SITE INSPECTION REPORT FOR PER- AND POLYFLUOROALKYL SUBSTANCES AT NEWPORT CHEMICAL DEPOT, NEWPORT, INDIANA

Prepared for:

U.S. ARMY

ODCS, G-9, ISE BRAC

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
BEC	BRAC Environmental Coordinator
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CoC	Chain-of-Custody
CSM	Conceptual Site Model
DPT	Direct Push Technology
DERP	Defense Environmental Restoration Program
DI	Deionized
DO	Dissolved Oxygen
DoD	U.S. Department of Defense
DQO	Data Quality Objective
DUA	Data Usability Assessment
ELAP	Environmental Laboratory Accreditation Program
EIS	Extracted Internal Standard
ESCA	Environmental Service Cooperative Agreement
FCR	Field Change Request
FOST	Finding of Suitability to Transfer
GPS	Global Positioning System
GSB	Gypsum Sludge Basin
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid (GenX)
HQ	Hazard Quotient
ID	Identifier
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IDW	Investigation-Derived Waste
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	Liquid Chromatography with Tandem Mass Spectrometry
LCS	Laboratory Control Sample
LOD	Limit of Detection
LOQ	Limit of Quantitation
LTM	Long-Term Monitoring
LUC	Land Use Control
MDEQ	Michigan Department of Environmental Quality
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NECD	Newport Chemical Depot
NECDF	Newport Chemical Agent Disposal Facility
NECDRA	Newport Chemical Depot Reuse Authority

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

NFA	No Further Action
NGVD	National Geodetic Vertical Datum
NPL	National Priorities List
ORP	Oxidation Reduction Potential
OSD	Office of the Secretary of Defense
OSHA	Occupational Safety and Health Administration
P.E.	Professional Engineer
P.G.	Professional Geologist
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCC	Pollution Control Center
PCCRP	Pollution Control Center Retention Pond
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonate
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PMP	Project Management Professional
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RDX	1,3,5-Trinitro-1,3,5-Triazine
REM	Registered Environmental Manager
RPD	Relative Percent Difference
RSL	Regional Screening Level
SDG	Sample Delivery Group
SI	Site Inspection
SL	Screening Level
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TNT	2,4,6-Trinitrotoluene
U.S.C.	United States Code
UFP-QAPP	Uniform Federal Policy Quality Assurance Project Plan
UN	United Nations
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
VX	O-Ethyl S-(2-Diisopropylaminoethyl) Methyl Phosphonothioate

EXECUTIVE SUMMARY

The U.S. Army (Army) is conducting Preliminary Assessments (PAs) and Site Inspections (SIs) to determine the use, storage, disposal, or release of per- and polyfluoroalkyl substances (PFAS) at multiple Base Realignment and Closure (BRAC) installations, nationwide. This report documents SI activities conducted for nine areas of potential interest (AOPIs) at the Newport Chemical Depot (NECD) in Newport, Indiana. AOPIs were identified during the PA phase for investigation through multimedia sampling in an SI phase to determine whether a PFAS release occurred. Activities were completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 United States Code [U.S.C.] §9601, et seq.); the Defense Environmental Restoration Program (DERP, 10 U.S.C. §2700, et seq.); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 Code of Federal Regulations [CFR] Part 300); Army and U.S. Department of Defense (DoD) policy and guidance; and U.S. Environmental Protection Agency (USEPA) guidance.

The PA identified areas where PFAS-containing materials were used, stored, and/or disposed of, or areas where known or suspected releases to the environment occurred. Based on recommendations from the PA, soil, groundwater, sediment, and/or surface water samples were collected from the nine AOPIs. The field investigation at NECD was conducted in accordance with the Programmatic Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (Leidos 2022a) and NECD UFP-QAPP Addendum (Leidos 2022b). Samples collected during this SI were analyzed for PFAS using procedures compliant with the DoD Quality Systems Manual (QSM) Version 5.3, Table B-15 (DoD 2019) and the laboratory standard operating procedure (SOP).

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

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

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

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

AOPI Name	Exceedance of SLs		Recommendation
	Groundwater	Soil	
Fire Training Pit	No	No	Further investigation not recommended
Scrap Yard	Yes	No	Further investigation recommended
Fire Department Training (Building 255A)	Yes	No	Further investigation recommended
Facility 262D Loading Dock	Yes	No	Further investigation recommended
Foam House at TNT Acid Area	No	No	Further investigation not recommended
PCC Clarifiers and PCCRP	No	No	Further investigation not recommended
Former Locomotive House (Building 718A)	No	No	Further investigation not recommended
Fire Station (Building 709A)	Yes	No	Further investigation recommended
Fire Equipment Storage (Building 733K)	Yes	No	Further investigation recommended

Highlighted values indicate AOPIs with a recommendation for further investigation.

1. INTRODUCTION

The U.S. Army (Army) is conducting Preliminary Assessments (PAs, 40 Code of Federal Regulations [CFR] 300.420(b)) and Site Inspections (SIs, 40 CFR 300.420(c)) to investigate the presence or release of per- and polyfluoroalkyl substances (PFAS), by investigating the use, storage, or disposal of PFAS at multiple Base Realignment and Closure (BRAC) installations, nationwide. This SI is focused on the former Newport Chemical Depot (NECD) and was conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 United States Code [U.S.C.] §9601 et seq.); the Defense Environmental Restoration Program (DERP, 10 U.S.C. §2700 et seq.); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300); Army and U.S. Department of Defense (DoD) policy and guidance; and U.S. Environmental Protection Agency (USEPA) guidance. NECD is not on the National Priorities List (NPL), and the Army is responsible for compliance with CERCLA in accordance with Executive Order 12580, as amended.

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

1.1 SCOPE AND OBJECTIVES

The overall objective of the SI is to determine the presence or absence of PFAS at each AOPI. This SI Report uses the findings from the PA in conjunction with soil, groundwater, surface water, and sediment sampling data to determine whether PFAS have been released to the environment and whether a release has affected or may affect specific human health targets. Furthermore, the SI will evaluate and summarize the need for additional investigation (40 CFR 300.420(c)(1)).

The SI scope included preparation of project planning documents; field investigation; validation and management of analytical data; comparison of analytical data to the screening levels (SLs) published in the 2022 Office of the Secretary of Defense (OSD) Memorandum (DoD 2022a); and documentation of the investigation results. This SI was conducted in accordance with the Programmatic Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (Leidos 2022a) and the NECD UFP-QAPP Addendum (Leidos 2022b). The field activities followed site-specific sampling and health and safety protocols, as identified in the Programmatic Accident Prevention Plan (APP) (Leidos 2022c) and the NECD Site Safety and Health Plan (Appendix A of the NECD UFP-QAPP Addendum).

1.2 NECD DESCRIPTION

NECD is a former Army facility located in west-central Indiana, in Vermillion County. The 2005 BRAC Commission recommended NECD for closure, and it was closed on July 18, 2010. Except for 101 acres that were transferred to the U.S. Coast Guard (USCG), the excessed property was transferred to the Newport Chemical Depot Reuse Authority (NECDRA) in September 2011 (U.S. Army 2020). NECD has been redeveloped into Vermillion Rise Mega Park, an office and industrial park, which is home to multiple businesses (DoD 2020b).

During the development of the PA, historical records, interviews, aerial photographic analysis, site reconnaissance, available documentation and physical evidence were reviewed to determine where PFAS-containing materials may have previously been stored, used, or disposed of (40 CFR 300/420(b)(5)). The evaluated areas include fire stations; fire training areas; landfills; wastewater treatment plants; photochemical processing facilities; pesticide facilities; vehicle maintenance shops; metal plating areas; chemical storage areas; wash racks; fire suppression systems; and laundry facilities. The NECD PFAS PA

recommended nine AOPIs for further investigation in an SI due to known or potential historical PFAS-containing material use, storage, or disposal. The AOPIs, as well as the dates of operation and sizes of each area, are presented in Table 1-1 and illustrated in Figure 1-2.

Table 1-1. List of AOPIs at NECD

AOPI Name	Dates of Operation	Size (acres)
Fire Training Pit	Late 1960s to early 1980s	0.11
Scrap Yard	1990s	7.1
Fire Department Training (Building 255A)	Unknown to c2010	0.05
Facility 262D Loading Dock	1980s	0.85
Foam House at TNT Acid Area	1972 to 1980	0.26
PCC Clarifiers and PCCRP	1972-1980	59
Former Locomotive House (Building 718A)	1980	0.71
Fire Station (Building 709A)	1942 to 2010	0.07
Fire Equipment Storage (Building 733K)	Unknown (post 1972)	0.29

1.3 REPORT ORGANIZATION

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

- ***Section 2. Environmental Setting***—This section discusses the environmental setting at NECD. Demographics, land use, geology, hydrogeology, hydrology, soil, and climate are described.
- ***Section 3. Field Investigation Activities***—This section provides field procedures followed during the implementation of the SI.
- ***Section 4. Data Analysis and Quality Assurance Summary***—This section describes the laboratory chemical analysis program for the investigation. Sample handling procedures, laboratory equipment calibration, laboratory analytical methods, data reporting and validation, and sample data quality assurance (QA)/quality control (QC) are discussed.
- ***Section 5. Screening Levels***—This section presents the Target PFAS with SLs outlined in the 2022 OSD Memorandum (DoD 2022a) and the SLs to which SI results are compared.
- ***Section 6. SI Results***—This section presents the data gathered during the SI activities and updated conceptual site models (CSMs).
- ***Section 7. Conclusions and Recommendations***—This section summarizes the SI conclusions and presents recommendations for the NECD AOPIs.
- ***Section 8. References—***This section lists the references that were used in the preparation of this report.
- ***Appendices***—Appendices A through I include data from field activities or related assessments:
  - Appendix A. Daily Field Summary Notes
  - Appendix B. Photograph Log
  - Appendix C. Field Activity Logs
  - Appendix D. Boring Logs and Well Construction Logs
  - Appendix E. Sampling and Calibration Logs
  - Appendix F. Field Change Request (FCR)
  - Appendix G. Investigation-Derived Waste (IDW) Documents
  - Appendix H. Data Usability Assessment (DUA)
  - Appendix I. Data Presentation Tables.

2. ENVIRONMENTAL SETTING

This section provides general information about NECD, including the site location, operational history, current and projected land use, climate, topography, geology, hydrogeology, surface water hydrology, potable wells within a 5-mile radius of the installation, and applicable ecological receptors.

2.1 SITE LOCATION

NECD is a former Army facility that consisted of approximately 7,236 acres while in operation (SAIC 2008). NECD is located in west-central Indiana, in Vermillion County, near the town of Newport. NECD is approximately 65 miles west of Indianapolis and approximately 140 miles south of Chicago. The Indiana/Illinois state line is 2 miles from the western boundary of NECD. Vermillion County is primarily agricultural in nature, with farmland dominating its rural landscape. NECD is surrounded by agricultural fields or, in a few areas, wooded areas. All properties adjacent to and surrounding NECD are located in unincorporated Vermillion County and have been zoned for agricultural use, with the exception of two county-owned properties, which are zoned for business use (NECDRA 2009). Several creeks flow through NECD, including Little Vermillion River, Little Raccoon Creek, Buck Creek, and Jonathan Creek; all of these creeks are tributaries of the Wabash River. Figure 2-1 depicts the NECD site features, including the site boundary, roads, buildings, topography, and location of the creeks.

2.2 SITE OPERATIONAL HISTORY

NECD was established in 1942 on approximately 22,000 acres as the Wabash River Ordnance Works, a 1,3,5-trinitro-1,3,5-triazine (RDX) production facility. The RDX facility was operational beginning in 1942, and in 1943, production facilities for the manufacturing of heavy water related to the Manhattan Project were constructed at NECD for the Atomic Energy Commission (now the Nuclear Regulatory Commission). Operations continued until NECD was placed on standby status in 1946. After World War II, most of the land was sold, and NECD was reduced to approximately 7,236 acres. The heavy water plant was placed on standby status in 1946 but was reactivated from 1952 through 1957 to support the Korean War effort.

A chemical plant for the production of the nerve agent O-ethyl S-(2-diisopropylaminoethyl) methyl phosphonothioate (VX) was constructed in 1958 by the Food Machinery Corporation near the former heavy water production facility. In 1964, the Wabash River Ordnance Works and the Newport Army Chemical Plant were combined and renamed the Newport Army Ammunition Plant and then Newport Chemical Depot. From 1960 to 1968, all of the United States' VX was produced at NECD until halted by President Richard Nixon. The VX was stored at NECD until its destruction at the Newport Chemical Agent Disposal Facility (NECDF) from 2002 until 2008 (SAIC 2008). In 1970, a 2,4,6-trinitrotoluene (TNT) production facility was constructed to support the Vietnam War. Only two of the five production lines operated, and the production was discontinued in 1975.

The 2005 BRAC Commission recommended the closure of NECD upon completion of the chemical demilitarization mission. The entire former facility (i.e., the site), has been transferred out of Army ownership. On October 4, 2006, 101 acres were transferred to USCG via a Fed-to-Fed transfer. NECD was closed on July 18, 2010, and the chemical demilitarization mission of NECDF was completed by 2011. Property was transferred via Economic Development Conveyance to the Local Reuse Authority (NECDRA) in September 2011 (6,652 acres of Finding of Suitability to Transfer [FOST] 1 property), September 2012 (478 acres of FOST 2 property), and May 2015 (5 acres of FOST 3 property). NECD has been the subject of various environmental actions, studies, and cleanup actions since the 1970s. In 2012, the Army completed environmental remediation activities in coordination with the Indiana Department of Environmental Management (IDEM) and established an Environmental Service Cooperative Agreement (ESCA) with NECDRA to complete long-term monitoring (LTM) activities (U.S. Army 2020).

2.3 DEMOGRAPHICS, PROPERTY TRANSFER, AND LAND USE

Most of the area surrounding NECD is agricultural cropland, woodlands, and pastures. Land use for the areas immediately adjacent to NECD are primarily zoned agricultural (NECDRA 2009). Nearby towns and cities include Newport, Montezuma, Dana, Clinton, and Cayuga. Land use in Vermillion County is heavily agricultural, with 119,318 acres or approximately 73 percent of the total land area of the county in farm production (U.S. Army 1998). The population of Vermillion County in 2019 was 15,498 persons with a population density of 63.1 persons per square mile according to U.S. Census survey data (U.S. Census Bureau 2019).

The 101-acre USCG property is on the western boundary and contains a communications tower and related technical facilities. A few farmhouses and other detached residential structures, as well as two non-residential farm use structures, are located along Highway 63, which forms the eastern boundary. These properties are zoned as "A" (Agricultural). The Vermillion County Jail is located immediately across Highway 63 from the main gate, and a Vermillion County Public Works Garage is located across Highway 63 from the far northeastern corner of NECD; these two properties are zoned as "B2" (Business) (NECDRA 2009).

The NECD reuse plan was approved by the U.S. Department of Housing and Urban Development on April 7, 2010 (U.S. Army 2020). NECD property was transferred to the Local Reuse Authority (NECDRA) from 2011 to 2015. The Army and NECDRA established an ESCA to provide provisions for NECDRA to conduct LTM and clay cap inspections and to enforce environmental restrictive covenants. LTM includes groundwater monitoring at the Decontaminated Waste Burial Ground and RDX Manufacturing (NECDRA 2022).

NECD has been redeveloped into Vermillion Rise Mega Park, an office and industrial park covering 7,100 acres with 2,806 acres of deed restricted areas to support bat habitat for the federally endangered Indiana bat. NECDRA has retained ownership of most of NECD since initial property transfer, although it has sold property for agricultural use in the southwestern/western portion of the facility and commercial/industrial use in the east-central portion of NECD. NECDRA owns the areas where AOPIs were evaluated as part of this SI.

2.4 TOPOGRAPHY

The topography at NECD is flat, ranging from approximately 650 feet above mean sea level (amsl) near the main eastern entrance to the installation to 530 feet amsl in the drainage basin in the northwestern portion of the Installation (Figure 2-1). The Ranney wells area to the east is approximately 480 feet amsl (USGS 1964, 1978a, 1978b, and 1979). Most of the land surface is characterized by slightly undulating to nearly level upland lying at elevations between 620 and 640 feet (all elevations refer to the National Geodetic Vertical Datum [NGVD] of 1929). NECD lies within the Tipton Till Plain section of the Central Lowland Province of the United States. It is a nearly featureless glacial plain dissected by old and newer stream drainages and dotted with glacial features such as end moraines. Several creeks flow through NECD, including Little Vermillion River and tributaries of Jonathan Creek, which flow off NECD in a northern direction; Little Raccoon Creek, which originates in the eastern portion of NECD and flows in a southerly direction off NECD; and southerly flowing Buck Creek, which is located in the southwestern portion of NECD. All of these creeks are tributaries of the Wabash River, which is located approximately 2 miles east of NECD (Earth Tech 2002).

2.5 GEOLOGY

This section provides information on the regional geology of Vermillion County and the geology that underlies NECD. This information is based on data from previous environmental investigations (unrelated to PFAS) and reference documents, such as U.S. Geological Survey (USGS) documents.

NECD lies in the Central Lowland Plains physiographic division of the Central United States (USGS 1970). The facility is underlain by approximately 70 to 100 feet of unconsolidated glacial till (primarily a stratified ground moraine) and capped by thin loess (wind-deposited silt) that grades into morainal deposits along the escarpment formed by the Wabash River, approximately 2 miles to the east. The till is composed of poorly sorted clay, silt, sand, and minor gravel, and displays both vertical and lateral variability (Earth Tech 2002).

The glacial till was deposited by at least two Pleistocene ice sheets, during the Kansan and Wisconsinan stages, and comprises the major part of the Trafalgar Formation in Indiana. The Trafalgar Formation is composed of three members separated by thin (1 to 3 feet), frequently truncated sand and gravel deposits. From youngest to oldest, these members are the Snider Till, the Batestown Till, and the Glenburn Till. The younger till members are thinner and finer grained than the underlying older till members (USAEHA 1975).

Depth to the bedrock surface is typically from 45 to 140 feet below ground surface (bgs). The bedrock in Vermillion County lies near the edge of the Indiana Basin and dips slightly toward the southwest. The uppermost consolidated bedrock unit below the glacial deposits is the Carbondale Group, composed of shale and sandstone of Pennsylvanian age and ranging in thickness from approximately 10 to 100 feet. The Carbondale Group is part of the larger Allegheny Series; other groups of the series outcrop along the Big Vermillion and Wabash Rivers.

Underlying the Carbondale Group is the Raccoon Creek Group. Comprising the basal Pennsylvanian unit, the Raccoon Creek Group varies in thickness from 145 to more than 200 feet and is composed primarily of shale and sandstone, with thinner beds of limestone, clay, and coal. These Pennsylvanian units lie unconformably above Mississippian-age sedimentary rocks that, in turn, overlie a series of very thick Paleozoic formations, which extend more than 1 mile down to pre-Cambrian granites and metamorphic rocks (USAEHA 1975).

The Pennsylvanian bedrock units form part of the western limb of a vast anticline, the axis of which strikes in a north-south direction, thus causing bedrock to dip slightly to the southwest. No evidence of significant faulting in the NECD area exists (USAEHA 1975).

2.6 HYDROGEOLOGY

The depth to groundwater typically ranges from 15 to 30 feet bgs. Surficial and shallow groundwater occurs in discontinuous sand and gravel lenses and sandy zones in the glacial till at NECD. Water-bearing zones exist under confined conditions surrounded by impermeable glacial till and may be poorly connected to other localized surficial or shallow groundwater. Groundwater flow is mostly horizontal and dictated by areas of high topographic relief and the effect from the proximity of streams and related tributaries that have eroded into the glacial till. In general, two major shallow groundwater basins are located within NECD. The shallow groundwater in the southern and southeastern portions of NECD flows toward the south and southwest and discharges into tributaries of Little Raccoon Creek, which flows into the Wabash River at a point approximately 5 miles southeast of the NECD boundary. Shallow groundwater in the northern and western portions of NECD moves north toward Little Vermillion River and ultimately flows east of Newport to the Wabash River. Within these groundwater basins, several shallow groundwater divides exist, coincident with topographic highs, in the central and western areas of NECD (Dames & Moore 1991a).

2.7 SURFACE WATER HYDROLOGY

NECD lies within the western half of the Wabash River watershed. Surface runoff near NECD flows into drainage ditches and creeks that empty into the Wabash River, which is approximately 2 miles east of NECD. The Wabash River flows southward between Indiana and Illinois, and empties into the Ohio River near the John T. Myers Locks and Dam near Posey County, Indiana, and Gallatin County on the Illinois border (Tetra Tech 2001). Spring Creek and the Big Vermillion River drain the northern portion of

Vermillion County, with the Little Vermillion River draining the central portion. Near NECD, Little Raccoon, Norton, Feather, and Brouilletts Creeks provide drainage for the southern area of Vermillion County (Earth Tech 2002).

The land within NECD drains into one of four natural drainage basins (HUC14 watersheds). Most of the facility drains north into the Little Vermillion River watershed or south into the Little Raccoon Creek watershed. A small portion of NECD closest to the Wabash River drains directly into the Wabash-Montezuma watershed, with the far western end of NECD draining into the Jonathan Creek watershed (Matrix 2009).

NECD contains 213 acres of wetland habitat. This acreage amounts to 3 percent of the total land area. The installation has 24 miles of linear wetlands (USFWS 2001). A 1999 survey of NECD (EarthSource 1999) identified 12.5 acres of jurisdictional wetlands or other waters of the United States as defined by the *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1* (USACE 1987). Eight distinct sections of wetlands or wetland complexes were delineated during the survey. Both the eastern and western branches of Little Vermillion River were identified as waters of the United States that provide important buffers for water quality and valuable riparian habitat.

Soil types at NECD suggest that the flat upland portions of NECD once supported significant areas of depressional, slough-swale wet prairie wetlands within a matrix of tallgrass prairie (EarthSource 1999). Virtually all of these rich prairie soils were converted to agricultural land uses during European settlement of the region (Hedge and Bacone 1994, Homoya et al. 1985). The hydrology of the wetland soils (i.e., the Sable and Ragsdale series) found on the uplands have been extensively manipulated through surface ditches and subsurface drain tiles to improve soil drainage and support row crop production. Consequently, many of the fragmented wetlands that remain on NECD are remnants of much larger systems, and the current vegetation types reflect an alteration of the natural hydrology that is more favorable to the development of drier, forested, and scrub-shrub wetland communities (EarthSource 1999). Despite their fragmentation, wetland areas at NECD still perform important water quality functions and provide valuable habitat for wildlife and avifauna, such as the Virginia rail, wood duck, and sora (Chandler and Weiss 1994).

2.8 WATER USAGE

The Ranney wells area, which supplies all water to NECD, is located on the bottomlands of the Wabash River Valley, approximately 2 miles from the eastern boundary of NECD (Figure 2-1). Three of six original wells are now owned by a private citizen (Matrix 2009). NECDRA owns and operates the remaining three wells. These wells are registered with the Indiana Department of Natural Resources (IDNR) as significant water withdrawal facilities (Registration No. 00884); however, only one well is currently active (Ranney Well #3). Ranney Well #3 was installed in 1942. The current pumping capacity of this well is approximately 3,260 gallons per minute (IDNR 2021).

Raw water from the Ranney well, which NECDRA owns and operates, is pumped directly into a 7-million-gallon reservoir (Building 402A). Building 402A is the only active raw water storage facility on the former NECD. Two potable water pumps, two service water pumps, and two fire water pumps are located in the pump house (Building 412A) supplied by the reservoir. The potable water storage facility is the elevated tank (Water Tower 510), with a capacity of 100,000 gallons. A 60,000-gallon elevated tank in the former TNT area once served as a secondary raw water storage facility. Potable water is chlorinated and transferred to Water Tower 510 by two inline pumps in the pump house. Potable water from Water Tower 510 is distributed via a 20-inch-diameter steel transmission main to the industrial and shops area at NECD. This 20-inch main once provided water to the TNT area. The service water system is supplied directly from the 7-million-gallon reservoir pump house. The service water system provides water to the Vermillion County Jail, the administration building (Building 7700), and Building 3005. Water is chlorinated for potable use at each of these facilities (Matrix 2009).

According to the IDEM Division of Water groundwater database, approximately 135 water wells registered by IDNR are within a 4-mile radius of NECD (IDNR 2021). An Environmental Data Resources, Inc. report generated for NECD was reviewed to obtain offsite water supply well information.

2.9 ECOLOGICAL PROFILE

NECD provides suitable habitat for a variety of species. While the property was functioning as a military facility, public access for wildlife viewing; nature photography; antler collection; and the gathering of edible fruits, mushrooms, nuts, and berries was allowed in Hunt Areas 10 through 14 until September 11, 2001. Public access for outdoor recreation was restricted after September 11, 2001, due to the sensitive nature of nerve agent VX stored at NECD and the associated high level of security. Hunting of deer, small game, and wild turkey also was previously allowed at NECD. Since transfer of the facility, NECDRA has operated a hunting lottery for select hunting seasons and has offered hunting leases (The Clintonian 2022). Due to the limited amount of suitable aquatic habitat on NECD, hunting of migratory waterfowl is not permitted (Tetra Tech 2001, SAIC 2008).

Flora – NECD occupies an ecotone between the eastern deciduous forest and the tallgrass prairie. Several invasive plant species occur at NECD. Plants classified as noxious by the State of Indiana and that require control include Canada thistle (*Cirsium arvense*), shattercane (*Sorghum bicolor*), bur cucumber (*Sicyos angulatus*), and Johnson grass (*Sorghum halepense*). Non-native plants, such as multiflora rose *(Rosa multiflora)*, bush honeysuckles *(Lonicera* spp.*)*, Russian olive *(Elaeagnus angustifolia)*, and garlic mustard *(Alliaria petiolata)*, pose more serious threats to the ecological health of NECD plant communities. Garlic mustard *(A. petiolata)* was discovered in 1994 in the Jonathan Creek watershed in the northwestern corner of NECD. The negative impact of non-native honeysuckle species and garlic mustard *(A. petiolata)* on native woodland flora, particularly spring geophytes, has been well documented in the eastern United States (Tetra Tech 2001).

Virtually all of the wet prairie and oak savanna vegetation on the uplands of NECD was converted to agricultural land uses during the settlement period. However, NECD also has restored more than 335 acres of tallgrass prairie communities in several areas in the southwestern portion of NECD; the restored prairies were once part of the pre-European settlement grasslands environment. Prairie restoration at NECD includes both establishment of new prairie areas and maintenance of planted sites (Mason & Hanger 2006).

With the redevelopment of NECD into Vermillion Rise Mega Park, 2,806 acres were designated as an Indiana bat (*Myotis sodalis*) protective zone of forested trees with restrictions on tree cutting to support bat habitat. In addition, approximately 1,640 acres were established as a conservation area, including 500 acres that could be used for prairie restoration (U.S. Army 2020).

Fauna – Previous investigations and surveys have documented the presence of at least 35 mammal species representing 14 families at NECD. Common species include white-tailed deer *(Odocoileus virginianus)*, coyotes *(Canis latrans)*, raccoons *(Procyon lotor)*, striped skunks *(Mephitis mephitis)*, eastern cottontail rabbits *(Sylvilagus floridanus)*, opossums *(Didelphis virginiana)*, and various small rodents. NECD personnel also have reported sightings of badgers *(Taxidea taxus)*, gray squirrels *(Sciurus carolinensis)*, and thirteen-lined ground squirrels *(Ictidomys tridecemlineatus)*; however, the presence of these species has not yet been confirmed in formal investigations. Approximately 157 bird species have been documented at NECD, either on a permanent, transient, or migratory basis. Some of the more common species present on a year-round basis include American kestrels *(Falco sparverius)*, blue jays *(Cyanocitta cristata)*, northern bobwhites *(Colinus virginianus)*, downy woodpeckers *(Picoides pubescens)*, northern flickers *(Colaptes auratus)*, horned larks *(Eremophila alpestris)*, American crows *(Corvus brachyrhynchos)*, European starlings *(Sturnus vulgaris)*, American goldfinches *(Spinus tristis)*, and song sparrows *(Melospiza melodia)*.

Fifteen species of reptiles (3 turtles, 2 lizards, and 10 snakes) have been documented at NECD. Eastern painted pond turtles *(Chrysemys picta picta)* and eastern box turtles *(Terrapene carolina carolina)* are common at NECD; snapping turtles *(Chelydra serpentina)* also are present but are less abundant. Common snakes include black rat snakes *(Pantherophis obsoletus)* and northern water snakes *(Nerodia sipedon)*.

Fifteen amphibian species have been documented at NECD. Common species include spring peepers *(Pseudacris crucifer)*, chorus frogs *(Pseudacris ocularis)*, American toads *(Anaxyrus americanus)*, and small-mouth salamanders *(Ambystoma texanum)*. Suitable wetland habitat on the uplands at NECD is limited, which may be a factor in the diversity of species and numbers of individuals detected during herpeto-fauna surveys.

Thirty-two fish species representing eight families occur within the streams of NECD or near the NECD boundary; these species have been detected during various survey efforts over the past 25 years. No species of live mussels or their shells have been collected in NECD waters to date (SAIC 2008). Aquatic habitat at NECD does not currently support a sport fishery.

Rare, Threatened, and Endangered Species – The federally and state-listed endangered Indiana bat (*Myotis sodalis*) and federally listed threatened northern long-eared bat (*Myotis septentrionalis*) have been observed at NECD. Maternity colonies of both the Indiana bat and northern long-eared bat have been identified at NECD (NRC 2003). Biological surveys have confirmed that the Indiana bat (*Myotis sodalist)* and northern long-eared bat (*Myotis septentrionalis)* forage and roost at NECD. The state-listed endangered northern harrier (*Circus hudsonius)* has been observed at NECD (Audubon 2022). No federally or state-listed reptile, amphibian, or fish species have been observed during previous surveys at NECD.

The bald eagle (*Haliaeetus leucocephalus)* was delisted from the Endangered Species Act but is protected under the Bald and Golden Eagle Protection Act. Wintering bald eagles have been observed along the Wabash River and near NECD's administration building area (NRC 2003). According to NECD personnel, the fact that the bald eagle is a transient visitor is evident by sightings in the winter but not in the summer. No new nests have been built on or near NECD in recent years.

2.10 CLIMATE

NECD is located in a region characterized by a temperate continental climate with humid to sub-humid moisture regimes, moderately cold winters, and long summers. Over the course of the year, the temperature typically varies from 21 to 85°F and is rarely below 2°F or above 92°F (Weather Spark 2021).

Rainfall is sufficient for diversified agriculture uses except during short intervals during the height of summer, when evaporation from soils can exceed rainfall for brief periods and complicate farming activities. Rainfall during the spring wet season is usually adequate to prepare the soil for the summer. Average annual precipitation is 41 inches, ranging from 35 to 50 inches on a 10-year cycle (Matrix 2009). Newport experiences extreme seasonal variation in the perceived humidity. Humidity ranges from 0 percent in December to 63 percent in July. The average season snowfall is 24 inches, with most of the snow falling in December, January, and February (Weather Spark 2021).

3. FIELD INVESTIGATION ACTIVITIES

This section provides field procedures followed during the implementation of the SI (40 CFR 300.420(c)(4)(i)). The principal guidance document for the field investigation activities and procedures used for the NECD SI were consistent with the requirements presented in the Army Guidance for Addressing Releases of PFAS (U.S. Army 2018).

3.1 SITE INSPECTION DATA QUALITY OBJECTIVES

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

3.2 SAMPLE DESIGN AND RATIONALE

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

The general approach for determining the presence or absence of PFAS at an AOPI consisted of collecting two direct push technology (DPT) groundwater samples within and downgradient from the AOPI; three soil samples from three soil borings; and one co-located surface water and sediment sample, if these media were present. In addition, temporary monitoring wells were proposed at the Facility 262D Loading Dock and Fire Department Training (Building 255A) AOPI due to limited historical information of groundwater flow direction. The temporary wells were intended for collection of groundwater samples and water levels to help determine the direction of groundwater flow at the AOPIs.

Each location that was sampled, with a unique set of coordinates, was assigned a specific site location in the format of NECD-XXX-##, where:

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

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

- XXX = abbreviation for the AOPI being sampled
- ## = the sequential number of each sample location within the AOPI
- ZZ = sample media (i.e., MW = groundwater from permanent/existing well, GW = groundwater from DPT location, TW = groundwater from temporary monitoring well, SS = surface soil, SB = subsurface soil, SW = surface water, SD = sediment)
- zz = sequence number for the sample at the location.

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

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

3.3 FIELD INVESTIGATION ACTIVITIES

SI field activities were conducted from June 20 to 30, 2022. The locations and methods of sample collection under the SI are described in the following sections. Sampling procedures adhered to the Programmatic UFP-QAPP (Leidos 2022a) and NECD UFP-QAPP Addendum (Leidos 2022b), with relevant information summarized below.

Sampling activities at NECD included collecting surface and subsurface soil samples from soil borings, installing temporary groundwater monitoring wells and DPT screen point samplers, conducting one round of groundwater samples, and collecting sediment and surface water samples where these media were present. Samples were analyzed for 26 PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Table B-15 of DoD Quality Systems Manual (QSM) Version 5.3 (DoD 2019) to determine the presence or absence of PFAS. A total of 107 samples were planned among the 9 AOPIs, including 1 existing monitoring well groundwater sample, 6 temporary monitoring well groundwater samples, 14 DPT screen point groundwater samples, 24 surface soil samples, 56 subsurface soil samples, 3 surface water samples, and 3 sediment samples. A breakdown of samples collected at each AOPI is provided in Table 3-1. Prior to beginning sampling, site reconnaissance and utility clearance were performed. Sampling was completed at one AOPI before moving to the next AOPI when feasible. Any variances in sampling procedure, such as moving a location or sample point elimination, were discussed with the project team and communicated in daily field summary emails (Appendix A). Field procedures and any variances are discussed in the following sections. Photographs of SI field activities are provided in Appendix B.

Table 3-1. NECD AOPI SI Sample Collection

AOPI Name	Soil Samples	Groundwater Samples	Sediment Samples	Surface Water Samples
Fire Training Pit	1 SS / 6 SB	2	0	0
Scrap Yard	3 SS /6 SB	2	1	1
Fire Department Training (Building 255A)	1 SS /6 SB	3	0	0
Foam House at TNT Acid Area	2 SS / 4 SB	1	0	0
Facility 262D Loading Dock	2 SS / 6 SB	3	0	0
PCC Clarifiers and PCCRP	4 SS / 6 SB	3	2	2
Former Locomotive House (Building 718A)	0 SS / 5 SB	2	0	0
Fire Station (Building 709A)	2 SS / 6 SB	2	0	0
Fire Equipment Storage (Building 733K)	3 SS / 6 SB	2	0	0
Total	**18 SS / 51 SB**	**20**	**3**	**3**

SS = Surface soil sample
SB = Subsurface soil sample

3.4 FIELD PROCEDURES

The following sections describe utilities clearance, temporary well installation and development procedures, field procedures for sampling each medium, borehole abandonment, and location survey. Details regarding each of these activities are documented on Task Team Activity Log Sheets that are provided in Appendix C.

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

3.4.1 Utility Clearance

Prior to initiating intrusive activities, the field manager coordinated underground utility clearances for the nine AOPIs through NECDRA, and Indiana811 "Call Before You Dig." As part of the utility clearance process, individual utility companies were consulted (as needed), each area was visually inspected to verify that utilities had been marked, and the field manager looked for signs of unidentified utilities (including overhead utilities) and completed a Subsurface Clearance Checklist prior to initiating drilling operations. In addition, as part of field activities and prior to conducting powered drilling within 25 feet of known or suspected subsurface utilities, the boreholes were excavated using a low-impact technique (hand auger) to a minimum of 5 feet bgs.

3.4.2 Bulk Source Water Sampling

Prior to beginning work, two bulk source water samples (NECD-SB01 and NECD-SB02) were collected on June 9, 2022, for PFAS analysis to determine if the source water was PFAS-free (i.e., PFAS not detected at concentrations greater than the LOD) and could be used for drilling and decontamination. Sample NECD-SB01 was collected from a potable water source located in the onsite maintenance building. Sample NECD-SB02 was collected from a fire hydrant located northeast of the Former Locomotive Building AOPI. Source water was purged for a minimum of 1 minute prior to filling high-density polyethylene (HDPE) bottles. Water from the maintenance building spigot was determined to be PFAS free and was used as a drilling and decontamination water source during field sampling.

3.4.3 Soil Sampling

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

Soil samples were collected in disposable, PFAS-free acetate liners using a Geoprobe® 7822DT. If necessary for utility clearance, the top 5 feet of a soil boring were collected with a stainless-steel hand auger. Each soil core was logged for lithology in accordance with USACE guidance and recorded on a drilling log (drilling logs are provided in Appendix D). All soil sample intervals were homogenized in disposable HDPE bags prior to placing the soil into 4-ounce HDPE sample bottles. Sample bottles were labeled and sealed in zip-lock bags and placed on wet ice for cooling to ≤6°C. Additional details on protocols for obtaining soil samples are outlined on Worksheet #18 and the Leidos SOP "Soil Sampling" provided in the Programmatic UFP-QAPP (Leidos 2022a).

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

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

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

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

3.4.4 Groundwater Sampling

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

Groundwater was sampled by the low-flow purge method from installed and developed temporary monitoring wells or via grab samples collected from installed DPT groundwater sampling assemblies (e.g., Geoprobe® SP22 screen point samplers). Existing permanent monitoring well GS-20T was determined to be compromised, and NEPCCGS-MW01 was not collected.

3.4.4.1 Temporary Monitoring Well Sampling

Temporary monitoring wells were installed at the Facility 262D Loading Dock and Fire Department Training (Building 255A) AOPIs using a Geoprobe® 7822DT DPT drill rig and constructed using new 1-inch-diameter schedule 40 polyvinyl chloride (PVC) and 5-foot screened sections. All temporary monitoring wells were developed and stabilized except for three wells that repeatedly went dry during development and were considered developed after all other criteria were achieved, excluding the stability parameters. Well development forms are provided in Appendix E.

Prior to sampling, static water level measurements were collected to the nearest 0.01 foot. Following completion of monitoring well purging and stabilization, samples were collected in laboratory-supplied HDPE plastic containers. All samples were collected and handled while wearing clean non-powdered, disposable nitrile gloves. Sample bottles were labeled and sealed in zip-lock bags and placed on wet ice for cooling to ≤6°C. New, clean nitrile gloves were donned prior to each new sample collection. Sampling containers were labeled with the following information: site name, sample identification, date and time of sample collection, name of sampler, sample preservation, and type of analysis.

Three temporary wells (NECD-262-01, NECD-FDT-02, and NECD-FDT-03) were not capable of sustaining adequate purging and experienced continuous drawdown at the lowest pump settings. These wells were purged dry and allowed to recharge. The field team returned to the wells when a sufficient volume of water had entered the wells, not to exceed 24 hours, and grab samples were collected using a peristaltic pump and new HDPE tubing.

Once groundwater sampling was complete, all temporary monitoring wells were abandoned in accordance with IDEM *Drilling Procedures and Monitoring Well Construction Guidelines* (IDEM 2009). Temporary monitoring wells were abandoned by removing all PVC casing and screen and backfilling the borehole

from the bottom to the surface with bentonite chips. The chips were then hydrated with PFAS-free bulk source water. Surface completion matched the surrounding surface (i.e., concrete, asphalt, grass).

3.4.4.2 DPT Screen Point Sampling

Groundwater samples were collected from 14 DPT groundwater sample locations. Collection methods for DPT groundwater samples are outlined in USEPA's *Groundwater Sampling and Monitoring with Direct Push Technologies* (USEPA 2005) and IDEM's *Technical Guidance Document for Groundwater Sampling with a Peristaltic Pump* (IDEM 2021). Following completion of drilling each borehole for soil lithology and sample collection, the inner drill rods were removed and a decontaminated SP-22 DPT groundwater sampling assembly, which included a 3-foot slotted stainless screen attached to the inner drill rods, was installed in the borehole. The outer drilling rods were then retracted, allowing formation water to enter the screened interval. Select locations used clean, new 1-inch PVC screen and riser in the open borehole instead of the SP-22 stainless steel sampler.

Groundwater samples were grab collected using a peristaltic pump with new HDPE tubing inserted through the drilling rods. Laboratory-supplied HDPE bottles were directly filled from the peristaltic tubing, labeled, sealed, placed in zip-lock bags, and then placed on wet ice for cooling to ≤6°C. Sampling containers were labeled with the following information: site name; sample identification; date and time of sample collection; name of sampler; sample preservation; and type of analysis.

If groundwater volume allowed for the collection of water quality measurements, they were recorded after the collection of the groundwater sample. Once sampling was complete, all tooling and materials were removed and the borehole abandoned. The borehole was sealed with bentonite chips to approximately 1 foot bgs and the chips were hydrated with PFAS-free bulk source water obtained onsite. Surface restoration matched the surrounding surface (e.g., concrete, asphalt, grass).

3.4.5 Surface Water and Sediment Sampling

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

Surface water samples were collected directly from the selected locations by submerging the HDPE sample bottle just below the water surface, being careful to avoid sediment agitation. Following sample collection, a calibrated Horiba U5000, Model U-52 was used to collect water quality parameters (i.e., temperature, specific conductivity, pH, dissolved oxygen [DO], turbidity, oxidation reduction potential [ORP]).

Following the collection of surface water samples, sediment samples were collected directly from the selected locations from 0 to 6 inches bgs using decontaminated stainless steel hand augers. Sediment sampling was performed after surface water sampling to avoid sediment in the surface water sample. All sediment samples were homogenized in disposable HDPE bags prior to placing the sediment into laboratory-supplied 4-ounce HDPE sample bottles. Sample containers were labeled, sealed in zip-lock bags, and placed on wet ice for cooling to ≤6°C. The co-located surface water and sediment sample NECD-PCC-07 was relocated to the same location as NECD-PCC-05 due to surface water being present at that location. Surface water was not present at the original location for NECD-PCC-07 in the northern Gypsum Sludge Basin (48948).

Observation and measurements taken during surface water and sediment sampling were recorded on the sediment/surface water sampling forms provided in Appendix E.

3.4.6 Equipment Calibration

Equipment including a photoionization detector and a water quality instrument (Horiba U-5000, Model U-52) were calibrated daily per Worksheet #24 of the Programmatic UFP-QAPP (Leidos 2022a) against known standards in accordance with the manufacturer's instructions and documented on the calibration forms provided in Appendix E.

3.4.7 Location Survey

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

3.4.8 Deviations and Field Change Requests

FCR 2022-01 was initiated to reflect updated guidance from the *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD 2022a). This memorandum updated guidance expanded the target analyte list to include hexafluoropropylene oxide dimer acid (HFPO-DA) as well as account for changes in the May 2022 USEPA SLs for PFAS. This approved FCR accounts for the most current available SLs presented in this SI Report and mitigates a potential gap with the previous exclusion of HFPO-DA. FCR 2022-01 is included in Appendix F.

No instances of field modification impacting project scope and/or data usability/quality were encountered during the SI fieldwork. Activities were completed per the Programmatic UFP-QAPP (Leidos 2022a) and NECD UFP-QAPP Addendum (Leidos 2022b). The following minor deviations from the Programmatic UFP-QAPP and NECD UFP-QAPP Addendum were observed during field activities and summarized for USACE in daily field notes:

- The quantities of samples varied from Table 17-1 of the NECD UFP-QAPP Addendum (Leidos 2022b). The deviation in sample quantities is a result of actual field conditions, including pavement in place of surface soil and the presence of a shallow groundwater table at select AOPIs. Surface soil samples and subsurface soil samples were collected as detailed in Worksheet #18 of the NECD UFP-QAPP Addendum, which specified samples of pavement and saturated soils would not be collected.
    - Six planned surface soil samples (NEFTP02-SS01, NEFTP03-SS01, NEFDT01-SS01, NEFDT03-SS01, NE26202-SS01, and NEFLH03-SS01) were not collected due to the presence of concrete or gravel at the surface. Sample NEPCC05-SS01 was not collected due to the presence of saturated soil/standing water at the surface at the location of NECD-PCC-05. One additional surface soil sample was collected at NEFES04-SS01 since soil was present at the location instead of the assumed paved surface.
    - Five subsurface soil samples were not collected during field sampling activities. Sample NEPCC04-SB03 was not collected due to shallow refusal at 4.5 feet bgs. Sample NEFLH03-SB03 was not collected due to shallow refusal at 4 feet bgs. Sample NEPCC06-SB03 was not collected due to the presence of shallow groundwater (<5 feet bgs). Samples NEPCC05-SB02 and NEPCC05-SB03 were not collected due to the presence of saturated soil/standing water at the surface of the location of NECD-PCC-05. No samples are assigned to station NECD-PCC-05 because the location was converted to be a sediment/surface water sample identified as NECD-PCC-07.
- Existing monitoring well GS-20T was determined to be compromised and could not be sampled.
- Because the original sample location was dry, NECD-PCC-07 was moved to the location originally identified as NECD-PCC-05 to allow the collection of a co-located surface water/sediment sample

from the saturated soil and standing water present there. Sample location NECD-PCC-05 was eliminated.

- Temporary monitoring wells were surveyed using an automatic level and GPS for determination of AOPI groundwater flow direction. Following collection of coordinates, temporary wells were abandoned as detailed in Section 3.4.7.
- Equipment rinsate blanks were collected at a frequency of 7 percent, which was below the Programmatic UFP-QAPP-specified frequency of 10 percent. All equipment rinsate blank results were non-detect; therefore, they did not have an impact on data quality.
- Toxicity characteristic leaching procedure (TCLP) pesticides and TCLP herbicides were not collected as part of the IDW analytical suite, as detailed in Appendix B of the NECD UFP-QAPP Addendum (Leidos 2022b). This modification was per guidance from the waste hauler that TCLP pesticides and TCLP herbicide analysis were not necessary based on suspected contaminants from site history and previous investigations.

3.5 DECONTAMINATION PROCEDURES

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

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

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

3.6 DISPOSITION OF FIELD INVESTIGATION-DERIVED WASTE

The IDW generated during the SI at NECD included solids (e.g., soil, sediment, well construction materials, acetate liners) and liquids (e.g., development and purge water, decontamination rinse water). These materials were managed in accordance with the IDW Management Plan provided in Appendix B of the NECD UFP-QAPP Addendum (Leidos 2022b).

All IDW generated at NECD was placed in United Nations (UN)-approved, 55-gallon drums for storage, transport, and disposal. Permanent labels for the drums included a unique container number, a description of the contents (i.e., soil or wastewater), the fill date, the source location, the generator's name (i.e., NECD),

and a telephone number for the generator's point of contact (e.g., the Army BRAC Environmental Coordinator [BEC]). Each bucket or carboy used to temporarily store liquid IDW before it was transferred to a 55-gallon drum was marked "Nonpotable Water" or "Decontamination Waste" to comply with requirements of the IDW Management Plan.

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

No IDW from NECD was characterized as hazardous. The signed waste manifests and certificates of disposal are provided in Appendix G. Containerized waste will be disposed of in accordance with applicable state and Federal Resource Conservation and Recovery Act (RCRA) regulations. The licensed and certified waste hauler (US Ecology) removed the drums containing IDW waste from NECD on January 10, 2023, for disposal at the US Ecology Michigan Disposal Waste Treatment Plant located at 49350 N I-94 Service Drive in Belleville, Michigan. Soiled personal protective equipment (PPE) was bagged and disposed of as municipal waste.

4. DATA ANALYSIS AND QUALITY ASSURANCE SUMMARY

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

Pace Analytical Services, LLC, located in West Columbia, South Carolina, was selected as the DoD Environmental Laboratory Accreditation Program (ELAP)-accredited analytical laboratory for the analysis of PFAS during the NECD SI field activities. Sections 4.1 through 4.4 summarize sample handling procedures, laboratory analytical methods, data QA/QC, data reporting and validation, and sample QA/QC. A QA summary of the analytical data is presented in Section 4.5. Appendix H provides the DUA that details the quality and usability of the SI analytical data and the process performed to evaluate the data for compliance with established QC criteria.

4.1 SAMPLE HANDLING PROCEDURES

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

4.1.1 Chain-of-Custody Record

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

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

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

4.1.2 Laboratory Sample Receipt

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

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

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

4.2 LABORATORY ANALYTICAL METHODS

The chemical analysis program for the NECD SI conforms to the analytical requirements presented in the Programmatic UFP-QAPP (Leidos 2022a) and NECD UFP-QAPP Addendum (Leidos 2022b) for the chemical analysis of field investigation samples. All samples were analyzed for PFAS using LC/MS/MS procedures compliant with DoD QSM Version 5.3, Table B-15 (DoD 2019) and the laboratory SOP.

4.3 DATA QUALITY ASSURANCE/QUALITY CONTROL

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

4.3.1 Laboratory Quality Assurance/Quality Control

Samples were analyzed for PFAS using LC/MS/MS in compliance with DoD QSM Version 5.3, Table B-15 (DoD 2019). QC checks included holding times, method blanks, calibration standards, extracted internal standards (EISs), laboratory control samples (LCSs), MS/MSDs, and detection limits. The acceptance criteria and laboratory SOP are provided in the Programmatic UFP-QAPP (Leidos 2022a) and NECD UFP-QAPP Addendum (Leidos 2022b).

Method Blanks—Method blanks were used to monitor the possibility of laboratory-induced contamination by running a volume of approved reagent water through the entire analytical scheme (i.e., extraction, concentration, analysis). Blank requirements are specified in the DoD QSM Version 5.3, Table B-15 (DoD 2019) and the laboratory SOP.

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

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

4.3.2 Field Quality Assurance/Quality Control

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

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

QC Sample	Frequency
Field Blank	1 per DI water source
Source Water Blank	1 per bulk rinse water source
Equipment Rinsate Blank	1 for every 10 or fewer investigative samples
Field Duplicate	1 for every 10 or fewer investigative samples
Reagent Blank	1 per drinking water sampling event; none required for this event

4.4 DATA REPORTING AND VALIDATION

The Leidos QA Manager or designee initiated a validation of the analytical data packages. One hundred percent of the data were validated using objective criteria taken from the requirements of the Programmatic UFP-QAPP (Leidos 2022a) and DoD QSM Version 5.3 (DoD 2019) and qualified in accordance with DoD Data Validation Guidelines Module 3 (DoD 2020a) and the revised table for sample qualification in the presence of blank contamination (DoD 2022b).

Reported laboratory data were reviewed in accordance with DoD QSM Stage 2B validation guidelines to ensure that the QC results fell within appropriate QC limits for holding times, blank contamination, EISs, calibrations, MS/MSDs, LCSs, and ion ratios. Any data validation qualifiers resulting from outlier QC results were applied and a data validation report, as previously described, was prepared. In addition, 10 percent of the data were validated in accordance with DoD QSM Stage 3 guidelines, and analytical results were checked and recalculated from raw data.

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

4.5 QUALITY ASSURANCE SUMMARY

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

4.5.1 Precision

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

4.5.2 Accuracy

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

4.5.3 Sensitivity

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

4.5.4 Representativeness

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

4.5.5 Comparability

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

4.5.6 Completeness

Completeness measures the amount of valid data obtained from the sampling and analysis effort. For analytical data to be usable, each data point must be validated and meet criteria without significant non-conformance.

4.5.7 Data Usability

Data that have been qualified as estimated (i.e., J, J+, J-, UJ) during validation indicate accuracy, precision, or sensitivity QC measurements may have exceeded criteria, but the results are considered valid. Data that were recommended for exclusion during validation (qualified X) and subsequently rejected (qualified R) by the project decision team were not used during the evaluation of project objectives.

5. SI SCREENING LEVELS

Detected concentrations of the Target PFAS in samples collected during this SI are compared to residential scenario SLs calculated using the USEPA regional screening level (RSL) calculator for soil and the tap water criteria for groundwater, as published in the 2022 OSD Memorandum (DoD 2022a). This SI uses the SLs and a target hazard quotient (HQ) of 0.1 to evaluate the Target PFAS concentrations. These SLs (Table 5-1) are used to evaluate the data and determine if future investigation is warranted at each AOPI. SLs for the other PFAS analyzed during this SI currently do not exist.

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

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

Note: The residential tap water SLs are used to evaluate groundwater and surface water data. The residential soil SLs are used to evaluate soil and sediment data. Laboratory results are reported to 2 significant figures.

6. SI RESULTS

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

6.1 CONCEPTUAL SITE MODELS

The preliminary CSMs developed for each AOPI during the PA were further refined for each AOPI where Target PFAS were detected at concentrations greater than the LOD in soil, groundwater, surface water, or sediment. Based on the SI sample results, CSMs presented for each AOPI represent the current understanding of site conditions with respect to known or suspected sources of PFAS-containing materials, potential transport mechanisms and migration pathways, and potentially exposed human receptors.

The CSMs evaluated ingestion, dermal contact, and inhalation exposure routes for human receptors. The exposure pathways are evaluated as complete, potentially complete, or incomplete in the CSMs presented in figures in each AOPI-specific CSM section. In the absence of toxicity information for the inhalation route, the inhalation exposure pathway of PFAS (via dust) is considered potentially complete in soil where Target PFAS are detected. The remaining exposure pathway designations were determined as follows:

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

LUCs are in place at three AOPIs: the Scrap Yard, the Pollution Control Center (PCC) Clarifiers and Pollution Control Center retention Pond (PCCRP), and the Former Locomotive House (Building 718A). These LUCs are discussed in greater detail in the individual AOPI sections below.

6.2 FIRE TRAINING PIT AOPI

6.2.1 AOPI Background

Fire training commenced at the Fire Training Pit AOPI in the late 1960s. Based on personnel interviews, the use of the site continued until the early 1980s. Diesel and gasoline were burned during fire training exercises. The Fire Training Pit was identified during the PA as an AOPI due to the likely use of training activities conducted with aqueous film-forming foam (AFFF) and/or protein foam. Although the types of protein foams potentially used at the Fire Training Pit AOPI are unknown, according to ITRC guidance, protein foams were often fluoroprotein foams and may contain PFAS (ITRC 2020b).

SI sampling (unrelated to PFAS) was conducted in November 2008 and March 2009 to determine whether fuel-related chemical constituents (VOCs, SVOCs, and lead) had been released to the environment due to previous fire training activities. The VOC and polynuclear aromatic hydrocarbon (PAH) concentrations detected during the SI sampling appeared consistent with the area's use as a fire training pit but did not exceed human health SLs (SAIC 2009). The 2009 SI Report recommended no further action (NFA) for the Fire Training Pit, and IDEM concurred with this recommendation. However, since contaminants related to fire training activities were detected in soil at the site, AFFF may have also been released to site media (soil and groundwater).

6.2.2 SI Sampling and Results

Seven soil samples and one QC duplicate were collected from three soil borings (NECD-FTP-02, NECD-FTP-03, and NECD-FTP-04) from within the central portion of the potential release area at the Fire Training Pit AOPI. One surface soil sample and two subsurface soil samples were collected from NECD-FTP-04. At NECD-FTP-02 and NECD-FTP-03, only subsurface soil samples were collected (two samples at each boring), as gravel was observed in the 0- to 1-foot bgs surface soil interval. In addition, two wells were installed: one downgradient (NECD-FTP-01) and one within the central portion of the potential release area (NECD-FTP-02). One grab groundwater sample was collected from each location. In addition, one QC duplicate sample was collected for groundwater at the AOPI. Figure 6-1 depicts sampling locations at the Fire Training Pit AOPI. The Target PFAS analytical results for soil and groundwater samples collected are provided in Table 6-1 and Figure 6-2 and summarized below.

6.2.2.1 Soil

PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in any of the soil samples collected at the Fire Training Pit AOPI.

6.2.2.2 Groundwater

PFOS, PFOA, PFBS, and PFHxS were detected in groundwater samples at the Fire Training Pit AOPI. PFNA or HFPO-DA were not detected at concentrations greater than the LODs in groundwater samples. Two PFAS, PFBS and PFHxS, were detected at location NECD-FTP-02 within the central portion of the potential release area. PFBS and PFHxS also were detected at higher concentrations in the downgradient groundwater sample location (NECD-FTP-01) to the southwest of the Fire Training Pit. In addition to PFBS and PFHxS, PFOS and PFOA were detected in the downgradient groundwater sample location. None of the Target PFAS detected in groundwater exceeded their respective SLs.

6.2.3 CSM

The Fire Training Pit AOPI is approximately 0.11 acres. The area is an uneven grassy field in a geographic depression with no structures. The ground surface elevation of the Fire Training Pit is approximately 650 feet amsl. Stormwater runoff from the area likely drains into the unlined ditch that runs along the dirt road to the west of the AOPI, ultimately reaching the tributary to Little Raccoon Creek approximately 0.2 miles southwest of the AOPI.

Shallow subsurface geology in the east-central portion of NECD is generally composed of glacial till deposits that are approximately 100 feet thick and underlain by Pennsylvanian age sandstones and shales. Stratigraphic units identified during the SI include an upper layer, beginning at 0.5 feet bgs, composed of silty sand with trace amounts of clay overlying a layer of fine- to coarse-grained sand with some silt and clay (5 to 10 feet bgs). Shallow groundwater is approximately between 5 and 7 feet bgs at this AOPI and flows to the southwest toward Little Raccoon Creek (SAIC 2003). Surface water and sediment are not present at the Fire Training Pit AOPI.

NECD has been redeveloped into Vermillion Rise Mega Park, an office and industrial park. Vermillion Rise obtains drinking water via the Ranney well, which is located on the bottomlands of the Wabash River Valley approximately 2 miles from the eastern boundary of NECD. Onsite water wells are not used for drinking water at NECD. LUCs are not in place at the Fire Training Pit AOPI.

The primary release mechanism is the potential release of PFAS-containing materials to surface soils related to historical operations at the Fire Training Pit. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through infiltration, leaching, and percolation.

The soil exposure pathway is incomplete as no Target PFAS were detected in soil samples at the Fire Training Pit and the concentrations detected in groundwater do not exceed the SLs. Although onsite water wells are not used for drinking water at NECD, an onsite potentially complete groundwater exposure pathway exists at the Fire Training Pit AOPI because Target PFAS were detected at concentrations less than the SLs in groundwater and no groundwater use restrictions are in place at the Fire Training Pit AOPI. Furthermore, a potentially complete groundwater exposure pathway exists for offsite residents because drinking water is obtained from private wells in the vicinity of NECD. Figure 6-3 presents the CSM for the Fire Training Pit AOPI.

6.2.4 Recommendation

Detected concentrations of Target PFAS in groundwater at the Fire Training Pit AOPI were less than the SLs. In addition, concentrations of Target PFAS were not detected in soil; therefore, further investigation is not recommended.

Table 6-1. Target PFAS Analytical Results at the Fire Training Pit AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-FTP-02	NEFTP02-SB02	BORE	2.00-4.00	06/26/2022	2.4 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NEFTP02-SB02FD	BORE	2.00-4.00 (D)	06/26/2022	2.5 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NEFTP02-SB03	BORE	5.00-7.00	06/26/2022	2.4 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
NECD-FTP-03	NEFTP03-SB02	BORE	1.50-3.50	06/26/2022	1.9 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
	NEFTP03-SB03	BORE	4.00-6.00	06/26/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NECD-FTP-04	NEFTP04-SS01	BORE	0.00-1.00	06/27/2022	1.8 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
	NEFTP04-SB02	BORE	2.00-4.00	06/27/2022	2.3 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NEFTP04-SB03	BORE	5.00-7.00	06/27/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-FTP-01	NEFTP01-GW01	PNCH	10.00	06/27/2022	<4.1 U	**2.5 J**	**38**	<2.1 U	**4.9**	**1.7 J**
NECD-FTP-02	NEFTP02-GW01	PNCH	10.00	06/26/2022	<4 U	**1.4 J**	**7.7**	<2 U	<2 U	<2 U
	NEFTP02-GW01FD	PNCH	10.00	06/26/2022 (D)	<4 U	**1.3 J**	**7.5**	<2 U	<2 U	<2 U

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
(D) = Field duplicate sample.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.

6.3 SCRAP YARD AOPI

6.3.1 AOPI Background

The NECD Fire Department conducted fire training activities at the Scrap Yard in the 1990s. Railroad ties and RDX were burned at the Scrap Yard (SAIC 2008). The Scrap Yard was previously investigated as part of the Demilitarization Incinerator/Scrap Yard. Since contaminants related to fire training activities (e.g., explosives, VOCs, SVOCs, and metals) were detected in soil at the site (Dames & Moore 1991b) and interviews with former Army personnel confirmed that fire training activities were conducted in the area, AFFF and/or fluoroprotein foams may have been released to site media.

6.3.2 SI Sampling and Results

Nine soil samples were collected from three soil borings (NECD-SYA-01, NECD-SYA-02, and NECD-SYA-03) at the Scrap Yard AOPI. One surface soil sample and two subsurface soil samples were collected from each of the three soil borings. Two grab groundwater samplers were installed at the Scrap Yard AOPI: one at NECD-SYA-01 to the northwest and one at NECD-SYA-02 to the southwest. One grab groundwater sample was collected from each location. In addition, co-located surface water and sediment samples were collected outside the project boundary from Little Raccoon Creek, downgradient from the potential release area. Figure 6-4 depicts sampling locations at the Scrap Yard AOPI. The Target PFAS analytical results for soil, groundwater, surface water, and sediment samples collected are provided in Table 6-2 and Figure 6-5 and summarized below.

6.3.2.1 Soil

PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in the soil samples collected at the Scrap Yard AOPI. PFOS and PFOA were detected at estimated concentrations less than the SLs in the surface soil within the central portion of the potential release area at NECD-SYA-01. PFOS and PFOA were not detected in soils at NECD-SYA-02 or NECD-SYA-03.

6.3.2.2 Groundwater

PFOS, PFOA, PFBS, and PFNA were detected in groundwater samples at the Scrap Yard AOPI. PFHxS or HFPO-DA were not detected at concentrations greater than the LODs in groundwater samples. PFOS, PFOA, PFBS, and PFNA were detected in groundwater at sample location NECD-SYA-01. PFOS and PFOA were detected at NECD-SYA-01 at concentrations exceeding the SLs. PFOS was detected at a concentration of 6.9 ng/L, which exceeds the 4 ng/L SL. PFOA was detected at a concentration of 12 ng/L, which exceeds the 6 ng/L SL. PFBS and PFNA were detected at NECD-SYA-01 at concentrations less than the SLs. At location NECD-SYA-02, PFOA and PFBS were both detected. PFOA was detected at a concentration of 31 ng/L, which exceeds the SL of 6 ng/L. PFBS was detected at concentrations less than the SL.

6.3.2.3 Surface Water

PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in surface water samples. PFOS and PFOA were detected in the surface water sample collected from Little Raccoon Creek (NESYA04-SW01) and its field duplicate at estimated concentrations less than the SLs.

6.3.2.4 Sediment

PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in the sediment sample and its field duplicate collected from Little Raccoon Creek.

6.3.3 CSM

The Scrap Yard AOPI is approximately 7.12 acres. The area is an open, overgrown, grassy field surrounded by trees. An access road extends along the eastern boundary of the AOPI. The ground surface elevation of the Scrap Yard is approximately 610 feet amsl. Topography slopes to the west toward Little Raccoon Creek, which is located approximately 200 feet west of the AOPI.

Previous investigations at the Scrap Yard have described the subsurface geology as being predominantly composed of glacial till deposits overlain by loess. Stratigraphic units identified during the SI include an upper layer, beginning at 0.5 feet bgs, were composed of a clay with trace to little sand, underlain by the uppermost water-bearing unit consisting of a poorly graded sand encountered at approximately 5 feet bgs. Between 7 and 8 feet bgs, a clay confining layer was encountered that extended past boring termination. Historical groundwater flow direction is southwest into Little Raccoon Creek (SAIC 2003).

The primary release mechanism is the potential release of AFFF to surface soils related to historical fire training operations at the Scrap Yard. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through infiltration, leaching, and percolation, and to surface water and sediment via runoff of precipitation.

The surface soil exposure pathway at the Scrap Yard AOPI is potentially complete because Target PFAS were detected at estimated concentrations less than the SLs in surface soil and greater than the SLs in groundwater at the site. Although Target PFAS were detected at concentrations less than the SLs in surface soil at the Scrap Yard AOPI, an LUC restricting intrusive activity, residential use, and agricultural use is in place, as described in the Decision Document reviewed and accepted by IDEM in 2004. The restriction on intrusive activity makes the subsurface soil exposure pathway incomplete for the duration that the LUC remains on the property.

Onsite water wells are not used for drinking water at NECD and LUCs restricting groundwater use and intrusive activity are in place at the Scrap Yard. Although LUCs exist, they are unrelated to Target PFAS; therefore, they should be considered potentially incomplete. However, since Target PFAS were detected at concentrations that exceed the SLs and drinking water is obtained from private wells in the vicinity of NECD, the groundwater exposure pathway for offsite residents is potentially complete. Onsite human receptor exposure to surface water and sediment is unlikely, as NECD is zoned for commercial/industrial use and no surface water or sediment is present at the Scrap Yard AOPI, making the exposure pathway incomplete. Figure 6-6 presents the CSM for the Scrap Yard AOPI.

Little Raccoon Creek is a perennial surface water feature located directly west of the AOPI and may receive stormwater runoff and/or infiltration from shallow groundwater. Target PFAS were detected in surface water collected from Little Raccoon Creek downstream from the Scrap Yard AOPI. Although uncertainty about the detected concentrations exists because all data for surface water are estimated, several other AOPIs with potential PFAS-containing materials (Fire Equipment Storage, Fire Station, and Fire Training Pit) are located upgradient with a potential for drainage to Little Raccoon Creek upstream of the sample point and may warrant future evaluation.

6.3.4 Recommendation

Detected concentrations of Target PFAS in groundwater at the Scrap Yard exceed the SLs; therefore, further investigation is recommended.

Table 6-2. Target PFAS Analytical Results at the Scrap Yard AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-SYA-01	NESYA01-SS01	BORE	0.00-1.00	06/24/2022	2.2 U	0.55 U	0.55 U	0.55 U	**0.4 J**	**0.47 J**
	NESYA01-SB02	BORE	1.00-3.00	06/24/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NESYA01-SB03	BORE	3.00-5.00	06/24/2022	2.4 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
NECD-SYA-02	NESYA02-SS01	BORE	0.00-1.00	06/23/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NESYA02-SB02	BORE	2.00-4.00	06/23/2022	2 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
	NESYA02-SB03	BORE	4.00-6.00	06/23/2022	1.9 U	0.48 U	0.48 U	0.48 U	0.48 U	0.48 U
NECD-SYA-03	NESYA03-SS01	BORE	0.00-1.00	06/24/2022	2.4 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NESYA03-SB02	BORE	1.00-3.00	06/24/2022	2.5 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NESYA03-SB03	BORE	3.00-5.00	06/24/2022	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-SYA-01	NESYA01-GW01	PNCH	10.00	06/25/2022	<3.8 U	**1.2 J**	<1.9 U	**2.7 J**	**12**	**6.9**
NECD-SYA-02	NESYA02-GW01	PNCH	10.00	06/24/2022	<4.1 U	**1.5 J**	<2.1 U	<2.1 U	**31**	<2.1 U
Surface Water				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-SYA-04	NESYA04-SW01	SWTR	0.00	06/30/2022	<4 U	<2 U	<2 U	<2 U	**3.3 J**	**1.1 J**
	NESYA04-SW01FD	SWTR	0.00	06/30/2022 (D)	<3.7 U	<1.8 U	<1.8 U	<1.8 U	**3.2 J**	**1 J**
Sediment				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-SYA-04	NESYA04-SD01	SEDI	0.00-0.50	06/30/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NESYA04-SD01FD	SEDI	0.00-0.50 (D)	06/30/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U

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

6.4 FIRE DEPARTMENT TRAINING (BUILDING 255A) AOPI

6.4.1 AOPI Background

Fire training activities are suspected to have occurred inside the Fire Department Training (Building 255A) based on interviews and the presence of a smoke odor and soot observed inside the building during the PA site visit. Due to the storage and use of AFFF and/or fluoroprotein foams by the NECD Fire Department, these materials may have been used during fire training activities. Therefore, Fire Department Training (Building 255A) was included as an AOPI during the PA. The exact dates and frequency of fire training activities at this AOPI are unknown. In October 2008, the building was being used for storage of fire training and gas mask training equipment (SAIC 2008).

6.4.2 SI Sampling and Results

Seven soil samples and one QC duplicate sample were collected from three soil borings (NECD-FDT-01, NECD-FDT-02, and NECD-FDT-03) outside the building footprint and the potential release area at the Fire Department Training (Building 255A) AOPI. Two subsurface soil samples were collected from each of the three soil borings. One surface soil sample was also collected from the potential release area at sample location NECD-FDT-02. Surface soil was not present at the other two soil boring locations. In addition, three temporary wells were installed at the Fire Department Training (Building 255A) AOPI for the collection of groundwater samples and determination of groundwater flow direction. One groundwater sample was collected at each temporary well. Sediment and surface water do not exist at this AOPI. Figure 6-7 depicts sampling locations at the Fire Department Training (Building 255A) AOPI. The Target PFAS analytical results for soil and groundwater samples collected are provided in Table 6-3 and Figure 6-8 and summarized below.

6.4.2.1 Soil

PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in the soil samples collected at the Fire Department Training (Building 255A) AOPI.

6.4.2.2 Groundwater

PFOS, PFOA, PFBS, PFNA, and PFHxS were detected in groundwater samples collected at the Fire Department Training (Building 255A) AOPI. HFPO-DA was not detected at concentrations greater than the LOD in groundwater samples. PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected outside the suspected release area at sample location NECD-FDT-01. PFOA and PFHxS were detected at sample location NECD-FDT-02 at concentrations less than the SLs. PFOS, PFOA, PFBS, PFNA, and PFHxS were detected at the highest concentrations at the AOPI in groundwater collected from location NECD-FDT-03. Location NECD-FDT-03 was determined to be downgradient from the source area based on groundwater level information. PFOA was detected at 6.9 ng/L in sample NEFDT03-TW01, which exceeds the 6 ng/L SL. PFOS was detected at a concentration of 5.4 ng/L, which exceeds the 4 ng/L SL, and PFNA was detected at concentrations of 7.2 ng/L, which is greater than the 6 ng/L SL .

6.4.3 CSM

Building 255A is approximately 2,032 ft^2 and is constructed on a concrete foundation approximately 3 feet above grade. It is surrounded by gravel driveways and roads. A berm on the backside of the building separates the building from the brushy area to the south. The ground surface elevation of Building 255A is approximately 640 feet amsl.

Surface water and sediment do not exist at the Building 255A AOPI. The closest surface water body to Building 255A is a tributary to Little Raccoon Creek approximately 0.5 miles to the east. Stormwater

drainage likely follows topography and drains as overland flow to the east/northeast, eventually joining Little Raccoon Creek.

Similar to other AOPIs in the southeastern portion of NECD, the subsurface geology at Building 255A is likely composed of glacial till deposits overlain by loess. Stratigraphic units identified during the SI include an upper layer, composed of clay and silt that graded to sand, underlain by the uppermost water-bearing unit consisting of well-graded sand with some gravel encountered from 7.5 to 12 feet bgs. A confining silt/clay layer was encountered below the groundwater-bearing zone that extended past boring termination. Based on groundwater level data collected from temporary wells installed as part of field investigation activities, groundwater flow at the Fire Department Training (Building 255A) AOPI is to the northeast, which also correlates to the highest concentrations of Target PFAS detected immediately downgradient from the AOPI.

Due to the fire training activities that were conducted, the surface soil surrounding Building 255A is the source medium for potential PFAS-containing material contamination. Details regarding specific AFFF releases were not discovered through research and personnel interviews. The primary release mechanism is the potential release of AFFF to surface soils related to historical operations at Building 255A. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through infiltration, leaching, and percolation. Surface water and sediment are not present at the Fire Department Training (Building 255A) AOPI.

Although onsite water wells are not used for drinking water at NECD, a complete groundwater exposure pathway exists for onsite workers because Target PFAS were detected at concentrations that exceed the SLs and no groundwater use restrictions are in place at the Fire Equipment Storage (Building 733K) AOPI. In addition, a potentially complete exposure pathway exists for offsite residents because drinking water is obtained from private wells in the vicinity of NECD. Although Target PFAS were not detected in soil at concentrations greater than the LODs, the onsite soil exposure pathways are potentially complete due to SLs being exceeded in the groundwater. Figure 6-9 presents the CSM for the Fire Department Training (Building 255A) AOPI.

6.4.4 Recommendation

Detected concentrations of Target PFAS in groundwater at the Fire Department Training (Building 255A) AOPI exceed the SLs; therefore, further investigation is recommended.

Table 6-3. Target PFAS Analytical Results at the Fire Department Training (Building 255A) AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-FDT-01	NEFDT01-SB02	BORE	5.00-7.00	06/23/2022	1.9 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
	NEFDT01-SB03	BORE	10.00-12.00	06/23/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NECD-FDT-02	NEFDT02-SS01	BORE	0.00-1.00	06/23/2022	2 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
	NEFDT02-SB02	BORE	3.00-5.00	06/23/2022	2.4 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NEFDT02-SB03	BORE	7.00-9.00	06/23/2022	2 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
	NEFDT02-SB03FD	BORE	7.00-9.00 (D)	06/23/2022	2 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
NECD-FDT-03	NEFDT03-SB02	BORE	2.50-4.50	06/23/2022	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NEFDT03-SB03	BORE	5.50-7.50	06/23/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-FDT-01	NEFDT01-TW01	WELL	15.00	06/29/2022	<4.1 U	<2 U	<2 U	<2 U	<2 U	<2 U
	NEFDT01-TW01FD	WELL	15.00	06/29/2022 (D)	<3.8 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U
NECD-FDT-02	NEFDT02-TW01	WELL	14.00	06/29/2022	<3.9 U	<2 U	**2.1 J**	<2 U	**1.6 J**	<2 U
NECD-FDT-03	NEFDT03-TW01	WELL	15.00	06/29/2022	<4.1 U	**4.5**	**2.8 J**	**7.2**	**6.9**	**5.4**

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

6.5 FACILITY 262D LOADING DOCK AOPI

6.5.1 AOPI Background

According to personnel interviews, firefighting foam was used in the 1980s during fire training activities at the Facility 262D Loading Dock on Loading Dock Road and inside the fenced-in area immediately south of the Facility 262D Loading Dock. The foam that was used at this site came from the 55-gallon drums that were filled at the TNT Acid Area Tank Farm. The exact dates and frequency of AFFF or protein foam use is unknown.

6.5.2 SI Sampling and Results

Eight soil samples were collected within the central portion of the potential release area from three soil borings at the Facility 262D Loading Dock AOPI. Two subsurface soil samples were collected from each of the three soil borings (NECD-262-01, NECD-262-02, and NECD-262-03). Two surface soil samples (NE26201-SS01 and NE26203-SS01) were also collected from NECD-262-01 and NECD-262-03. Surface soil was not present at NECD-262-02 due to concrete at the surface. In addition, three temporary wells (NECD-262-01, NECD-262-02, and NECD-262-03) were installed within the central portion of the potential release area at the Facility 262D Loading Dock AOPI for the collection of groundwater samples and determination of groundwater flow direction. One groundwater sample was collected from each temporary well (NE26201-TW01, NE26202-TW01, and NE26203-TW01). Figure 6-10 depicts soil and groundwater sampling locations at the Facility 262D Loading Dock AOPI. Sediment and surface water do not exist at this AOPI. The Target PFAS analytical results for soil and groundwater samples collected are provided in Table 6-4 and Figure 6-11 and summarized below.

6.5.2.1 Soil

PFOS was detected within the central portion of the potential release area at the Facility 262D Loading Dock AOPI. PFOA, PFNA, PFHxS, PFBS, or HFPO-DA were not detected in soil samples. PFOS was detected at sample location NECD-262-02 at an estimated concentration of 0.32 µg/kg, less than the SL of 4 µg/kg.

6.5.2.2 Groundwater

PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA/GenX were not detected at concentrations greater than the LOD in groundwater samples collected at location NECD-262-01 or NECD-262-03. PFOS and PFHxS were detected in groundwater at NECD-262-02 within the central portion of the potential release area at the Facility 262D Loading Dock AOPI. PFOS was detected at a concentration of 7.4 ng/L, which exceeds the 4 ng/L SL. PFHxS was detected at 2.6 J ng/L, less than the SL of 39 ng/L.

6.5.3 CSM

The Facility 262D Loading Dock is an approximately 0.39-acre grassy area within the former fence line of the former wooden loading dock. The ground surface elevation of the Facility 262D Loading Dock is approximately 630 feet amsl. Since no surface water bodies are at the site and the surrounding area is at a relatively constant elevation, drainage of any stormwater is likely poor for the general region. The closest surface water body is a stream approximately 0.7 miles east of Facility 262D Loading Dock and flows in a northeasterly direction.

The geology of the western portion of NECD is characterized by glacial till, consistent with the other regions of NECD. Stratigraphic units identified during the SI include an upper layer, composed of clay, underlain by the uppermost water-bearing unit consisting of poorly graded sand with trace gravel encountered from 7 to

12 feet bgs. Based on groundwater level data collected from temporary wells installed as part of field investigation activities, groundwater flow at the AOPI is to the northwest, with NECD-262-03 representing the upgradient groundwater and NECD-262-01 and NECD-262-02 being cross-gradient from each other.

Due to the potential release of AFFF or fluoroprotein foam from fire training activities, the surface soil at the Facility 262D Loading Dock is the source medium for potential PFAS-containing material contamination. Details regarding specific AFFF releases were not discovered through research and personnel interviews. The primary release mechanism is the potential release of AFFF to surface soils related to historical operations at the Facility 262D Loading Dock. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through infiltration, leaching, and percolation. Surface water and sediment are not present at the Facility 262D Loading Dock AOPI.

The exposure pathway for soil at the Facility 262D Loading Dock AOPI is potentially complete due to Target PFAS concentrations detected at concentrations less than the SLs in soil as well as Target PFAS concentrations that exceed the SLs in groundwater. Although onsite water wells are not used for drinking water at NECD, a complete exposure pathway exists for onsite workers because Target PFAS concentrations detected in groundwater exceed the SLs and no groundwater use restrictions are in place at the Facility 262D Loading Dock AOPI. In addition, a potentially complete pathway exists for offsite residents because drinking water is obtained from private wells in the vicinity of NECD. Surface water and sediment are not present at the Facility 262D Loading Dock; therefore, the exposure pathway is incomplete. Figure 6-12 presents the CSM for the Facility 262D Loading Dock AOPI.

6.5.4 Recommendation

Detected concentrations of Target PFAS in groundwater at the Facility 262D Loading Dock AOPI exceed the SLs; therefore, further investigation is recommended.

Table 6-4. Target PFAS Analytical Results at the Facility 262D Loading Dock AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-262-01	NE26201-SS01	BORE	0.00-1.00	06/21/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NE26201-SB02	BORE	4.00-6.00	06/21/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NE26201-SB03	BORE	9.00-11.00	06/21/2022	1.9 U	0.48 U	0.48 U	0.48 U	0.48 U	0.48 U
NECD-262-02	NE26202-SB02	BORE	3.00-5.00	06/21/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NE26202-SB03	BORE	5.00-7.00	06/21/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	**0.32 J**
NECD-262-03	NE26203-SS01	BORE	0.00-1.00	06/21/2022	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NE26203-SB02	BORE	5.00-7.00	06/21/2022	2.1 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NE26203-SB03	BORE	8.00-10.00	06/21/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-262-01	NE26201-TW01	WELL	15.00	06/29/2022	<4 U	<2 U	<2 U	<2 U	<2 U	<2 U
NECD-262-02	NE26202-TW01	WELL	15.00	06/29/2022	<4.2 U	<2.1 U	**2.6 J**	<2.1 U	<2.1 U	**7.4**
NECD-262-03	NE26203-TW01	WELL	15.00	06/29/2022	<3.6 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U	<1.8 U

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
Highlighted values indicate an exceedance of the SL.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.

6.6 FOAM HOUSE AT TNT ACID AREA AOPI

6.6.1 AOPI Background

The TNT manufacturing plant was established in the early 1970s. AFFF or fluoroprotein foam was stored in a foam-generating fire suppression system housed in Building 3063 at the TNT Acid Area. The plant only produced TNT between April 1973 and April 1974 (TLI 2007). According to personnel interviews, testing of the foam system may have been conducted by an outside contractor. The volume of the foam storage tank is unknown, and the foam system has since been removed. The foam was transferred from the tank into an unknown number of 55-gallon drums; according to personnel interviews, this occurred prior to 1980. The foam may have been released from the fire suppression system or during transfer between containers and was included as an AOPI during the PA.

6.6.2 SI Sampling and Results

Six soil samples and one QC duplicate sample were collected within the central portion of the potential release area from two soil borings at the Foam House at TNT Acid Area AOPI. One surface soil sample and two subsurface soil samples were collected from each of the soil borings (NECD-FHA-01 and NECD-FHA-02). In addition, one grab groundwater sample was collected within the central portion of the potential release area at the Foam House at TNT Acid Area AOPI at location NECD-FHA-01. Sample locations are shown in Figure 6-13, in conjunction with the PCC Clarifiers and PCCRP AOPI. Sediment and surface water do not exist at this AOPI. The Target PFAS analytical results for soil and groundwater samples collected at the Foam House at TNT Acid Area AOPI are provided in Table 6-5 and Figure 6-14 and summarized below.

6.6.2.1 Soil

PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in soil at the Foam House at TNT Acid Area AOPI.

6.6.2.2 Groundwater

PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in groundwater at the Foam House at TNT Acid Area AOPI.

6.6.3 Recommendation

Target PFAS were not detected at the Foam House at TNT Acid Area AOPI in soil or groundwater; therefore, further investigation is not recommended.

Table 6-5. Target PFAS Analytical Results at the Foam House at TNT Acid Area AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-FHA-01	NEFHA01-SS01	BORE	0.00-1.00	06/22/2022	2.4 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NEFHA01-SB02	BORE	5.00-7.00	06/22/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NEFHA01-SB02FD	BORE	5.00-7.00 (D)	06/22/2022	2.4 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NEFHA01-SB03	BORE	10.00-12.00	06/22/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
NECD-FHA-02	NEFHA02-SS01	BORE	0.00-1.00	06/22/2022	1.8 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
	NEFHA02-SB02	BORE	4.00-5.00	06/22/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NEFHA02-SB03	BORE	10.00-12.00	06/22/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-FHA-01	NEFHA01-GW01	PNCH	15.00	06/23/2022	<4.1 U	<2 U	<2 U	<2 U	<2 U	<2 U

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
(D) = Field duplicate sample.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.

6.7 PCC CLARIFIERS AND PCCRP AOPI

6.7.1 AOPI Background

The PCC Clarifiers and PCCRP AOPI consists of the concrete clarifiers and PCCRP in the northern portion of the AOPI and the GSBs in the southern portion of the AOPI. The PCC consisted of a lime mix house, an equalizing basin, three neutralizing tanks, and two concrete clarifiers that were used for the neutralization of acidic wastewaters associated with TNT production in 1973 and 1974. During operation, water from the concrete clarifiers was discharged to the PCCRP via underground pipes and sludge from the clarifiers was pumped through underground pipes into the GSBs. The AFFF or fluoroprotein foam from the TNT Acid Area Tank Farm Fire Suppression System was reportedly disposed of at the PCC Clarifiers, which potentially discharged to the PCCRP and/or the GSBs.

Soil, surface water, sediment, and groundwater sampling activities were conducted at the PCCRP and GSBs during multiple investigations at NECD. Samples were analyzed for VOCs, SVOCs, metals, and explosives. Based on the findings of the 2003 RCRA Facility Investigation (SAIC 2003), the Army recommended NFA with the implementation of LUCs for the GSBs and PCCRP due to metals in the groundwater. The Army's recommendation was reviewed and approved by IDEM (IDEM 2004). LUCs in place at the PCC Clarifiers and PCCRP AOPI include restrictions on groundwater use, residential use, and agricultural use in the northernmost GSB.

6.7.2 SI Sampling and Results

Eleven soil samples were collected from four soil borings distributed downgradient from the PCC Clarifiers potential release area, within the northern and southern GSBs, and downgradient from the PCCRP. Surface soil samples were collected from each of the four soil borings (NECD-PCC-02, NECD-PCC-03, NECD-PCC-04, and NECD-PCC-06).

Two subsurface soil samples were collected downgradient from the PCCRP at sample location NECD-PCC-02 and two were collected downgradient from the PCC Clarifiers at sample location NECD-PCC-03. Only one subsurface soil sample was able to be collected within GSB sample location NECD-PCC-04 due to shallow refusal and GSB sample location NECD-PCC-06 due to the presence of shallow groundwater.

In addition, three grab groundwater samples were collected downgradient from the PCC Clarifiers potential release area (NECD-PCC-03), downgradient from the PCCRP (NECD-PCC-2), and downgradient from the GSBs (NECD-PCC-01). Co-located surface water and sediment samples were collected within the northern GSB from sample location NECD-PCC-07 and within the PCCRP in the vicinity of the pump station at sample location NECD-PCC-08. Figure 6-13 depicts sampling locations at the PCC Clarifiers and PCCRP AOPI. The Target PFAS analytical results for soil, groundwater, surface water, and sediment samples collected are provided in Table 6-6 and Figure 6-14 and summarized below.

6.7.2.1 Soil

PFOS was detected in soil at the PCC Clarifiers and PCCRP AOPI. PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in the soil at the PCC Clarifiers and PCCRP AOPI. PFOS was detected in one soil sample at an estimated concentration less than the SL downgradient from the PCCRP in sample NEPCC-02-SB03.

6.7.2.2 Groundwater

PFOS, PFOA, PFBS, PFNA, and PFHxS were detected in groundwater at the PCC Clarifiers and PCCRP AOPI. HFPO-DA was not detected at concentrations greater than the LOD. At location NECD-PCC-01, PFOA and PFNA were detected at estimated concentrations less than the SLs. PFOS, PFOA, PFNA, and

PFHxS were detected at location NECD-PCC-02 at estimated concentrations less than the SLs. At location NECD-PCC-03, within the PCC Clarifiers potential release area, PFOS, PFOA, PFBS, PFNA, and PFHxS were all detected below the SLs.

6.7.2.3 Surface Water

PFOS and PFOA were detected in surface water at the PCC Clarifiers and PCCRP AOPI. PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in surface water samples collected at the PCC Clarifiers and PCCRP AOPI. PFOS and PFOA were detected at estimated concentrations less than the SLs within the PCCRP in the vicinity of the pump station at sample location NECD-PCC-08.

6.7.2.4 Sediment

PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in sediment at the PCC Clarifiers and PCCRP AOPI.

6.7.3 CSM

The PCC Clarifiers and PCCRP AOPI is approximately 59 acres located adjacent to the south-central boundary of NECD. The ground surface elevation ranges from approximately 630 to 640 feet amsl across the AOPI. The PCCRP currently holds surface water and the northern GSB is swampy and contained surface water during the SI field activities. No other perennial surface water features exist at the AOPI.

The subsurface geology at the PCC Clarifiers and PCCRP was characterized during the SI to be fill material consisting of a mixture of sand, gravel, and clay within the upper 5 feet, followed by inorganic silty clays. Saturated sands were encountered from 7. 5 to 12 feet bgs at the AOPI and was 2 to 3 feet thick underlain by clay till. Shallow groundwater at the PCC Clarifiers and PCCRP during the SI was encountered from 7 to 12 feet bgs. Groundwater flow is influenced by the eastern side of a divide that separates the PCCRP and the GSBs. On the eastern side of this divide, where the clarifiers and PCCRP are located, groundwater flows to the northeast (Dames & Moore 1991a). South of this divide, groundwater flows to the southwest in the vicinity of the GSBs.

Due to the potential disposal of AFFF or fluoroprotein foam into the PCC Clarifiers, the source media for potential PFAS-containing material contamination includes surface soil at the PCC Clarifiers, surface water at the PCCRP, and sludge at the GSBs. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil, surface water, and sediment to deeper subsurface soil and groundwater through infiltration, leaching, and percolation.

Although the PCCRP is lined and the PCC Clarifiers are constructed of concrete, the integrity of these structures is unknown and migration to subsurface soil and/or groundwater may have occurred. During operation, water was pumped from the PCCRP via underground piping to the Wabash River. Therefore, the possibility exists that a release to the Wabash River may have occurred. Perennial surface water drainage features are not present at the PCC Clarifiers and PCCRP AOPI. Target PFAS detected at concentrations less than the SLs in both subsurface soil and groundwater result in potentially complete exposure pathways for soil. The only Target PFAS detected in soil is an estimated concentration less than the SLs; however, in the absence of restrictions for intrusive activity at the PCC Clarifiers and PCCRP AOPI, groundwater detections result in a potentially complete soil exposure pathway. An LUC is in place restricting groundwater use at the PCC Clarifiers and PCCRP AOPI, making the groundwater exposure pathway for ingestion incomplete for the duration that the LUC remains on the property for the specific constituents of interest identified in the original Record of Decision, but because PFAS are not part of the original restriction, the pathway must be considered potentially complete. No restriction is in place on intrusive activity to eliminate the possibility of dermal contact with groundwater onsite, making the exposure

pathway for dermal contact with groundwater potentially complete. The groundwater exposure pathway for offsite residents is also potentially complete because drinking water is obtained from private wells in the vicinity of NECD.

Detected concentrations less than the SLs in surface water result in a potentially complete exposure pathway onsite; however, all data for surface water at the PCC Clarifiers and PCCRP AOPI are estimated concentrations less than the limit of quantitation. Figure 6-15 presents the CSM for the PCC Clarifiers and PCCRP AOPI.

6.7.4 Recommendation

Detected concentrations of Target PFAS were less than the SLs in all media; therefore, further investigation is not recommended at the PCC Clarifiers and PCCRP AOPI.

Table 6-6. Target PFAS Analytical Results at the PCC Clarifiers and PCCRP AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-PCC-02	NEPCC02-SS01	BORE	0.00-1.00	06/22/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NEPCC02-SB02	BORE	2.00-4.00	06/22/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NEPCC02-SB03	BORE	5.50-7.50	06/22/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	**0.26 J**
NECD-PCC-03	NEPCC03-SS01	BORE	0.00-1.00	06/22/2022	1.9 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
	NEPCC03-SB02	BORE	4.50-6.50	06/22/2022	2.6 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
	NEPCC03-SB03	BORE	10.00-12.00	06/22/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NECD-PCC-04	NEPCC04-SS01	BORE	0.00-1.00	06/25/2022	2.3 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NEPCC04-SS01FD	BORE	0.00-1.00 (D)	06/25/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NEPCC04-SB02	BORE	2.50-4.50	06/25/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
NECD-PCC-06	NEPCC06-SS01	BORE	0.00-1.00	06/25/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NEPCC06-SB02	BORE	2.00-4.00	06/25/2022	2.6 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-PCC-01	NEPCC01-GW01	PNCH	15.00	06/23/2022	<4.1 U	<2.1 U	<2.1 U	**1.1 J**	**1.2 J**	<2.1 U
NECD-PCC-02	NEPCC02-GW01	PNCH	10.00	06/22/2022	<4.1 U	<2.1 U	**1.5 J**	**1.4 J**	**2 J**	**3.2 J**
NECD-PCC-03	NEPCC03-GW01	PNCH	15.00	06/22/2022	<4 U	**16**	**32**	**1.7 J**	**3 J**	**2 J**
Surface Water				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-PCC-07	NEPCC07-SW01	SWTR	0.00	06/30/2022	<5.5 U	<2.9 U	<2.9 U	<1.5 U	<1.8 U	<3 U
NECD-PCC-08	NEPCC08-SW01	SWTR	0.00	06/24/2022	<4 U	<2 U	<2 U	<2 U	**0.99 J**	**1.5 J**
Sediment				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-PCC-07	NEPCC07-SD01	SEDI	0.00-0.50	06/30/2022	2.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
NECD-PCC-08	NEPCC08-SD01	SEDI	0.00-0.50	06/24/2022	2.8 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
(D) = Field duplicate sample.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.

6.8 FORMER LOCOMOTIVE HOUSE (BUILDING 718A) AOPI

6.8.1 AOPI Background

The Former Locomotive House is located in the eastern portion of NECD approximately 0.4 miles west of the Fire Training Pit. The building has been demolished and is currently a gravel-covered lot. According to personnel interviews, 55-gallon drums of AFFF or protein foam from the TNT Acid Area Tank Farm Fire Suppression System were temporarily stored at the building prior to offsite disposal.

According to the Environmental Condition of Property, contaminated soil and surface water were discovered near the Former Locomotive House in July 2000 during construction of the NECDF (U.S. Army BRAC 2008). The Former Locomotive House was investigated because of a potential release of solvents and petroleum products. Petroleum-contaminated soil was removed in 2003 (SAIC 2008). Surface water was associated with unlined basins in the VX area south of the Former Locomotive House, which has been removed. Since chemicals were released to soil at the site, PFAS may have also been released to site media if a release occurred.

6.8.2 SI Sampling and Results

Five subsurface soil samples were collected from three soil borings from the Former Locomotive House (Building 718A) AOPI, including outside the former bay doors in the central portion of the potential release area, in the downgradient area (west) near the Former Locomotive House bay doors, and within the central portion of the potential release area beneath the building pad. Two subsurface soil samples were collected from NECD-FLH-02 and NECD-FLH-04; however, only one subsurface soil sample was collected at NECD-FLH-03, as refusal was encountered multiple times at approximately 4 feet bgs at this location. In addition, two grab groundwater samplers were installed and collected downgradient from the potential release area (NECD-FLH-01) and in the central portion of the potential release area downgradient from the Former Locomotive House bay doors (NECD-FLH-02). Figure 6-16 depicts sampling locations at the Former Locomotive House (Building 718A) AOPI. Surface soil, sediment, and surface water were not present at this AOPI. The Target PFAS analytical results for soil and groundwater samples collected are provided in Table 6-7 and Figure 6-17 and summarized below.

6.8.2.1 Soil

PFOS, PFOA, PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in soil at the Former Locomotive House (Building 718A) AOPI.

6.8.2.2 Groundwater

PFOS and PFOA were detected at estimated concentrations in groundwater at the Former Locomotive House (Building 718A) AOPI. PFBS, PFNA, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in groundwater. PFOS and PFOA were detected at concentrations less than the SLs in both the central portion of the potential release area and downgradient from the Former Locomotive House bay doors where potential release was most likely.

6.8.3 CSM

The Former Locomotive House was situated on 0.12 acres and is now a vacant gravel-covered lot with well-maintained grass to the north and west. The ground surface elevation of the Former Locomotive House is approximately between 620 and 630 feet amsl. Stormwater at the AOPI likely follows topography and drains to the southwest. The closest perennial surface water body is a tributary to Little Raccoon Creek located 0.4 miles to the southwest.

Similar to other AOPIs in the eastern portion of NECD, subsurface geology at the Former Locomotive House is generally composed of glacial till deposits, up to 100 feet thick in some areas, overlain by a thin layer of loess, both of which are underlain by Pennsylvanian age sandstone and shales. Shallow groundwater at the Former Locomotive House is approximately 8 to 10 feet bgs and flows south/southwest toward Little Raccoon Creek. Surface water and sediment are not present at the Former Locomotive House (Building 718A) AOPI.

Due to the potential release of AFFF or protein foam from the fire suppression system, the surface soil surrounding the footprint of the Former Locomotive House is the source medium for potential PFAS-containing material contamination. Details regarding any specific AFFF releases were not discovered through research and personnel interviews. The primary release mechanism is the potential release of AFFF to surface soils related to historical operations at the Former Locomotive House. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through infiltration, leaching, and percolation. Surface water and sediment are not present at the Former Locomotive house (Building 718A) AOPI.

The soil exposure pathway is incomplete as no Target PFAS were detected in soil samples at the Former Locomotive House and Target PFAS were detected in groundwater at estimated concentrations and do not exceed the SLs. Although onsite water wells are not used for drinking water at NECD, an onsite potentially complete groundwater exposure pathway exists at the Former Locomotive House (Building 718A) AOPI because Target PFAS were detected at estimated concentrations less than the SLs in groundwater and groundwater use restrictions are not in place at the Former Locomotive House (Building 718A) AOPI. Furthermore, a potentially complete groundwater exposure pathway exists for offsite residents because drinking water is obtained from private wells in the vicinity of NECD. Figure 6-18 presents the CSM for the Former Locomotive House (Building 718A) AOPI.

6.8.4 Recommendation

Target PFAS were not detected in either groundwater or soil at concentrations greater than the SLs; therefore, further investigation is not recommended at the Former Locomotive House (Building 718A) AOPI.

Table 6-7. Target PFAS Analytical Results at the Former Locomotive House (Building 718A) AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-FLH-02	NEFLH02-SB01	BORE	3.00-5.00	06/27/2022	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NEFLH02-SB02	BORE	6.00-8.00	06/27/2022	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NEFLH02-SB02FD	BORE	6.00-8.00 (D)	06/27/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NECD-FLH-03	NEFLH03-SB02	BORE	2.00-4.00	06/27/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
NECD-FLH-04	NEFLH04-SB01	BORE	5.00-7.00	06/27/2022	2.1 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NEFLH04-SB02	BORE	8.00-10.00	06/27/2022	2 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-FLH-01	NEFLH01-GW01	PNCH	10.00	06/30/2022	<3.4 U	<1.7 U	<1.7 U	<1.7 U	<1.7 U	<1.7 U
NECD-FLH-02	NEFLH02-GW01	PNCH	10.00	06/28/2022	<4.1 U	<2.1 U	<2.1 U	<2.1 U	**1.4 J**	**1.1 J**

The SLs are the Residential Scenario SLs calculated using the USEPA RSL Calculator provided in the July 2022 OSD Memorandum for Tap Water using an HQ = 0.1.
Bolded values denote detected concentrations.
(D) = Field duplicate sample.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but not detected above the reported sample quantitation limit.

6.9 FIRE STATION (BUILDING 709A) AOPI

6.9.1 AOPI Background

The Fire Station, constructed in 1942, is a shingled siding building on a slab concrete foundation located in the eastern portion of NECD. Prior to the 2010 facility closure, no other uses for the building were identified other than as the Fire Station. According to personnel interviews, AFFF was stored on the fire truck, which was parked and washed at the Fire Station. The fire truck had five 5-gallon cans of AFFF, designed with a venturi system to mix AFFF with water. The exact dates of AFFF storage at the Fire Station are unknown.

6.9.2 SI Sampling and Results

Soil borings were installed and sampled at the AOPI within the central portion of the potential release area northwest of the bay doors within the pavement, located east of the bay doors in the grass, and downgradient from the fire station where stormwater drainage from the pavement may flow to the grass south of the building. Two surface soil samples were collected in the location of potential stormwater drainage from the pavement into the grass at sample locations NECD-FSA-03 and NECD-FSA-04. Surface soil was not present at NECD-FSA-02. Two subsurface soil samples were also collected from each of the three soil borings. In addition, two grab groundwater samplers were installed and collected downgradient from the potential release area. Location NECD-FSA-02 was installed closest to the central portion of the potential release area within the pavement area near the bay doors and NECD-FSA-01 was installed downgradient from the historical groundwater flow direction to the southwest at the Fire Station (Building 709A) AOPI. Figure 6-20 depicts sampling locations at the Fire Station (Building 709A) AOPI. Sediment and surface water were not present at this AOPI. The Target PFAS analytical results for soil and groundwater samples collected are provided in Table 6-8 and Figure 6-20 and summarized below.

6.9.2.1 Soil

PFOS, PFOA, and PFNA were detected in soil at the Fire Station (Building 709A) AOPI. PFBS, PFHxS, or HFPO-DA were not detected at concentrations greater than the LODs in soil. Target PFAS were not detected in subsurface soil beneath the pavement at location NECD-FSA-02. PFOS, PFOA, and PFNA were detected at concentrations less than the SLs in surface and subsurface soil at the AOPI. The highest concentrations of Target PFAS detected at the Fire Station (Building 709A) AOPI in soil were present in the grass immediately outside the bay doors at NECD-FSA-03.

6.9.2.2 Groundwater

PFOS, PFOA, PFBS, PFNA, and PFHxS were detected in groundwater at the Fire Station (Building 709A) AOPI. HFPA-DA was not detected at concentrations greater than the LOD in groundwater. PFBS and PFHxS did not exceed SLs at the Fire Station (Building 709A) AOPI. PFOS and PFOA were detected at concentrations greater than the SLs in both groundwater samples (NECD-FSA-01and NECD-FSA-02). In addition, PFNA was detected at concentrations greater than the SL at the farthest downgradient location (NECD-FSA-01). The maximum concentrations of PFOA and PFNA observed at the Fire Station (Building 709A) AOPI were at NECD-FSA-01. At location NECD-FSA-01, downgradient from the potential release area, PFOS was detected at a concentration of 7.5 ng/L, PFOA was detected at a concentration of 56 ng/L, and PFNA was detected at a concentration of 11 ng/L, all of which exceed the SLs. At location NECD-FSA-02, within the central portion of the potential release area near the bay doors within the parking lot, PFOS was detected at a concentration of 40 ng/L, the maximum concentration detected at the Fire Station (Building 709A) AOPI, and PFOA was detected at a concentration of 39 ng/L.

6.9.3 CSM

The Fire Station building is approximately 2,580 ft^2 and is still present. It has not been used as a Fire Station since facility closure. The building is surrounded largely by asphalt and a level grassy area that is well maintained. The ground surface elevation of the Fire Station is approximately between 630 and 640 feet amsl. Stormwater primarily drains south across the asphalt parking lot; however, a drainage swale exists immediately east of the Fire Station building that parallels the pavement.

Similar to other AOPIs in the eastern portion of NECD, subsurface geology at the Fire Station is generally composed of glacial till deposits, up to 100 feet thick in some areas, overlain by a thin layer or loess, both of which are underlain by Pennsylvanian age sandstone and shales. Shallow groundwater at the Fire Station is approximately 6 to 8 feet bgs and flows southwest toward Little Raccoon Creek. Surface water and sediment are not present at the Fire Station (Building 709A) AOPI.

Due to the potential release of AFFF or fluoroprotein foam from storage and/or use of these materials and activities such as washing fire trucks and transporting containers, the surface soil surrounding the building of the Fire Station is the source medium for potential PFAS contamination. Details regarding known AFFF releases were not discovered through research and personnel interviews. The primary release mechanism is the potential release of AFFF to surface soils related to historical operations at the Fire Station, specifically, the storage of AFFF on fire trucks. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through infiltration, leaching, and percolation.

The surface soil and subsurface soil exposure pathways for onsite workers are both potentially complete due to Target PFAS detected at concentrations less than the SLs in soil, and concentrations of Target PFAS in groundwater that exceed the SLs. Although onsite water wells are not used for drinking water at NECD, the groundwater exposure pathway for onsite workers is complete because detected concentrations of Target PFAS exceed the SLs and no groundwater use restrictions are in place at the Fire Station (Building 709A) AOPI. In addition, the groundwater exposure pathway for offsite residents is potentially complete because drinking water is obtained from private wells in the vicinity of NECD. Figure 6-21 presents the CSM for the Fire Station (Building 709A) AOPI.

6.9.4 Recommendation

SLs Detected concentrations of Target PFAS in groundwater exceed the SLs; therefore, further investigation is recommended at the Fire Station (Building 709A) AOPI.

Table 6-8. Target PFAS Analytical Results at the Fire Station (Building 709A) AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-FSA-02	NEFSA02-SB01	BORE	3.00-5.00	06/28/2022	2.1 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NEFSA02-SB02	BORE	5.50-7.50	06/28/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NECD-FSA-03	NEFSA03-SS01	BORE	0.00-1.00	06/29/2022	1.8 U	0.44 U	0.44 U	**0.58 J**	**0.77 J**	**3.3**
	NEFSA03-SB02	BORE	3.00-5.00	06/29/2022	2.3 U	0.55 U	0.55 U	**0.4 J**	0.55 U	**5.6**
	NEFSA03-SB03	BORE	6.00-8.00	06/29/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.86 J**
	NEFSA03-SB03FD	BORE	6.00-8.00 (D)	06/29/2022	2.2 U	0.55 U	0.55 U	0.55 U	0.55 U	**0.28 J**
NECD-FSA-04	NEFSA04-SS01	BORE	0.00-1.00	06/29/2022	2.1 U	0.5 U	0.5 U	**2**	**1.7**	**0.51 J**
	NEFSA04-SB02	BORE	1.00-3.00	06/29/2022	2.2 U	0.55 U	0.55 U	0.55 U	**0.43 J**	0.55 U
	NEFSA04-SB03	BORE	3.00-5.00	06/29/2022	1.9 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-FSA-01	NEFSA01-GW01	PNCH	10.00	06/28/2022	<3.8 U	**1.3 J**	**1.4 J**	**11**	**56**	**7.5**
NECD-FSA-02	NEFSA02-GW01	PNCH	10.00	06/28/2022	<4 U	**1 J**	**4.2**	**4.7**	**39**	**40**

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

6.10 FIRE EQUIPMENT STORAGE (BUILDING 733K) AOPI

6.10.1 AOPI Background

Building 733K, built in 1942, is a corrugated steel building on a slab concrete foundation located in the eastern portion of NECD. According to personnel interviews, 1,000 gallons of AFFF were stored in 5-gallon cans at Building 733K. In October 2008, the building was being used for emergency vehicle storage and emergency responder training. The building had been used for storage of firefighting equipment, masks, and air cylinders, and was historically used to store unfilled reject land mine components (SAIC 2008). Although the exact dates of AFFF storage at Building 733K are unknown, releases or leaks of AFFF may have occurred at the site.

6.10.2 SI Sampling and Results

Nine soil samples and one QC duplicate were collected from three soil borings at the Fire Equipment Storage (Building 733K) AOPI. One surface soil sample and two subsurface soil samples were collected from each soil boring (NECD-FES-02, NECD-FES-03, and NECD-FES-04). In addition, two grab groundwater samplers were installed and sampled at the Fire Equipment Storage (Building 733K) AOPI, one downgradient from the potential release area (NECD-FES-01) and one within the central portion of the potential release area near the southern bay doors (NECD-FES-02). Figure 6-22 depicts sampling locations at the Fire Equipment Storage (Building 733K) AOPI. Sediment and surface water were not present at this AOPI. The Target PFAS analytical results for soil and groundwater samples collected are provided in Table 6-9 and Figure 6-23.

6.10.2.1 Soil

PFOS, PFOA, and PFHxS were detected at estimated concentrations in soil at the Fire Equipment Storage (Building 733K) AOPI. PFBS, PFNA, or HFPO-DA were not detected at concentrations greater than the LODs in soil. Target PFAS were not detected in soil within the potential release area near the bay doors at NECD-FSA-02 or NECD-FES-04. PFOS, PFOA, and PFHxS were detected only at estimated concentrations in surface soil on the northern side of the building less than the SLs at location NECD-FES-03.

6.10.2.2 Groundwater

PFOS, PFOA, PFBS, PFNA, and PFHxS were detected in groundwater at the Fire Equipment Storage (Building 733K) AOPI. HFPO-DA was not detected at concentrations greater than the LOD in groundwater.

At location NECD-FES-01, farthest downgradient from the AOPI, PFOS, PFOA, PFBS, and PFHxS were detected, with one compound, PFOA, exceeding the SL at a concentration of 6.5 ng/L. PFOS, PFBS, and PFHxS at NECD-FES-01 were all detected at concentrations less than the SLs. The highest concentrations of Target PFAS at the AOPI were detected at location NECD-FES-02, near the southern bay doors within the central portion of the potential release area. At location NECD-FES-02, PFOS, PFOA, PFNA, PFHxS, and PFBS were detected, with PFOS, PFOA, and PFNA concentrations exceeding the SLs. PFOS was detected at a concentration of 4.6 ng/L, which exceeds the 4 ng/L SL. PFOA was detected at a concentration of 6.8 ng/L, which exceeds the 6 ng/L SL. PFNA was detected at a concentration of 6.6 ng/L, which exceeds the 6 ng/L SL.

6.10.3 CSM

Building 733K is approximately 12,800 ft^2 and has a ground surface elevation of approximately 630 feet amsl. The building is surrounded by asphalt and other structures. Stormwater at Building 733K drains south into roadside drainage ditches.

Similar to other AOPIs in the eastern portion of NECD, subsurface geology at Building 733K is generally composed of glacial till deposits, up to 100 feet thick in some areas, overlain by a thin layer of loess, both of which are underlain by Pennsylvanian age sandstone and shales. Shallow groundwater at Building 733K is approximately between 8 and 10 feet bgs and flows southwest toward Little Raccoon Creek. Surface water and sediment are not present at the Fire Equipment Storage (Building 733K) AOPI.

Due to the potential release of AFFF or fluoroprotein foam, the surface soil surrounding the Fire Equipment Storage (Building 733K) is the source medium for potential PFAS contamination. Details regarding known AFFF releases were not discovered through research and personnel interviews. The primary release mechanism is the potential release of AFFF to surface soils related to historical operations at Building 733K, specifically, the large amount of AFFF stored in the building. The secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through infiltration, leaching, and percolation.

The surface soil and subsurface exposure pathways for onsite workers are both potentially complete despite all Target PFAS in soil being detected at estimated concentrations because groundwater concentrations exceed the SLs. Although onsite water wells are not used for drinking water at NECD, the groundwater exposure pathway for onsite workers is complete because detected concentrations of Target PFAS exceed the SLs and no groundwater use restrictions are in place at the Fire Equipment Storage (Building 733K) AOPI. In addition, the groundwater exposure pathway for offsite residents is potentially complete because drinking water is obtained from private wells in the vicinity of NECD. Figure 6-24 presents the CSM for the Fire Equipment Storage (Building 733K) AOPI.

6.10.4 Recommendation

SLs Detected concentrations of Target PFAS in groundwater exceed the SLs; therefore, further investigation is recommended at the Fire Equipment Storage (Building 733K) AOPI.

Table 6-9. Target PFAS Analytical Results at the Fire Equipment Storage (Building 733K) AOPI

Location ID	Sample ID	Sample Type	Depth (ft)	Sample Date	HFPO-DA or GenX	PFBS	PFHxS	PFNA	PFOA	PFOS
Soil				**Units**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
				Screening Levels	**23**	**1900**	**130**	**19**	**19**	**13**
NECD-FES-02	NEFES02-SS01	BORE	0.00-1.00	06/28/2022	1.9 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
	NEFES02-SS01FD	BORE	0.00-1.00 (D)	06/28/2022	1.9 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
	NEFES02-SB02	BORE	5.00-7.00	06/28/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	NEFES02-SB03	BORE	8.00-10.00	06/28/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NECD-FES-03	NEFES03-SS01	BORE	0.00-1.00	06/29/2022	1.9 U	0.48 U	**0.22 J**	0.48 U	**0.22 J**	**0.47 J**
	NEFES03-SB02	BORE	3.00-5.00	06/29/2022	2.3 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
	NEFES03-SB03	BORE	6.50-8.50	06/29/2022	1.9 U	0.48 U	0.48 U	0.48 U	0.48 U	0.48 U
NECD-FES-04	NEFES04-SS01	BORE	0.00-1.00	06/29/2022	2.4 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	NEFES04-SB01	BORE	3.00-5.00	06/29/2022	1.9 U	0.48 U	0.48 U	0.48 U	0.48 U	0.48 U
	NEFES04-SB02	BORE	6.00-8.00	06/29/2022	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Groundwater				**Units**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**	**ng/L**
				Screening Levels	**6**	**601**	**39**	**6**	**6**	**4**
NECD-FES-01	NEFES01-GW01	PNCH	10.00	06/28/2022	<3.8 U	**0.94 J**	**1.7 J**	<1.9 U	**6.5**	**1.9 J**
NECD-FES-02	NEFES02-GW01	PNCH	15.00	06/28/2022	<4.2 U	**4.5**	**2.7 J**	**6.6**	**6.8**	**4.6**

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

7. CONCLUSIONS AND RECOMMENDATIONS

An SI is conducted when the PA determines an AOPI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multimedia sampling at AOPIs to determine whether a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required (40 CFR 300.420(5)). The SI Report used the findings from the PA in conjunction with soil, groundwater, surface water, and sediment sampling data for each AOPI to determine whether Target PFAS have been released to the environment and whether a release has affected or may affect specific human health targets.

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

Target PFAS were detected at eight AOPIs: Fire Training Pit, Scrap Yard, Fire Department Training (Building 255A), Facility 262D Loading Dock, PCC Clarifiers and PCCRP, Former Locomotive House (Building 718A), Fire Station (Building 709A), and Fire Equipment Storage (Building 733K). Target PFAS concentrations exceeded SLs at five of the AOPIs. HFPO-DA was not detected at any AOPI, and only PFOS, PFOA, and PFNA were detected at concentrations that exceeded SLs.

The CSMs were updated for each AOPI where Target PFAS were detected. The updated CSMs detailed site geological conditions; determined primary and secondary release mechanisms; identified potential human receptors; and detailed complete, potentially complete, and incomplete exposure pathways for current and reasonably anticipated future exposure scenarios. Table 7-1 summarizes the conclusions and recommendations for each AOPI.

The following five AOPIs were recommended for further investigation:

- Scrap Yard
- Fire Department Training (Building 255A)
- Facility 262D Loading Dock
- Fire Station (Building 709A)
- Fire Equipment Storage (Building 733K).

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

AOPI	Detection of HFPO-DA, PFBS, PFHxS, PFNA, PFOS, and/or PFOA				Recommendation and Rationale
	Groundwater	Soil	Surface Water	Sediment	
Fire Training Pit	Detected	ND	–	–	SLs not exceeded; further investigation not recommended at this time
Scrap Yard	Exceeds SL	Detected	Detected Off-AOPI	ND	SLs exceeded in groundwater; further investigation recommended
Fire Department Training (Building 255A)	Exceeds SL	ND	–	–	SLs exceeded in groundwater; further investigation recommended
Facility 262D Loading Dock	Exceeds SL	Detected	–	–	SLs exceeded in groundwater; further investigation recommended
Foam House at TNT Acid Area	ND	ND	–	–	Target PFAS not detected at concentrations greater than LODs; further investigation not recommended at this time
PCC Clarifiers and PCCRP	Detected	Detected	Detected	ND	SLs not exceeded; further investigation not recommended at this time
Former Locomotive House (Building 718A)	Detected	ND	–	–	SLs not exceeded; further investigation not recommended at this time
Fire Station (Building 709A)	Exceeds SL	Detected	–	–	SLs exceeded in groundwater; further investigation recommended
Fire Equipment Storage (Building 733K)	Exceeds SL	Detected	–	–	SLs exceeded in groundwater; further investigation recommended

Highlighted cells are recommended for further investigation.
– = Media not present.
ND = Non-Detect

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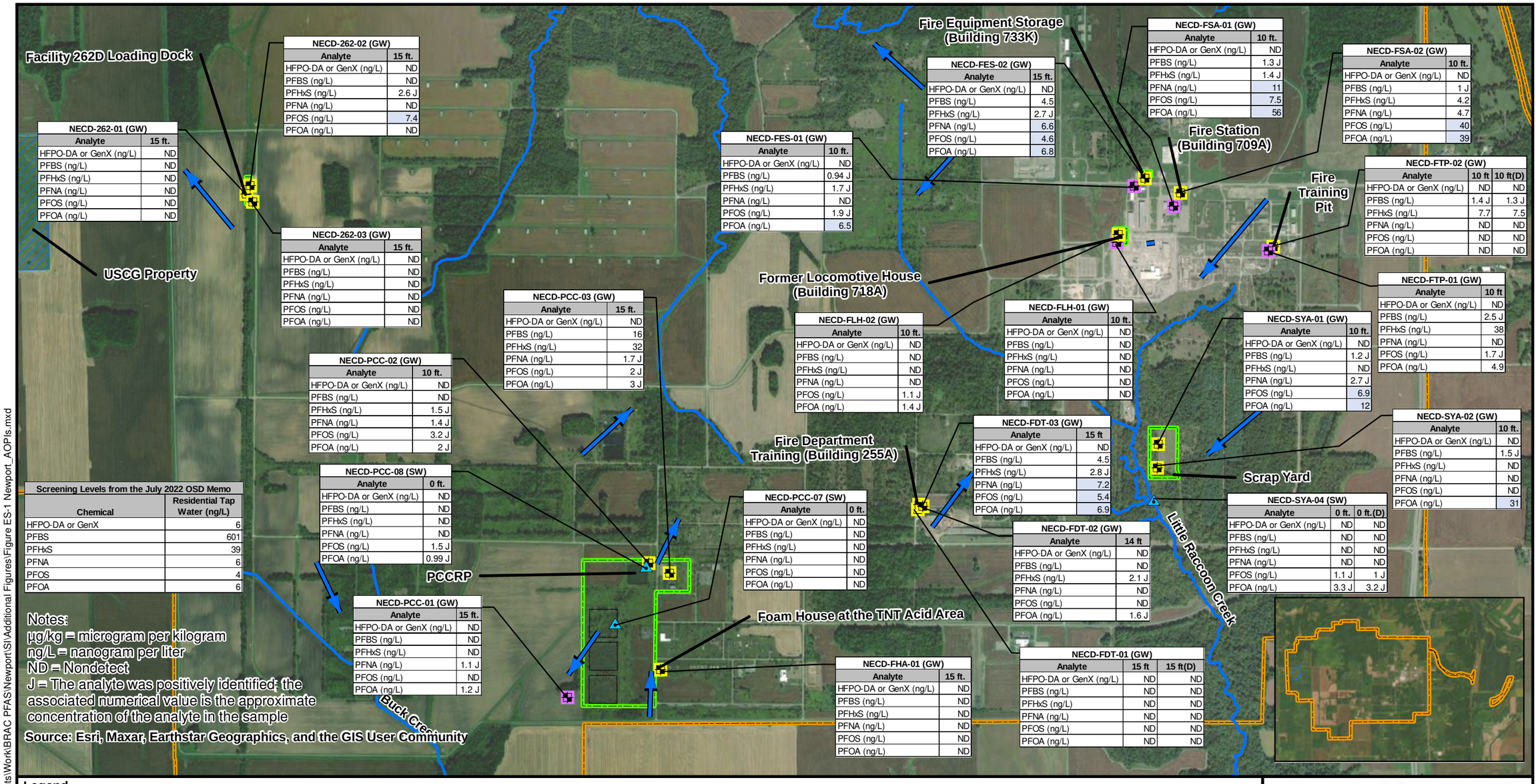
FIGURES



Legend

- Installation Boundary
- US Coast Guard Boundary
- Areas of Potential Interest (AOPI)
- Groundwater Flow
- DPT Groundwater Sample (5)
- DPT Groundwater Sample/Soil Boring (15)

Notes:
AOPI - Area of Potential Interest
GSB - Gypsum Sludge Basin
PCCRP - Pollution Control Center Retention Pond
USCG - United States Coast Guard
TNT - Trinitrotoluene

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

0 1,000 2,000
SCALE: 1" = 2,000'

IN STATE PLANE WEST N (NAD83)

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SUMMARY OF TARGET PFAS IN GROUNDWATER AND SURFACE WATER NEWPORT CHEMICAL DEPOT

FIGURE ES-1 | DATE: 4/19/2023

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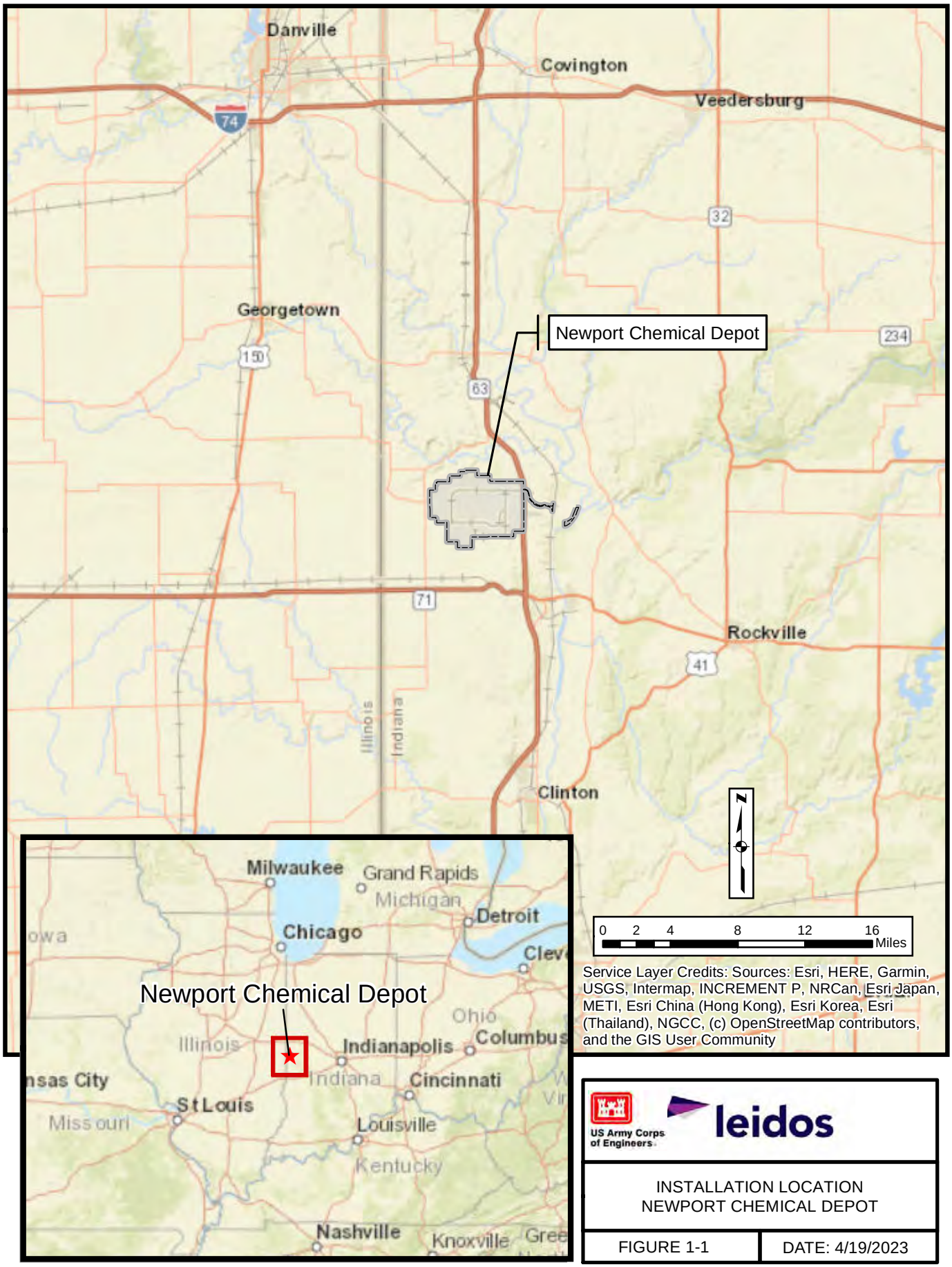

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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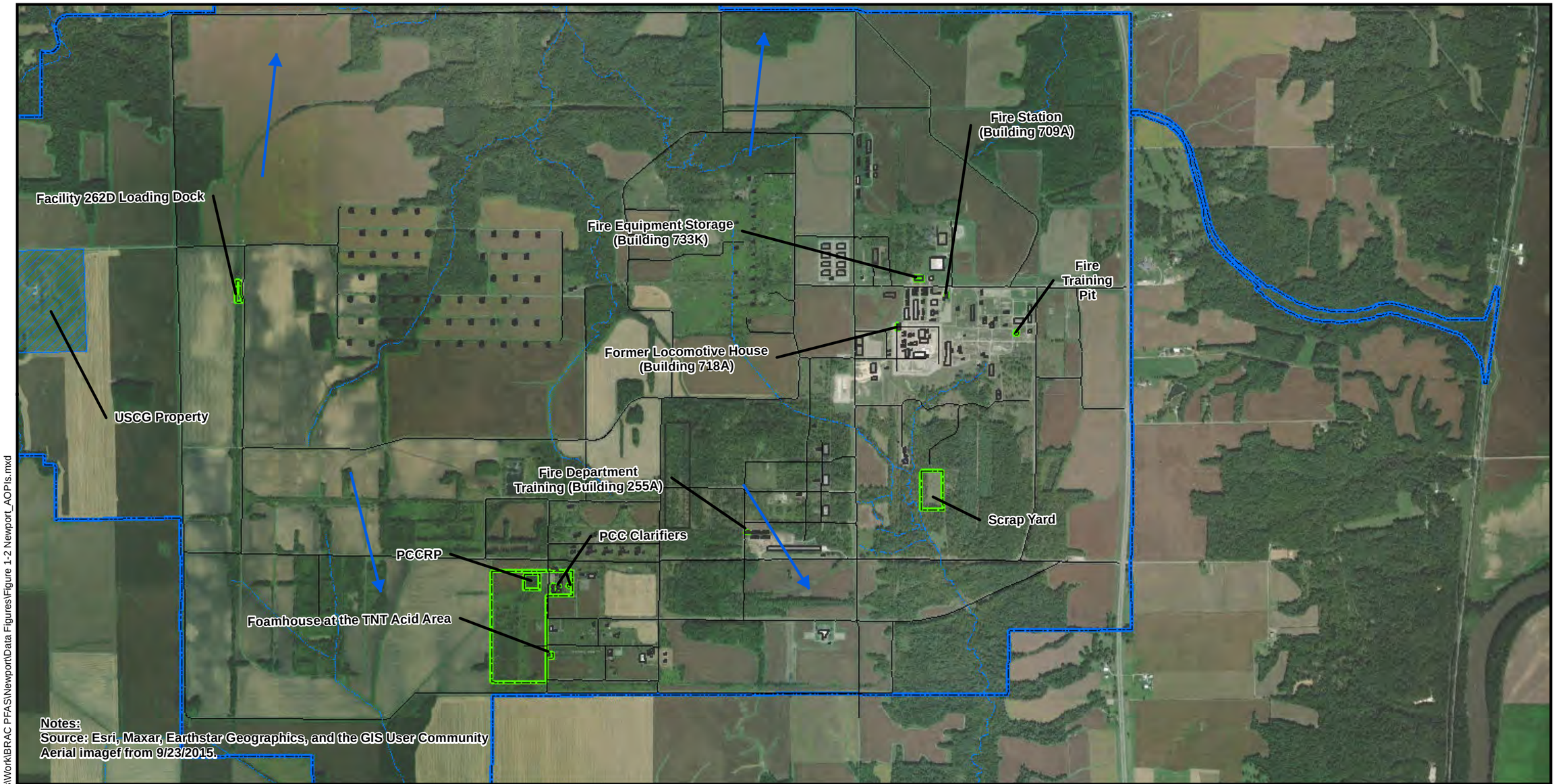
INSTALLATION LOCATION
NEWPORT CHEMICAL DEPOT

FIGURE 1-1	DATE: 4/19/2023



C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\Data Figures\Figure 1-2 Newport_AOPIs.mxd

Legend

- Installation Boundary
- US Coast Guard Boundary
- Areas of Potential Interest (AOPI)
- Buildings
- Roads
- Surface Water Feature
- Groundwater Flow

PCCRP - Pollution Control Center Retention Pond

0 2,000 4,000

SCALE: 1" = 2,000'

IN STATE PLANE EAST (NAD83)

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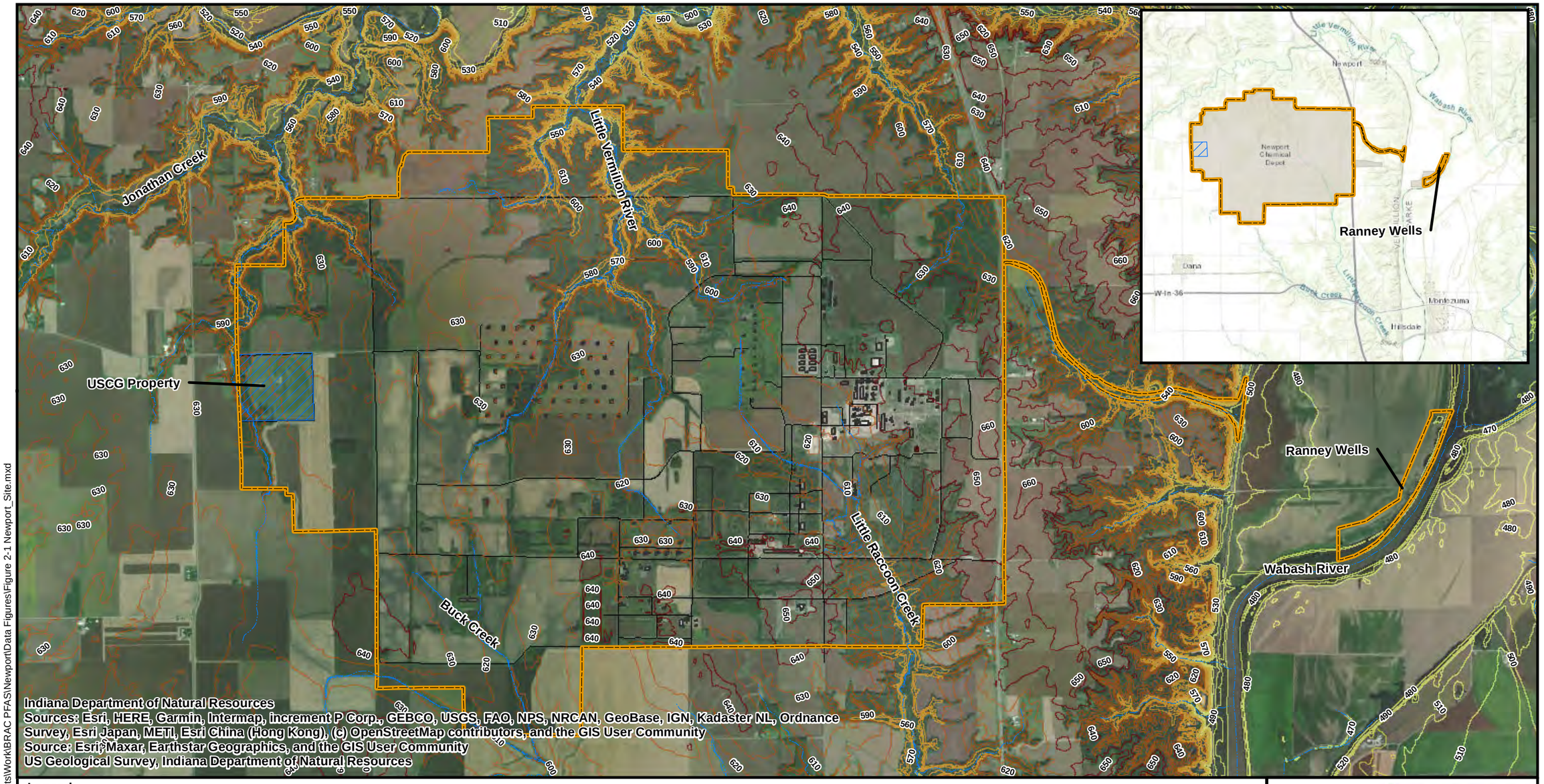
AOPI LOCATIONS
NEWPORT CHEMICAL DEPOT

FIGURE 1-2 | DATE: 3/13/2023


Jonathan Creek
Little Vermilion River
Little Raccoon Creek
Buck Creek
Wabash River
USCG Property
Ranney Wells
Ranney Wells
Newport Chemical Depot
Newport
Dana
Hillsdale
Montezuma
W In-36
Indiana Department of Natural Resources
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
US Geological Survey, Indiana Department of Natural Resources
Legend
Installation Boundary
US Coast Guard Boundary
Roads
Buildings
Surface Water Feature
10-foot Contours
470 - 510
510 - 550
550 - 590
590 - 630
630 - 670
0
3,000
6,000
SCALE: 1" = 3,000'
IN STATE PLANE WEST (NAD83)
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SITE FEATURES
NEWPORT CHEMICAL DEPOT
FIGURE 2-1
DATE: 4/19/2023
C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\Data Figures\Figure 2-1 Newport_Site.mxd

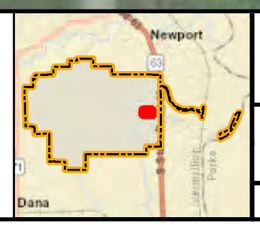
Legend

- Installation Boundary
- Area of Potential Interest (AOPI)
- Groundwater Flow
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)

0 100 200

SCALE: 1" = 100'

IN STATE PLANE WEST (NAD83)



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FIRE TRAINING PIT AOPI
SAMPLE LOCATIONS
NEWPORT CHEMICAL DEPOT

FIGURE 6-1 | DATE: 4/19/2023

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

NECD-FTP-03 (SO)		
Analyte	1.5-3.5 ft.	4-6 ft.
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOS (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND

Fire Training Pit

NECD-FTP-02 (SO)			
Analyte	2-4 ft.	2-4 ft.(D)	5-7 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

NECD-FTP-04 (SO)			
Analyte	0-1 ft.	2-4 ft.	5-7 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

NECD-FTP-02 (GW)		
Analyte	10 ft	10 ft(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	1.4 J	1.3 J
PFHxS (ng/L)	7.7	7.5
PFNA (ng/L)	ND	ND
PFOS (ng/L)	ND	ND
PFOA (ng/L)	ND	ND

NECD-FTP-01 (GW)	
Analyte	10 ft
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	2.5 J
PFHxS (ng/L)	38
PFNA (ng/L)	ND
PFOS (ng/L)	1.7 J
PFOA (ng/L)	4.9

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
Indiana Department of Natural Resources
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

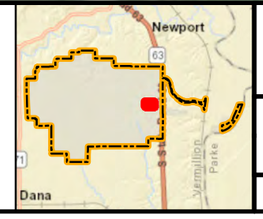
Legend
- Installation Boundary
- Area of Potential Interest (AOPI)
- Groundwater Flow
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)

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

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

0 100 200
SCALE: 1" = 100'

IN STATE PLANE WEST (NAD83)



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FIRE TRAINING PIT AOPI
SAMPLE RESULTS
NEWPORT CHEMICAL DEPOT

FIGURE 6-2 | DATE: 4/19/2023

C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\SI\Additional Figures\Figure 6-2 Newport_FireTrainingPit.mxd

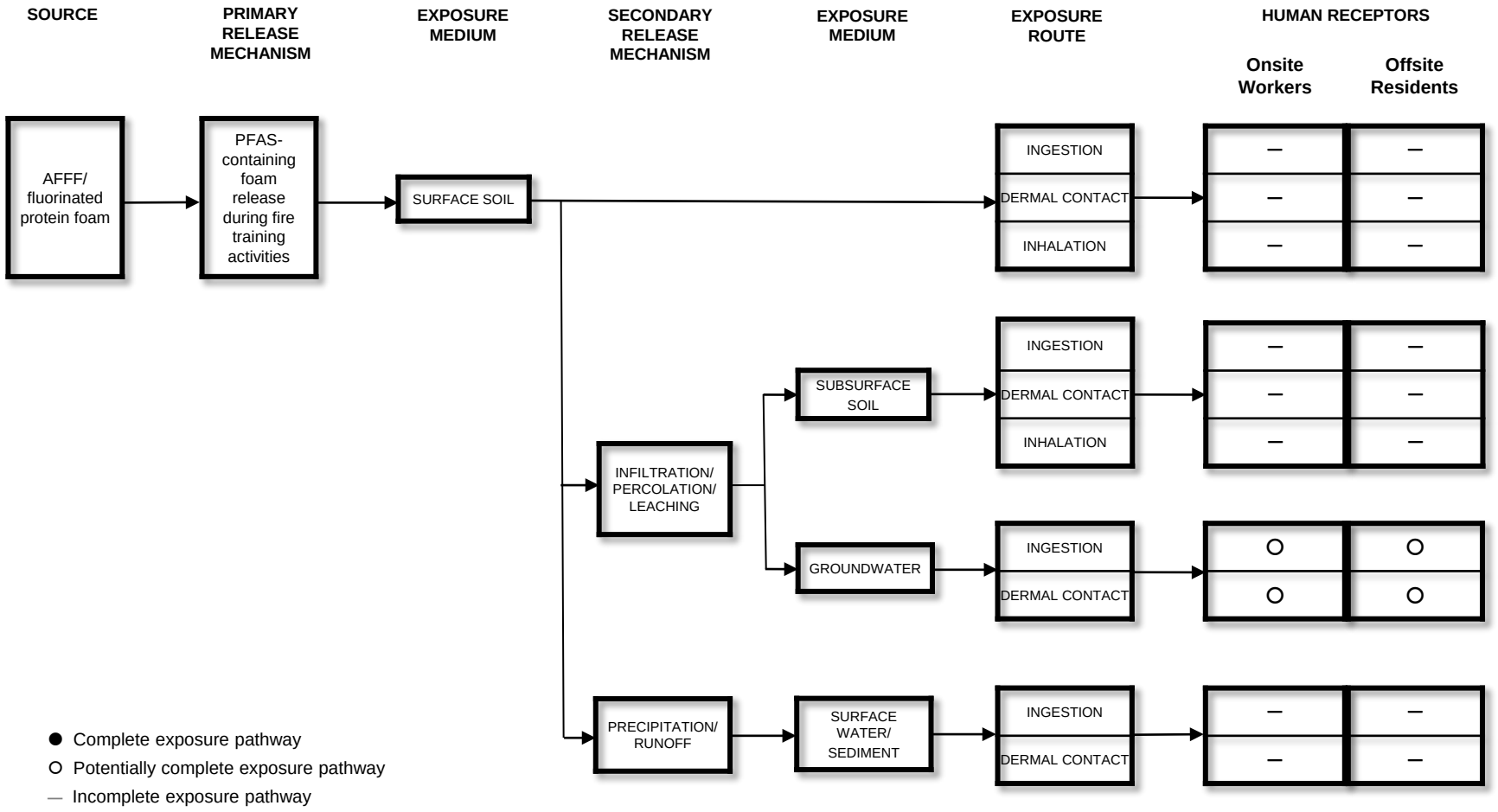


Figure 6-3. Human Health CSM for Fire Training Pit AOPI

C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\SI\Additional Figures\Figure 6-4 Newport_ScrapYard.mxd

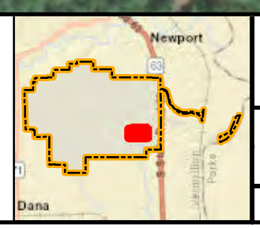
Legend

- Installation Boundary
- Area of Potential Interest (AOPI)
- Previous Scrap Pile/Gravel Area
- Previous Ground Scar
- Demilitarization Incinerator
- Groundwater Flow
- DPT Groundwater Sample/Soil Boring (2)
- Soil Boring (1)
- Surface Water/Sediment (1)

0 200 400

SCALE: 1" = 200'

IN STATE PLANE WEST (NAD83)



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SCRAP YARD AOPI SAMPLE LOCATIONS
NEWPORT CHEMICAL DEPOT

FIGURE 6-4 | DATE: 4/19/2023

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

NECD-SYA-01 (SO)			
Analyte	0-1 ft.	1-3 ft.	3-5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	0.47 J	ND	ND
PFOA (µg/kg)	0.4 J	ND	ND

NECD-SYA-01 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	1.2 J
PFHxS (ng/L)	ND
PFNA (ng/L)	2.7 J
PFOS (ng/L)	6.9
PFOA (ng/L)	12

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

NECD-SYA-02 (SO)			
Analyte	0-1 ft.	2-4 ft.	4-6 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

NECD-SYA-02 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	1.5 J
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOS (ng/L)	ND
PFOA (ng/L)	31

NECD-SYA-04 (SD)		
Analyte	0-0.5 ft.	0-0.5 ft.(D)
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOS (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND

NECD-SYA-04 (SW)		
Analyte	0 ft.	0 ft.(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	ND	ND
PFHxS (ng/L)	ND	ND
PFNA (ng/L)	ND	ND
PFOS (ng/L)	1.1 J	1 J
PFOA (ng/L)	3.3 J	3.2 J

Little Raccoon Creek

Scrap Yard

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

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

Legend

- Installation Boundary
- Area of Potential Interest (AOPI)
- Previous Scrap Pile/Gravel Area
- Previous Ground Scar
- Demilitarization Incinerator
- Groundwater Flow
- DPT Groundwater Sample/Soil Boring (2)
- Soil Boring (1)
- Surface Water/Sediment (1)

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

0 200 400
SCALE: 1" = 200'

IN STATE PLANE WEST (NAD83)

Newport, Dana, Vermillion Parke

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SCRAP YARD AOPI SAMPLE RESULTS
NEWPORT CHEMICAL DEPOT

FIGURE 6-5 | DATE: 4/19/2023

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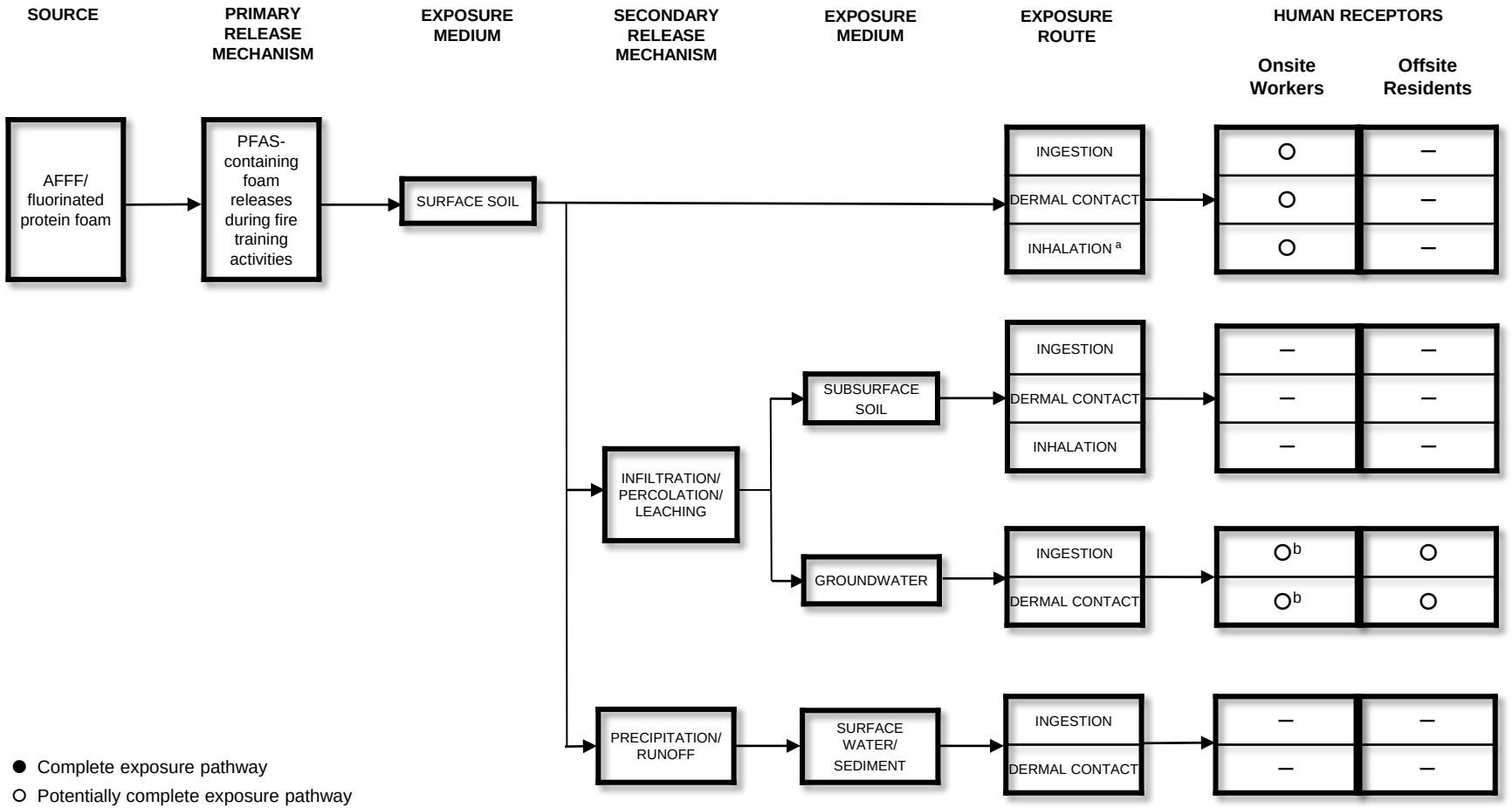


● Complete exposure pathway
○ Potentially complete exposure pathway
— Incomplete exposure pathway

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

[b] Land use controls, including restrictions on groundwater use, are in place at this AOPI; however, since the restrictions are unrelated to PFAS, the pathway is potentially complete.

Figure 6-6. Human Health CSM for Scrap Yard AOPI

C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\SI\Additional Figures\Figure 6-7 Newport_FireDepartmentTraining.mxd

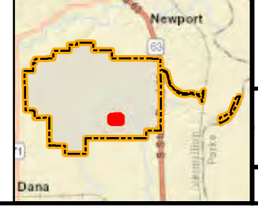
Legend

- Installation Boundary
- Area of Potential Interest (AOPI)
- Temporary Well/Soil Boring (3)
- Groundwater Flow

0 100 200

SCALE: 1" = 150'

IN STATE PLANE WEST (NAD83)



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FIRE DEPARTMENT TRAINING
(BUILDING 255A) AOPI SAMPLE LOCATIONS
NEWPORT CHEMICAL DEPOT

FIGURE 6-7 | DATE: 4/19/2023

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

NECD-FDT-02 (SO)				
Analyte	0-1 ft.	3-5 ft.	7-9 ft.	7-9 ft.(D)
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND	ND

NECD-FDT-02 (GW)	
Analyte	14 ft
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	2.1 J
PFNA (ng/L)	ND
PFOS (ng/L)	ND
PFOA (ng/L)	1.6 J

NECD-FDT-01 (SO)		
Analyte	5-7 ft.	10-12 ft.
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOS (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND

NECD-FDT-01 (GW)		
Analyte	15 ft	15 ft(D)
HFPO-DA or GenX (ng/L)	ND	ND
PFBS (ng/L)	ND	ND
PFHxS (ng/L)	ND	ND
PFNA (ng/L)	ND	ND
PFOS (ng/L)	ND	ND
PFOA (ng/L)	ND	ND

NECD-FDT-03 (SO)		
Analyte	2.5-4.5 ft.	5.5-7.5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOS (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND

NECD-FDT-03 (GW)	
Analyte	15 ft
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	4.5
PFHxS (ng/L)	2.8 J
PFNA (ng/L)	7.2
PFOS (ng/L)	5.4
PFOA (ng/L)	6.9

Fire Department Training (Building 255A)

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

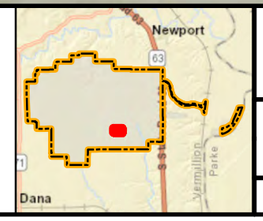
Legend
- Installation Boundary
- Area of Potential Interest (AOPI)
- Temporary Well/Soil Boring (3)
- Groundwater Flow

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

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

0 100 200
SCALE: 1" = 150'

IN STATE PLANE WEST (NAD83)



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FIRE DEPARTMENT TRAINING
(BUILDING 255A) AOPI SAMPLE RESULTS
NEWPORT CHEMICAL DEPOT

FIGURE 6-8 | DATE: 4/19/2023

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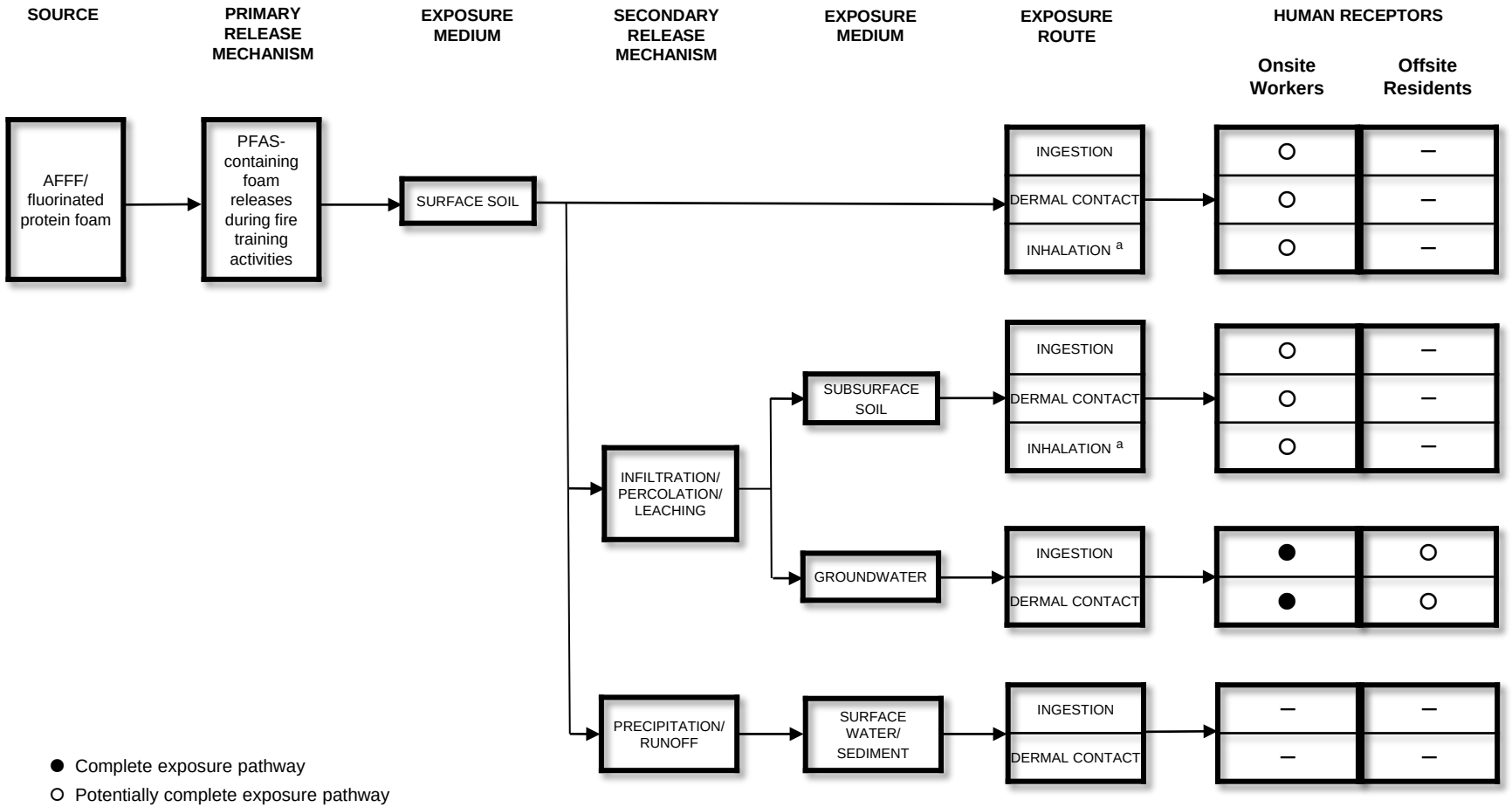

Figure 6-9. Human Health CSM for Fire Department Training (Building 255A) AOPI

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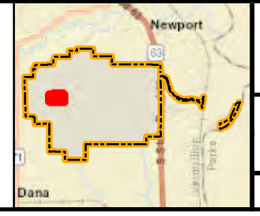
Legend

- Installation Boundary
- Area of Potential Interest (AOPI)
- Former Facility 262D Loading Dock
- Former Fence
- Temporary Well/Soil Boring (3)
- Groundwater Flow

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

0 150 300
SCALE: 1" = 150'

IN STATE PLANE WEST (NAD83)



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FACILITY 262D LOADING DOCK AOPI
SAMPLE LOCATIONS
NEWPORT CHEMICAL DEPOT

FIGURE 6-10 | DATE: 4/19/2023

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

Facility 262D Loading Dock

NECD-262-02 (SO)		
Analyte	3-5 ft.	5-7 ft.
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOS (µg/kg)	ND	0.32 J
PFOA (µg/kg)	ND	ND

NECD-262-02 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	2.6 J
PFNA (ng/L)	ND
PFOS (ng/L)	7.4
PFOA (ng/L)	ND

NECD-262-01 (SO)			
Analyte	0-1 ft.	4-6 ft.	9-11 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

NECD-262-01 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOS (ng/L)	ND
PFOA (ng/L)	ND

NECD-262-03 (SO)			
Analyte	0-1 ft.	5-7 ft.	8-10 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

NECD-262-03 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOS (ng/L)	ND
PFOA (ng/L)	ND

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

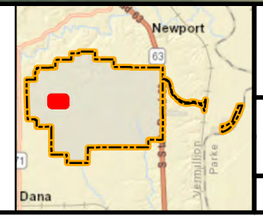
Legend
- Installation Boundary
- Area of Potential Interest (AOPI)
- Former Facility 262D Loading Dock
- Former Fence
- Temporary Well/Soil Boring (3)
- Groundwater Flow

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

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

0 150 300
SCALE: 1" = 150'

IN STATE PLANE WEST (NAD83)



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FACILITY 262D LOADING DOCK AOPI
SAMPLE RESULTS
NEWPORT CHEMICAL DEPOT

FIGURE 6-11 | DATE: 4/19/2023

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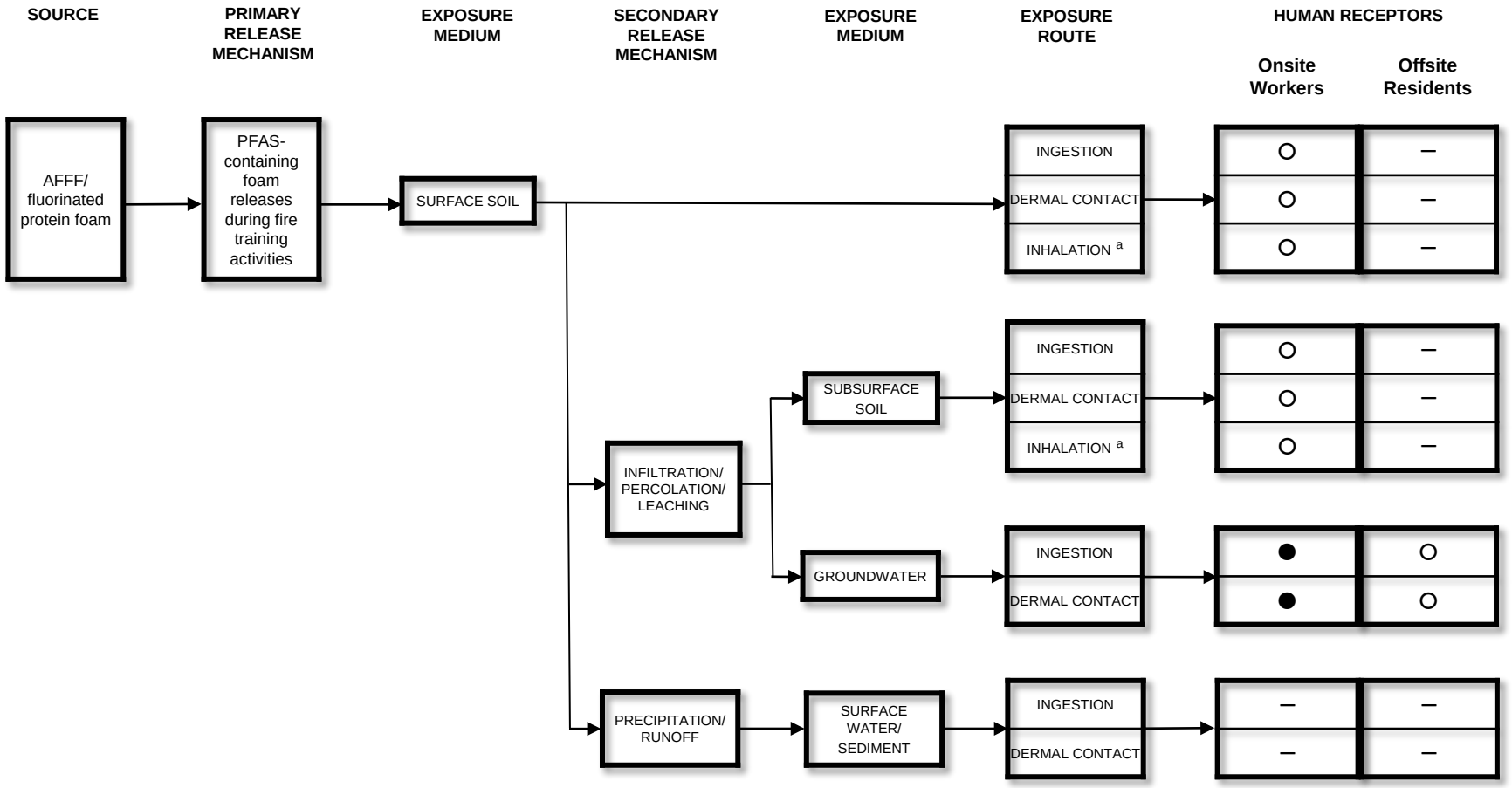


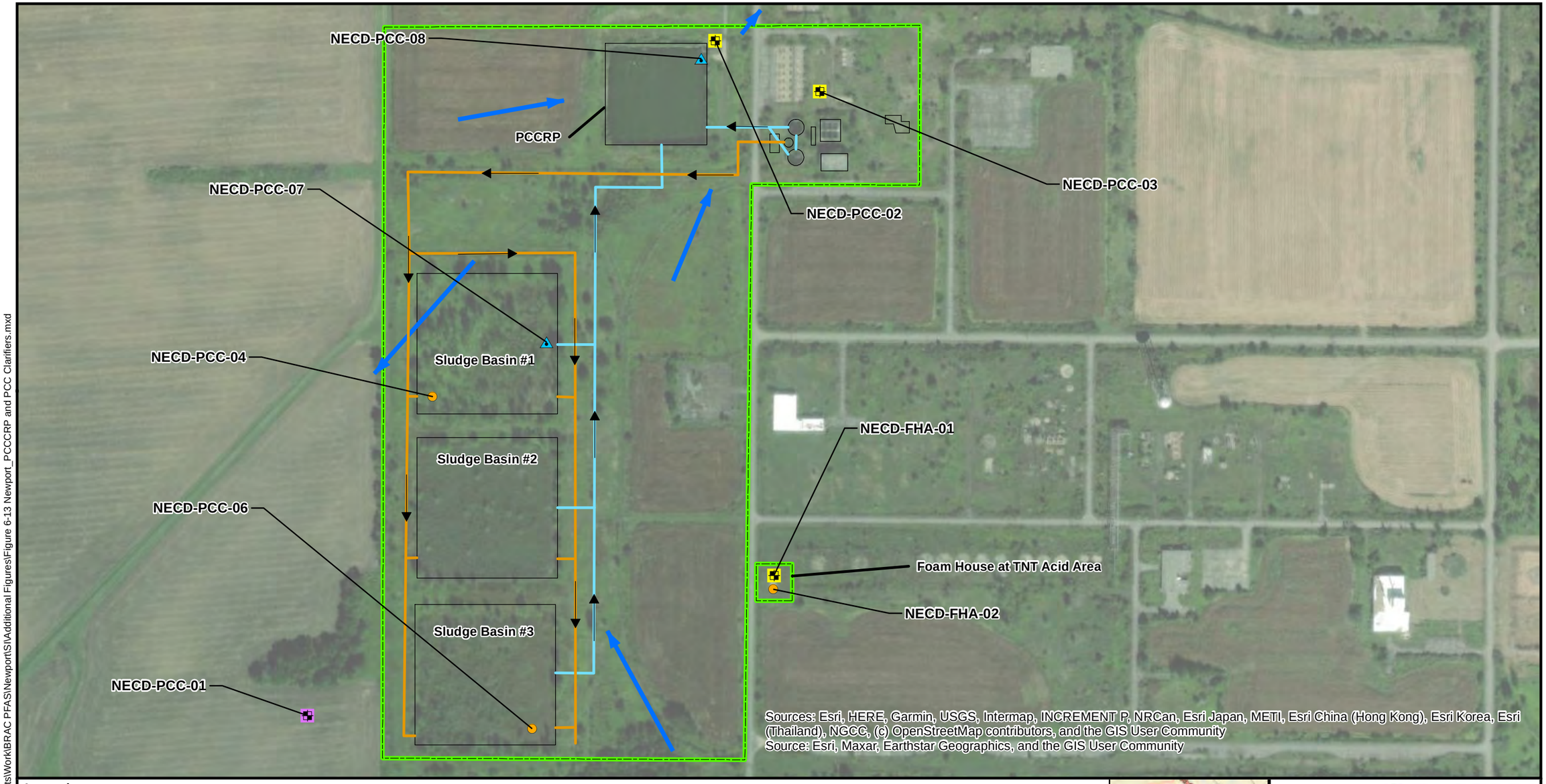
● Complete exposure pathway

○ Potentially complete exposure pathway

— Incomplete exposure pathway

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

Figure 6-12. Human Health CSM for Facility 262D Loading Dock AOPI



C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\SI\Additional Figures\Figure 6-13 Newport_PCCCRP and PCC Clarifiers.mxd

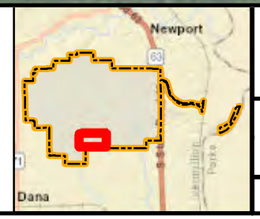
Legend

- Installation Boundary
- Areas of Potential Interest
- Sludge Lines
- Water Lines
- Groundwater Flow
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (3)
- Soil Boring (3)
- Surface Water/Sediment (2)

0 300 600

SCALE: 1" = 300'

IN STATE PLANE WEST (NAD83)



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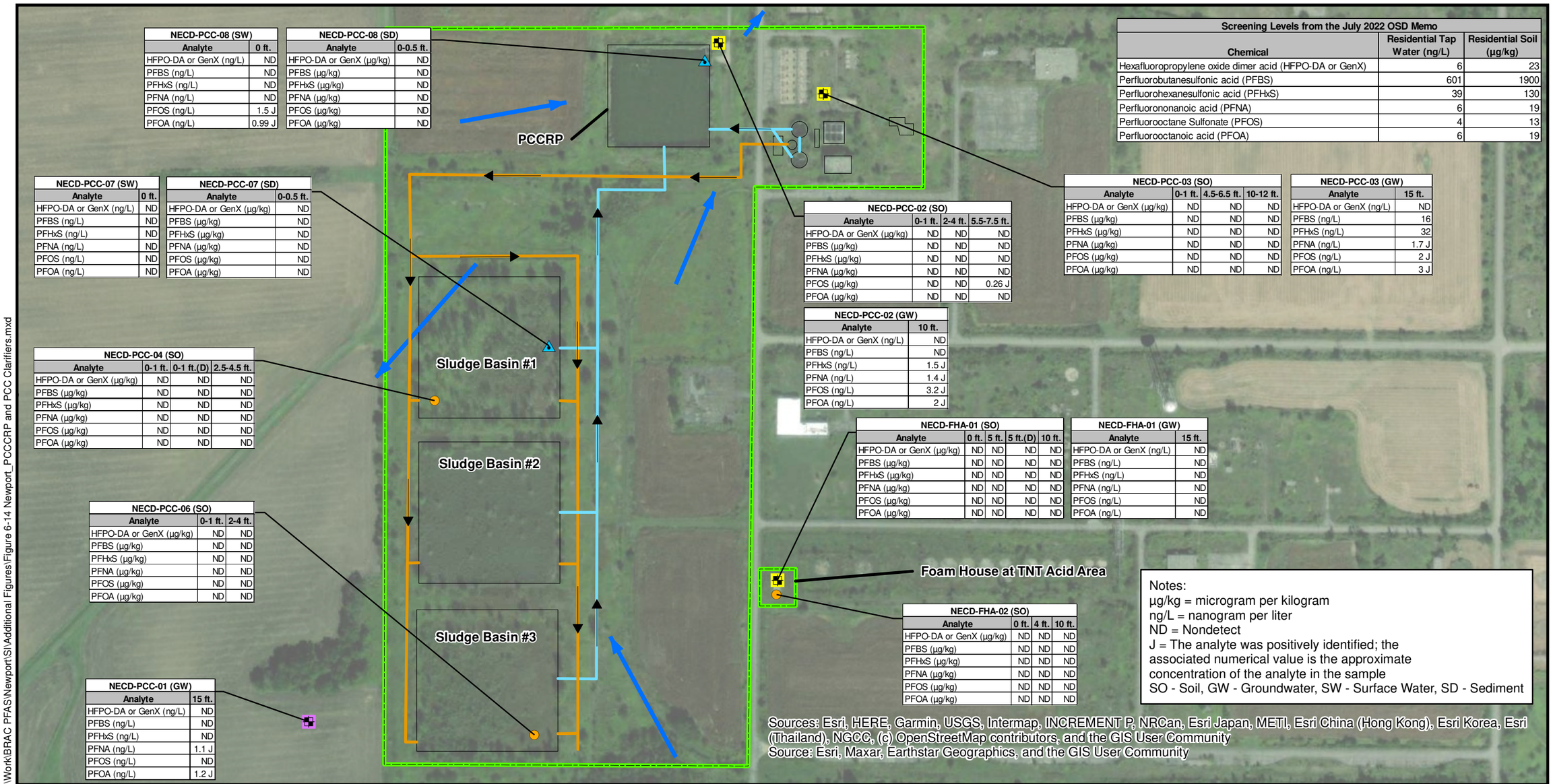
PCC CLARIFIERS AND PCCRP AOPI AND FOAM HOUSE AOPI SAMPLE LOCATIONS
NEWPORT CHEMICAL DEPOT

FIGURE 6-13 | DATE: 4/19/2023



NECD-PCC-08 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOS (ng/L)	1.5 J
PFOA (ng/L)	0.99 J

NECD-PCC-08 (SD)	
Analyte	0-0.5 ft.
HFPO-DA or GenX (µg/kg)	ND
PFBS (µg/kg)	ND
PFHxS (µg/kg)	ND
PFNA (µg/kg)	ND
PFOS (µg/kg)	ND
PFOA (µg/kg)	ND

NECD-PCC-07 (SW)	
Analyte	0 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOS (ng/L)	ND
PFOA (ng/L)	ND

NECD-PCC-07 (SD)	
Analyte	0-0.5 ft.
HFPO-DA or GenX (µg/kg)	ND
PFBS (µg/kg)	ND
PFHxS (µg/kg)	ND
PFNA (µg/kg)	ND
PFOS (µg/kg)	ND
PFOA (µg/kg)	ND

NECD-PCC-04 (SO)			
Analyte	0-1 ft.	0-1 ft.(D)	2.5-4.5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

NECD-PCC-06 (SO)		
Analyte	0-1 ft.	2-4 ft.
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOS (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND

NECD-PCC-01 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	1.1 J
PFOS (ng/L)	ND
PFOA (ng/L)	1.2 J

NECD-PCC-02 (SO)			
Analyte	0-1 ft.	2-4 ft.	5.5-7.5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	0.26 J
PFOA (µg/kg)	ND	ND	ND

NECD-PCC-02 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	1.5 J
PFNA (ng/L)	1.4 J
PFOS (ng/L)	3.2 J
PFOA (ng/L)	2 J

NECD-PCC-03 (SO)			
Analyte	0-1 ft.	4.5-6.5 ft.	10-12 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

NECD-PCC-03 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	16
PFHxS (ng/L)	32
PFNA (ng/L)	1.7 J
PFOS (ng/L)	2 J
PFOA (ng/L)	3 J

NECD-FHA-01 (SO)				
Analyte	0 ft.	5 ft.	5 ft.(D)	10 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND	ND

NECD-FHA-01 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOS (ng/L)	ND
PFOA (ng/L)	ND

NECD-FHA-02 (SO)			
Analyte	0 ft.	4 ft.	10 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

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

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

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

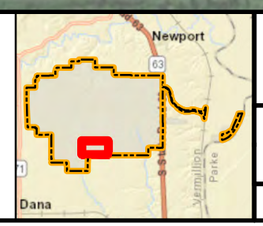
Legend

- Installation Boundary
- Areas of Potential Interest (AOPI)
- Sludge Lines
- Water Lines
- Groundwater Flow
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (3)
- Soil Boring (3)
- Surface Water/Sediment (2)

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

0 300 600
SCALE: 1" = 300'

IN STATE PLANE WEST (NAD83)



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PCC CLARIFIERS AND PCCRP AOPI AND FOAM HOUSE AOPI SAMPLE RESULTS
NEWPORT CHEMICAL DEPOT

FIGURE 6-14 | DATE: 4/19/2023

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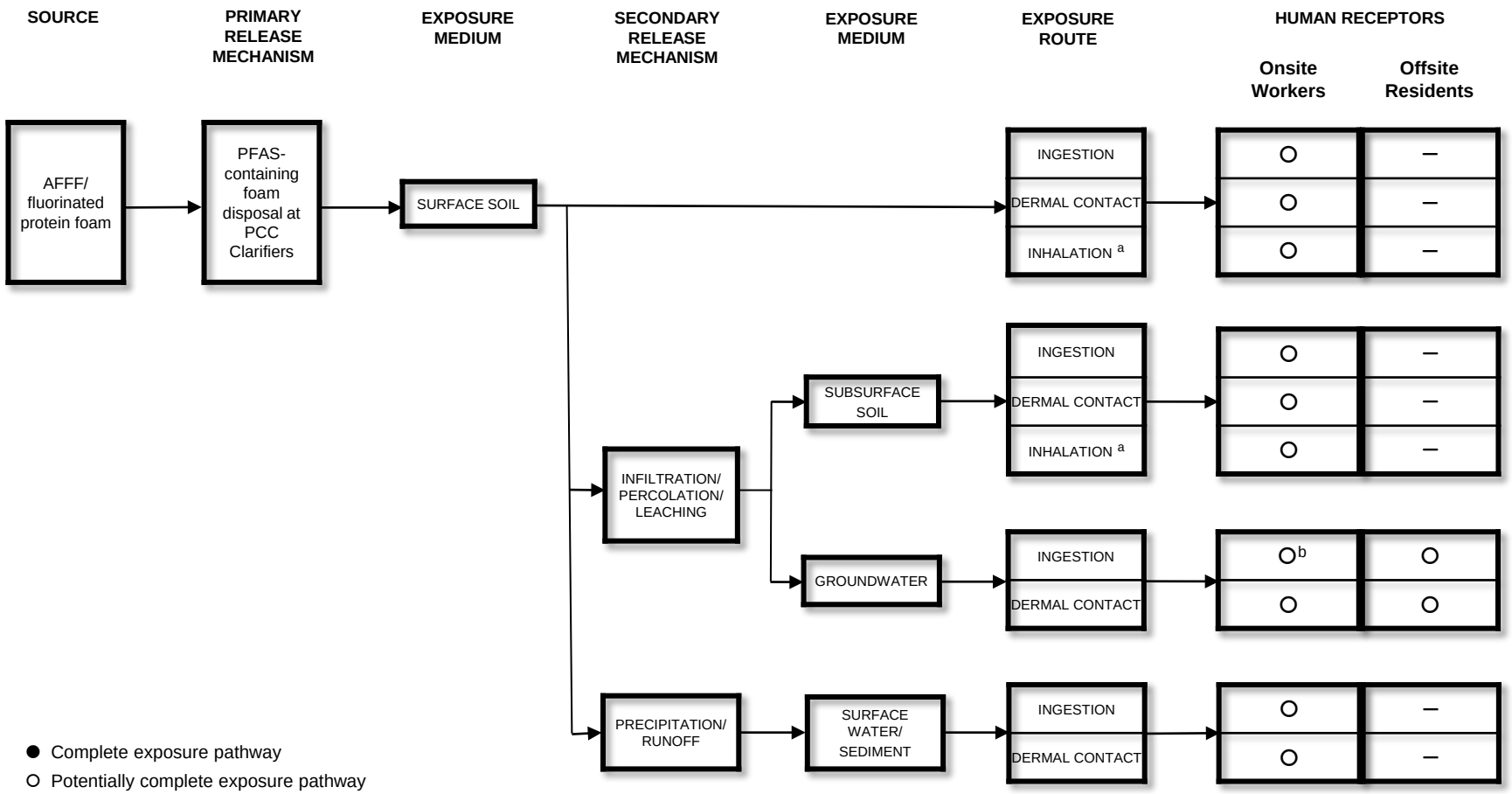
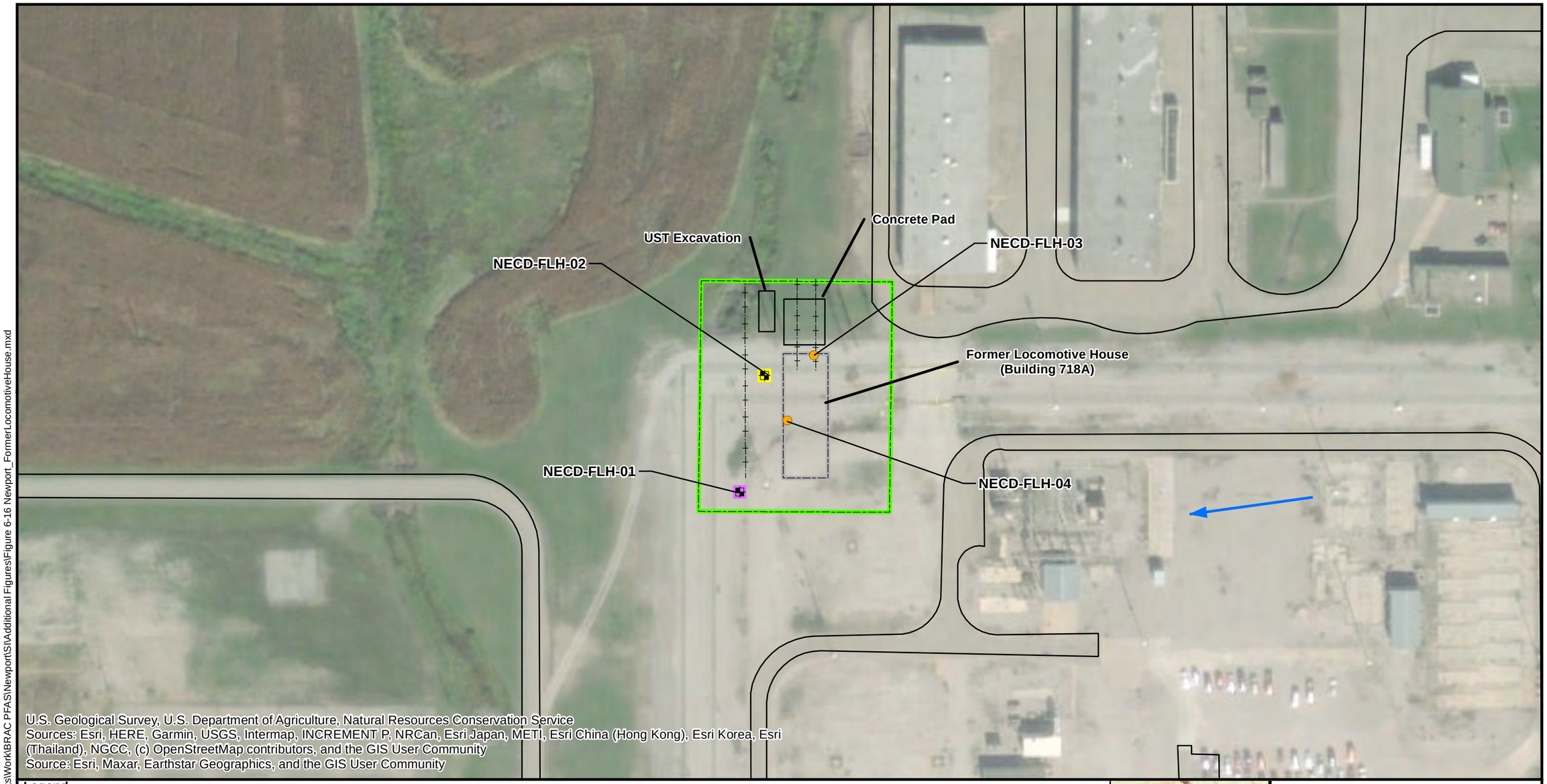


Figure 6-15. Human Health CSM for PCC Clarifiers and PCCRP AOPI



C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\SI\Additional Figures\Figure 6-16 Newport_FormerLocomotiveHouse.mxd

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

UST Excavation

Concrete Pad

Former Locomotive House (Building 718A)

NECD-FLH-02 (SO)			
Analyte	3-5 ft.	6-8 ft.	6-8 ft.(D)
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

NECD-FLH-02 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOS (ng/L)	1.1 J
PFOA (ng/L)	1.4 J

NECD-FLH-01 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	ND
PFHxS (ng/L)	ND
PFNA (ng/L)	ND
PFOS (ng/L)	ND
PFOA (ng/L)	ND

NECD-FLH-03 (SO)	
Analyte	2-4 ft.
HFPO-DA or GenX (µg/kg)	ND
PFBS (µg/kg)	ND
PFHxS (µg/kg)	ND
PFNA (µg/kg)	ND
PFOS (µg/kg)	ND
PFOA (µg/kg)	ND

NECD-FLH-04 (SO)		
Analyte	5-7 ft.	8-10 ft.
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOS (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND

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

U.S. Geological Survey, U.S. Department of Agriculture, Natural Resources Conservation Service
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
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

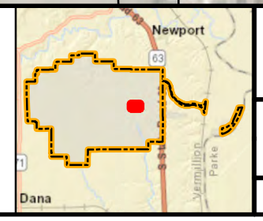
Legend

- Installation Boundary
- Area of Potential Interest (AOPI)
- Road
- Former Railroad
- Groundwater Flow
- Former Locomotive House
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)

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

0 100 200
SCALE: 1" = 100'

IN STATE PLANE WEST (NAD83)



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FORMER LOCOMOTIVE HOUSE
(BUILDING 718A) AOPI SAMPLE RESULTS
NEWPORT CHEMICAL DEPOT

FIGURE 6-17 | DATE: 4/19/2023

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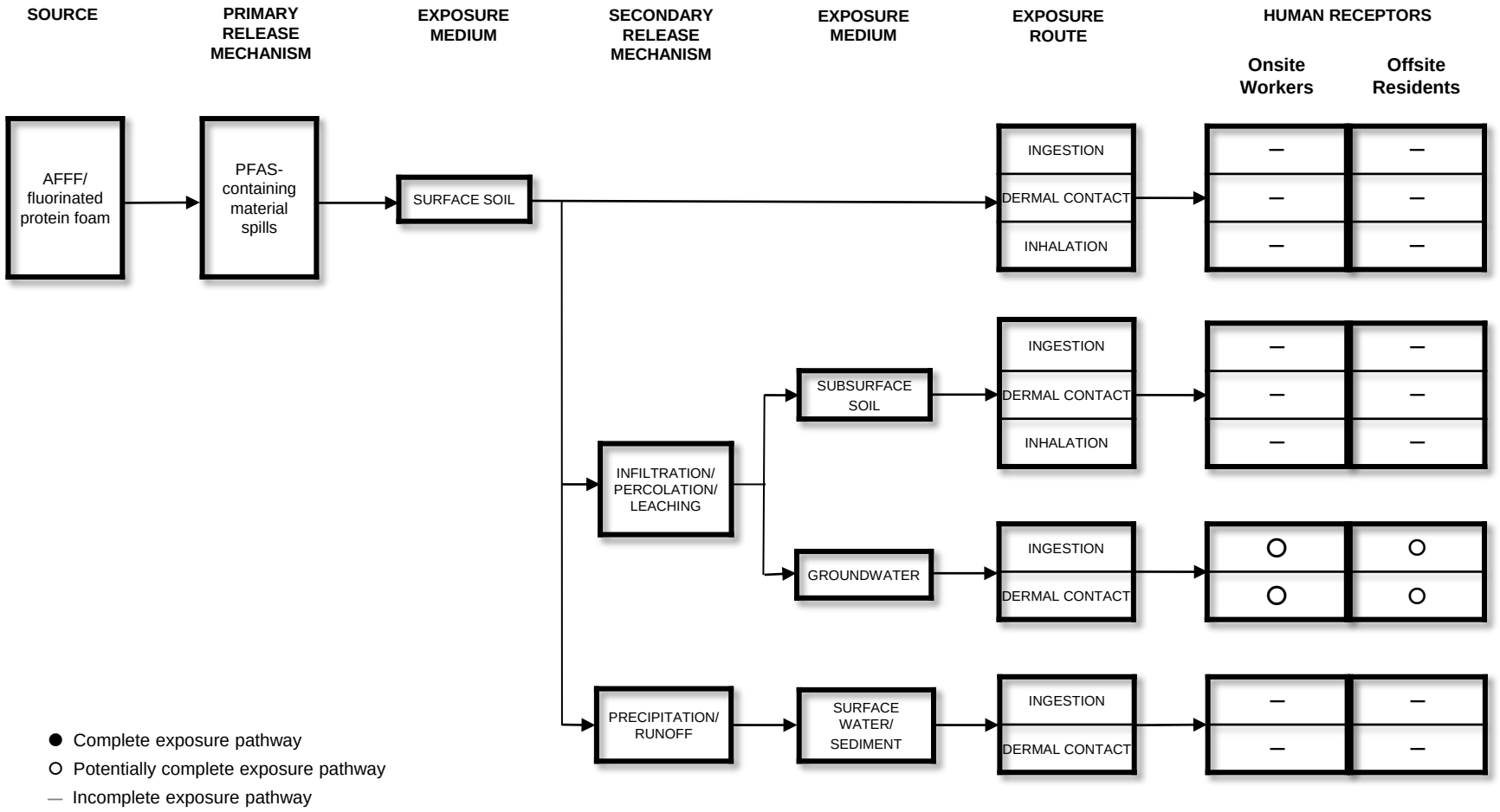
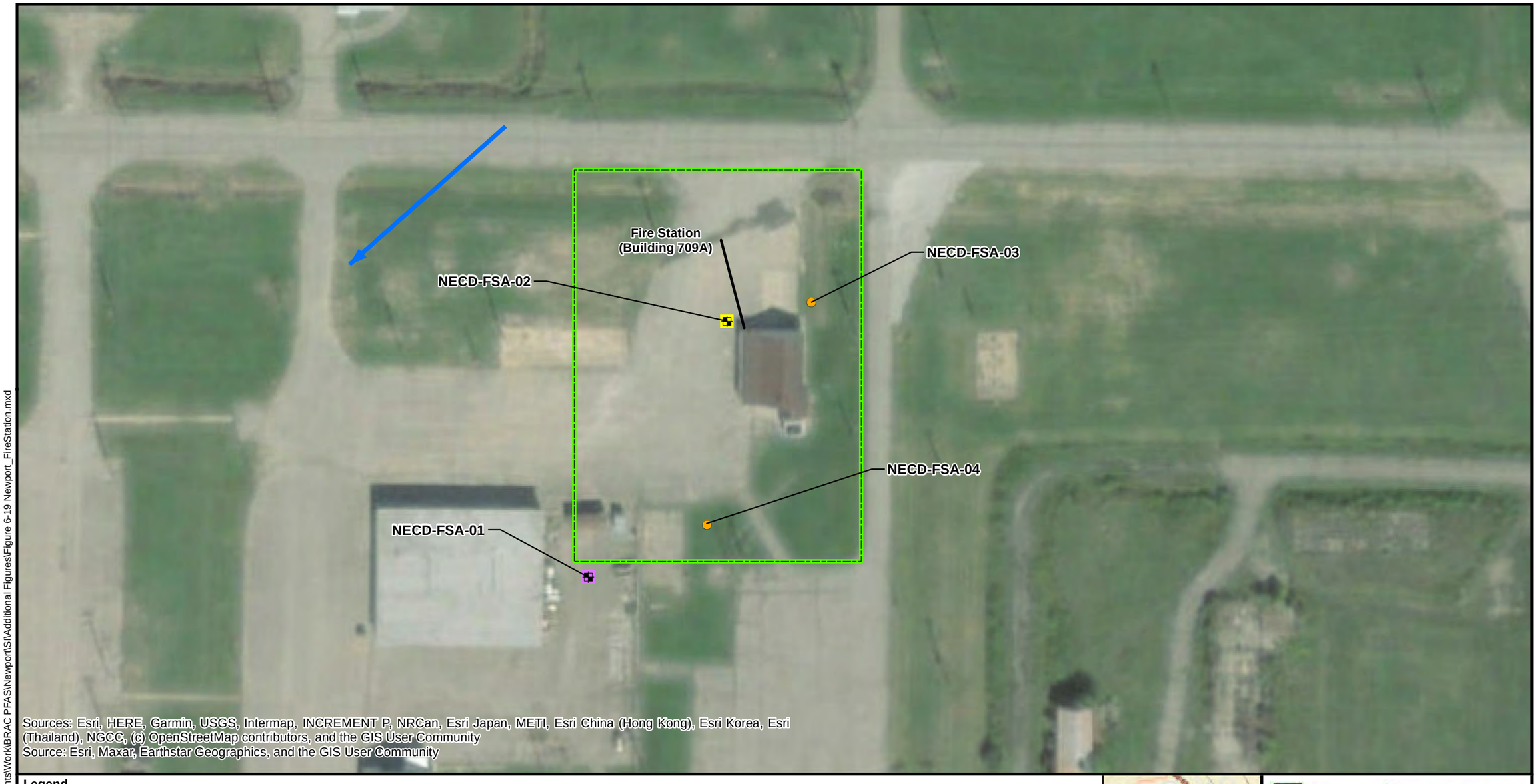


Figure 6-18. Human Health CSM for Former Locomotive House (Building 718A) AOPI



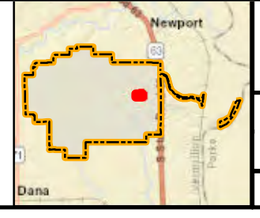
Legend

- Installation Boundary
- Area of Potential Interest (AOPI)
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)
- Groundwater Flow

0 75 150

SCALE: 1" = 75'

IN STATE PLANE WEST (NAD83)



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FIRE STATION (BUILDING 709A) AOPI
SAMPLE LOCATIONS
NEWPORT CHEMICAL DEPOT

FIGURE 6-19 | DATE: 4/19/2023

C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\SI\Additional Figures\Figure 6-19 Newport_FireStation.mxd

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

Fire Station
(Building 709A)

NECD-FSA-02 (SO)		
Analyte	3-5 ft.	5.5-7.5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND
PFBS (µg/kg)	ND	ND
PFHxS (µg/kg)	ND	ND
PFNA (µg/kg)	ND	ND
PFOS (µg/kg)	ND	ND
PFOA (µg/kg)	ND	ND

NECD-FSA-02 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	1 J
PFHxS (ng/L)	4.2
PFNA (ng/L)	4.7
PFOS (ng/L)	40
PFOA (ng/L)	39

NECD-FSA-03 (SO)				
Analyte	0-1 ft.	3-5 ft.	6-8 ft.	6-8 ft.(D)
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND	ND
PFNA (µg/kg)	0.58 J	0.4 J	ND	ND
PFOS (µg/kg)	3.3	5.6	0.86 J	0.28 J
PFOA (µg/kg)	0.77 J	ND	ND	ND

NECD-FSA-04 (SO)			
Analyte	0-1 ft.	1-3 ft.	3-5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	2	ND	ND
PFOS (µg/kg)	0.51 J	ND	ND
PFOA (µg/kg)	1.7	0.43 J	ND

NECD-FSA-01 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	1.3 J
PFHxS (ng/L)	1.4 J
PFNA (ng/L)	11
PFOS (ng/L)	7.5
PFOA (ng/L)	56

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

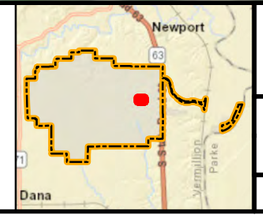
Legend
- Installation Boundary
- Area of Potential Interest (AOPI)
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)
- Groundwater Flow

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

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

0 75 150
SCALE: 1" = 75'

N
IN STATE PLANE WEST (NAD83)



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FIRE STATION (BUILDING 709A) AOPI
SAMPLE RESULTS
NEWPORT CHEMICAL DEPOT

FIGURE 6-20 | DATE: 4/19/2023

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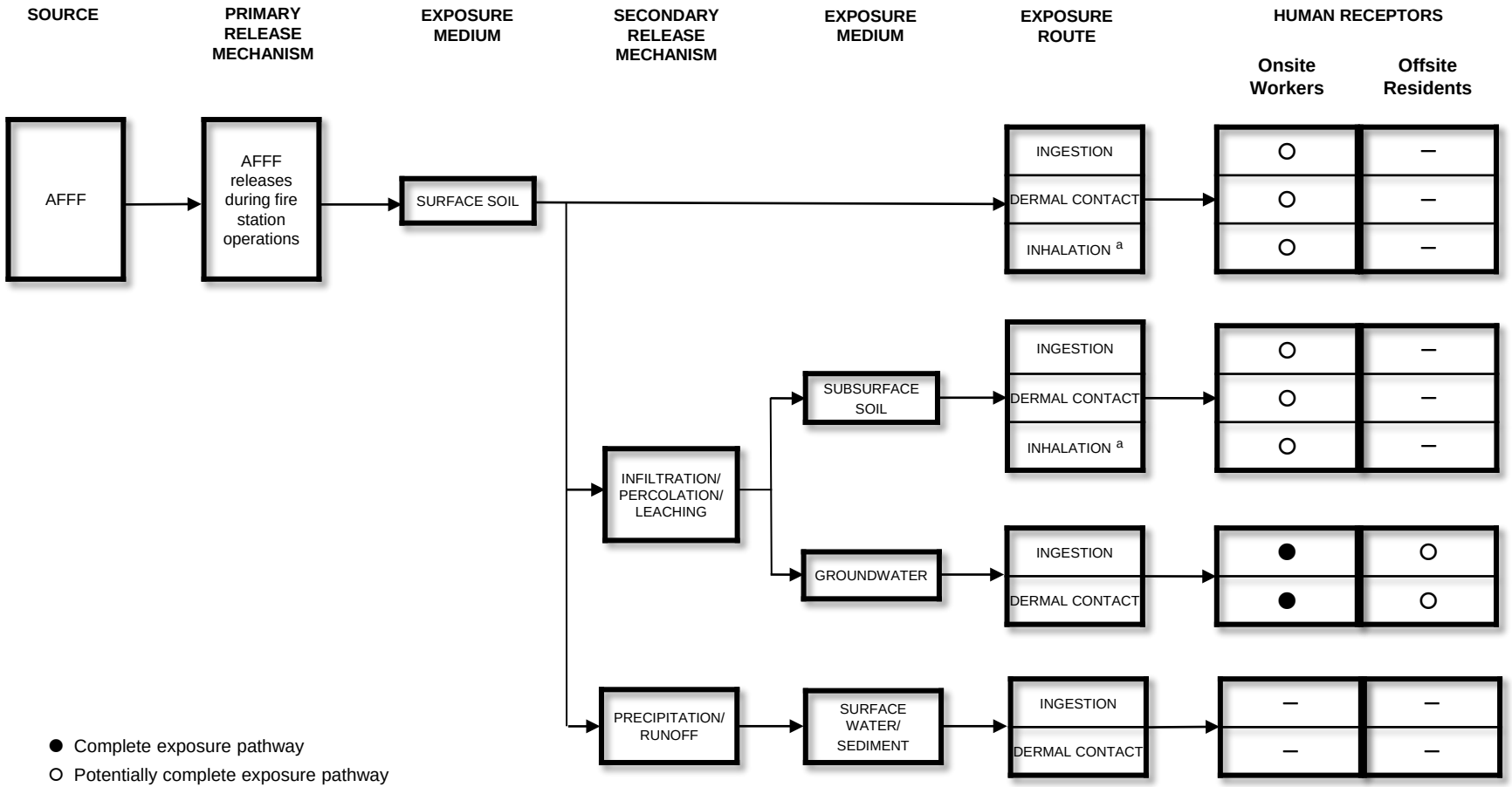
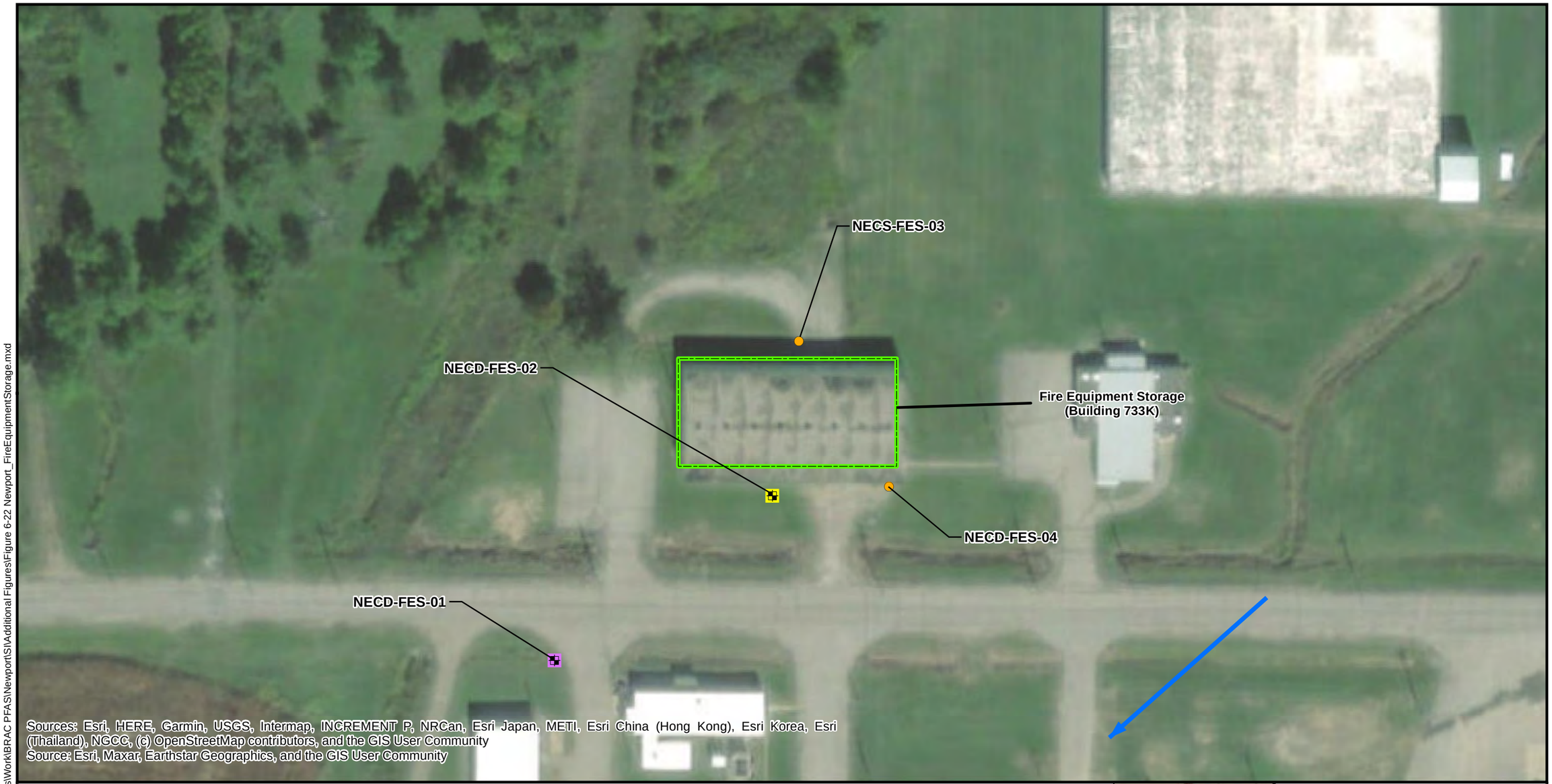


Figure 6-21. Human Health CSM for Fire Station (Building 709A) AOPI



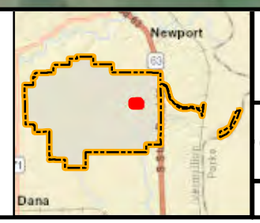
Legend

- Installation Boundary
- Area of Potential Interest (AOPI)
- Groundwater Flow
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)

0 75 150

SCALE: 1" = 75'

IN STATE PLANE WEST
N (NAD83)



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FIRE EQUIPMENT STORAGE
(BUILDING 733K) AOPI SAMPLE LOCATIONS
NEWPORT CHEMICAL DEPOT

FIGURE 6-22 | DATE: 4/19/2023

C:\Users\woodleych\Documents\Work\BRAC PFAS\Newport\SI\Additional Figures\Figure 6-22 Newport_FireEquipmentStorage.mxd

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

NECD-FES-03 (SO)			
Analyte	0-1 ft.	3-5 ft.	6.5-8.5 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	0.22 J	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	0.47 J	ND	ND
PFOA (µg/kg)	0.22 J	ND	ND

NECD-FES-02 (SO)				
Analyte	0-1 ft.	0-1 ft.(D)	5-7 ft.	8-10 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND	ND

NECD-FES-02 (GW)	
Analyte	15 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	4.5
PFHxS (ng/L)	2.7 J
PFNA (ng/L)	6.6
PFOS (ng/L)	4.6
PFOA (ng/L)	6.8

NECD-FES-01 (GW)	
Analyte	10 ft.
HFPO-DA or GenX (ng/L)	ND
PFBS (ng/L)	0.94 J
PFHxS (ng/L)	1.7 J
PFNA (ng/L)	ND
PFOS (ng/L)	1.9 J
PFOA (ng/L)	6.5

NECD-FES-04 (SO)			
Analyte	0-1 ft.	3-5 ft.	6-8 ft.
HFPO-DA or GenX (µg/kg)	ND	ND	ND
PFBS (µg/kg)	ND	ND	ND
PFHxS (µg/kg)	ND	ND	ND
PFNA (µg/kg)	ND	ND	ND
PFOS (µg/kg)	ND	ND	ND
PFOA (µg/kg)	ND	ND	ND

Fire Equipment Storage
(Building 733K)

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

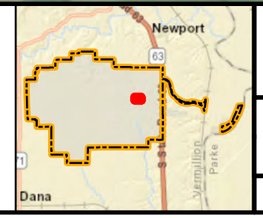
Legend
- Installation Boundary
- Area of Potential Interest (AOPI)
- Groundwater Flow
- DPT Groundwater Sample (1)
- DPT Groundwater Sample/Soil Boring (1)
- Soil Boring (2)

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

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

0 75 150
SCALE: 1" = 75'

IN STATE PLANE WEST (NAD83)



US Army Corps of Engineers
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FIRE EQUIPMENT STORAGE
(BUILDING 733K) AOPI SAMPLE RESULTS
NEWPORT CHEMICAL DEPOT

FIGURE 6-23 | DATE: 4/19/2023

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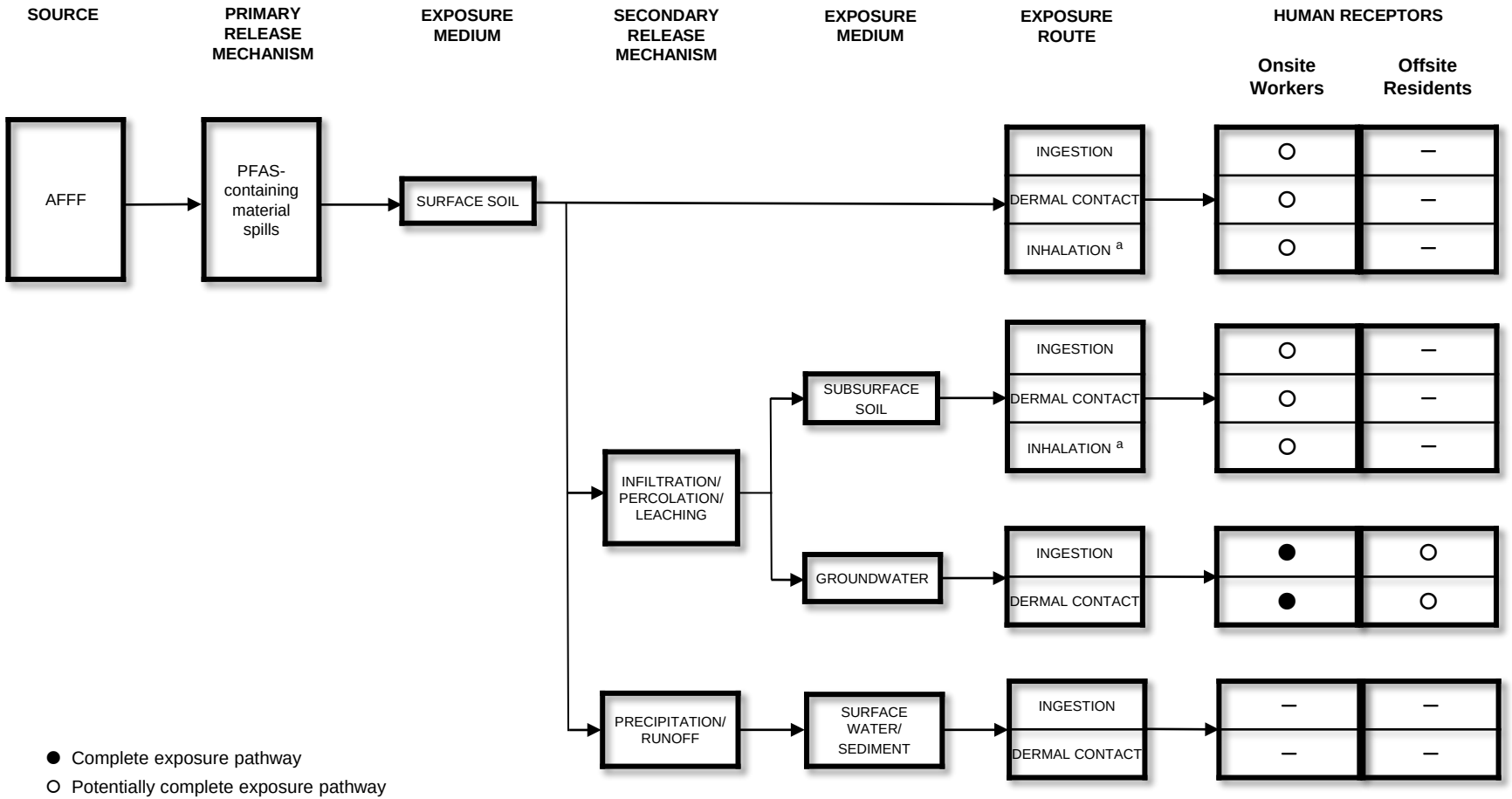

Figure 6-24. Human Health CSM for Fire Equipment Storage (Building 733K) AOPI