FINAL
Site Inspection Report
Facility Maintenance Shop #7
Norfolk, Nebraska

Site Inspections for Perfluorooctanoic Acid (PFOA), Perfluorooctanesulfonic Acid (PFOS), Perfluorohexanesulfonic Acid (PFHxS), Perfluorononanoic acid (PFNA), Hexafluoropropylene oxide dimer acid (HFPO-DA), and Perfluorobutanesulfonic Acid (PFBS)
ARNG Installations, Nationwide

October 2023

Prepared for

Army National Guard Headquarters
111 S. George Mason Drive
Arlington, VA 22204

UNCLASSIFIED

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
%	Percent
µg/kg	Microgram(s) per kilogram
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous film-forming foam
amsl	Above mean sea level
AOI	Area of Interest
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
bgs	Below ground surface
btoc	Below top of casing
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain-of-custody
CSM	Conceptual site model
DA	U.S. Department of the Army
DoD	Department of Defense
DPT	Direct-push technology
DQO	Data quality objective
DUA	Data usability assessment
EA	EA Engineering, Science, and Technology, Inc., PBC
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FB	Field blank
FMS	Facility Maintenance Shop
ft	Foot (feet)
HA	Health Advisory
HDPE	High-density polyethylene
HFPO-DA	Hexafluoropropylene oxide dimer acid
ID	Identification
IDW	Investigation-derived waste
ITRC	Interstate Technology Regulatory Council
K_{oc}	Organic carbon normalized distribution coefficient
LC/MS/MS	Liquid Chromatography/Tandem Mass Spectrometry

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

MIL SPEC	Military specification
MS	Matrix spike
MSD	Matrix spike duplicate
NEARNG	Nebraska Army National Guard
NELAP	National Environmental Laboratory Accreditation Program
ng/g	Nanogram(s) per gram
ng/L	Nanogram(s) per liter
No.	Number
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	Per- and polyfluoroalkyl substances
PFBS	Perfluorobutanesulfonic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PID	Photoionization detector
PVC	Polyvinyl chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
SI	Site Inspection
SL	Screening level
TOC	Total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

EXECUTIVE SUMMARY

The Army National Guard (ARNG) G-9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) (Assistant Secretary of Defense) dated 6 July 2022. The six compounds listed in the OSD memorandum include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide-dimer acid (HFPO-DA) [1]. These compounds are collectively referred to as "relevant compounds" throughout the document and the applicable screening levels (SLs) are provided below in **Table ES-1**.

The PA identified one Area of Interest (AOI) where PFAS-containing materials may have been used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOI identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on SLs for the relevant compounds. This SI was completed at the Norfolk Facility Maintenance Shop (FMS) #7 located in Norfolk, Nebraska and it was determined that no further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for the AOI 1 at this time. The Norfolk FMS #7 will be referred to as the "Facility" throughout this document.

The Facility, operated by the Nebraska ARNG (NEARNG), encompasses approximately 13.6 acres in Madison County, Nebraska, approximately 1 mile south of Norfolk, Nebraska. The Facility provides support through fleet maintenance on various vehicles including trucks, fire trucks, jeeps, and heavy equipment for several NEARNG units. The property has been owned and operated by the State of Nebraska since 2003 and was previously owned by the City of Norfolk. The Norfolk FMS #7 is located within the Elkhorn River Valley, approximately 2,300 feet southwest of the Elkhorn River (AECOM Technical Services, Inc. [AECOM] 2020).

The PA identified one AOI for investigation during the SI phase. SI sampling results from the AOI were compared to OSD SLs for the relevant compounds. **Table ES-2** summarizes the SI results for the AOI. Based on the results of this SI, no further evaluation under CERCLA is warranted at this time.

[1] Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model (CSM) developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

Table ES-1. Screening Levels (Soil and Groundwater)

Analyte	Residential (Soil) (µg/kg)[1] 0-2 ft bgs	Industrial/Commercial Composite Worker (Soil) (µg/kg)[1] 2-15 ft bgs	Tap Water (Groundwater) (ng/L)[1]
PFOA	19	250	6
PFOS	13	160	4
PFBS	1,900	25,000	601
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:
1. Assistant Secretary of Defense. 2022. Risk Based Screening Levels Calculated for Groundwater and Soil using U.S. Environmental Protection Agency's Regional SL Calculator. Hazard Quotient (HQ) = 0.1. July 2022.
2. Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

bgs = Below ground surface
µg/kg = Microgram(s) per kilogram
ng/L = Nanogram(s) per liter

Table ES-2. Summary of Site Inspection Findings and Recommendations

AOI	Potential Release Area	Soil Source Area	Groundwater Source Area	Groundwater Facility Boundary	Future Action
1	Firetruck Storage Building	◐	◐	◐	No Further Action

Legend:
● = Detected; exceedance of screening levels.
◐ = Detected; no exceedance of screening levels.
○ = Not detected.

1. INTRODUCTION

1.1 PROJECT AUTHORIZATION

The Army National Guard (ARNG) G-9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) dated 6 July 2022 (Assistant Secretary of Defense 2022). The six compounds listed in the OSD memorandum will be referred to as "relevant compounds" throughout this document and include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide-dimer acid (HFPO-DA)[2] at ARNG facilities nationwide. The ARNG performed this SI at the Norfolk Facility Maintenance Shop (FMS) #7 located in Norfolk, Nebraska. The Norfolk FMS#7 will be referred to as the "Facility" throughout this document.

The SI project elements were performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (U.S. Environmental Protection Agency [USEPA] 1980), as amended; the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300) (USEPA 1994); and in compliance with U.S. Department of the Army (DA) requirements and guidance for field investigations.

1.2 SITE INSPECTION PURPOSE

A PA was performed at the Norfolk FMS #7 (AECOM Technical Services, Inc. [AECOM] 2020) that identified one Area of Interest (AOI) where PFAS-containing materials may have been used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOI identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on screening levels (SLs) for the relevant compounds.

[2] Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model (CSM) developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

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2. FACILITY BACKGROUND

2.1 FACILITY LOCATION AND DESCRIPTION

Norfolk FMS #7 is located in Madison County, Nebraska, approximately 1 mile south of Norfolk, Nebraska. The facility is adjacent to the Norfolk Regional Airport (**Figure 2-1**). Norfolk FMS#7 is accessible from North Airport Road. Norfolk FMS #7 provides maintenance support for several Nebraska ARNG (NEARNG) units by performing fleet maintenance on various vehicles including trucks, fire trucks, jeeps, and heavy equipment. The Facility contains five work bays that accommodate five vehicles, allowing 30 to 50 vehicles to undergo maintenance at any time. The Norfolk FMS #7 was constructed on a parcel of land that is approximately 13.6 acres and has been owned and operated by the State of Nebraska since 2003. Before 2003, the City of Norfolk owned and operated the land. The Norfolk FMS #7 building was built between May 2003 and December 2004. The facility consists of the Administration and Maintenance Hangar, oil/water separator system, an unheated storage building, and parking lots (AECOM 2020).

2.2 FACILITY ENVIRONMENTAL SETTING

Norfolk FMS #7 is in the Elkhorn River Valley. The facility is approximately 2,300 feet (ft) south of the Elkhorn River with farmland to the east and west. There are five lakes located within 3 miles of the facility. Mendelmans Lake, Andys Lake, Pofahl Lake, and Lehman Lake are located to the east of the facility, and Saras Lake is located to the north. The elevation of the facility is approximately 1,573 ft above mean sea level (amsl) (AECOM 2020).

The following sections include information on geology, hydrogeology, hydrology, climate, and current and future land use. The topography at Norfolk FMS #7 is shown on **Figure 2-2**. The regional geology and groundwater features are shown on **Figure 2-3**. The regional surface water features and drainage basins are shown on **Figure 2-4**. Groundwater elevations and contours are presented on **Figure 2-5**.

2.2.1 Geology

Norfolk FMS #7 lays within the middle of the Great Plains. The soil present at the Norfolk FMS #7 is a shallow low-permeability layer that is typically between 3 and 8 ft thick, although the depth and thickness vary considerably under the Facility. This soil layer impacts groundwater flow under the Facility. The surface geology at the facility consists of unconsolidated Quaternary sediments, which consist of gravel, silts, and clays. These sediments can range in thickness in Madison County, from slightly less than 50 ft in the Elkhorn River Valley to as much as 400 ft in the uplands area. Under this layer, there are rock layers that are roughly 59 to 69 ft thick. The uppermost bedrock unit underlying the Norfolk FMS #7 is the Cretaceous age Niobrara Chalk (AECOM 2020).

During the SI, the soil underling the Facility was found to be generally composed of organic silt, very fine sand, low plasticity silty sand, and some medium to high plasticity sandy clays. The borings were completed at depths ranging from 20 to 22 ft below ground surface (bgs). Samples for grain size analyses were collected at one location (AOI01-03) and analyzed via American

Society for Testing and Materials (ASTM) Method D-422. The results indicate that the soil samples are comprised primarily of sand (77.5 Percent [%]) and silt and clay (22.5%). Boring logs are presented in **Appendix D** and grain size results are presented in **Appendix E**.

2.2.2 Hydrogeology

The Norfolk FMS #7 has a groundwater table that is approximately 18 to 20 ft bgs, although history shows it has been shallower at depths ranging from 5 to 15 ft bgs. It is common to see groundwater elevation fluctuate approximately 5 ft due to high uses of irrigation and occasional droughts. The most fluctuation recorded was a 10-ft change between 2006 and 2009, but it was not significant enough to raise the groundwater level to intercept the shallow low-permeability soil layer. This layer is within the vadose zone throughout the year, except on a rare occasion of an elevated water table (AECOM 2020).

The primary sources of groundwater in Madison County are from the sand and gravels that overly the bedrock in most of the county. The Niobrara Chalk is a significant source of water, as water can be obtained from fractures, crevices, and solution cavities within the chalk. Although as adequate amounts of water can generally be obtained from the Quaternary sands and gravels in the area, the Niobrara Chalk is not exclusively used (AECOM 2020).

There is one domestic water well located within the boundary of the Facility. This domestic well is used to supply drinking water to the facility. The well depth is approximately 60 ft deep with a water pumping level of 29 ft. The well is located on the south side of the facility. There are several additional domestic, commercial/industrial, monitoring, livestock, and unknown well types located cross-gradient and within a 1-mile radius of the Facility (AECOM 2020) (**Figure 2-3**).

Depths to water measured in December 2021 during the SI ranged from approximately 17 to 21 ft bgs during synoptic water level measurements. Total boring completion depths, to accommodate temporary well installation, ranged from 20 to 22 ft bgs. Groundwater elevation contours from the SI are presented on **Figure 2-5** and indicate the groundwater flow direction at Norfolk FMS #7 is primarily to the north based on calculated groundwater elevations (**Figure 2-5**).

2.2.3 Hydrology

The Facility is approximately 2,300 ft south of the Elkhorn River. The Elkhorn River, including all its tributaries, drains nearly 94 % of Madison County. The Elkhorn River generally flows from west to east and eventually drains into the Platte River approximately 80 miles from the Facility. Surface water flow direction at the facility is to the north towards the Elkhorn River (**Figure 2-4**). The Facility is located in the Elkhorn River drainage area. Stormwater from the Facility drains into the Elkhorn River through various drainage ditches on the northern side. In addition, surface water drains off the Facility into ponds or lakes surrounding the area before ultimately flowing in the Elkhorn River (AECOM 2020).

2.2.4 Climate

The climate at Norfolk FMS #7 has four defined seasons in which summers are warm and humid, winters are typically dry with light snow, and spring months tend to produce high amounts of thunderstorms and even tornadoes. Temperatures vary from average highs of 60.5 degrees Fahrenheit (°F) to average lows of 38°F. The average annual temperature is 49.25°F. Average precipitation is 27.42 inches of rain (AECOM 2020).

2.2.5 Current and Future Land Use

The Norfolk FMS #7 is a fenced, controlled access facility and is adjacent to the Norfolk Regional Airport. Reasonably anticipated future land use is not expected to change from the current land use; however, future infrastructure improvements, land acquisitions, and land use controls are unknown (AECOM 2020).

2.2.6 Sensitive Habitat and Threatened/Endangered Species

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

The following species are listed as federally endangered, threatened, proposed, and/or candidate species in Madison County, Nebraska (U.S. Fish and Wildlife Service 2022):

- **Birds:** Piping Plover (*Charadrius melodus*) – Federally Threatened; Whooping Crane (Grus americana) – Federally Endangered
- **Fishes:** Pallid Sturgeon (*Scaphirhynchus albus*) – Federally Endangered; Topeka Shiner (*Notropis topeka*) – Federally Endangered
- **Flowering Plants:** Western Prairie Fringed Orchid (*Platanthera praeclara*) – Federally Threatened
- **Insects:** Monarch Butterfly (Danaus plexippus) – Federal Candidate
- **Mammal:** Northern Long-eared Bat (*Myotis septentrionalis*) – Federally Threatened.

2.3 HISTORY OF PFAS USE

One potential PFAS release area was identified at the Facility during the PA where aqueous film-forming foam (AFFF) was stored (AECOM 2020). Interviews and records obtained during the PA indicate that the Firetruck Storage Building stores four firetrucks, two of which are capable of holding aqueous AFFF. Additionally, eight 55-gallon drums of AFFF are stored within the building. A description of the AOI is presented in **Section 3**.

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Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

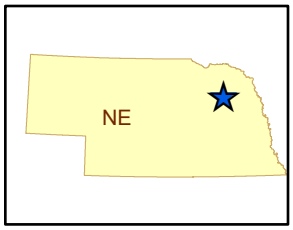
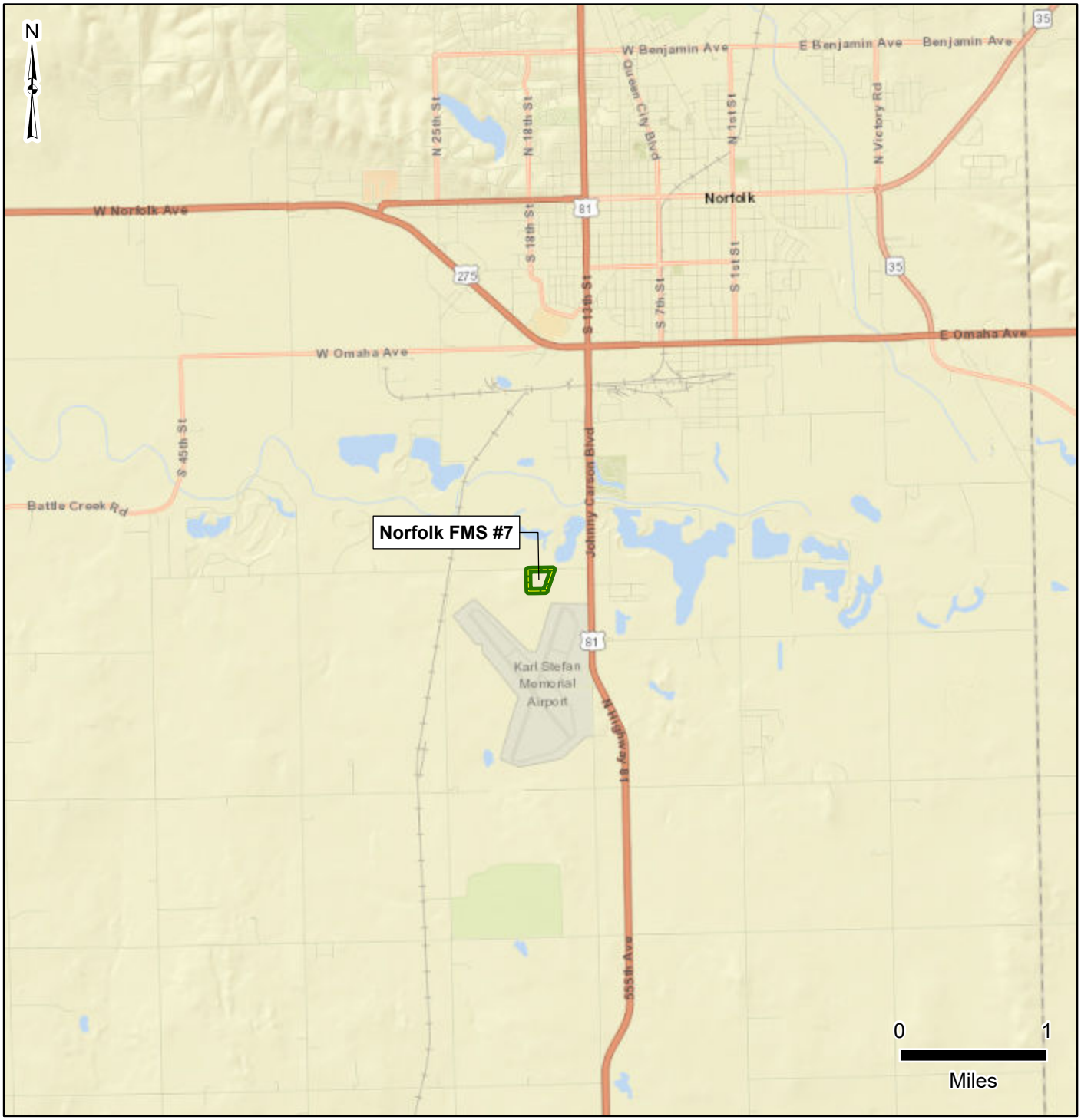


Figure 2-1
Facility Location



Facility Data

Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

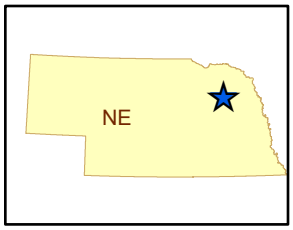

Figure 2-2
Topography

Facility Data

Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

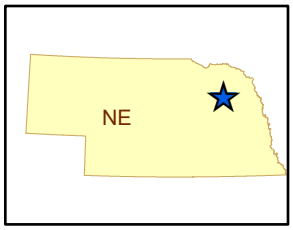
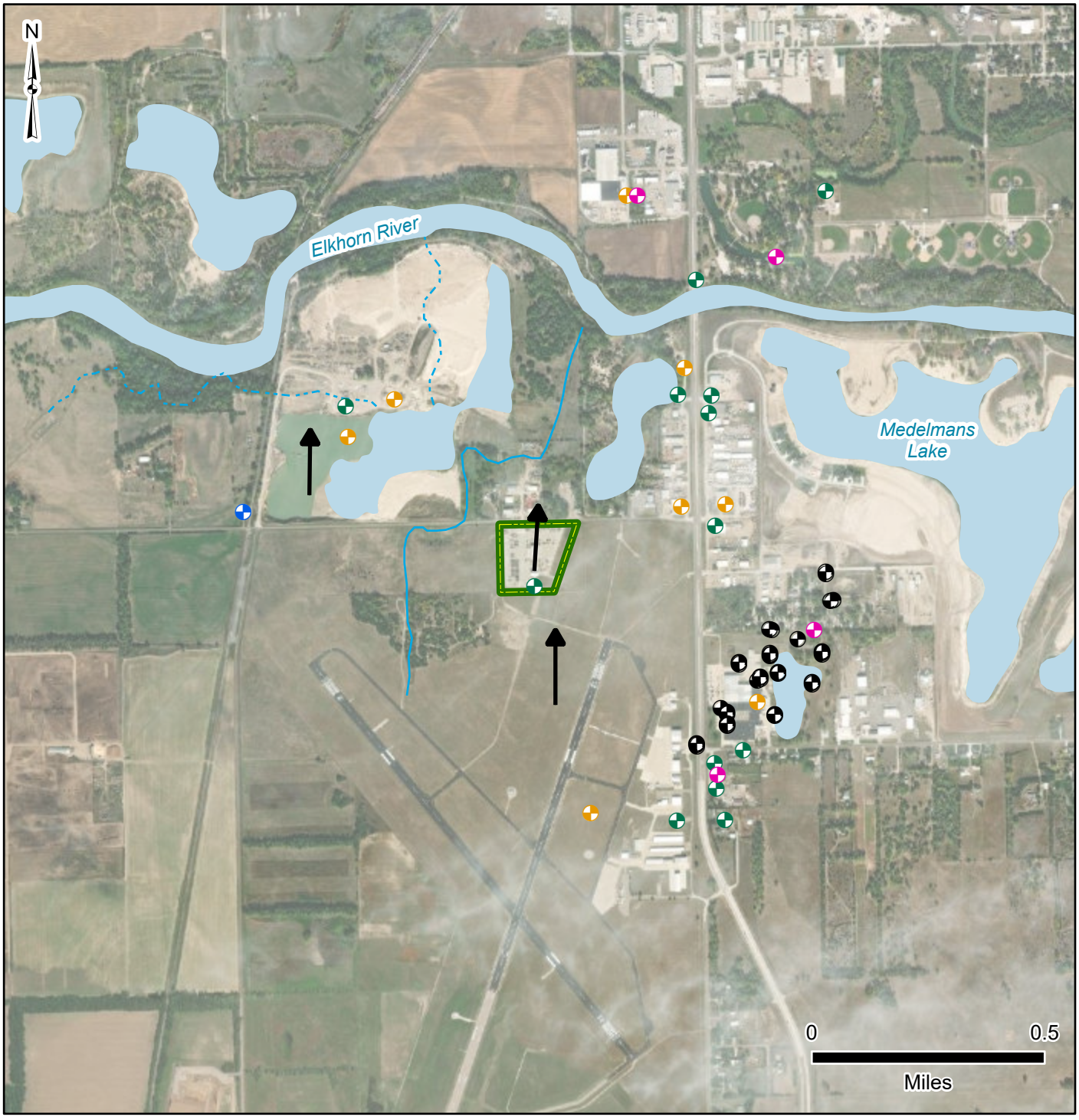


Figure 2-3
Groundwater Features



Facility Data
- Facility Boundary

Well Type
- Domestic
- Commercial/Industrial
- Livestock
- Monitoring/Observation/Recovery
- Other/Unknown

Hydrology/Hydrogeology
- Inferred Groundwater Flow Direction
- Intermittent Creek/Stream
- Waterbody

Data Sources:
ESRI 2020
AECOM 2020

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

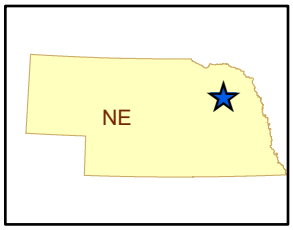
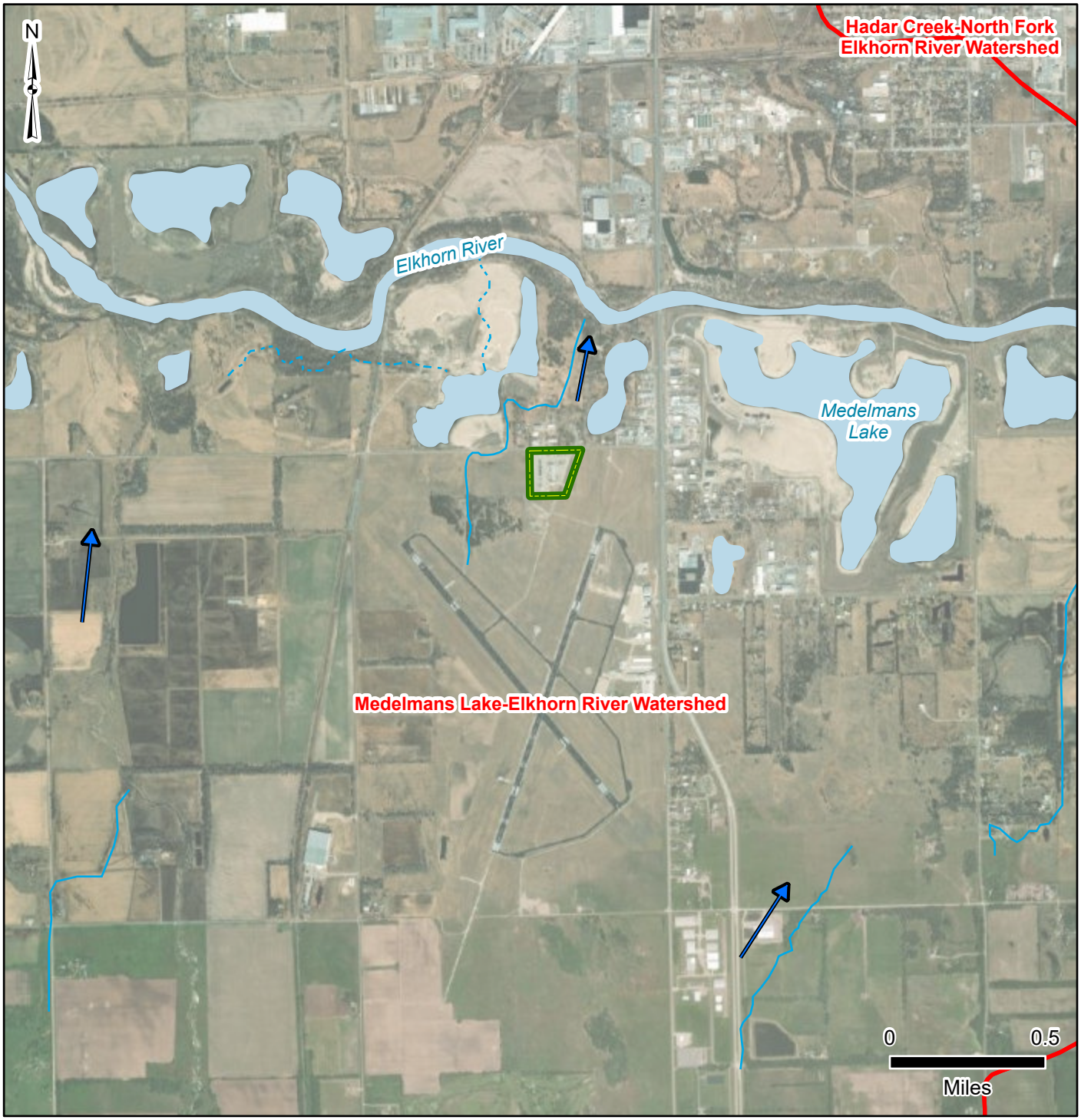


Figure 2-4
Surface Water Features



Facility Data
- Facility Boundary

Hydrology/Hydrogeology
- Surface Water Flow Direction
- Intermittent Creek/Stream
- Waterbody
- Watershed Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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Army National Guard Site Inspections
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Norfolk FMS #7, Nebraska

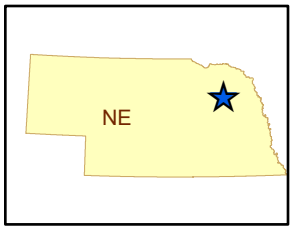
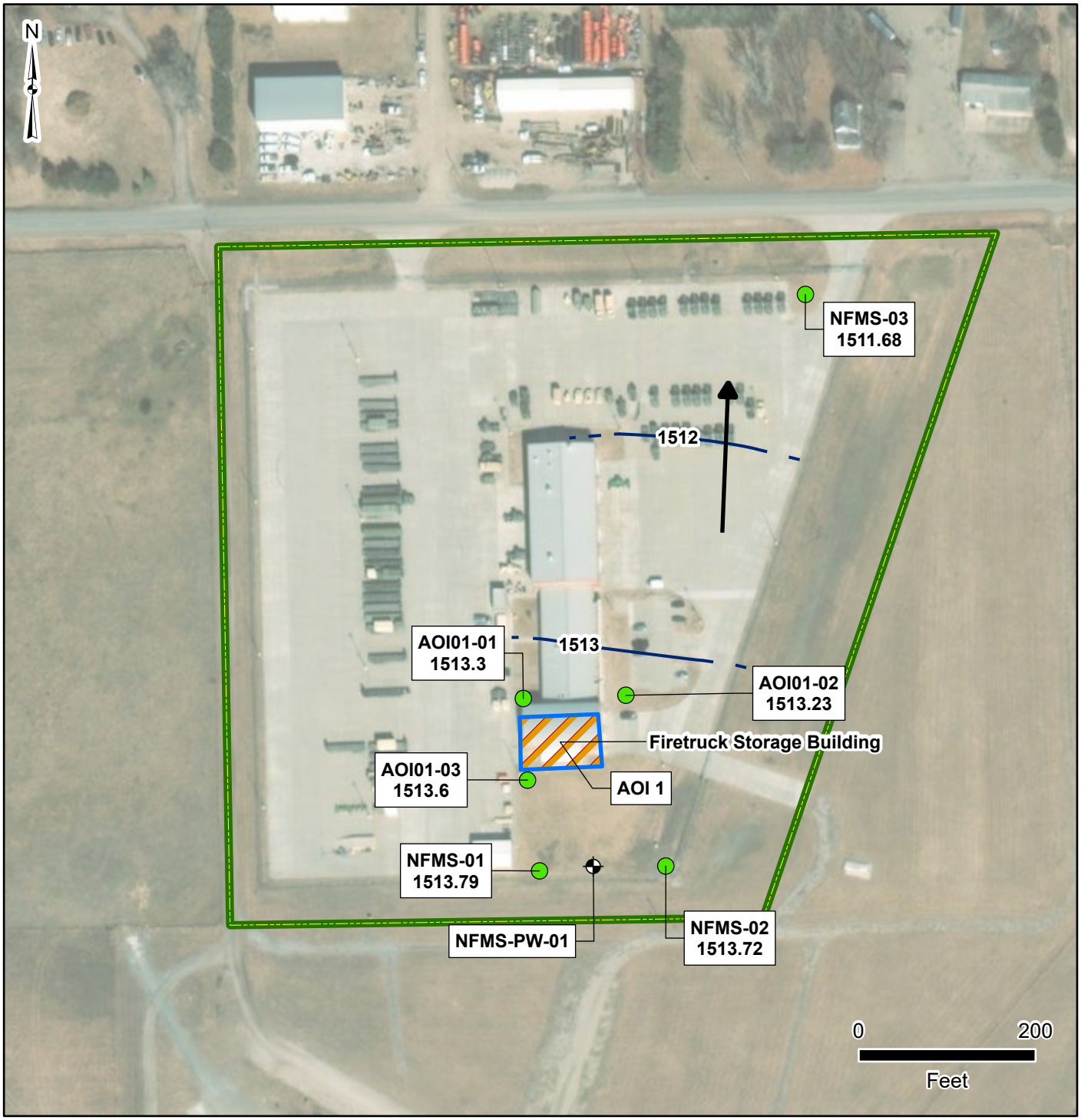


Figure 2-5
Groundwater Elevations, December 2021



Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction
- Groundwater Contour Interval (1 Foot)
- Dashed where Inferred

Data Sources:
ESRI 2020
AECOM 2020

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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3. SUMMARY OF AREAS OF INTEREST

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, one potential release area was identified at Norfolk FMS #7 and identified as AOI 1 Firetruck Storage Building. The potential release area and Norfolk Regional Airport (a potential adjacent source) are shown on **Figure 3-1**.

3.1 AOI 1 – FIRETRUCK STORAGE BUILDING

The Norfolk FMS #7 Firetruck Storage Building is located at the south end of the Facility. The Firetruck Storage Building holds four permanent firetrucks. Of the four firetrucks, two can hold only water, while the other two have the capability of holding AFFF. According to the PA, the firetrucks that have the capability to hold AFFF have never been filled with AFFF concentrate. The firetrucks are 15 years old and are tested annually for hose pressure with water only. There were no reported leaks from any of the firetrucks dating back to 2014. Based on interviewee knowledge, the firetrucks were only stored at the Facility and no maintenance on the firetrucks occurred. There are floor drains in the Firetruck Storage Building leading to an oil/water separator, which discharges to the stormwater system on the north side of the Facility (AECOM 2020).

Additionally, the Firetruck Storage Building contains eight 55-gallon drums of 3% AFFF. It could not be confirmed if the firetrucks and bulk AFFF are used at the Facility. The personnel with direct knowledge of the activities at the Facility prior to 2014 were on military deployment during the PA; therefore, information prior to 2014 regarding the AFFF is unknown (AECOM 2020).

There are ABC handheld fire extinguishers present at the Facility. No AFFF fire extinguishers were ever present at the facility (AECOM 2020).

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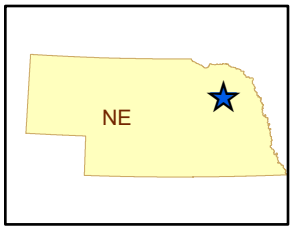
Figure 3-1
Areas of Interest



Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Well Type
- Domestic

Hydrology/Hydrogeology
- Surface Water Flow Direction
- Groundwater Flow Direction
- Waterbody

Data Sources:
ESRI 2020
AECOM 2020

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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4. PROJECT DATA QUALITY OBJECTIVES

As identified during the data quality objective (DQO) process and outlined in the SI Uniform Federal Policy (UFP) – Quality Assurance Project Plan (QAPP) Addendum (EA 2021a), the objective of the SI is to identify whether there has been a release to the environment at the AOI identified in the PA. For each AOI, ARNG determines if further investigation is warranted, a removal action is required to address immediate threats, or whether no further action is warranted. This SI evaluated groundwater and soil for presence or absence of relevant compounds at the AOI.

4.1 PROBLEM STATEMENT

ARNG will recommend an AOI for remedial investigation (RI) if site-related soil and groundwater samples have concentrations of the relevant compounds above the OSD risk-based SLs. The SLs are presented in **Section 6.1** of this report.

4.2 INFORMATION INPUTS

Primary information inputs for the SI include the following:

- The PA Report for the Norfolk FMS #7 (AECOM 2020)
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific UFP-QAPP Addendum (EA 2021a)
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling

4.3 STUDY BOUNDARIES

The scope of the SI was bounded horizontally by the property limits of the Facility (**Figure 2-1**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). Temporal boundaries were limited to the earliest available time field resources were available to complete the study.

4.4 ANALYTICAL APPROACH

Samples were analyzed by Eurofins Lancaster Laboratories Environmental LLC, accredited under the Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP); Accreditation No. 0001.01 and the National Environmental Laboratory Accreditation Program (NELAP) (Commonwealth of Pennsylvania Department of Environmental Protection, Accreditation No. 36-00037). PFAS data underwent 100% Stage 2B validation in accordance with the DoD General Data Validation Guidelines (2019b) and DoD Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual (QSM) Table B-15 (2020).

PFAS data were compared to applicable SLs and decision rules as defined in the UFP-QAPP Addendum (EA 2021a).

4.5 DATA USABILITY ASSESSMENT

The Data Usability Assessment (DUA), which is provided in **Appendix A**, is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision making (DoD 2019a, 2019b, USEPA 2017).

Based on the DUA, the environmental data collected during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUA and its associated data validation reports. These data are of sufficient quality to meet the objectives and requirements of the UFP-QAPP Addendum (EA 2021a).

5. SITE INSPECTION ACTIVITIES

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

- *Final Preliminary Assessment Report, Norfolk Facility Maintenance Shop #7, Nebraska*, dated September 2020 (AECOM 2020)

- *Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide*, dated December 2020 (EA 2020a)

- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Norfolk Facility Maintenance Shop #7, Nebraska*, dated October 2021 (EA 2021a)

- *Final Programmatic Accident Prevention Plan, Revision 1*, dated November 2020 (EA 2020b)

- *Final Site Safety and Health Plan, Norfolk Facility Maintenance Shop #7, Nebraska*, dated March 2021 (EA 2021b)

The SI field activities were conducted on 8 and 9 December 2021 and consisted of DPT boring, hand auger boring, soil sample collection, temporary monitoring well installation, and grab groundwater sample collection. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a), except as noted in **Section 5.9**. Field Change Request Forms can be found in **Appendix B4**.

The following samples were collected during the SI and analyzed for a subset of 24 PFAS compounds via Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) compliant with QSM Version 5.3 Table B-15 to fulfill the project DQOs:

- Twenty (20) soil samples from six soil boring and one hand auger locations
- Six (6) grab groundwater samples from six temporary well locations
- Six (6) quality assurance (QA)/quality control (QC) samples

Figure 5-1 provides the sample locations for all media across the Facility. **Table 5-1** presents the list of samples collected for each medium. Field documentation is provided in **Appendix B**. A log of Daily Notice of Field Activity was completed throughout the SI field activities, which is provided in **Appendix B1**. Sampling forms are provided in **Appendix B2**. Land survey data is provided in **Appendix B3**. Photographs were not collected during this field effort.

5.1 PRE-INVESTIGATION ACTIVITIES

In preparation for the SI field activities, project team members participated in Technical Project

Planning (TPP) meetings, performed utility clearance, and sampled decontamination source water. Details of these activities are presented below.

5.1.1 Technical Project Planning

The U.S. Army Corps of Engineers (USACE) TPP Process, Engineer Manual (EM) 200-1-2 (Department of Army 2016) defines four phases to project planning: (1) defining the project phase; (2) determining data needs; (3) developing data collection strategies; and (4) finalizing the data collection plan. The process encourages stakeholder involvement in the SI, beginning with defining overall project objectives, including DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 21 September 2021, prior to SI field activities with stakeholders. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include ARNG G-9, NEARNG, USACE, and the Nebraska Department of Environment and Energy representatives familiar with the Facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the UFP-QAPP Addendum (EA 2022).

A TPP Meeting 3 was held on 15 August 2023 to discuss the results of the SI. Meeting minutes for TPP 3 are included in **Appendix C** of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

The 811 Nebraska Dig line was contracted to notify them of intrusive work at the Facility. Utility clearance was performed at each of the proposed boring locations on 1 December 2021 with input from the EA field team. Additionally, the first 5 ft of each boring were pre-cleared by EA's drilling subcontractor, Plains Environmental Services, Inc., using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

A sample from a potable water source at EA's office in Lincoln, Nebraska, was collected on 10 November 2021, prior to mobilization. Results of the sample confirmed this source to be acceptable for use in this investigation; therefore, it was used throughout the field activities. Specifically, the same was analyzed for PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15. These results can be found in **Appendix E**.

Materials that were used within the sampling zone were confirmed as acceptable for use in the PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling environment was provided in the Standard Operating Procedures appendix (Appendix A) to the Programmatic UFP-QAPP (EA 2020a).

5.2 SOIL BORINGS AND SOIL SAMPLING

Soil samples were collected using a hand auger (0 to 2 ft bgs) and via DPT drilling methods in accordance with Standard Operating Procedure 047 *Direct-Push Technology Sampling* (EA 2021a). A GeoProbe® 5410 truck-mounted dual-tube sampling system was used to collect continuous soil cores to the target depth. A hand auger was used to remove soil from the top 5 ft of the boring in compliance with utility clearance procedures.

Three discrete soil samples were collected for chemical analysis from each soil boring: one sample at the surface (0 to 2 ft bgs) and two subsurface soil samples. One boring (AOI01-03) included an additional discrete subsurface soil sample (i.e., four total samples from this boring), which was inadvertently analyzed for PFAS from the 17–18 ft bgs interval that was sampled for geotechnical analyses. One subsurface soil sample was collected approximately 1 ft above the groundwater table, and one was collected at the mid-point between the surface and the groundwater table (not to exceed 15 ft bgs). Groundwater was encountered at depths ranging from 14 to 18 ft bgs during drilling. Total boring completion depths, to accommodate temporary well installation, ranged from 20 to 22 ft bgs.

All soil sample locations are shown on **Figure 5-1**, and boring sample depths are provided in **Table 5-1**. The soil boring locations were selected based on the AOI information provided in the PA (AECOM 2020) and as agreed upon by stakeholders during the TPP and review of the UFP-QAPP Addendum (EA 2021a).

During the drilling, the soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System. A photoionization detector (PID) was used to screen the breathing zone during boring activities as a part of personal safety requirements. Observations and measurements were recorded on sampling forms (**Appendix B2**) and in a non-treated field logbook. Depth interval, recovery thickness, PID concentrations, moisture, relative density, Munsell color, and Unified Soil Classification System texture were recorded. The boring logs are provided in **Appendix D**.

Each sample was collected into a laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottle and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard chain-of-custody (COC) procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table B-15). One sample per AOI was additionally analyzed for total organic compound (TOC) (USEPA Method 9060A), pH (USEPA Method 9045D), and grain size (ASTM D422) in accordance with the UFP-QAPP Addendum (EA 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. Matrix spike (MS)/matrix spike duplicates (MSDs) were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. In instances when non-dedicated sampling equipment was used, such as a hand auger for the shallow soil samples, one equipment blank was collected per day and analyzed for the same parameters as the soil samples. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6 degrees Celsius (°C) during shipment.

DPT borings were converted to temporary wells, which were subsequently abandoned after sampling and surveying in accordance with the UFP-QAPP Addendum (EA 2021a). After removal of the casings, boreholes were abandoned using bentonite chips. Borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces.

5.3 TEMPORARY WELL INSTALLATION AND GROUNDWATER GRAB SAMPLING

Temporary wells were installed using a GeoProbe® 5410 truck-mounted dual-tube sampling system. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 5-ft section of 1-inch Schedule 40 polyvinyl chloride (PVC) screen with sufficient casing to reach the ground surface. New PVC pipe and screen were used at each location to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

Groundwater samples were collected, after a period of time following well installation to allow groundwater to infiltrate and recharge the temporary well intervals, using a peristaltic pump with PFAS-free HDPE tubing. Each sample was collected in laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, and oxidation reduction potential) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) before each grab sample was collected in a separate container. Samples were packaged on ice and transported via FedEx under standard COC procedures to the laboratory and analyzed for PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 in accordance with the UFP-QAPP Addendum (EA 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/ MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. One field blank (FB) and one equipment blank were collected in accordance with the UFP-QAPP Addendum (EA 2021a). A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6°C during shipment.

DPT borings were converted to temporary wells, which were subsequently abandoned in accordance with the UFP-QAPP Addendum (EA 2021a) using bentonite chips and surface completion material (native topsoil material) at completion of sampling activities.

5.4 SYNOPTIC WATER LEVEL MEASUREMENTS

Groundwater levels were used to monitor facility-wide groundwater elevations and assess groundwater flow. Synoptic water level elevation measurements were collected from the newly installed temporary monitoring wells, taken from the survey mark on the northern side of the well casing. Groundwater elevation data are provided in **Table 5-3**.

5.5 SURVEYING

The northern side of each new temporary well casing was surveyed using a Trimble R10 real-time kinematic differential global positioning system. Positions were collected in the applicable Universal Transverse Mercator zone projection with World Geodetic System 1984 datum (horizontal) and North American Vertical Datum of 1988 (vertical). Surveying data were collected on 9 December 2021 and are provided in **Appendix B3**.

5.6 INVESTIGATION-DERIVED WASTE

As of the date of this report, the disposal of PFAS investigation-derived waste (IDW) is not regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the UFP-QAPP Addendum (EA 2021a).

Soil IDW (i.e., soil cuttings) was left in place at the point of source. The soil cuttings were distributed on the downgradient side of the borehole. The liquid IDW (i.e., purge water, development water, and decontamination fluids) generated during the SI activities was containerized in one 55-gallon drum, which was labeled and secured in a building along the southern Facility boundary fence. The liquid IDW container remains at the Facility awaiting disposal following USACE, ARNG, and regulatory approval of a Letter Work Plan for IDW Disposal. The Letter Work Plan will be submitted for review and approval upon issuance of the Draft Final SI Report.

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

5.7 LABORATORY ANALYTICAL METHODS

Samples were analyzed for PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 at Eurofins Lancaster Laboratories Environmental, LLC, in Lancaster, Pennsylvania, a DoD ELAP and National Environmental Laboratory Accreditation Program-certified laboratory.

A select number of soil samples were also analyzed for TOC using USEPA Method 9060A, pH by USEPA Method 9045D, and grain size by ASTM D422.

5.8 DEVIATIONS FROM UFP-QAPP ADDENDUM

Deviations from the UFP-QAPP Addendum occurred based on field conditions. These deviations were discussed between EA, ARNG, and USACE. One deviation from the UFP-QAPP Addendum is noted below:

- AOI01-HA-01: This surface soil sampling location was moved to a grassy area that was more in line with the preferential drainage pathway from the potential release associated with the Firetruck Storage Building. This change is noted in the Field Change Request Form provided in **Appendix B4**.

An additional deviation occurred that was not documented on a Field Change Request Form. Photographs of field activities were not collected during the SI; therefore, no photographic log is presented in this SI report.

Table 5-1. Samples by Medium
Norfolk FMS #7, Norfolk, Nebraska
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (QSM Version 5.3 Table B-15)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
Soil Samples							
AOI01-01-SB-0-2	12/09/2021	0-2	X				
AOI01-11-SB-0-2	12/09/2021	0-2	X				Field duplicate of AOI01-01-SB-0-2
AOI01-01-SB-7-8	12/09/2021	7-8	X				
AOI01-01-SB-15-16	12/09/2021	15-16	X				
AOI01-02-SB-0-2	12/09/2021	0-2	X				
AOI01-02-SB-8-9	12/09/2021	8-9	X				
AOI01-02-SB-16-17	12/09/2021	16-17	X				
AOI01-13-SB-0-2	12/09/2021	0-2	X				Field duplicate of AOI01-03-SB-0-2
AOI01-03-SB-0-2	12/09/2021	0-2	X				
AOI01-03-SB-7-8	12/09/2021	7-8	X				
AOI01-03-SB-14-15	12/09/2021	14-15	X				
AOI01-03-SB-17-18	12/09/2021	17-18	X	X	X	X	pH/TOC and grainsize
NFMS-01-SB-0-2	12/09/2021	0-2	X				
NFMS-01-SB-6-7	12/09/2021	6-7	X				MS/MSD
NFMS-01-SB-13-14	12/09/2021	13-14	X				
NFMS-02-SB-0-2	12/09/2021	0-2	X				
NFMS-02-SB-6-7	12/09/2021	6-7	X				
NFMS-02-SB-13-14	12/09/2021	13-14	X				
NFMS-03-SB-0-2	12/09/2021	0-2	X				
NFMS-03-SB-6-7	12/09/2021	6-7	X				
NFMS-03-SB-14-15	12/09/2021	14-15	X				
AOI01-HA-01-0-2	12/09/2021	0-2	X				
Groundwater Samples							
AOI01-01-GW	12/09/2021	-	X				
AOI01-11-GW	12/09/2021	-	X				Field duplicate of AOI01-01-GW
AOI01-02-GW	12/09/2021	-	X				
AOI01-03-GW	12/09/2021	-	X				
NFMS-01-GW	12/09/2021	-	X				
NFMS-02-GW	12/09/2021	-	X				
NFMS-03-GW	12/09/2021	-	X				
Blank Samples/Source Water							
NFMS-FB-12092021	12/09/2021	-	X				Field blank
NFMS-EB-12092021	12/09/2021	-	X				Equipment blank
DECON_TEST_111021	11/10/2021	-	X				Source Water

Table 5-2. Soil Boring Depths and Temporary Well Screen Intervals
Norfolk FMS #7, Norfolk, Nebraska
Site Inspection Report

Area of Interest	Boring ID	Soil Boring Depth (ft bgs)	Temporary Well Screen Interval (ft bgs)
1	AOI01-01	22	16-21
	AOI01-02	22	17-22
	AOI01-03	20	15-20
Facility Boundary	NFMS-01	20	13-18
	NFMS-02	20	13-18
	NFMS-03	20	15-20

Table 5-3. Groundwater Elevations
Norfolk FMS #7, Norfolk, Nebraska
Site Inspection Report

Temporary Monitoring Well ID	Top of Casing Elevation (ft amsl)	Depth to Water (ft btoc)	Depth to Water (ft bgs)	Groundwater Elevation (ft amsl)
AOI01-01	1534.35	21.05	18.51	1513.30
AOI01-02	1534.20	20.97	18.14	1513.23
AOI01-03	1531.93	18.33	17.83	1513.60
NFMS-01	1532.58	18.79	16.69	1513.79
NFMS-02	1531.12	17.4	15.10	1513.72
NFMS-03	1529.15	17.47	16.54	1511.68

Notes:
amsl = Above mean sea level
bgs = Below ground surface
btoc = Below top of casing
ft = feet
ID = Identification

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Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

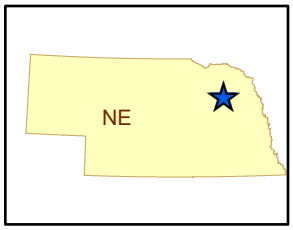
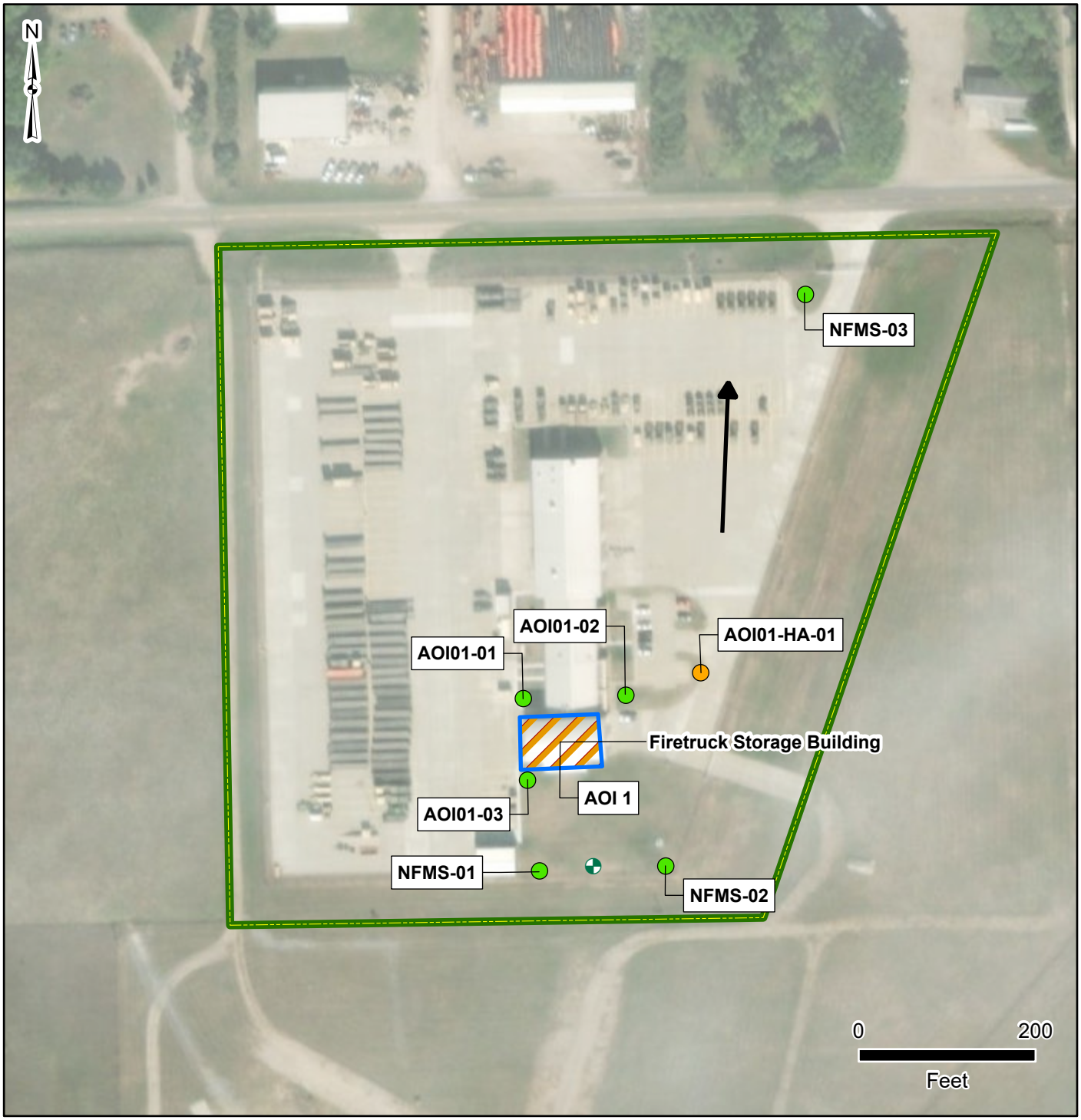


Figure 5-1
Site Inspection Sample Locations



Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Sample Locations
- DPT Boring
- Domestic Well
- Hand Auger

Hydrogeology
- Groundwater Flow Direction

Data Sources:
ESRI 2020
AECOM 2020

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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6. SITE INSPECTION RESULTS

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for the AOI and boundary areas is provided in **Sections 6.3 and 6.4**. **Tables 6-2 through 6-5** present results for the relevant compounds in soil and groundwater. Tables that contain all results are provided in **Appendix E**, and the laboratory reports are provided in **Appendix F**.

6.1 SCREENING LEVELS

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 6 July 2022 (Assistant Secretary of Defense, 2022). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to the five compounds presented on **Table 6-1**.

Table 6-1. Screening Levels (Soil and Groundwater)

Analyte	Residential (Soil) (µg/kg)[1] 0 to 2 ft bgs	Industrial / Commercial Composite Worker (Soil) (µg/kg) [1] 2 to 15 ft bgs	Tap Water (Groundwater) (ng/L) [1]
PFOA	19	250	6
PFOS	13	160	4
PFBS	1,900	25,000	601
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:
1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient=0.1. July 2022.
2. Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

µg/kg = Microgram(s) per kilogram
ng/L = Nanogram(s) per liter

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the Facility; the residential scenario is applied to surface soil results (0 to 2 ft bgs) and the industrial/commercial worker scenario is applied to shallow and deep subsurface soil results (2 to 15 ft bgs). The SLs are not applied to deep subsurface soil results (greater than 15 ft bgs) because 15 ft is the anticipated limit of construction activities.

6.2 SOIL PHYSICOCHEMICAL ANALYSES

To provide basic soil parameter information, soil samples were analyzed for TOC and pH, which are important for evaluating transport through the soil medium. **Appendix E** contains the results of the TOC and pH sampling.

The data collected in this investigation will be used in subsequent investigations, where appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate Technology Regulatory Council (ITRC), several important PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors. At relevant environmental pH values, certain PFAS are present as organic anions, and are therefore relatively mobile in groundwater (Xiao et al. 2015) but tend to associate with the organic carbon fraction that may be present in soil or sediment (Higgins and Luthy 2006; Guelfo and Higgins 2013). When sufficient organic carbon is present, organic carbon normalized distribution coefficients (K_{oc} values) can help in evaluating transport potential, though other geochemical factors (for example, pH and presence of polyvalent cations) may also affect PFAS sorption to solid phases (ITRC 2018).

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, which includes the Firetruck Storage Building. The detected compounds are summarized in **Tables 6-2 through 6-5**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.3.1 AOI 1 – Soil Analytical Results

Figures 6-1 through 6-5 present the ranges of detections in soil. **Tables 6-2 through 6-4** summarize the soil results.

Soil was sampled at three boring locations associated with the potential release area at AOI 1. Soil was sampled from three intervals at each of the boring locations: surface (0–2 ft bgs), shallow subsurface soil (less than 9ft bgs), and deep subsurface soil (up to 18 ft bgs). One boring (AOI01-03) included an additional discrete subsurface soil sample (i.e., four total samples from this boring). Additionally, one surface soil sample was collected using a hand auger from 0-2 ft bgs.

PFOA was detected in the surface interval at boring AOI01-02 (0.22 J µg/kg) and boring AOI01-03 (1.8 µg/kg) below the SL of 19 µg/kg. PFNA was detected in the surface interval at boring AOI01-03 (1.3 µg/kg) below the SL of 19 µg/kg. PFBS, PFHxS, and PFOS were not detected in the surface soil samples in AOI 1.

A total of seven subsurface soil samples were collected from AOI 1 (four shallow subsurface and three deep subsurface samples). One relevant compound was detected in subsurface soil. PFOA was detected in one subsurface sample, AOI01-03-SB-7-8 (0.22 J µg/kg) below the SL of 250

µg/kg. PFBS, PFHxS, PFNA, and PFOS were not detected in the subsurface soil samples in AOI 1.

6.3.2 AOI 1 – Groundwater Analytical Results

Figures 6-6 and 6-7 present the ranges of detections in groundwater. **Table 6-5 summarizes the** groundwater results.

Groundwater samples were collected from three temporary wells at AOI 1 during the SI activities. PFOA was detected (1.5 J ng/L) in groundwater at one temporary monitoring well location (AOI01-03) below the SL (6 ng/L). PFOS was detected (0.69 J ng/L) in one temporary monitoring well location (AOI01-01) below the SL (4 ng/L). PFBS was detected in groundwater at concentrations ranging from 0.7 J ng/L (AOI01-03) to 6.2 ng/L (AOI01-01) in all three wells below the SL (601 ng/L). PFHxS and PFNA were not detected in groundwater at any location.

6.3.3 AOI 1 – Conclusions

Based on the results of the SI, PFNA and PFOA were detected in soil samples and PFBS, PFOS, and PFOA were detected in groundwater samples below their respective SLs. Therefore, further evaluation of AOI 1 is not warranted.

6.4 BOUNDARY SAMPLE LOCATIONS

This section presents the analytical results for soil and groundwater in comparison to SLs for samples collected at Facility boundary. The detected compounds are summarized in **Tables 6-2 through 6-5**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.4.1 Boundary Locations – Soil Analytical Results

Figures 6-1 through 6-5 present the ranges of detections in soil. **Tables 6-2 through 6-4** summarize the soil results.

Soil boundary sample locations were comprised of three boring locations (NFMS-01 through NFMS-03) along the facility boundary. Boring locations NFMS-01 and NFMS-02 were along the southern/upgradient boundary of the facility. Boring location NFMS-03 was along the northern/downgradient boundary of the facility. Soil was sampled from three intervals in the three borings; surface (0–2ft bgs), shallow subsurface soil (less than 9 ft bgs), and deep subsurface soil (less than 15 ft bgs).

None of the five relevant compounds were detected in soil samples taken from the facility boundary boring locations.

6.4.2 Boundary Locations – Groundwater Analytical Results

Figures 6-6 and 6-7 present the ranges of detections in groundwater. **Table 6-5 summarizes the** groundwater results.

Groundwater samples were collected from two temporary well locations along the southern/upgradient facility boundary (NFMS-01 and NFMS-02). None of the five relevant compounds were detected in groundwater samples taken from the southern/upgradient facility boundary temporary well locations. A groundwater sample was collected from one temporary well location along the northern/downgradient facility boundary (NFMS-03). PFBS was detected at a concentration of 1.3 J ng/L below the SL (601 ng/L) at NFMS-03. None of the other four relevant compounds were detected in the groundwater sampling taken from the northern/downgradient facility boundary temporary well location.

6.4.3 Conclusions

Based on the results of the SI, PFBS was detected in groundwater at the northern/downgradient temporary well location below the SL Therefore, further evaluation of the facility boundary to determine contribution from potential upgradient sources is not warranted.

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, NFMS #7

		Location ID	AOI01-01		AOI01-01		AOI01-02		AOI01-03		AOI01-03	
		Sample Name	AOI01-01-SB-0-2		AOI01-11-SB-0-2		AOI01-02-SB-0-2		AOI01-03-SB-0-2		AOI01-13-SB-0-2	
		Parent Sample ID			AOI01-01-SB-0-2						AOI01-03-SB-0-2	
		Sample Date	12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021	
		Depth (ft bgs)	0-2		0-2		0-2		0-2		0-2	
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)												
Perfluorobutanesulfonic acid (PFBS)	1,900	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	19	µg/kg	ND	U	ND	U	ND	U	1.3		1.2	
Perfluorooctanesulfonic acid (PFOS)	13	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	19	µg/kg	ND	U	ND	U	0.22	J	1.8		1.4	

Notes:

1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.
2. The Screening Levels for soil are based on a residential scenario for incidental ingestion of contaminated soil.

µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
U = The analyte was not detected at a level greater than or equal to the adjusted detection level.
Qual = Qualifier.

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, NFMS #7

		Location ID	AOI01-HA		NFMS-01		NFMS-02		NFMS-03	
		Sample Name	AOI01-HA-01-0-2		NFMS-01-SB-0-2		NFMS-02-SB-0-2		NFMS-03-SB-0-2	
		Parent Sample ID								
		Sample Date	12/9/2021		12/9/2021		12/9/2021		12/9/2021	
		Depth (ft bgs)	0-2		0-2		0-2		0-2	
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)										
Perfluorobutanesulfonic acid (PFBS)	1,900	µg/kg	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	µg/kg	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	19	µg/kg	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	13	µg/kg	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	19	µg/kg	ND	U	ND	U	ND	U	ND	U

Notes:

1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.
2. The Screening Levels for soil are based on a residential scenario for incidental ingestion of contaminated soil.

µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
U = The analyte was not detected at a level greater than or equal to the adjusted detection level.
Qual = Qualifier.

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, Norfolk FMS #7

		Location ID	AOI01-01		AOI01-02		AOI01-03		AOI01-03		NFMS-01		NFMS-02		NFMS-03	
		Sample Name	AOI01-01-SB-7-8		AOI01-02-SB-8-9		AOI01-03-SB-14-15		AOI01-03-SB-7-8		NFMS-01-SB-6-7		NFMS-02-SB-6-7		NFMS-03-SB-6-7	
		Parent Sample ID														
		Sample Date	12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021	
		Depth (ft bgs)	7-8		8-9		14-15		7-8		6-7		6-7		6-7	
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																
Perfluorobutanesulfonic acid (PFBS)	25,000	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	µg/kg	ND	U	ND	U	ND	U	0.22	J	ND	U	ND	U	ND	U

Notes:
1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.
2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
U = The analyte was not detected at a level greater than or equal to the adjusted detection level.
Qual = Qualifier.

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Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, NFMS #7

			Location ID	AOI01-01		AOI01-02		AOI01-03		NFMS-01		NFMS-02		NFMS-03	
			Sample Name	AOI01-01-SB-15-16		AOI01-02-SB-16-17		AOI01-03-SB-17-18		NFMS-01-SB-13-14		NFMS-02-SB-13-14		NFMS-03-SB-14-15	
			Parent Sample ID												
			Sample Date	12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021	
			Depth (ft bgs)	15-16		16-17		17-18		13-14		13-14		14-15	
Analyte	**Screening Level[1,2]**	**Unit**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)															
Perfluorobutanesulfonic acid (PFBS)	25,000	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	µg/kg	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Notes:
1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.
2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the adjusted detection level.

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Table 6-5. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, NFMS #7

		Location ID	AOI01-01		AOI01-01		AOI01-02		AOI01-03		NFMS-01		NFMS-02		NFMS-03	
		Sample Name	AOI01-01-GW		AOI01-11-GW		AOI01-02-GW		AOI01-03-GW		NFMS-01-GW		NFMS-02-GW		NFMS-03-GW	
		Parent Sample ID			AOI01-01-GW											
		Sample Date	12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021		12/9/2021	
Analyte	**Screening Level[1]**	**Unit**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)																
Perfluorobutanesulfonic acid (PFBS)	601	ng/L	4.8		6.2		5.5		0.7	J	ND	U	ND	U	1.3	J
Perfluorohexanesulfonic acid (PFHxS)	39	ng/L	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	6	ng/L	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	4	ng/L	0.69	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	6	ng/L	ND	U	ND	U	ND	U	1.5	J	ND	U	ND	U	ND	U

Notes:
1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F). ng/L = Nanogram(s) per liter.
ng/L = Nanogram(s) per liter.
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the adjusted detection level.
Values exceeding the Screening Level are shaded gray.

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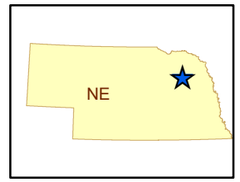
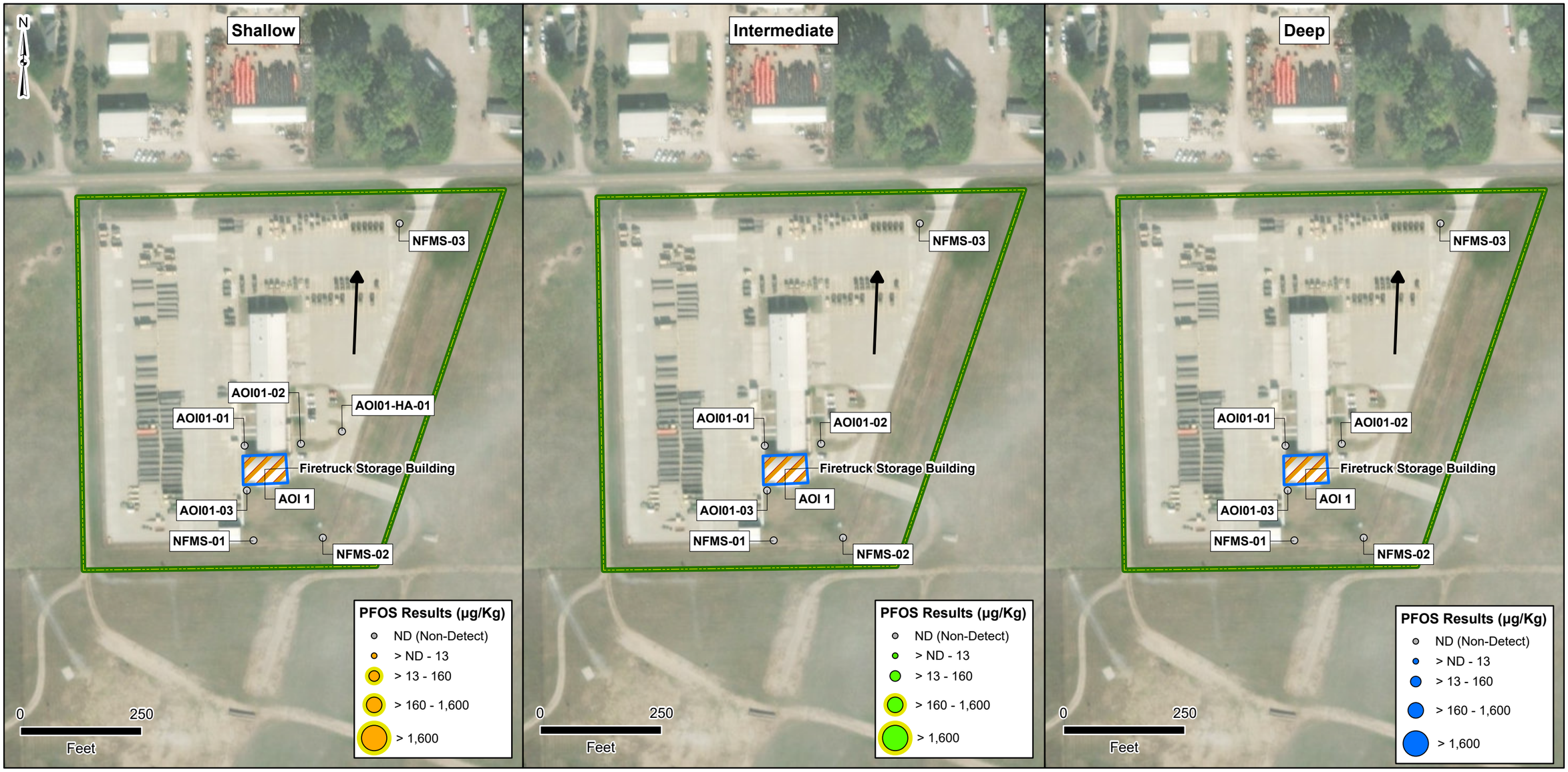
Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

Figure 6-1
AOI 1
PFOS Detections in Soil





Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFOS = Perfluorooctanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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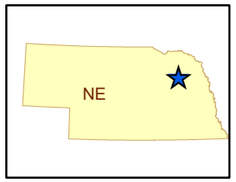
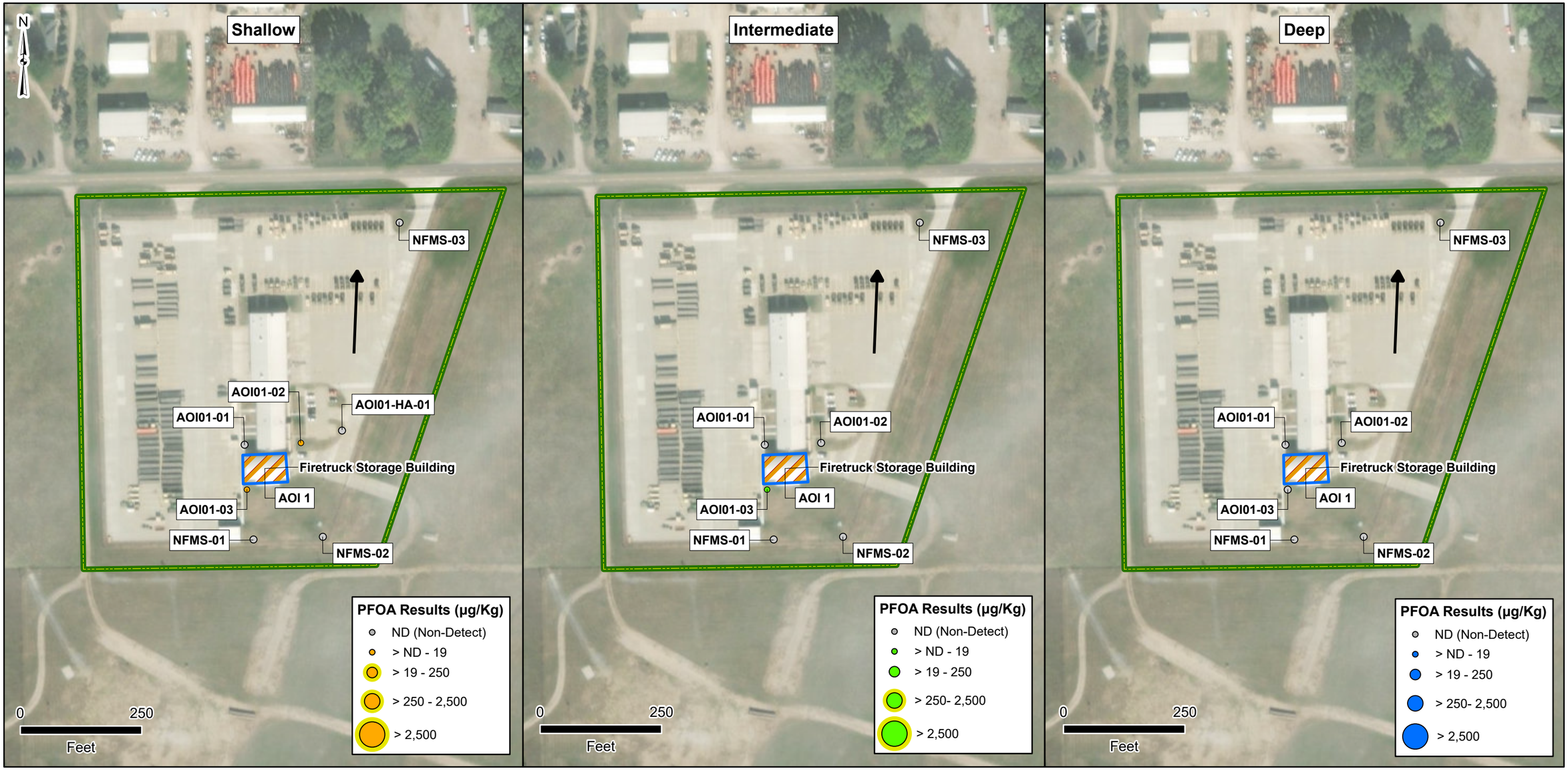
Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

Figure 6-2
AOI 1
PFOA Detections in Soil





Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFOA = Perfluorooctanoic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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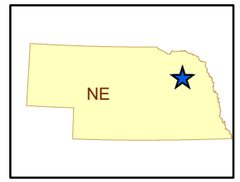
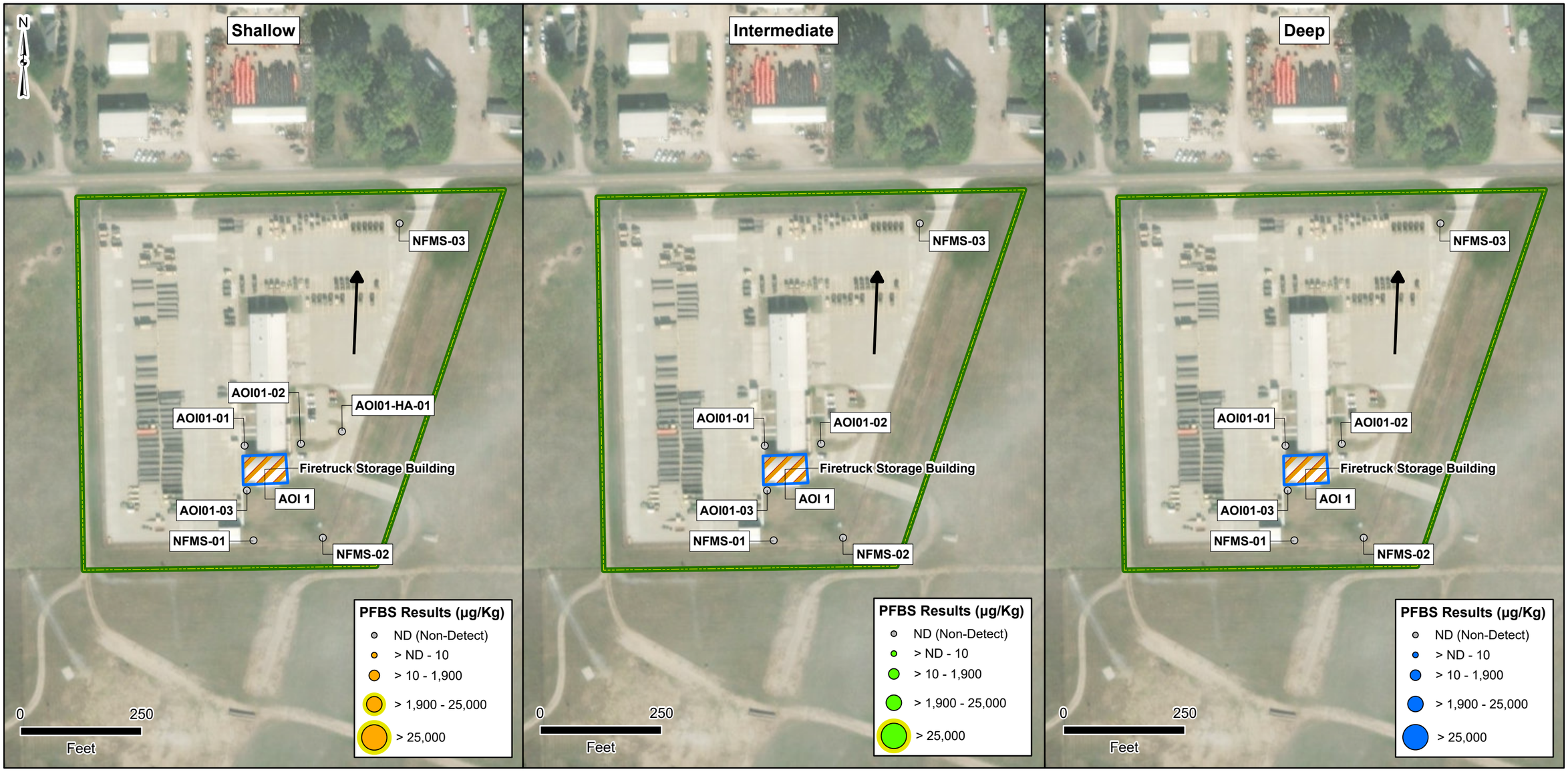
Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

Figure 6-3
AOI 1
PFBS Detections in Soil





Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFBS = Perfluorobutanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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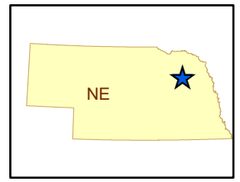
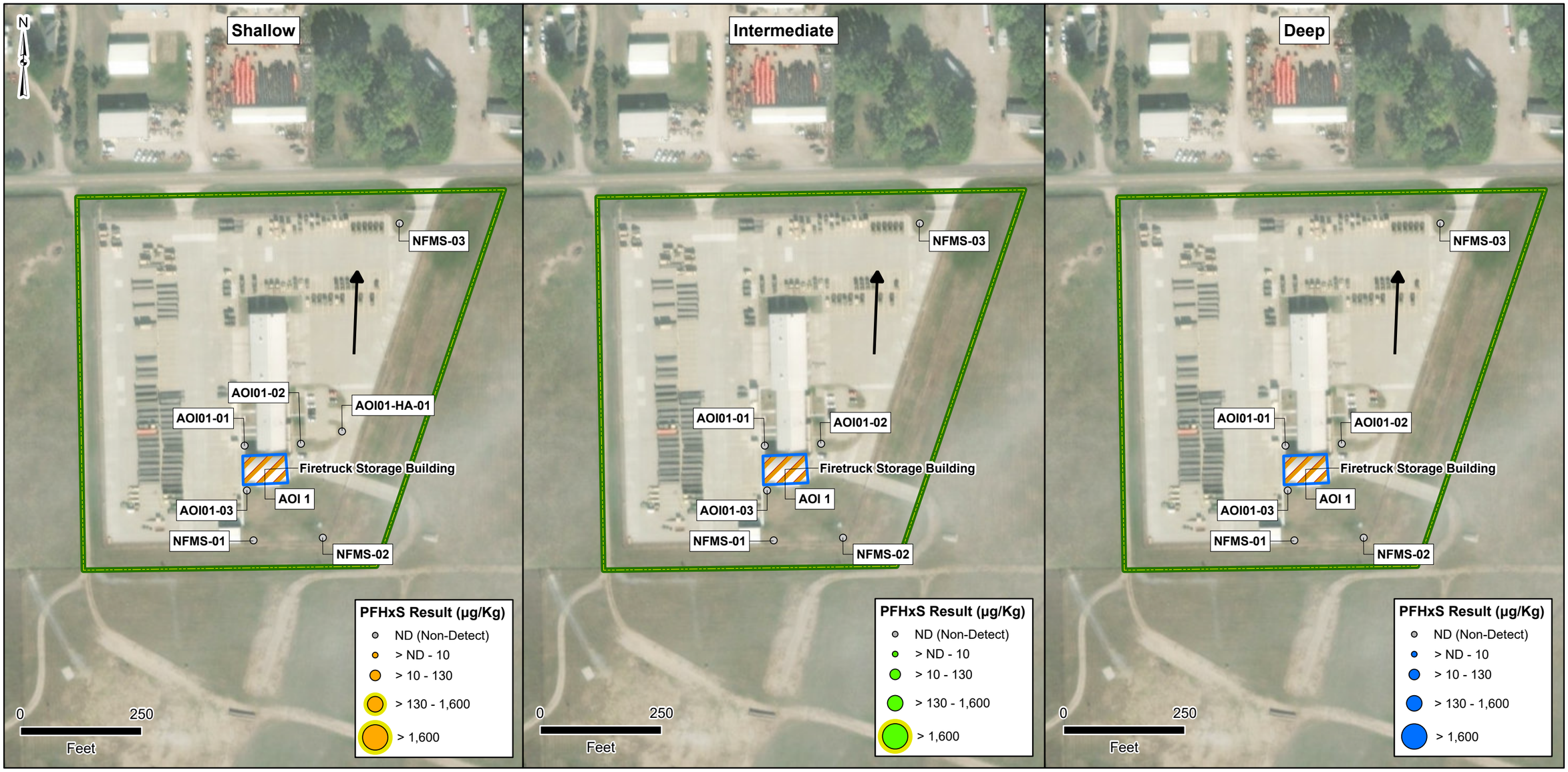
Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

Figure 6-4
AOI 1
PFHxS Detections in Soil





Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFHxS = Perfluorohexanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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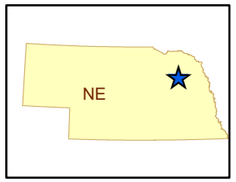
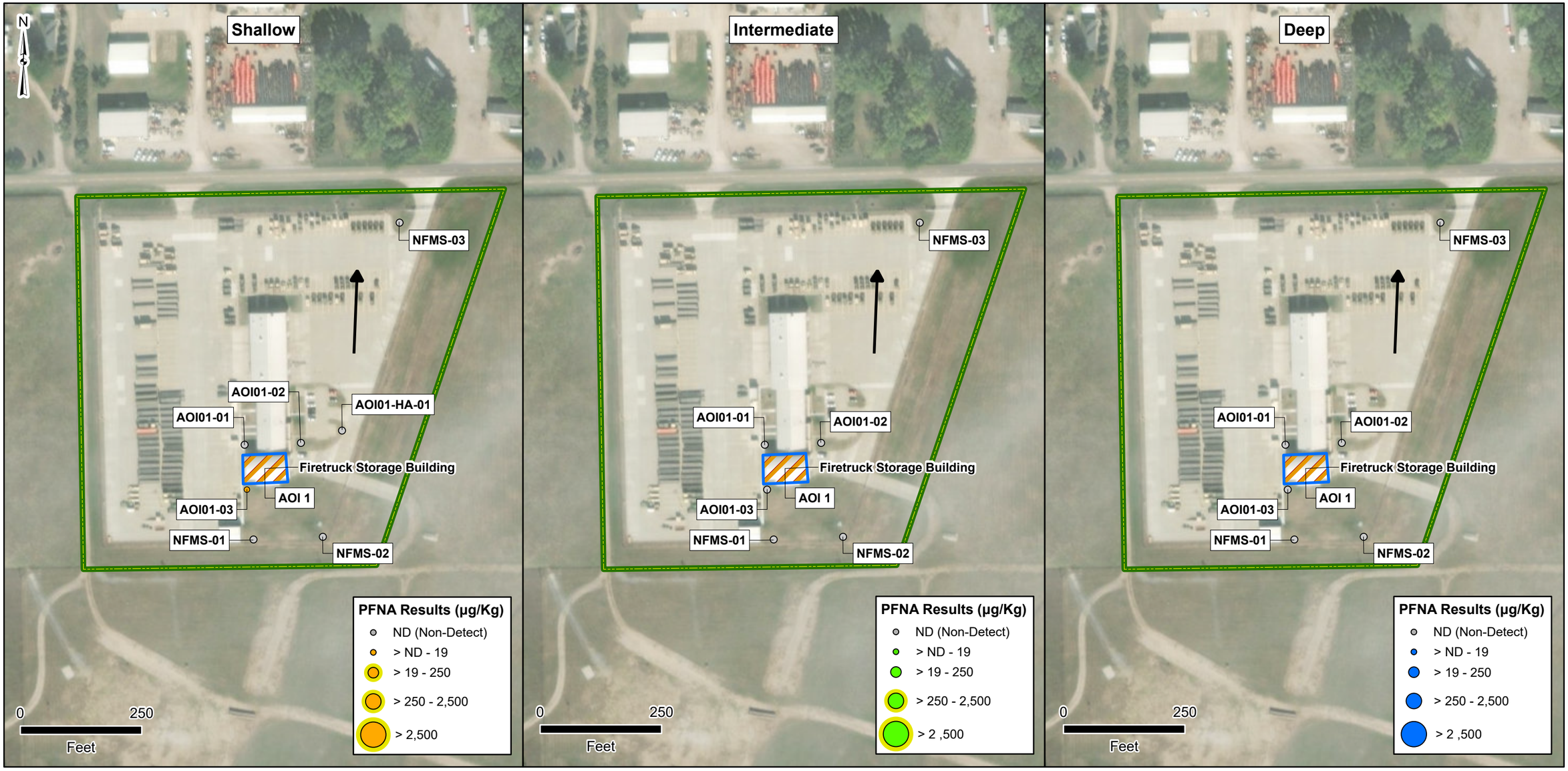
Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

Figure 6-5
AOI 1
PFNA Detections in Soil





Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFNA = Perfluorononanoic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2022
AECOM 2019

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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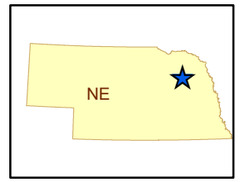
Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

Figure 6-6
AOI 1
PFOA, PFOS and PFBS Detections in Groundwater



Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFOA = Perfluorooctanesulfonic acid
PFOS = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2022
AECOM 2019

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

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Army National Guard Site Inspections
Site Inspection Report
Norfolk FMS #7, Nebraska

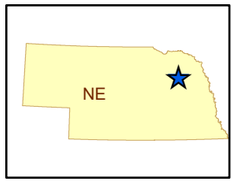
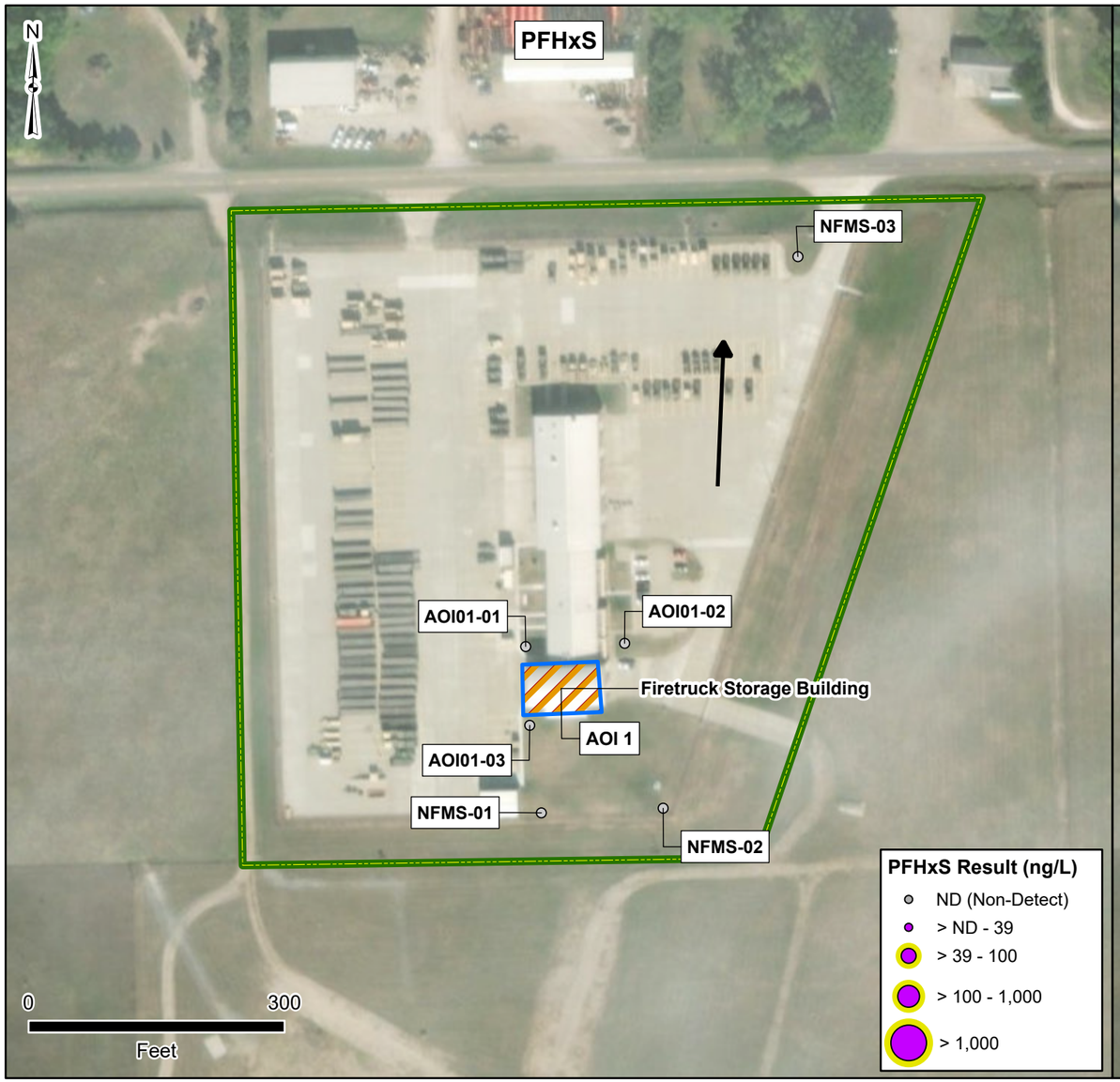
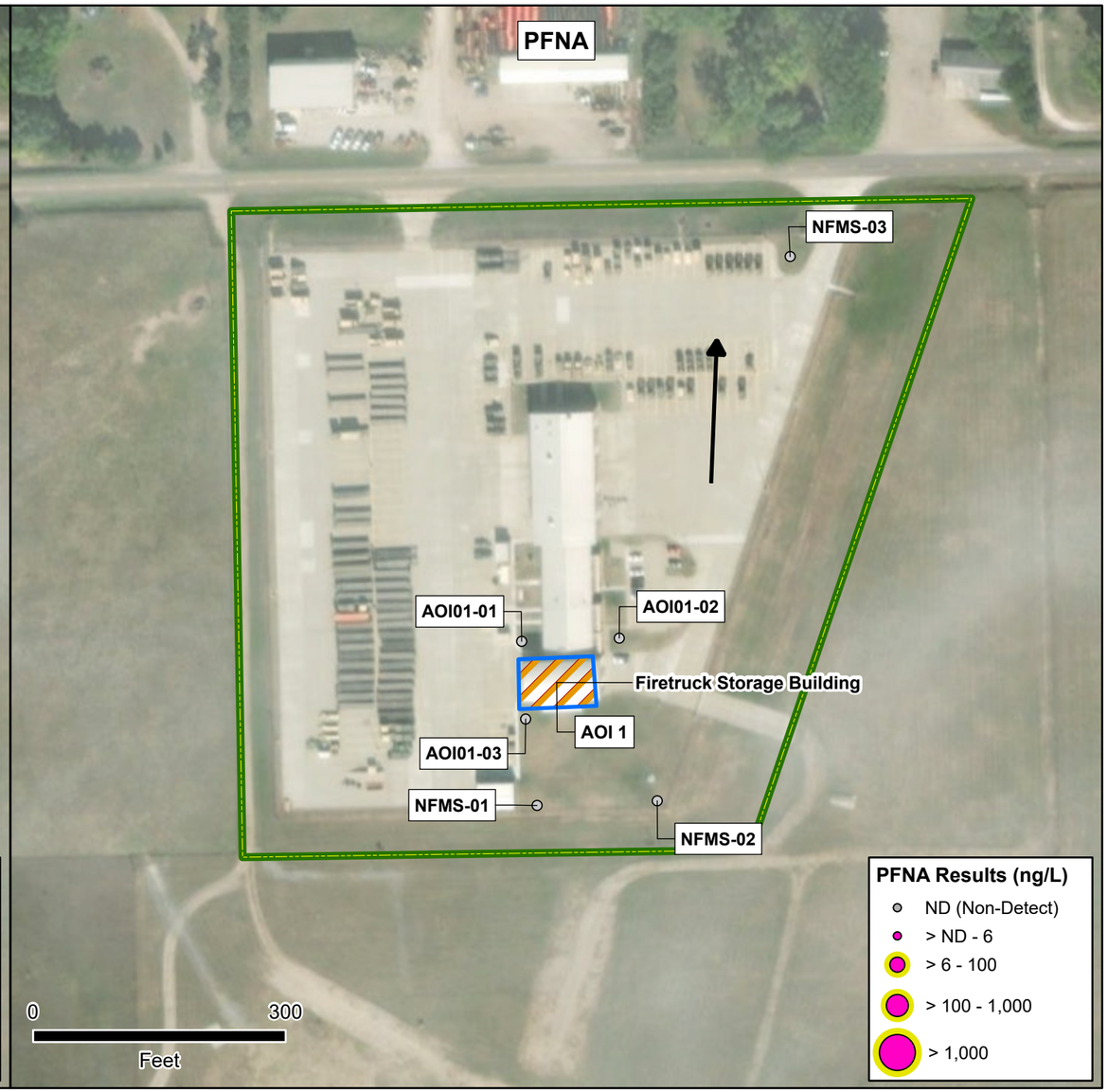


Figure 6-7
PFHxS and PFNA Detections in Groundwater





Facility Data
- Facility Boundary
- Areas of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFHxS = Perfluorohexanesulfonic acid
PFNA = Perfluorononanoic acid
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....January 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 14N

Path: G:\Federal\Nationwide\PFAS\MAES_6342503831\PROJECTS\SIReport\Norfolk\Norfolk\SIReport.aprx

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7. EXPOSURE PATHWAYS

The conceptual site model (CSM) for the AOI, revised based on the SI findings, is presented on **Figure 7-1**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

1. Contaminant source
2. Environmental fate and transport
3. Exposure point
4. Exposure route
5. Potentially exposed populations.

If any of these elements are missing, the pathway is incomplete. The CSM figures use an empty circle symbol to represent an incomplete exposure pathway. Areas with no identified complete pathway generally warrant no further action. However, the pathway is considered potentially complete if the relevant compounds are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of relevant compounds above the SLs. Areas with an identified potentially complete pathway that have detections of the relevant compounds above the SLs may warrant further investigation. Although the CSMs indicate whether potentially complete exposure pathways may exist, the recommendation for future study in a RI or no action at this time is based on the comparison of the SI analytical results for the relevant compounds to the SLs.

In general, the potential routes of exposure to the relevant compounds are ingestion and inhalation. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways are sparse and continue to be the subject of toxicological study. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA 2001). Receptors at the Facility include site workers (e.g., facility staff and visiting soldiers), construction workers, trespassers (though unlikely due to restricted access), residents outside the facility boundary, and recreational users outside of the facility boundary.

7.1 SOIL EXPOSURE PATHWAY

The SI results for relevant compounds in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1 based on the aforementioned criteria.

7.1.1 AOI 1

The Firetruck Storage Building contains eight 55-gallon drums of 3% AFFF. It could not be confirmed if the fire trucks and bulk AFFF are used at the Facility. Although there were no confirmed releases of AFFF as of 2014, activities prior to 2014 are unknown at this location.

AOI 1 is comprised of the Firetruck Storage Building, paved surfaces, and limited grassy areas surrounding the Firetruck Storage Building. There is no current/active construction underway at the Facility; therefore, the current construction worker pathway is considered incomplete.

Although PFNA and PFOA were detected in surface soil, the concentrations were below applicable SLs. Additionally, the majority of the facility is covered by buildings or paved areas. The areas that are not covered by buildings or pavement are vegetated making it less likely that exposure to surface soil will occur. However, facility workers and construction workers could contact PFAS constituents in surface soil via incidental ingestion or inhalation of dust, and the surface soil exposure pathway for facility workers and future construction workers is considered potentially complete. The exposure pathways for off-site residents and recreational users to surface soil are considered incomplete.

PFOA was additionally detected in shallow subsurface soil at a concentration below the SL. Ground disturbing activities to subsurface soil could result in construction worker exposure to detectable concentrations of PFOA via incidental ingestion. Therefore, the exposure pathway for subsurface soil is potentially complete for the future construction worker. The site worker/trespasser activities are anticipated to be limited to surface or near surface soil; therefore, the exposure pathway for this receptor group to subsurface soil is considered incomplete. The exposure pathways for off-site residents and recreational users to subsurface soil are considered incomplete.

PFNA and PFOA were detected in surface soils near the AOI. Stormwater drains into various drainage ditches on the northern side of the Facility, but there are no surface water features on the site. The Facility is 2,300 ft south of the Elkhorn River. PFAS constituents are water soluble, and as a result, it is possible that relevant PFAS compounds could migrate via surface water runoff. Based on site conditions (the majority of the facility is covered by buildings or paved areas and the remaining areas are vegetated), the exposure pathways for site workers/trespassers and future construction workers to surface water and sediment onsite are considered incomplete. In addition, the exposure pathways for off-site residents and recreational users of Elkhorn River via ingestion of surface water and sediment are considered potentially complete since low level concentrations of PFNA and PFOA were detected in surface soil and stormwater drains to the northside of the Facility. The CSM for AOI 1 is presented in **Figure 7-1**.

7.2 GROUNDWATER EXPOSURE PATHWAY

The SI results in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors based on the aforementioned criteria.

7.2.1 AOI 1

PFOS and PFOA were each detected in groundwater collected from one temporary well associated with AOI 1. PFBS was detected in groundwater collected from all three temporary wells associated with AOI 1; however, no concentrations exceeded their respective SLs. Due to depth to groundwater (17.40 to 21.05 ft bgs), it is unlikely that future construction workers will be exposed to PFAS through the groundwater via ingestion during trenching activities. Although there is one potable well present at the Facility, the exposure pathway for site workers/trespassers and future construction workers via ingestion of groundwater is considered to be incomplete due to the existing potable well being located upgradient of the AOI and no relevant compounds were detected in SI groundwater samples collected from adjacent temporary monitoring wells. The exposure pathways for off-site residents and recreational users to groundwater are considered incomplete. The CSM is presented in **Figure 7-1**.

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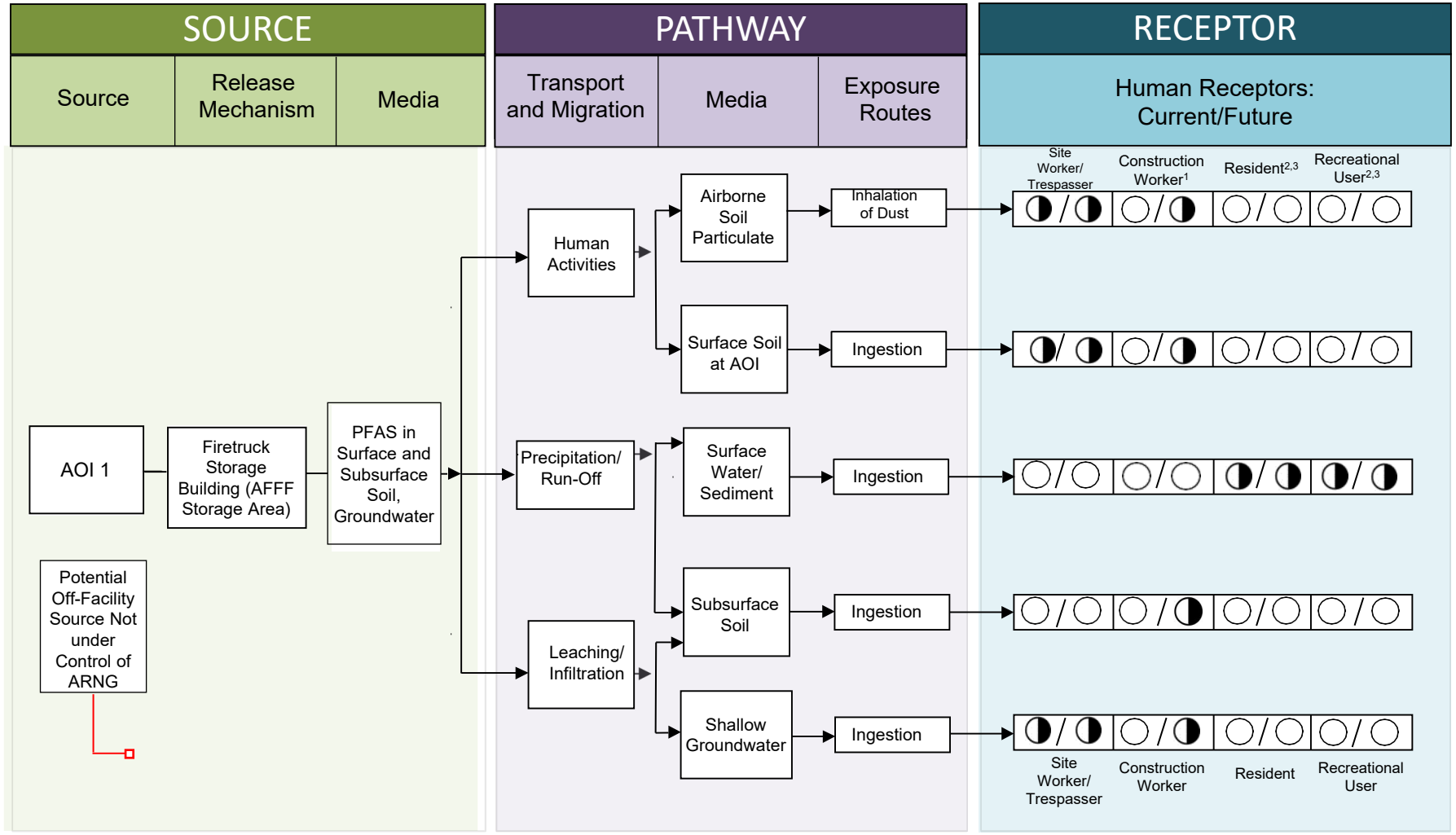

LEGEND

- Flow-Chart Stops
- Flow-Chart Continues
- Partial / Possible Flow
- Incomplete Pathway
- Potentially Complete Pathway
- Potentially Complete Pathway with Exceedance of Screening Level

Notes:

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

Figure 7-1
Conceptual Site Model
AOI 1

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8. SUMMARY AND OUTCOME

This section summarizes SI activities and findings. The most significant findings are summarized in this section and are reproduced directly or abstracted from information contained in this report. The outcome provides general and comparative interpretations of the findings relative to the SLs.

8.1 SITE INSPECTION ACTIVITIES

The SI field activities at the Facility were conducted on 9 December 2021. The SI field activities included soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a), except as previously noted in **Section 5.9**.

To fulfill the project DQOs set forth in the approved SI UFP-QAPP Addendum (EA 2021a), samples were collected and analyzed for a subset of 24 compounds by LC/MS/MS compliant with QSM Version 5.3 Table B-15 as follows:

- Twenty (20) soil samples from six boring and one hand augur locations;
- Six (6) grab groundwater samples from six temporary well locations; and
- Six (6) QA/QC samples.

An SI is conducted when the PA determines an AOI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multi-media sampling at AOIs to determine whether or not 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. Additionally, the CSM was refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure at the AOI, which is described in **Section 7**.

8.2 OUTCOME

Based on the results of this SI, further evaluation under CERCLA is not warranted for AOI 1 (see **Table 8-1**). Based on the CSM developed and revised based on the SI findings, concentrations of relevant compounds were below applicable SLs in soil and groundwater at AOI 1. Sample chemical analytical concentrations collected during this SI were compared against the project SLs for soil and groundwater, as described in **Table 6-1**.

A summary of the results of the SI data relative to the SLs is as follows:

- AOI 1:
    - PFOS, PFOA, and PFBS were detected in groundwater near the source area (AOI 1). PFOS and PFOA were detected in one out of three temporary wells associated with the AOI, with concentrations of 0.69 ng/L and 1.5 ng/L, respectively, which do not exceed the associated SLs. PFBS was detected in all three temporary wells associated with the AOI, with a maximum concentration of 6.2 ng/L, which does not exceed the

associated SL. Based on the results of the SI, further evaluation at AOI 1 is not warranted.

— PFNA and PFOA were detected in surface and shallow subsurface soil at AOI 1 at concentrations below the SLs. PFNA was detected in surface soil at a maximum concentration of 1.3 µg/kg and PFOA was detected in surface soil at a maximum concentration of 1.8 µg/kg, which are considerably lower than the applicable SLs of 19 µg/kg for each compound. Additionally, PFOA was detected in subsurface soil at a maximum concentration of 0.22 J µg/kg, which is three orders of magnitude below the applicable SL of 250 µg/kg. Based on the results of the SI, further evaluation at AOI 1 is not warranted.

- The Facility boundary:

— PFBS were detected in groundwater near the northern/downgradient facility boundary; however, PFBS did not exceed the SL in groundwater. None of the remaining relevant compounds (i.e., PFHxS, PFNA, PFOS, and PFOA) were detected in Facility boundary groundwater samples.

— None of the five relevant compounds (i.e., PFBS, PFHxS, PFNA, PFOS, and PFOA) were detected in soil samples taken from the facility boundary boring locations.

Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

Table 8-1 summarizes the SI results for soil and groundwater used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI.

Table 8-1. Summary of Site Inspection Findings and Recommendations

AOI	Potential Release Area	Soil Source Area	Groundwater Source Area	Groundwater Facility Boundary	Future Action
1	Firetruck Storage Building	◐	◐	◐	No Further Action

Legend:
● = Detected; exceedance of screening levels.
◐ = Detected; no exceedance of screening levels.
○ = Not detected.

9. REFERENCES

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