. Landfill 7 terminates at Lake Michigan. Prior to landfilling, a 42-inch storm drain was installed at the base of Wells Ravine (SAIC 1997). The storm drain collected discharges from the city of Highwood and locations along the alignment of Wells Ravine on Fort Sheridan. The storm sewer was buried by 10 to 15 feet of waste. This drain was eventually plugged and transformed into a leachate collection drain. Currently, Landfill 7 is a fenced

off grassed area with land use controls in place (routine maintenance, prescribed burns, mowing, and operation of the Building 100 leachate treatment) (Kemron 2008b). During operation, Landfill 7 received waste oil, solvents, paint products (thinner and stripper), photographic chemicals, carbon cleaning compounds, hospital and veterinary wastes, ammunition boxes treated with pentachlorophenol, radioactive instrumentation, polychlorinated biphenyls (PCBs), dials, gauges, sewage treatment sludge, incinerator and heating plant ash, building debris, and general office refuse (Kemron 2008b). In addition, open burning was conducted prior to 1970.

In October 1989, the pump used to transfer leachate from a collection well to the sanitary sewer was disconnected. A small amount of liquid was present in the wet well, suggesting that leachate infiltrated the storm drain and discharged to Lake Michigan. This led to the installation of a treatment system (Kemron 2008a). Land use controls are in place, which include visual inspections of Landfill 7. Groundwater samples are collected from six deep and six shallow monitoring wells and leachate samples are collected from the leachate collection system. In addition, stormwater monitoring includes quarterly sampling of the direct runoff flowing into two random stormwater inlets along the perimeter. An active leachate collection and storage system was installed in 2002. Four leachate collection pumps were installed: one each in Manhole 6000 (on top of Landfill 7, near the crest of the East Slope), the leachate interception trench sump, a pump in Building 100, and in the landfill gas condensate trap on Landfill 7. Prior to 2007, the waste was disposed of in a WWTP in Salem, Wisconsin. After 2007, the Army received approval for the leachate to be applied to a grassy area near the maintenance building.

- ***Landfill 8 (also called Fill Area 8) – 1952 to 1962:*** Located on the southern end of Fort Sheridan, between the housing area and Lake Michigan shoreline, encompassing approximately 3 acres. The area was seeded in 1962. No information is available concerning materials buried at the site, but glass and coal cinders were observed in the area (USACE 1990).
- ***Fill Area 9 – 1950s:*** Limited information exists on Fill Area 9 other than it was located near Landfill 1 and operated briefly in the 1950s.
- ***Incinerator – pre-1960:*** Precise dates of operation area are unknown but demolished in the 1960s and disposed of in one of the on-post landfills. The incinerator was located north of Wells Ravine and reportedly used to burn hospital infectious wastes (Earth Tech 1994).
- ***Fill Area 38-acre Parcel – Early 1900s:*** Located directly north of Landfill 2, encompassing the area that is now the fish pond. Ash, wire, and cinders were found during excavation activities.

4.2.5 Other Potential Sources of PFAS

In addition to AFFF-related and metal plating-related PFAS sources, other potential sources of PFAS may be associated with the use of some types of pesticides, car washes, engine lubricants, paint shops, laundry or waterproofing facilities, and photographic processing facilities. The potential non-AFFF PFAS sources at Fort Sheridan are discussed below and noted in Figure 4-1:

- ***Maintenance Activities/Wash Racks*** – Maintenance activities were conducted at Buildings 57 and 164. These buildings contained wash racks for vehicles/equipment until closure of Fort Sheridan. Vehicle and equipment maintenance activities were conducted; maintenance activities required the use of engine oils, fuels, lubricants, and cleaning solvents. An oil/water separator (OWS) was not identified on the Surplus OU property. Although a complete list of products used for wash rack operations is not available, it is understood that common products used in vehicle washing may have contained minor amounts of PFAS-containing materials and would not be considered a significant source of PFAS contamination. As a result, the potential PFAS impacts were determined to be unlikely. Significant PFAS impacts would have been more likely from emergency vehicles being serviced at the wash racks.

- ***Laundry*** – One building identified as the laundry facility was identified at Fort Sheridan. The laundry facility had no industrial laundry operations on-post but served as a logistical location for transfer of clothing for off-post laundering. Although a complete list of products used for laundry operations is not available, it is understood that common products used in wet and dry laundry facilities may have contained low concentrations of PFAS-containing materials and would not be considered a significant source of PFAS contamination. In addition, the activities associated with the post laundry were not tied to any other known areas where PFAS-containing materials were used, stored, or disposed of. As a result, the potential PFAS impacts were determined to be unlikely. Significant PFAS impacts would have been more likely from fire protective clothing and turnout gear being laundered at the facilities.
- ***Photographic Processing*** – Photographic processing occurred at Building 361. Photographic chemicals were reportedly disposed of at Landfill 7. A complete list of photographic processing chemicals used, stored, or disposed of at Fort Sheridan is not available. However, the use of PFAS-containing materials did not become prevalent in the photography industry until approximately the mid-1990s (Kodak 2002). Given the operational period of Fort Sheridan (1877 to 1993), the likelihood of PFAS impacts due to the use, storage, or disposal of photographic processing chemicals is assumed to be low.
- ***Pesticides/Chemical Storage Buildings*** – Pesticides were stored in Building 377 and at Building 172 at the golf course. Building 42 served as the hazardous material storage building since the 1950s and may have also stored pesticides. Although safety data sheets (SDSs) for a complete list of pesticides that were used, stored, and/or disposed of at Fort Sheridan were unavailable for review at the time of the PA, the use of fluorinated pesticides was infrequent until approximately the mid-2000s (Alexandrino et al. 2022). Given the operational period of operation for Fort Sheridan (1877 to 1993), the dates of pesticide use at the facility pre-date the use of fluorinated pesticides, and the likelihood of PFAS impacts due to pesticide use, storage, or disposal is assumed to be low.

During the document research and site visit, no additional potential PFAS-containing material use, storage, or disposal were identified.

4.3 POTENTIAL OFF-POST AND POST TRANSFER PFAS SOURCES

The search to identify potential off-post PFAS sources (i.e., not related to operations at Fort Sheridan), although not exhaustive, included review of significant potential contributors (i.e., airports, fire stations, landfills, WWTPs). In addition, EDR conducted a search of state and Federal environmental databases for the Fort Sheridan property and adjacent properties (EDR 2021).

Post transfer parcels and their current ownership are presented in Figure 4-1. Potential off-post PFAS sources within a 5-mile radius of Fort Sheridan that were identified during the records reviews, interviews, and the site visit are described below and presented in Figure 4-2.

Two fire departments, the Highland Park Fire Department and the Lake Forest Fire Department, respond to emergencies in their respective cities and on Fort Sheridan. In 2016, Highwood also had a fire department until it was combined with Highland Park. The former firefighter and member of the Highland Park Fire Department confirmed that they used AFFF during training activities until recently. He thinks Highwood and Lake Forest Fire Departments also trained with AFFF on their properties. The Highland Park Fire Department owns three Fire Stations, all within 5 miles of Fort Sheridan. The Lake Forest Fire Department owns one Fire Station within 5 miles of Fort Sheridan.

Spill and inventory records maintained by the Army Reserve confirmed the presence and use of AFFF post-BRAC closure of Fort Sheridan in the mid- to late 1990s. Inventory records indicate the routine storage of 4- to 5-gallon pails of AFFF on the Fort Sheridan Fire Department (operated by Fort McCoy) Hazardous Materials Trailer. Spill records from January 1994 document the use of a 5-gallon pail of AFFF to clean up a fuel spill associated with a heating oil tank at Building 432 (U.S. Army 1994).

5. SUMMARY OF PA RESULTS

The areas evaluated for potential PFAS use, storage, or disposal at Fort Sheridan were further refined during the PA process and categorized as an AOPI or not retained.

5.1 Areas Not Retained as AOPIs

Based on analysis of information obtained during document research, personnel interviews, and/or site reconnaissance, the areas described below were not retained as AOPIs. These areas were previously identified as potential PFAS sources (e.g., wash racks, automobile maintenance, photographic processing, pesticide use or storage, WWTPs, landfills). However, PA research does not indicate that PFAS-containing materials were used, stored or disposed of at these areas. A brief site history and the rationale for eliminating the areas as AOPIs are presented in Table 5-1.

Table 5-1. Summary of Areas Not Retained as AOPIs at Fort Sheridan

Area Description	Dates of Operation	Relevant Site History	Rationale
Building 40	1962-1967	Provided steam for heating buildings at Fort Sheridan. Materials used included caustic soda, cyclohexylamine, norpholine, potassium hydroxide, sodium sulfite, and phosphate.	Time frame before common use of PFAS.
Building 42	1950s - 1993	Building used by the Directorate of Logistics to store materials (office supplies) used on-post. Historically used since 1950s to store hazardous chemicals, paints and solvents.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 43: Directorate of Logistics Maintenance Shop	Unknown	Furniture cleaning and stripping, paint stripping, typewriter repair, and carpentry shop; connected to the chemical sewer.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 51: Motor Pool	1930-1993	Vehicle maintenance and 55-gallon drum storage.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 57: Maintenance Area/Wash Rack	Unknown	Building contained a wash rack for vehicles/equipment. Maintenance activities required the use of engine oils, fuels, lubricants, and/or solvents.	No evidence that PFAS-containing materials were used, stored, or disposed of. Fire equipment not washed at wash racks.
Outdoor Storage Area Buildings 70, 122, 143, 144, 145, and 146	1952-1985	Storage for assorted equipment and containers. Ground staining was observed in several aerial photographs.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 70	Unknown	Single story wooden-frame WWII vintage building used for pesticide storage. Floor is darkly stained and discolored for unknown reasons.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 86: Warehouse	1909-1997	Hazardous waste/materials storage.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 122	Unknown	Hazardous waste storage building; no evidence of spills or staining.	No evidence that PFAS-containing materials were used, stored, or disposed of.

Table 5-1. Summary of Areas Not Retained as AOPIs at Fort Sheridan (Continued)

Area Description	Dates of Operation	Relevant Site History	Rationale
Building 128	Unknown	Used for storage of instruments containing radioactive materials during the Nike Missile operations.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 129: Administrative Storage	1961-Unknown	Storage building for administrative supplies and maintenance parts, leased to Lake County Forest Preserve District for storage of golf course equipment.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 135: Hazardous Waste Storage	1940-1997	Hazardous wastes stored included trichloroethene, adhesives, primers, acids, solvents, hydraulic fluids, antifreeze, methanol, and aircraft grease.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Outdoor Storage Area Buildings 137X, 137, and 139	1952-1991	Historically used as a battery and drum storage area. Ground staining was observed around drums. Site is currently graveled. Tactical/combat armament and heavy equipment maintenance shop (lawnmowers/large trucks). Used for battery maintenance and equipment cleaning. The floor of Building 137 is heavily corroded. A parts washer is used for smaller parts, but large pieces of equipment are cleaned directly on the bay floor. Floor drains collect wash water to an OWS before discharge to the sanitary sewer.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 143: Storage Building	Unknown	Adjacent to Buildings 124, 144, 145, and 149. Building was marked with hazardous materials placards.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 157	1919-1950	Hazardous material storage.	Time frame before common use of PFAS.
Building 164: Maintenance Area/Wash Rack	Unknown	Building contained a wash rack for vehicles/equipment. Maintenance activities required the use of engine oils, fuels, lubricants, and/or solvents.	No evidence that PFAS-containing materials were used, stored, or disposed of. Fire equipment not washed at wash racks.
Building 172	Unknown	Fertilizer and pesticide storage and mixing location.	No evidence that PFAS-containing materials were used, stored, or disposed of. Based on the period of operation for Fort Sheridan, the dates of pesticide use at the facility pre-date the use of fluorinated pesticides.
Building 173	1941	Located north of 12th Road and west of Building 117. Hazardous material storage area and ordnance magazine.	Time frame before common use of PFAS.

Table 5-1. Summary of Non-AOPIs at Fort Sheridan (Continued)

Area Description	Dates of Operation	Relevant Site History	Rationale
Building 209	Unknown	Abandoned warehouse. Had center floor drain and hydraulic lift; therefore, may have been used for vehicle maintenance.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 216	1940-1993	Allied Trades Body Shop used this building to perform sandblasting, painting, and body work on automobiles (USATHAMA 1990). Non-silica grit was used for sandblasting. A parts cleaner was maintained by Safety Kleen. The paint spray booth was equipped with a ventilation system. Chemical agent resistant coating was used in booth operations.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 361: Photographic Processing	Unknown	Chemicals used and stored at Building 361 for photographic processing. Chemicals were disposed of down drains as well as to Landfill 7.	No evidence that PFAS-containing materials were used, stored, or disposed of. Based on the period of operation for Fort Sheridan, the dates of photographic processing pre-date the use of PFAS-containing materials in the photography industry.
Building 377: Pesticide/Chemical Storage	Unknown	Pesticides were stored in Building 377.	No evidence that PFAS-containing materials were used, stored, or disposed of. Based on the period of operation for Fort Sheridan, the dates of pesticide use at the facility pre-date the use of fluorinated pesticides.
Building 378	Unknown	Sump adjacent to Building 378 used for acid waste disposal generated from maintenance activities.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Building 379 and Associated Yard	Unknown-Present	Electronic Communications Repair shop, which houses machine shops, repair shops, a spray painting area, a sanding area, an electric kiln, and office space. Previous building operational history and waste handling protocols are not known. Building 379 was previously used as a radioactive equipment calibration house.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Vehicle and Equipment Storage Area 1	1950-1989	Currently, the paved parking area between Buildings 51, 55, 58, and 112. Historically used for vehicle maintenance. Solvents, waste oil, and maintenance-related fluids were stored on-post. Likely spills and leaks occurred; ground staining was observed in aerial photographs from 1962 to 1972 (USATHAMA 1990).	No evidence that PFAS-containing materials were used, stored, or disposed of.

Table 5-1. Summary of Non-AOPIs at Fort Sheridan (Continued)

Area Description	Dates of Operation	Relevant Site History	Rationale
Vehicle and Equipment Storage Area 2	Unknown-1993	Currently, the paved area east of Building 370 and adjacent to Building 58. Historically used for a vehicle and equipment storage lot. Stored hazardous materials including solvents and petroleum, oils, and lubricants (Diversified Technologies 1997a). Ground staining was observed in aerial photographs from 1952 to 1980.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Vehicle and Equipment Storage Area 5	1952-1985	Approximately 5,000-ft^2 area west of Building 128. Historically was a graveled area used for vehicle storage. Ground staining was observed in aerial photographs from 1962 to 1985.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Vehicle and Equipment Storage Area 6	1952-1985	Graveled area south of Building 128, bounded by 3rd, 4th, C, and D Streets. Historically was a graveled area used for vehicle storage. Ground staining was observed in aerial photographs in 1981.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Vehicle and Equipment Storage Area 7	1952-1981	Approximately 5-acre area bounded by B, C, 3rd, and 9th Streets. In 1962, the Vehicle and Equipment Storage Area was reduced to 2.5 acres. After 1985, Building 574 (barracks) was constructed. Ground staining was observed in aerial photographs from 1962 to 1981.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Vehicle and Equipment Storage Area 9	1952-Unknown	Covered most of the area south of Wells Ravine between Patton and 10th Street until 1976, when the size was reduced to a small fenced area west of Building 642. Historically was a motor repair area. Ground staining observed in aerial photographs from 1952 to 1972. Currently, the site is vegetated with some graveled areas.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Yard Area Building 126	Unknown	Historically used as a pesticide and fertilizer mixing area for maintaining the golf course. These activities occurred before and after the area was paved. Runoff collects in a drainage ditch that flows to Janes Ravine. As of 1997, the Lake County Forest Preserve operates the building.	No evidence that PFAS-containing materials were used, stored, or disposed of. Based on the period of operation for Fort Sherdian, the dates of pesticide use at the facility pre-date the use of fluorinated pesticides.
Yard Area Building 128 and Building 128 (previously Area Maintenance Support Activities 47)	Unknown	Used for electronic maintenance, the Nike regional service center, and waste material storage until remodeling was conducted in 1976. After 1976, the yard was used as a vehicle maintenance and waste storage area. Had a 500-gallon AST (oil).	No evidence that PFAS-containing materials were used, stored, or disposed of.

Table 5-1. Summary of Non-AOPIs at Fort Sheridan (Continued)

Area Description	Dates of Operation	Relevant Site History	Rationale
		Solvents/antifreeze were accumulated in 55-gallon drums. The yard had a curbed wash pad that drained to an OWS (U.S. Army 1993). Aerial photographs indicate the ground staining in the wash pad and drum staging area.	
Yard Area Building 377	Unknown	Pesticide storage and mixing building used by the Directorate of Engineering and Housing (USATHAMA 1990). Mixing occurred on a gravel yard in front of the building. In 1987, the wash area was upgraded with a curbed concrete pad; however, no drain was installed. Surface runoff occurs and flows northwest to a storm drain near Building 377.	No evidence that PFAS-containing materials were used, stored, or disposed of. Based on the period of operation for Fort Sheridan, the dates of pesticide use at the facility pre-date the use of fluorinated pesticides.
Yard Area at Former Building 563	Unknown	Was located in an extension of Wells Ravine. Excavated materials contained fill, municipal trash, and construction debris.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Yard Area Building 902	Unknown	Contained vehicle maintenance facilities for five reserve units. Used for small vehicle maintenance activities such as oil changes. Had five bays, no floor drains within the building, and a wash area with drains. Drains flow into a catch basin to a storm sewer to the southern branch of Janes Ravine.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Former Sewage Treatment Plant (Buildings 331 and 334)	1978	Received Fort Sheridan wastewater until 1978 when the Fort was connected to the NSSD sewer system. Sludge from the treatment plant was documented to be disposed of at Landfill 7.	No evidence that the Former Sewage Treatment Plant received PFAS-containing materials.
Former Incinerator	Unknown-1965	Located near the former STP at the top of the bluff adjacent to (north of) Landfill 7. Dates of operation are uncertain but probably extends back to WWI or earlier (SAIC 2002a). Interview records indicate that the incinerator was demolished before 1965, and the debris was disposed of in the landfill in operation at that time (possibly Landfill 7 based on proximity). The type of refuse that was incinerated also is uncertain, but it probably would have included office rubbish as a major component. The incinerator also handled infectious medical waste on Fort Sheridan (SAIC 2002a) prior to transfer of those activities to the Great Lakes Naval Training Center in approximately 1971.	Predates time frame of known PFAS usage.

Table 5-1. Summary of Non-AOPIs at Fort Sheridan (Continued)

Area Description	Dates of Operation	Relevant Site History	Rationale
Landfill 1	1940-1962	Received general refuse, and open burning occurred before soil cover was completed (USATHAMA 1990).	Predates time frame of PFAS usage.
Landfill 2	Unknown to Pre-WWII	Received mostly rubble pre-WWII.	Predates time frame of PFAS usage.
Landfill 3	1940s-1960s	Received general and domestic refuse (USATHAMA 1990). Open burning occurred. No indication that hazardous wastes were disposed of in this landfill.	Predates time frame of PFAS usage.
Landfill 4	mid-1960s-1967	West of Landfill 3, received construction debris.	Predates time frame of PFAS usage.
Landfill 5	Pre 1952	During previous investigations, slag, coal, and cinders were excavated.	Predates time frame of PFAS usage.
Landfill 6	1960s	Received industrial and domestic wastes, including demolition waste from WWII barracks.	Predates time frame of PFAS usage.
Landfill 7	1940 – 1979	Received industrial and domestic wastes. During operation, Landfill 7 was documented to receive waste oil, solvents, paint products (thinner and stripper), photographic chemicals, carbon cleaning compounds, hospital and veterinary wastes, ammunition boxes treated with pentachlorophenol, radioactive instrumentation, PCBs, dials, gauges, sewage treatment sludge, incinerator and heating plant ash, building debris, and general office refuse (5-year review and ANL 1989). In addition, open burning was conducted prior to 1970.	No evidence that PFAS-containing materials were disposed of at Landfill 7.

Table 5-1. Summary of Non-AOPIs at Fort Sheridan (Continued)

Area Description	Dates of Operation	Relevant Site History	Rationale
Landfill 8	1952 – 1962	Materials received are unknown. Coal cinders were observed in the landfill area.	Predates time frame of PFAS usage.
Fill Area 9	1950s	Materials received are unknown.	Predates time frame of PFAS usage.
Fill Area Parcel	Early 1900s	Materials received are unknown; however, ash wire and cinders were discovered during excavation.	Predates time frame of PFAS usage.
Incinerator	Pre 1960	Reportedly used to burn hospital infectious waste.	Predates time frame of PFAS usage.
Building 538: Fire Station	Pre 1960	Fort Sheridan Fire Station.	Predates time frame of PFAS usage.
Building 202	1988-1993	Administrative Record Storage and Offices for Fire Station.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Airfield Hangar	1953 – 1980s	Aircraft Hangar at Haley Airfield.	No evidence that PFAS-containing materials were used, stored, or disposed of. No information was located to document the hangar had an AFFF suppression system. AFFF at the airfield was not stored within the hangar.

5.2 AOPIs

Based on analysis of information obtained during document research, personnel interviews, and/or site reconnaissance, three areas were categorized as AOPIs, as presented in Table 5-2 and Figure 5-1. Site research conducted for this PA indicates that PFAS-containing material use, storage, or disposal is potentially suspected for these areas.

Table 5-2. Summary of AOPIs at Fort Sheridan

Area Description	Dates of Operation	Relevant Site History	Rationale
Building 79 Fire Station and Nozzle Spray Area	1893-1993	Operated as the primary facility Fire Station and stored AFFF on-post. Interview results document the use of AFFF during nozzle spray testing on-post in the back parking lot.	Fire Station with reported AFFF use and storage.
Buildings 67 and 70 Temporary Fire Station	1993	Following closure of the Fire Station at Building 79, equipment was transferred to the temporary Fire Station awaiting transfer to the community fire stations.	Fire Station with reported AFFF storage.
Haley Airfield/Crash Truck Storage	1953-1993	Fire/emergency response center for Haley Airfield. Contained a crash truck with AFFF storage.	Fire response vehicle with reported AFFF storage.

The preliminary CSM is summarized in Section 5.2.1. AOPI overviews and CSM summaries for each AOPI are presented in Sections 5.2.2 through 5.2.4.

5.2.1 Preliminary CSM

A preliminary CSM was prepared for each of the installation's AOPIs in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE 2012b) and USEPA guidance. The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses.

Based on the documented or potential historical use, storage, or disposal of PFAS-containing materials at Fort Sheridan, affected media are likely to consist of soil, groundwater, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, runoff/dissolution/adsorption with surface water or stormwater, and recharge to groundwater from surface water. While other potential exposure media (i.e., soil and sediment) besides drinking water sources (i.e., groundwater and/or surface water) may be impacted by PFAS, direct ingestion via drinking water is the most likely exposure route, and thus the Army's primary concern for human exposure. Therefore, the focus of the Army's PA program is on potential human exposures via drinking water ingestion. The potential for human exposures to PFAS through non-drinking water pathways has not yet been established and may be evaluated in the future if it is determined that those pathways warrant further consideration. The CSMs presented in this report focus on drinking water pathways via groundwater and surface water that are known to be used as a source of potable water.

Drinking water at Fort Sheridan is supplied by public water systems, which receive their water from Lake Michigan. A groundwater exposure pathway is considered potentially complete where constituents of interest (COIs) could migrate from the AOPI source area to water that is used for drinking water. Otherwise, the groundwater exposure pathway is considered incomplete. The following parameters are used to determine if an AOPI source area had a potentially complete groundwater exposure pathway:

- AOPIs located upgradient or in the vicinity of drinking water sources and that have the potential to influence groundwater associated with these potable sources are considered to have a potentially complete groundwater exposure pathway for on-post drinking water receptors.
- AOPIs located outside the vicinity or downgradient from on-post potable sources (drinking water wells) are considered to have an incomplete groundwater exposure pathway for on-post receptors.
- AOPIs that have the potential to influence groundwater that flows off-post are considered to have a potentially complete exposure pathway for off-post receptors.

The soil exposure pathway is considered potentially complete where COIs could be present in soil. A surface water exposure pathway is considered potentially complete where COIs could be present in a surface water body (e.g., a reservoir or large river) that serves as a potable water source. No on-post surface water features are used as a drinking water source; however, surface water migration to Lake Michigan is a potential exposure medium for off-post drinking water receptors. Figure 5-1 presents the locations of the AOPIs. AOPI-specific drinking water pathway CSM summaries are provided in Tables 5-3 through 5-5.

5.2.2 Building 79 Fire Station and Nozzle Spray Area AOPI Rationale and CSM

The Building 79 Fire Station and Nozzle Spray Area was identified as an AOPI following interviews with former Fire Station personnel. The Building 79 Fire Station and Nozzle Spray Area are located on properties that have been transferred to residential use as single-family dwellings.

Interviewees stated that approximately 50 gallons of AFFF were stored in 5-gallon buckets at the Fire Station. In addition, two or three five-gallon buckets were kept on three firetrucks parked in the bays at the station. In addition to AFFF stored within Building 79, nozzle spray activities occurred directly behind the Fire Station (Building 79) in a parking lot. The nozzle spray activities were described as blanketing the ground in the uncurbed parking lot with AFFF and dissolving it with water, flushing the water and AFFF mixture toward the tributary to Bartlett Ravine. These activities occurred until closure of the Fire Station in 1993.

Table 5-3. AOPI CSM Information Profile – Building 79 Fire Station and Nozzle Spray Area

Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	AOPI site structures/description	Former Fire Station building, adjacent grassy area leading to Bartlett Ravine.
	Latitude, longitude	42°12'55.89"N, 87°48'39.63"W
	Size	1.5 acres
Land Use	Current/future land use	Residential
CSM Profile	Source media	Soil/sediment/surface water
	Migration routes/release mechanisms	Constituents could migrate from soil to groundwater via desorption and dissolution. Constituents could migrate to surface water due to runoff, dissolution, and adsorption from stormwater and recharge to groundwater from surface water.
	Exposure pathways, media, and human receptors	Soil is considered a complete exposure pathway at the Fire Station. Although on-post groundwater is not currently used and unlikely to be used for drinking water at Fort Sheridan, a potential future exposure pathway exists on-post because there are no groundwater use restrictions at this AOPI. Additionally, an off-post exposure pathway exists because drinking water is obtained from Lake Michigan, immediately east of Fort Sheridan.

5.2.3 Buildings 67 and 70 Temporary Fire Station AOPI Rationale and CSM

Buildings 67 and 70 were used as a carpentry shop and pesticide shop, respectively, during the operation of Fort Sheridan. The buildings are located near Bartlett Ravine on the present-day Army Reserve Property. The temporary Fire Station at Buildings 67 and 70 was identified through personnel interviews. As part of BRAC closure and property transfer, the Fire Station at Building 79 was moved to Buildings 67 and 70 for approximately 1 year awaiting transfer of fire services and equipment to the community fire departments. Personnel interview documents that AFFF and equipment were stored at this conjoined building, but no fire training practices were performed at Buildings 67 and 70. Former Buildings 67 and 70 are located on Army Reserve property. As noted in Section 4.3, AFFF has been stored and used on the property post-transfer. Buildings 67 and 70 have since been demolished, and no structures currently exist at this AOPI. No records or additional information were located to determine whether spills occurred at the temporary Fire Station or whether AFFF was purposefully discharged as nozzle testing similar to Building 79.

Table 5-4. AOPI CSM Information Profile – Buildings 67 and 70 Temporary Fire Station

Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	AOPI site structures/description	The buildings have been demolished and the AOPI is currently a gravel and grassy lot.
	Latitude, longitude	42°12'41.98"N, 87°48'39.87"W
	Size	0.65 acres
Land Use	Current/future land use	Army Reserve
CSM Profile	Source media	Soil
	Migration routes/release mechanisms	Constituents could migrate from soil to groundwater via desorption and dissolution. Constituents could migrate from surface soil to surface water due to runoff, dissolution, and adsorption from stormwater and recharge to groundwater from surface water.
	Exposure pathways, media, and human receptors	Soil is considered a complete exposure pathway at Buildings 67 and 70. Although on-post groundwater is not currently used and unlikely to be used for drinking water at Fort Sheridan, a potential future exposure pathway exists on-post because there are no groundwater use restrictions at this AOPI. Additionally, an off-post exposure pathway exists because drinking water is obtained from Lake Michigan, immediately east of Fort Sheridan.

5.2.4 Haley Airfield/Crash Truck Storage AOPI Rationale and CSM

One crash truck storage building (Building 126), located west of the airport hangar (Building 117), functioned as a single bay Fire Station/emergency response building for Haley Airfield. Building 126 was constructed in 1959 and used as the fire/emergency response center for Haley Airfield until airfield closure (Diversified Technologies 1997b). Building 126 was a concrete floor building with two rooms, each with overhead doors. One room had a floor drain, which was cleaned via hydrojetting in 1995. 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. No records or interviews identified crashes, spills, or training using AFFF or foam at the airfield. The building has since been demolished.

Table 5-5. AOPI CSM Information Profile – Haley Airfield/Crash Truck Storage

Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	AOPI site structures/description	Building 126 has been demolished and is open recreational land as part of the nature preserve.
	Latitude, longitude	42°13'22.39"N, 87°49'3.91"W
	Size	0.15 acres
Land Use	Current/future land use	Recreational Use
CSM Profile	Source media	Soil
	Migration routes/release mechanisms	Constituents could migrate from soil to groundwater via desorption and dissolution. Constituents could migrate from surface soil to surface water due to runoff, dissolution, and adsorption from stormwater and recharge to groundwater from surface water.
	Exposure pathways, media, and human receptors	Soil is considered a complete exposure pathway at Building 126. Although on-post groundwater is not currently used and unlikely to be used for drinking water at Fort Sheridan, a potential future exposure pathway exists on-post because there are no groundwater use restrictions at this AOPI. Additionally, an off-post exposure pathway exists because drinking water is obtained from Lake Michigan, immediately east of Fort Sheridan.

5.3 DATA LIMITATIONS

The data limitations relevant to the development of this PA for PFAS at Fort Sheridan are discussed below.

A comprehensive well survey was not completed as part of this PA; therefore, the information reviewed regarding off-post wells is limited to the desktop survey completed. No off-post water supply wells were found in the EDR well search report (Appendix F). The State of Illinois well database identified water wells within a 4-mile radius off-post, but it could not be determined if they are used as potable water supply wells (ISGS 2022). Water intake is from Lake Michigan to the east.

The searches for ecological receptors and off-post PFAS sources were limited to easily identifiable and readily available information. An online database was referenced when identifying the ecological profile for the site (USFWS 2023).

Records reviewed during the PA process were limited in information regarding PFAS-containing materials, including AFFF use; procurement records of AFFF and documentation of AFFF used during firefighter training activities were unavailable. Anecdotal accounts of AFFF use (and likely PFAS release) were limited to available personnel, whose knowledge of AFFF use may have been restricted by their time spent at Fort Sheridan or previous roles held that limited their relevant knowledge of potential AFFF (or other PFAS) use. In absence of AFFF documentation, the PA was conducted through observation of operational periods, site usage, aerial photographs, a records review, anecdotal evidence, and personnel interviews to evaluate the likelihood of use, storage, or disposal of PFAS-containing materials.

The PA was conducted through observation of operational periods, site usage, aerial photographs, records reviews, anecdotal evidence, and personnel interviews to evaluate the use, storage, or disposal of PFAS-containing materials. Therefore, some conclusions and recommendations presented in this report are based on available information, professional judgment, and industry best practices.

6. CONCLUSIONS

This PA was conducted in accordance with DoD, Army, and USEPA guidance documents. Programmatically, the Army has focused its PFAS PA efforts on identifying locations where a potential for a release of PFAS exists (i.e., those locations where PFAS-containing materials were used, stored, or disposed of). Locations on Army installations with the greatest likelihood of releases of PFAS were evaluated as part of this PA, including use and storage of AFFF, such as fire stations. However, other potential sources of PFAS at Fort Sheridan were considered and have been documented in this PA. A combination of document review, Internet searches, interviews with Army personnel, and an installation site visit were used to identify specific areas of suspected PFAS use, storage, and disposal at Fort Sheridan.

The entire former Fort Sheridan installation was assessed, and 54 preliminary areas were identified and evaluated for potential use, storage and/or disposal of PFAS-containing materials. These areas were further refined during the PA process and then either identified as an area not retained for further investigation or as an AOPI. In accordance with the established process for the PA, three of the preliminary areas have been identified as AOPIs.

The AOPIs identified during this PA at Fort Sheridan are listed below:

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

A site-specific CSM was developed for each AOPI based on an assessment of existing records, personnel interviews, and site reconnaissance. The CSMs developed for this PA did not identify any of the three AOPIs as currently impacting or having the potential to impact on-post drinking water receptors as there are currently no on-post drinking water wells. A potential future pathway exists on-post because there are no groundwater use restrictions. The exposure pathway for off-post drinking water receptors is potentially complete for the three AOPIs as drinking water is sourced from Lake Michigan, which is located immediately east and downgradient of Fort Sheridan.

Given the findings of this PA, the AOPIs presented warrant further evaluation in a SI (40 CFR 300.420(c)).

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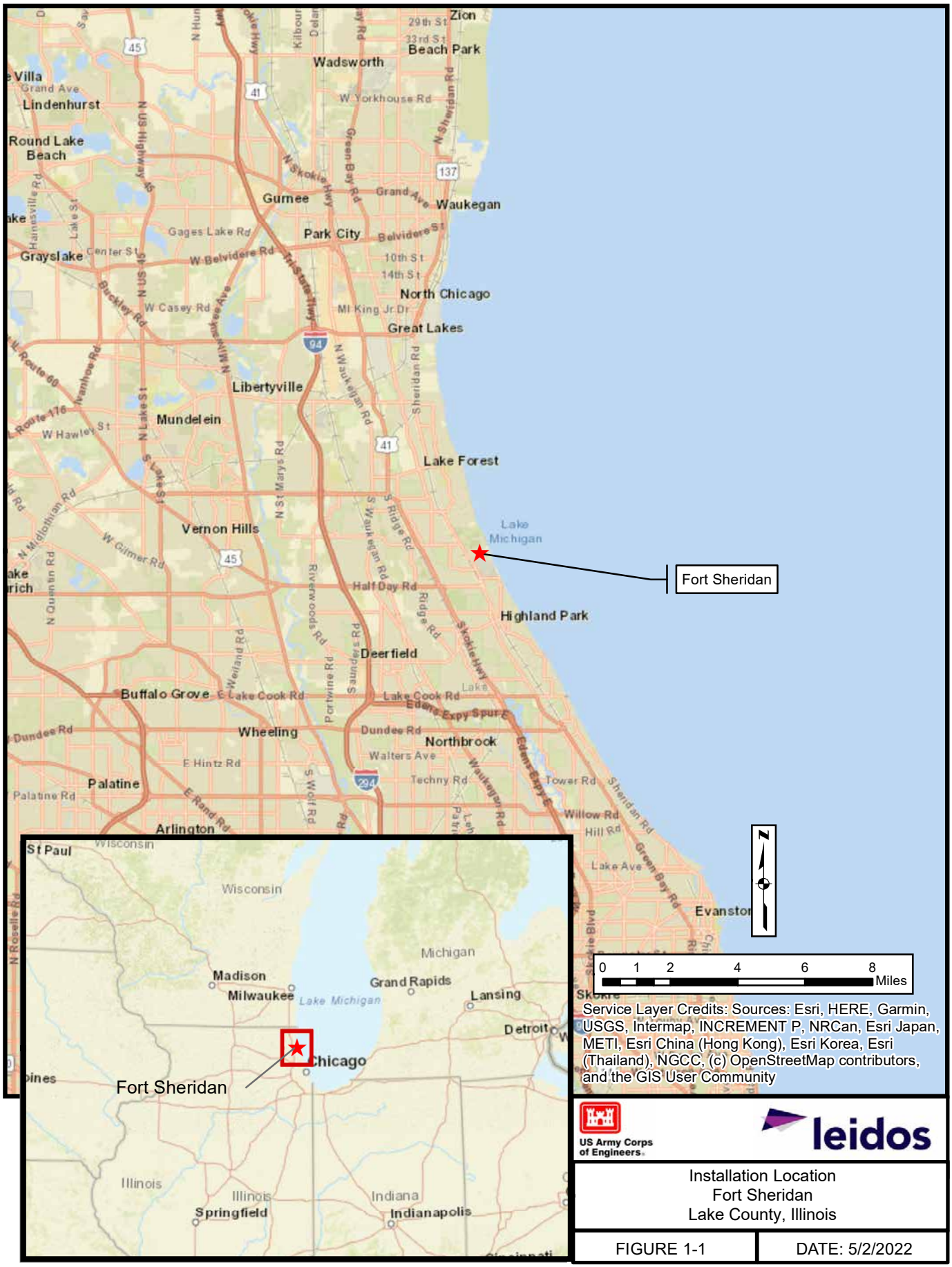
FIGURES


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
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Madison
Milwaukee
Grand Rapids
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Chicago
Fort Sheridan
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Springfield
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Indianapolis
0 1 2 4 6 8
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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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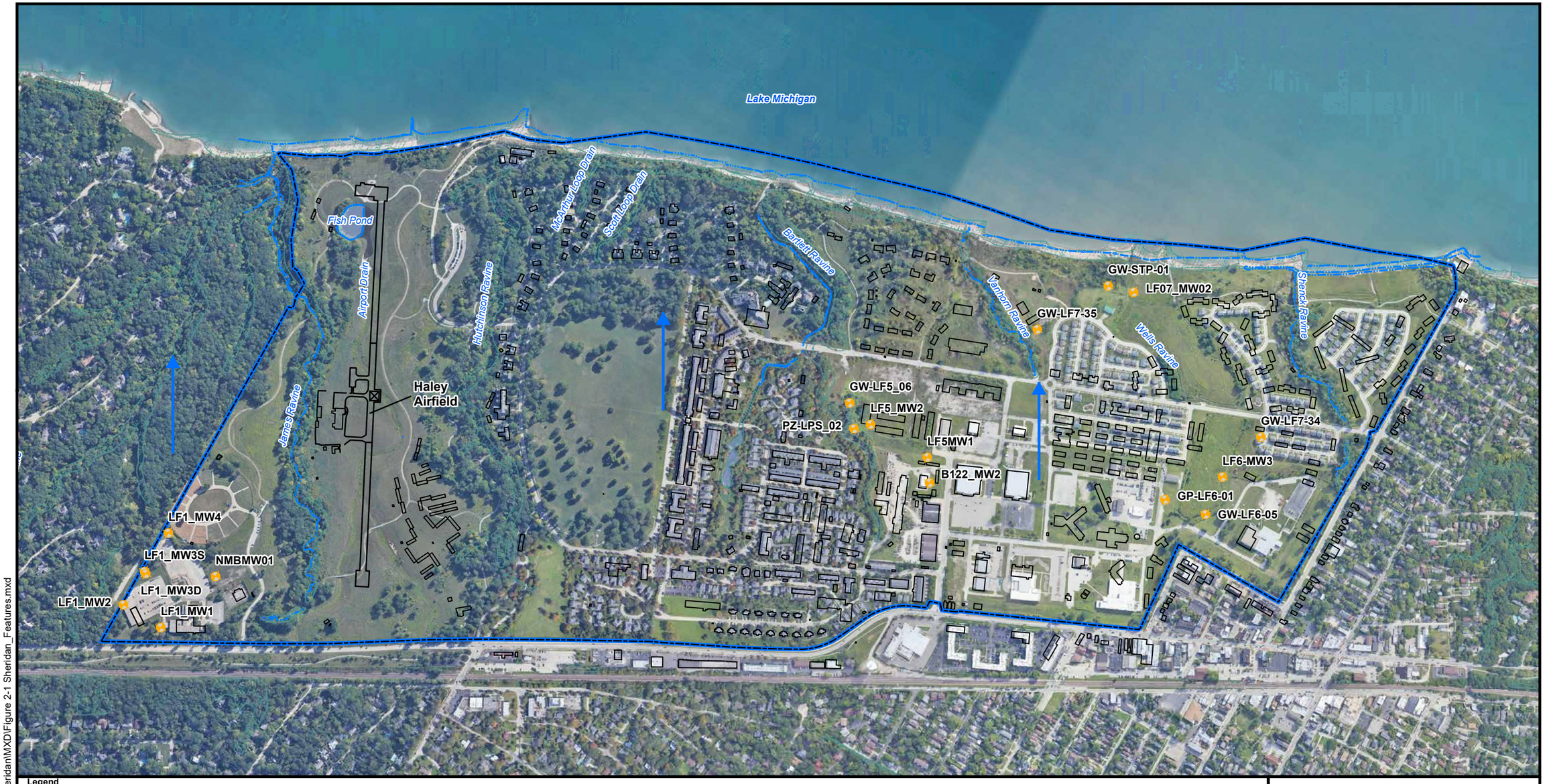
Installation Location
Fort Sheridan
Lake County, Illinois
FIGURE 1-1
DATE: 5/2/2022



Legend

- Retained Wells
- Installation Boundary
- Building
- Lake
- Pond
- River/Stream/Creek
- Lake County Wetland Inventory
- Drainage
- 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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Site Features
Fort Sheridan
Lake County, Illinois

FIGURE 2-1 | DATE: 4/29/2022

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\Figure 2-1 Sheridan_Features.mxd

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\Figure 2-2 Sheridan_Parcel_Transfer.mxd

Legend

- Installation Boundary
- U.S. Army Reserve Property
- U.S. Navy Property
- Veteran's Cemetery
- Openlands Lakeshore Preserve
- Town of Fort Sheridan Historical District

Notes:
Google Earth Imagery, Landsat/Copernicus 7/14/2018 & 6/14/2021
Property Transfer Data derived from 5-Year Review (2008)

IL STATE PLANE EAST (NAD83)

0 400 800
SCALE: 1" = 800'

US Army Corps of Engineers

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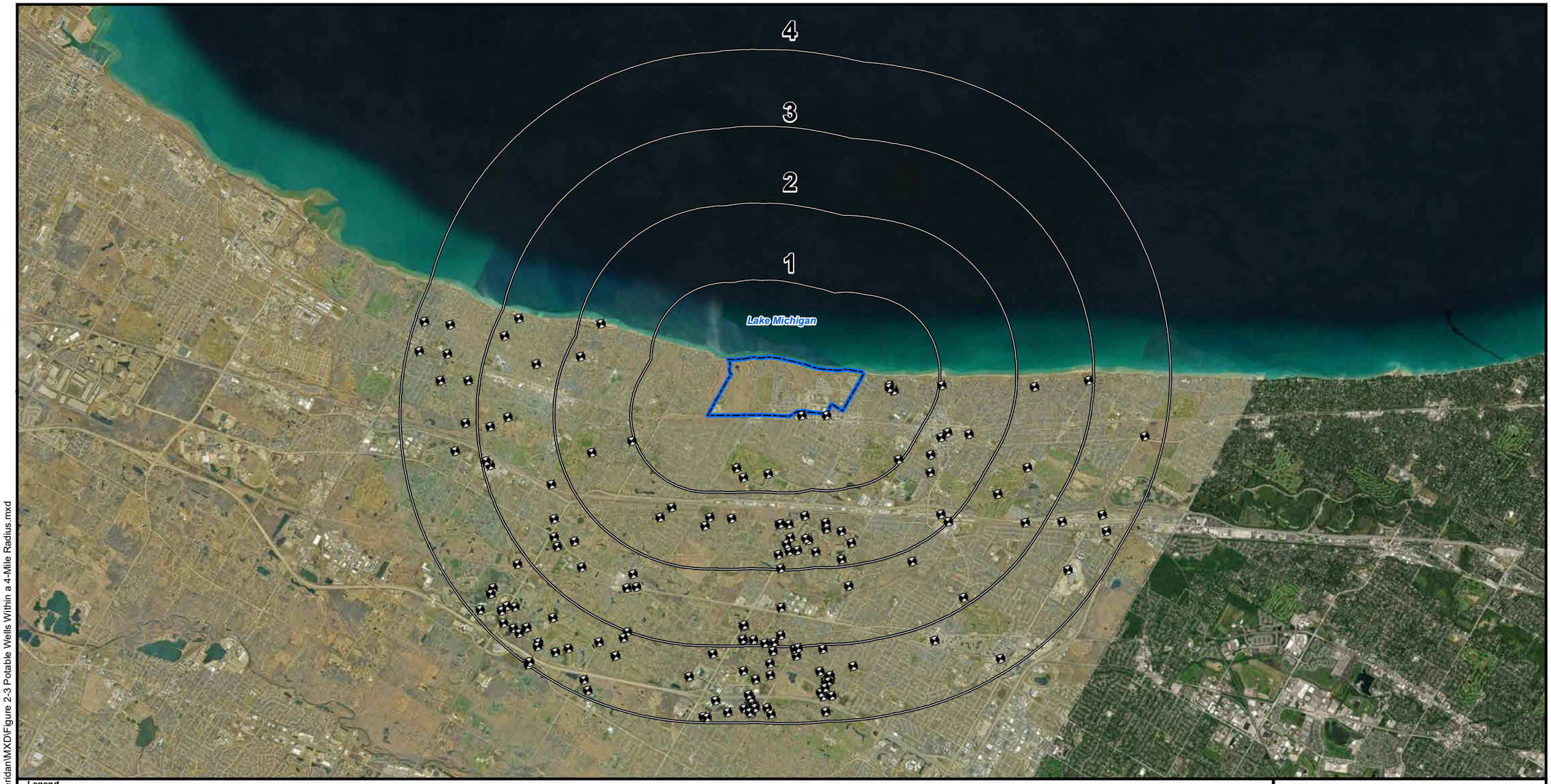
Parcel Transfer Map
Fort Sheridan
Lake County, Illinois

FIGURE 2-2 | DATE: 4/29/2022



Legend

- Water Well
- Installation Boundary
- Distance Rings (1-Mile)

Notes:
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Water Well Data obtained from Illinois Department of Natural Resources (https://isgs.illinois.edu/ilwater)

IL STATE PLANE EAST (NAD83)

0 6,900 13,800 Feet

SCALE: 1" = 7,000'

US Army Corps of Engineers

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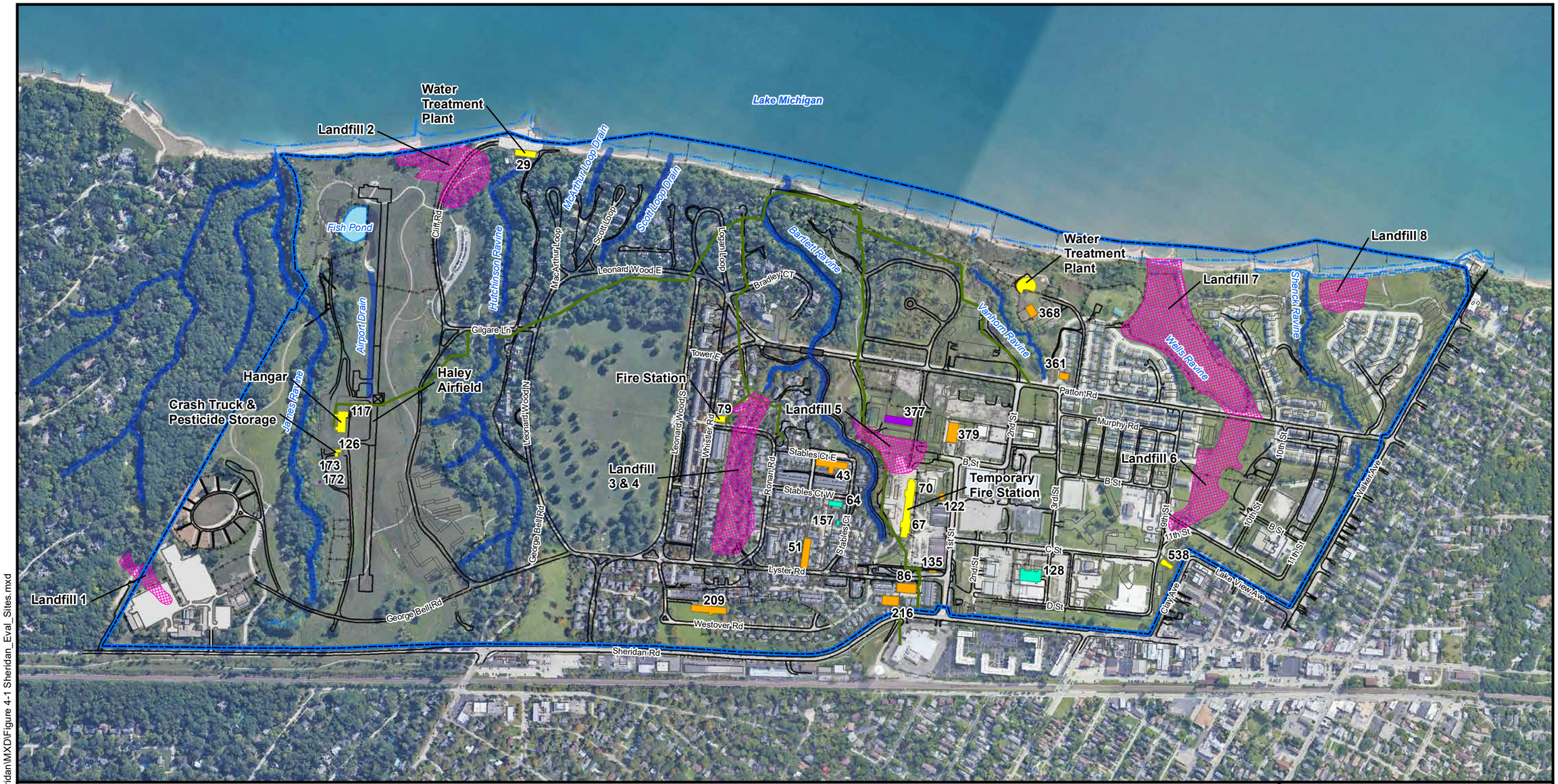
Potable Wells Within a 4-Mile Radius
Fort Sheridan
Lake County, Illinois

FIGURE 2-3 | DATE: 8/1/2023

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\Figure 2-3 Potable Wells Within a 4-Mile Radius.mxd



F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\Figure 4-1 Sheridan_Eval_Sites.mxd

Legend

- Fence
- Guardrail
- Trail
- Drainage
- Parking Area
- Railroad Feature
- Roads
- Sanitary & Storm Water Drain
- Bridge
- Structure - Pad
- Parking Area
- Water Feature
- Installation Boundary
- Ravines
- Landfill
- Hazardous materials storage, vehicle maintenance, & photographic processing areas
- Potential AFFF Release
- Pesticide Storage Areas
- Wash Racks

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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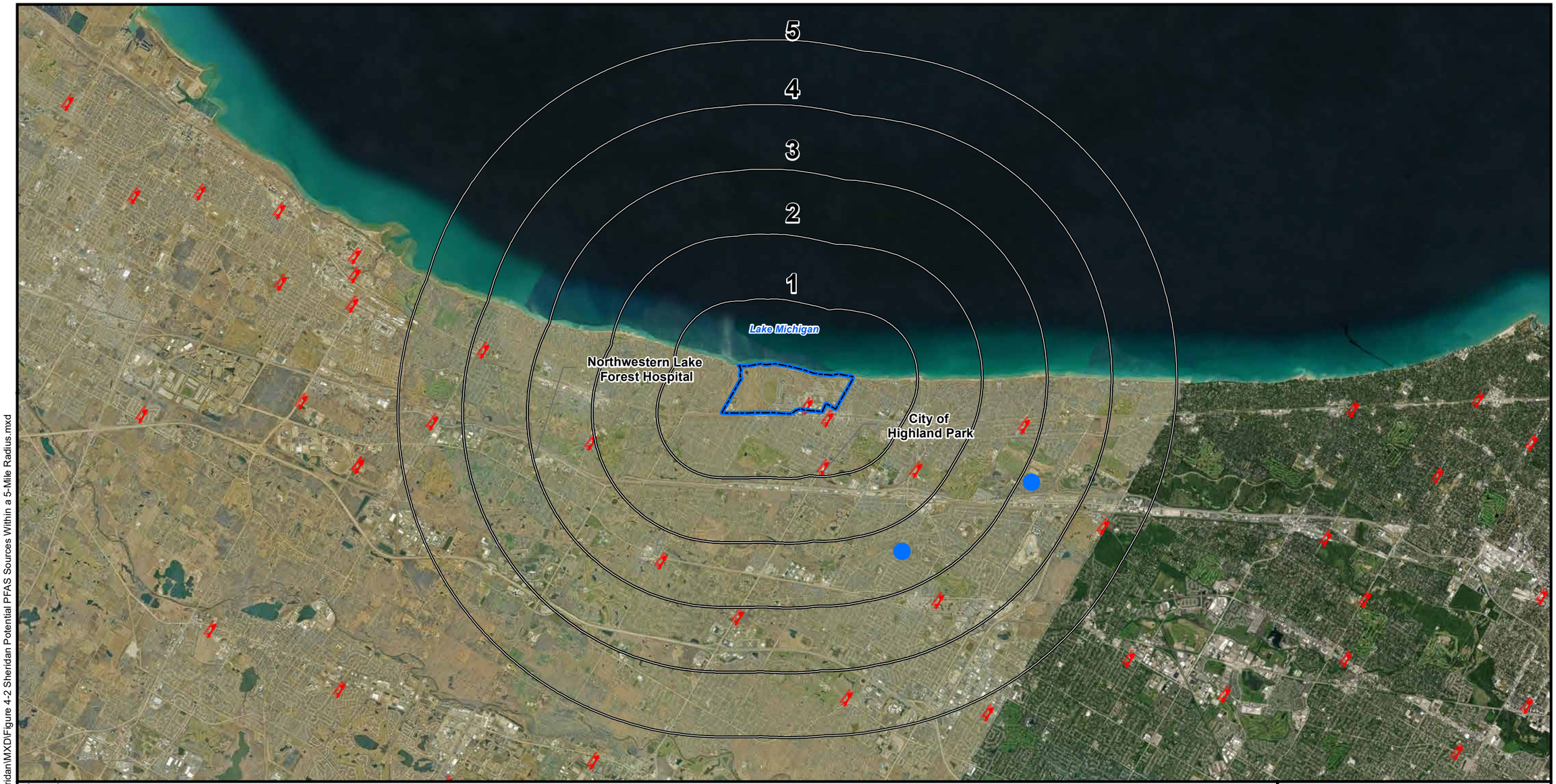
Evaluated Sites
Fort Sheridan
Lake County, Illinois

FIGURE 4-1 | DATE: 5/2/2022



F:\ARMY_BRAC_PFAS\FL_Sheridan\MXD\Figure 4-2 Sheridan Potential PFAS Sources Within a 5-Mile Radius.mxd

Legend

- Airport/Helipads (FAA)
- Fire Stations
- Wastewater Treatment Plants (EPA)
- Installation Boundary
- Distance Rings (1-Mile)

Notes:

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

IL STATE PLANE EAST (NAD83)

0 8,250 16,500 Feet

SCALE: 1" = 7,000'

US Army Corps of Engineers

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Potential PFAS Sources Within a 5-Mile Radius
Fort Sheridan, Lake County, Illinois

FIGURE 4-2 | DATE: 8/1/2023

Legend

- Installation Boundary
- Area of Potential Interest
- U.S. Army Reserve Property
- U.S. Navy Property
- Building
- Drainage
- 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 Map
Fort Sheridan
Lake County, Illinois

FIGURE 5-1 | DATE: 9/14/2023

F:\ARMY_BRAC_PFAS\Ft_Sheridan\MXD\Figure 5-1 Sheridan_AOPIs.mxd