NATIONAL AERONAUTICS SPACE ADMINISTRATION
JOHN H. GLENN RESEARCH CENTER

MEMORANDUM

DATE: July 17, 2020

SUBJECT: Approval and Funding for a Non-Time-Critical Removal Action at Erie County Conservation League Firing Range, NASA Plum Brook Station, Sandusky, Erie County, Ohio

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FINAL

ACTION MEMORANDUM

FOR

ERIE COUNTY CONSERVATION LEAGUE FIRING RANGE REMOVAL ACTION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PLUM BROOK STATION SANDUSKY, OHIO

Prepared for:

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July 17, 2020

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Material
AM	Action Memorandum
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	Below Ground Surface
BGSU	Bowling Green State University
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIP	Community Involvement Plan
COC	Chemical of Concern
COMETS	Construction, Maintenance, Environmental and Testing Services
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbon
DOI	Department of the Interior
ECCL	Erie County Conservation League
ECWD	Erie County Water Division
EE/CA	Engineering Evaluation/Cost Analysis
EO	Executive Order
EPC	Exposure Point Concentration
ESV	Ecological Screening Value
EU	Exposure Unit
FE	Federal Endangered
FT	Federal Threatened
ft^2	Square Feet
ft^3	Cubic Feet
GRC	Glenn Research Center
ID	Identifier
IRA	Interim Removal Action
LBP	Lead-Based Paint
LDR	Land Disposal Restriction
MCL	Maximum Contaminant Level
mg/cm^2	Milligrams per Square Centimeter
mg/L	Milligrams per Liter
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NTCRA	Non-Time-Critical Removal Action
OAC	Ohio Administrative Code
OBL	Obligate Wetland Plant
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
ORAM	Ohio Rapid Assessment Method
ORC	Ohio Revised Code
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PBOW	Plum Brook Ordnance Works
PBS	Plum Brook Station

ACRONYMS AND ABBREVIATIONS (Continued)

PCB	Polychlorinated Biphenyl
PEM	Palustrine Emergent
PSS	Palustrine Scrub-Shrub
RA	Removal Action
RAO	Removal Action Objective
RAWP	Removal Action Work Plan
RCI	Reactivity, Corrosivity, and Ignitability
RCRA	Resource Conservation and Recovery Act
RSE	Removal Site Evaluation
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SEMS	Superfund Enterprise Management System
SI	Site Investigation
SL	Screening Level
SOR	Sum-of-Ratios
SRV	Sediment Reference Value
SVOC	Semivolatile Organic Compound
TBC	To-Be-Considered
TCLP	Toxicity Characteristic Leaching Procedure
TechLaw	TechLaw, Inc.
TNT	Trinitrotoluene
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
XRF	X-Ray fluorescence
yd^3	Cubic Yard

OVERVIEW

A PURPOSE

The National Aeronautics and Space Administration (NASA), in accordance with its delegated authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104 and Executive Order (EO) 12580, has agreed to proceed with a non-time-critical removal action (NTCRA) for contaminated soil at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Ranges, and contaminated sediment in Pond West A at the former Erie County Conservation League (ECCL) Firing Range located at the Plum Brook Station (PBS) in Sandusky, Ohio.

This Action Memorandum (AM) was prepared by Leidos under the Construction, Maintenance, Environmental and Testing Services (COMETS) Contract Number 80GRC018C0022, Subcontract Number FA8-1-S1, Task Order Number E109. This AM is the primary decision document in establishing the Administrative Record for selecting the NTCRA responses per Section 113(k) of CERCLA and provides the following in accordance with the *Superfund Removal Guidance for Preparing Action Memoranda* (USEPA 2009):

- Determines the need for a CERCLA removal action (RA),
- Authorizes the RA,
- Identifies the action and cleanup levels (if applicable), and
- Explains the rationale for the removal response.

B NON-TIME-CRITICAL REMOVAL ACTION

The NTCRA can provide substantial risk reduction at a site by addressing specific problems without requiring time-consuming investigation and decision-making (USEPA 1992). The NTCRA generally attempts to control the source of contamination and can be used to remediate a site completely (DOE 1998). The purpose of the NTCRA at the ECCL Firing Range is to remove the sources of contamination, allowing for potential future unrestricted use.

This NTCRA process follows the Administrative Record requirements presented in Exhibit 2 of the *Superfund Removal Guidance for Preparing Action Memoranda* (USEPA 2009) and shown in **Figure 1**. NASA is the lead agency responsible for implementing the NTCRA and developed the *Final Erie County Conservation League Firing Range Removal Site Evaluation Report* (Leidos 2020) that contains all of the requirements of, and is equivalent to, an Engineering Evaluation/Cost Analysis (EE/CA) in accordance with *Guidance for Conducting Non-Time-Critical Removal Actions under CERCLA* (USEPA 1993).

C PUBLIC NOTIFICATION AND COMMENT PERIOD

Section 113(k)(2) of CERCLA provides for involving communities affected by response decisions at Superfund sites. To ensure public involvement of this NTCRA, NASA issued a notice of availability for the ECCL Firing Range Removal Site Evaluation (RSE) Report on May 2, 2020, seeking public input of the final remedy selection. The notice of availability was published in the local newspaper, the *Sandusky Register*, on the same date mentioned above. In response to state-wide social distancing orders for COVID-19, the RSE Report was made available for public review electronically on the State Library of Ohio's website, and included an option to request a physical copy of the RSE Report by mail. Upon the library reopening, the RSE Report and other project-related documents will be made available to the public in the Information Repository maintained at the Bowling Green State University (BGSU) Firelands Library located at 1 University Drive, Huron, Ohio. The notice of availability initiated the 30-day public comment period from May 4 to June 2, 2020.

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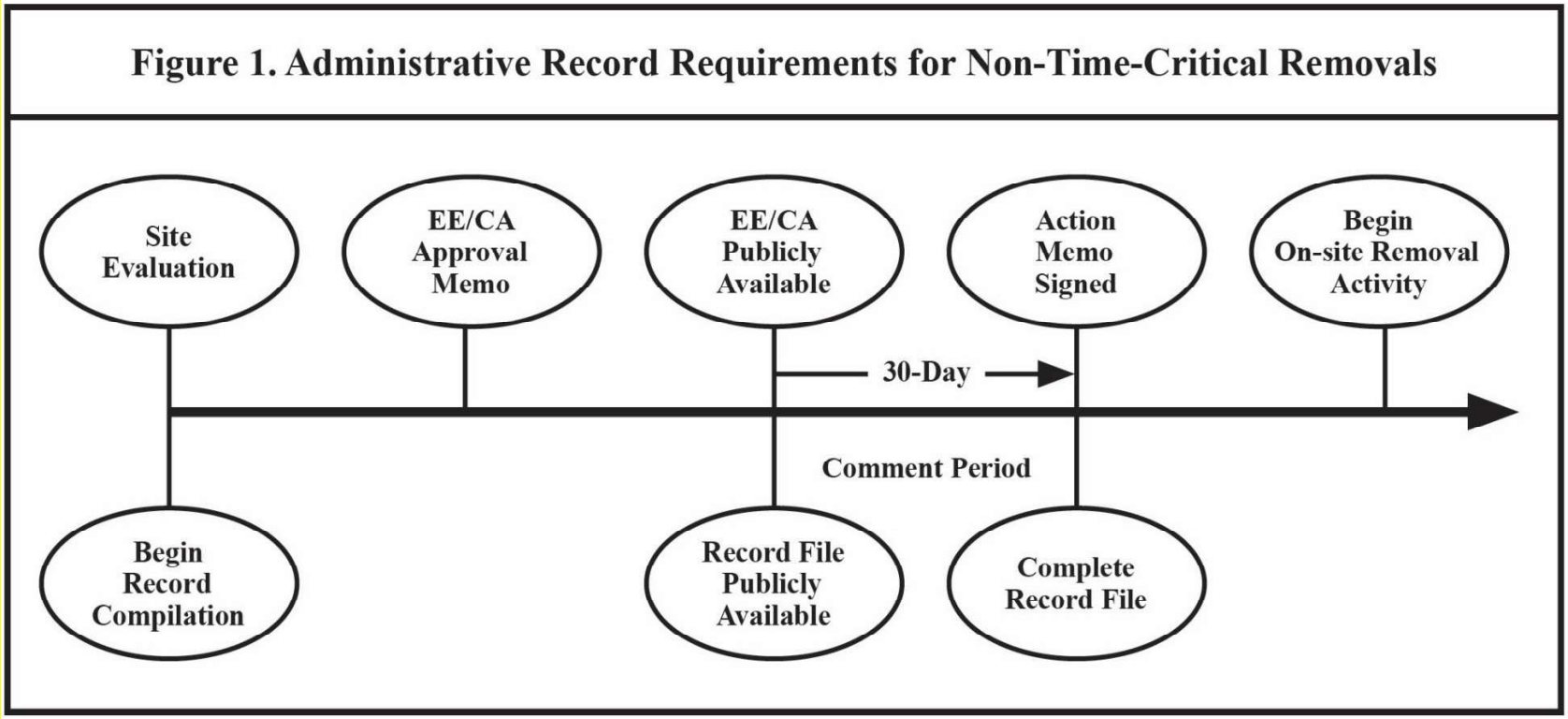

Figure 1. Administrative Record Requirements for Non-Time-Critical Removals

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NASA is developing a Community Involvement Plan (CIP) for seven sites at PBS under the CERCLA process, including the ECCL Firing Range, to ensure the public has convenient access to information regarding project progress. The NASA PBS community relations program interacts with the public through news releases and public meetings with local officials, interest groups, and the general public. NASA will continue to provide the public with information on the CERCLA sites at PBS, including the ECCL Firing Range.

D ACTION MEMORANDUM ORGANIZATION

This document meets the AM purpose and follows the basic AM outline, as presented in the *Superfund Removal Guidance for Preparing Action Memoranda* (USEPA 2009).

E NASA CERCLA AUTHORITY

Section 104 of CERCLA provides broad response action authority to the President. The President has delegated this authority to the heads of executive departments and agencies by EO 12580 (President of the United States of America, January 29, 1987), *Superfund Implementation*, as amended. In general, EO 12580 delegated to NASA response authority "…with respect to remedial actions for releases or threatened releases which are not on the National Priorities List ("the NPL") and removal actions other than emergencies, where either the release is on or the sole source of the release is from any facility or vessel under the jurisdiction, custody or control of ..." NASA.

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PART I: PURPOSE

The purpose of this AM is to request and document approval of the selected RA of contaminated soil and sediment at the ECCL Firing Range located at the NASA PBS in Sandusky, Ohio. Soil contaminated with metals and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) have been identified in the earthen backstop berms, target areas, and discharge areas of the following ranges: Pistol Range (East), Pistol Range (West), Trap and Skeet Ranges, and Rifle Range. Lead-contaminated sediment was identified at the Pond West.

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PART II: SITE CONDITIONS AND BACKGROUND

PBS is located in southern Erie County, Ohio, approximately 3 miles south of Sandusky, Ohio, and approximately 50 miles west of the NASA John H. Glenn Research Center (GRC) at Lewis Field in Cleveland, Ohio (**Figure 2**). The PBS facility encompasses approximately 6,740 acres (Leidos 2018b). Most of PBS is in Perkins and Oxford Townships, with some lands in Huron and Milan Townships.

The ECCL Firing Range is located near the intersection of U.S. Highway 250 and Fox Road on the eastern side of PBS, south of Sandusky, Ohio (**Figure 3**). NASA is implementing an NTCRA process to address human health and ecological risk identified in the soil and sediment present at the ECCL Firing Range at PBS. The selected action will remove the metals- and cPAH-contaminated soil at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Ranges to protect human and ecological receptors. This action also will remove the lead-contaminated sediment at Pond West A to protect human and ecological receptors.

The U.S. Environmental Protection Agency (USEPA) site identifier (ID) for PBS is OH3800015379. The ECCL Firing Range does not have a specific site ID assigned. The following subsections present the site conditions and background of the proposed removal areas.

A SITE DESCRIPTION

ECCL leased approximately 57 acres of land from NASA on the eastern side of PBS (**Figure 3**). The ECCL facility is not located within the 8-foot security fence; however, a perimeter fence was installed in February 2019 to restrict public access. The ECCL facility is currently an inactive firing range. The facility was thought to have closed on or about August 18, 2007 (SAIC 2010).

As noted in the *Final Preliminary Assessment of Erie County Conservation League Firing Range* (SAIC 2010), hereafter referred to as the Preliminary Assessment (PA), the ECCL facility included the following:

- A clubhouse and adjacent garage;
- Three trap and two skeet fields;
- A 25-yard pistol range (east);
- A 50-yard pistol and rifle range (west);
- A high-power rifle range with firing benches at 100 and 200 yards, respectively; and
- An archery range and elevated archery stand.

A 250-gallon aboveground diesel storage tank was located on a concrete pad near the garage for fueling maintenance equipment; no leaks or spills have been reported. No documentation for the tank removal is available. A shallow, man-made pond (approximately 2 to 3 feet deep and approximately 10,000 square feet [ft^2]) is located south-southwest of the Trap and Skeet Ranges, approximately 275 feet west of the former ECCL clubhouse (SAIC 2010).

The Pistol and Rifle Ranges consisted of a firing stand, an earthen mound backstop (to contain bullets and fragments), and side berms (to contain ricochets). The trap range consisted of five shooting positions and one structure, the "traphouse," from which the targets are thrown by a machine called a "trap." Shooting positions at the skeet ranges are arranged along an arc between two structures, the "high house" and the "low house," where targets are released. All firearms were discharged to the north. Trees and bushes are located at various places along the northern and western sides of the range and along the drainage ditch.

Access to the pistol and rifle ranges was restricted to range members only through fencing. Access to the Trap and Skeet Ranges was formerly open (no fencing).

Ammunition fired at the ECCL facility includes standard ball shot (<#6) and jacket ammunition (<0 caliber). Clay targets (e.g., White Flyer® Standard AA Pitch Trap/Skeet Target) were historically used at the Trap and Skeet Ranges; however, biodegradable "E-birds" have been used since approximately 2002 (SAIC 2010).

As noted in the 2010 PA, it is believed that reclamation of lead-impacted soils was conducted at the firing range in approximately 2000; however, no documentation of this removal activity is available (SAIC 2010). A relatively recent change in site conditions was identified during the Site Investigation (SI) Sampling and Analysis Plan (SAP) review of aerial photographs of the property. A historical aerial photograph from 2010 indicates soil excavation activities were conducted at the rifle range sometime after 2006. Activities included removal of shallow soil from the range floor and the entire western lateral berm. Structures previously located at the Trap and Skeet Ranges also were removed sometime between 2006 and 2010 (SAIC 2011). The clubhouse and garage were demolished sometime between July 2012 and October 2015, based on review of more recent aerial photographs (Leidos 2019a). However, no documentation of these removal activities is available.

On the eastern edge of the Trap and Skeet Ranges, a car dealership was constructed in 2016 on the two adjacent parcels between the ECCL site and U.S. Highway 250 (Leidos 2018a). The ECCL Trap and Skeet Range fields are currently composed of a mixture of open flat, grassy areas and areas of heavy scrub-shrub vegetation, with some mixed deciduous forest around the northern and southern drainage ditches and western ponds, in the northern portion of the Trap and Skeet Ranges, and in the eastern portion of the range. The pistol and rifle ranges are surrounded by earthen berms (primarily shale bedrock), which are vegetated with weeds and scrub-shrub vegetation and grassy areas on the pistol range floors. The rifle range floor is currently exposed, weathered shale bedrock from previous excavation activities and several areas covered with *Rosa multiflora* (Multiflora rose).

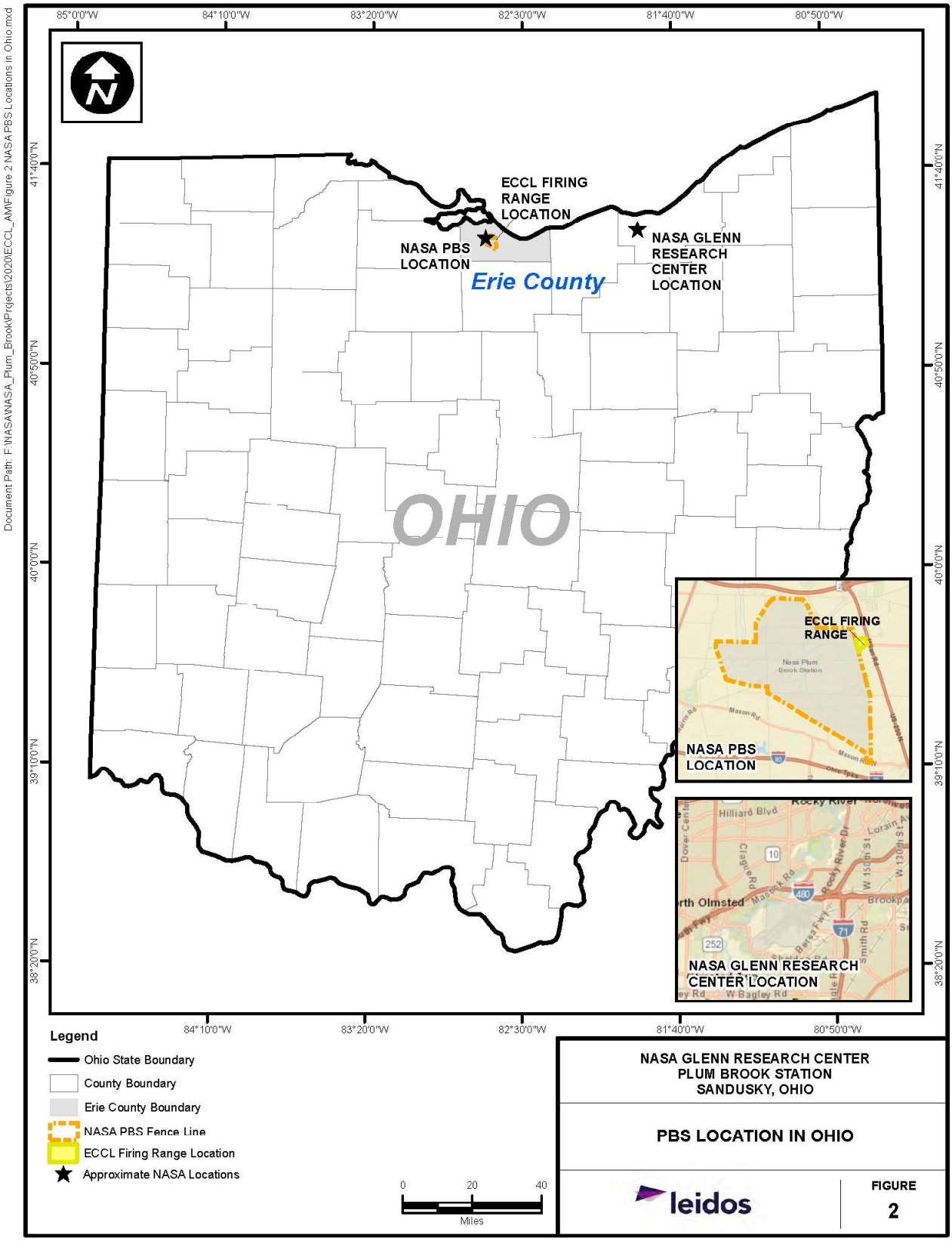

Figure 2. NASA PBS Location in Ohio

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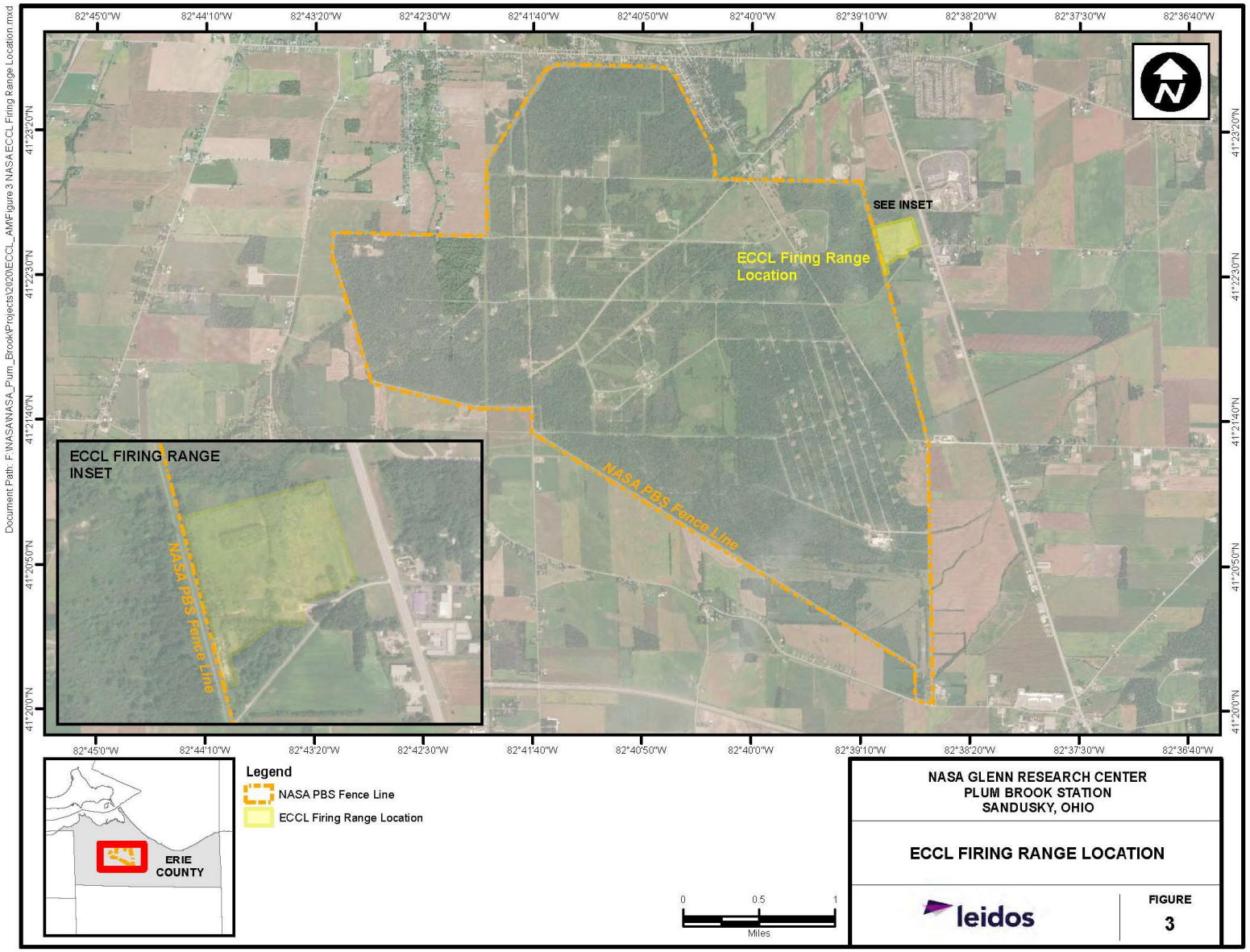

Figure 3. ECCL Firing Range Location

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A.1 Removal Site Evaluation

The PA (SAIC 2010) and the Erie County Conservation League (ECCL) Firing Range Site Investigation Report (Leidos 2018a), hereafter referred to as the SI Report, are the only previous documented investigations conducted at the ECCL Firing Range. The ECCL PA documented the results of a visual inspection of current conditions of the site; identified notable site features (e.g., topography, surface water drainage pathways, and surface/subsurface debris); and included a records review, including historical investigations at NASA PBS, historical maps, and aerial images. Historical images and photographs of site conditions at the time of the report are included in the document. The PA reported areas of known or suspected contamination, which included the pistol and rifle range impact berms (deposition of contaminants associated with discharged ammunition), the Trap and Skeet Ranges field (deposition of lead shot, fragmented clay targets, and shell casings), and portions of the pistol and rifle range floor (deposition of bullet jackets). It was believed that reclamation of lead-impacted soils was conducted at the rifle range approximately 10 years ago; however, no documentation of this removal activity is available. The PA did not include environmental sampling. As noted in to the PA (SAIC 2010), the potential for a release to groundwater that would result in impacts on human receptors due to past activities at the site was not suspected. Due to the presence of a surface water pathway (i.e., Dautch Ditch) and focused discharge via the drainage system onsite, a strong potential exists for a release of site contaminants to surface water via runoff and discharge from the range drainage system. The soil exposure pathway did not pose a primary threat to human receptor populations due to restricted access to the site pistol and rifle ranges and contact with the impact berm soils. However, the Trap and Skeet Ranges may pose a greater risk to human receptors due to the unrestricted access. In addition, no threat of a release of contaminants from soil to air due to the non-volatile nature of the contaminants in site soils (e.g., metals) existed, as well as to the presence of vegetative cover, which inhibits dust emissions (SAIC 2010). The PA concluded that due to site use, potential chemicals, and potential exposure pathways, additional investigation was warranted.

The first investigation to collect detailed information (including analytical data) at the ECCL Firing Range was the SI conducted by Leidos in 2016. The SI was conducted under the approved *Multi-Site Characterization Sampling and Analysis Plan* (SAIC 2011) and results presented in the SI Report (Leidos 2018a). SI activities at the ECCL Firing Range included collecting 168 surface soil samples, 9 dry sediment samples, and 9 co-located sediment/surface water samples. Samples were analyzed for firing range metals (antimony, arsenic, copper, iron, lead, tin, and zinc) and semivolatile organic compounds (SVOCs) (Leidos 2018a). Surface soil, sediment, and surface water analytical data were screened based upon the multiple criteria. The ecological risk screening identified 23 chemicals of potential ecological concern (COPECs) in surface soil, 10 COPECs in sediment, and 3 COPECs in surface water. COPECs for soil, sediment, and surface water included at least one metal and SVOC (Leidos 2018a). The human health risk screening identified multiple metals and SVOCs as chemicals of potential concern (COPCs) in soil. Arsenic and lead were identified as COPCs in sediment, and lead was identified as a COPC in surface water (Leidos 2018a).

Results of the SI activities indicated that the surface soil, sediment, and surface water at the ECCL Firing Range have been impacted by previous site activities. Further evaluation was recommended to fully determine the potential risk to human health and ecological receptors, and to determine if media not included in this SI (subsurface soil and/or groundwater) have been impacted. Additional surface/subsurface soil and sediment sampling was recommended to further delineate the vertical and horizontal extent of contamination at the ranges, ditches, and ponds. In addition, an interim removal action (IRA) was recommended for the Trap and Skeet Ranges and the Pistol and Rifle Range impact berms with surface soil lead concentrations above the Regional Screening Level (RSL). The recommended IRA included additional pre-delineation sampling, treatability study, excavation of surface soil (Trap and Skeet Ranges 0 to 1 foot below ground surface [bgs]), complete removal of impact and lateral berms, lead bullet screening, soil stabilization, and offsite non-hazardous waste disposal. The recommended IRA also included the excavation of the clay target and shotgun shell debris areas (including a portion of the drainage ditch) and

burned traphouse debris (including an asbestos-containing material [ACM] survey) within the Trap and Skeet Ranges (Leidos 2018a).

The RSE was conducted at the ECCL Firing Range in 2019, in accordance with the *Erie County Conservation League (ECCL) Firing Range Removal Action Project Work Plan* (Leidos 2019a), hereafter referred to as the Removal Action Work Plan (RAWP) and the *Erie County Conservation League (ECCL) Firing Range Removal Site Evaluation Sampling and Analysis Plan* (Leidos 2019b). The ECCL Firing Range was subdivided into exposure units (EUs) based on media type and historical use to focus the data collection to support the RA and includes:

- Drainage Ditch,
- Former Clubhouse and Garage,
- Pistol Range (East),
- Pistol Range (West),
- Rifle Range,
- Trap and Skeet Ranges,
- Ponds (Pond West A, Pond West B, and Pond East), and
- Groundwater.

During the RSE, 140 soil, 9 sediment, 3 groundwater, and 3 asbestos samples were collected, including 19 duplicates (16 for soil, 2 for sediment, and 1 for groundwater). Sample locations were selected based on SI analytical results in order to further evaluate potential risk to ecological receptors and human health and further define the extent of contamination. X-ray fluorescence (XRF) field screening technology was used to obtain real-time metal concentrations in soil samples and to determine which samples were submitted for laboratory analysis (Leidos 2020). The RSE soil samples submitted for laboratory analysis were analyzed for specific metals and/or polycyclic aromatic hydrocarbons (PAHs) and carbazole. RSE sediment samples submitted for laboratory analysis were analyzed for specific metals (i.e., lead and arsenic). Twelve temporary monitoring wells were installed at the ECCL Firing Range in August 2019 during RSE activities. Ten of the 12 wells did not yield groundwater, and the 2 wells that did yield groundwater were poor yielding. Groundwater samples collected from the ECCL Firing Range during the RSE were analyzed for metals (filtered and unfiltered) and PAHs.

Streamlined risk assessments were conducted in accordance with USEPA's Guidance for Conducting NTCRAs (USEPA 1993). SI and RSE sampling results were evaluated during the streamlined risk assessments. The streamlined human health evaluation consisted of the identification of COPCs by comparison of environmental sampling results to background concentrations and risk-based screening levels (SLs) followed by identification of chemicals of concern (COCs), which included a sum-of-ratios (SOR) to identify potential cumulative risks from multiple chemicals. The risk-based SLs used are the most stringent, based on a residential exposure scenario. Use of residential SLs allows for unrestricted reuse of the property. The streamlined ecological risk assessment was performed to establish the potential risk to wildlife. The results of the streamlined risk assessments are summarized below for each of the individual EUs and shown in **Figures 4 and 5**.

Drainage Ditch—No human health or ecological COCs were identified as requiring remediation in the surface soil at this EU.

Former Clubhouse and Garage—No human health or ecological COCs were identified as requiring remediation in the surface soil at this EU.

Pistol Range (East)—Lead was identified as a human health and ecological COC requiring remediation in the surface and subsurface soil at this EU. Antimony also was identified as a human health and ecological COC requiring remediation in the surface soil at this EU. The antimony locations are co-located with elevated concentrations of lead, and remediation of lead will address elevated concentrations of antimony.

Pistol Range (West)—Lead was identified as a human health COC requiring remediation in the surface soil at this EU. No human health COCs were identified as requiring remediation in the subsurface soil. Antimony exceeded the RSLs and background at three soil locations; these locations were co-located with elevated concentrations of lead, and remediation of lead will address elevated concentrations of antimony. Lead and copper were identified as ecological COCs requiring remediation in the surface soil at this EU. No ecological COCs were identified in the shallow subsurface soil.

Rifle Range—Lead was identified as a human health COC requiring remediation in the surface and subsurface soil at this EU. Elevated concentrations of antimony and cPAHs were detected; however, the exposure point concentrations (EPCs) of these chemicals are less than RSLs, and the locations with elevated concentrations are co-located with elevated concentrations of lead. Remediation of lead will address the elevated concentrations of antimony and cPAHs. Lead was identified as an ecological COC requiring remediation in the surface and subsurface soil at this EU. Antimony and copper also were identified as ecological COCs requiring remediation in the surface soil at this EU.

Trap and Skeet Ranges—Lead and the cPAHs benz(a)anthracene, benzo(a)pyrene, benzo(b)fluor-anthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were identified as human health COCs requiring remediation in the surface soil (0 to 2 feet bgs) of this EU. No human health COCs were identified for remediation in the subsurface soil (>2 feet bgs). Although elevated concentrations of antimony and arsenic were detected, these locations are co-located with elevated concentrations of lead or cPAHs. Remediation of lead and cPAHs will address the elevated concentrations of antimony and arsenic. Antimony, arsenic, lead, benz(a)anthracene, benzo(a)pyrene, and chrysene were identified as ecological COCs requiring remediation in the surface soil of this EU. No ecological COCs were identified for remediation in the subsurface soil.

Ponds—The ECCL Firing Range Ponds were further aggregated into three EUs based on past use, geography, and drainage from the firing ranges (Pond East, Pond West A, and Pond West B). Surface water samples were co-located with a subset of the sediment samples. Pond East is a man-made pond south of the trap field shooting points. No human health or ecological COCs were identified for remediation in sediment at Pond East. Pond West A is a small wetland west of the Trap and Skeet Ranges. Although human exposure to the sediment in the pond is limited, lead was identified as a COC for remediation in the wetland based on comparison to residential soil RSLs as part of the soil remediation at the Trap and Skeet Ranges. Lead and copper were identified as ecological COCs for remediation in Pond West A based on magnitude of exceedances despite the Ohio Rapid Assessment Method (ORAM) Category 2 rating. Pond West B is a small wetland west of the Trap and Skeet Ranges that has a hydraulic connection with Pond West A. No human health or ecological COCs were identified for remediation in sediment at Pond West B. No human health or ecological COCs were identified for remediation for surface water for any EU.

Groundwater—No human health COPCs were identified for remediation in groundwater.

An asbestos survey was conducted as part of the RSE to determine the presence or absence of surface ACM and ACM-impacted surface soils at the ECCL Firing Range. Sampling of potential ACM material and soils was performed concurrently by a certified Asbestos Hazard Evaluation Specialist. Two bulk samples of suspect ACM (roofing shingle) observed on the surface of the Trap and Skeet Ranges and one surface soil composite sample were collected from the soil surface of the location of the suspect ACM materials. Results for the three samples collected were non-detect for asbestos. The Pistol Range (East) and Pistol Range

(West) also were surveyed; no potential ACM was observed and no samples were collected in either pistol range (Leidos 2020).

A visual inspection and field screening for lead-based paint (LBP) on surface debris was conducted as part of the RSE. Field screening for LBP was conducted using a portable XRF analyzer. No screening results were greater than 1 milligram per cubic centimeter (mg/cm^2) of lead, which is considered to be LBP as defined by Title X of the Housing and Community Development Act of 1992. Therefore, no LBP or soil samples were required. Screening locations included barricade posts along the top of Pistol Range earthen berms, old fence posts, a former range gate, and a former shooting stand at the Pistol Range (East).

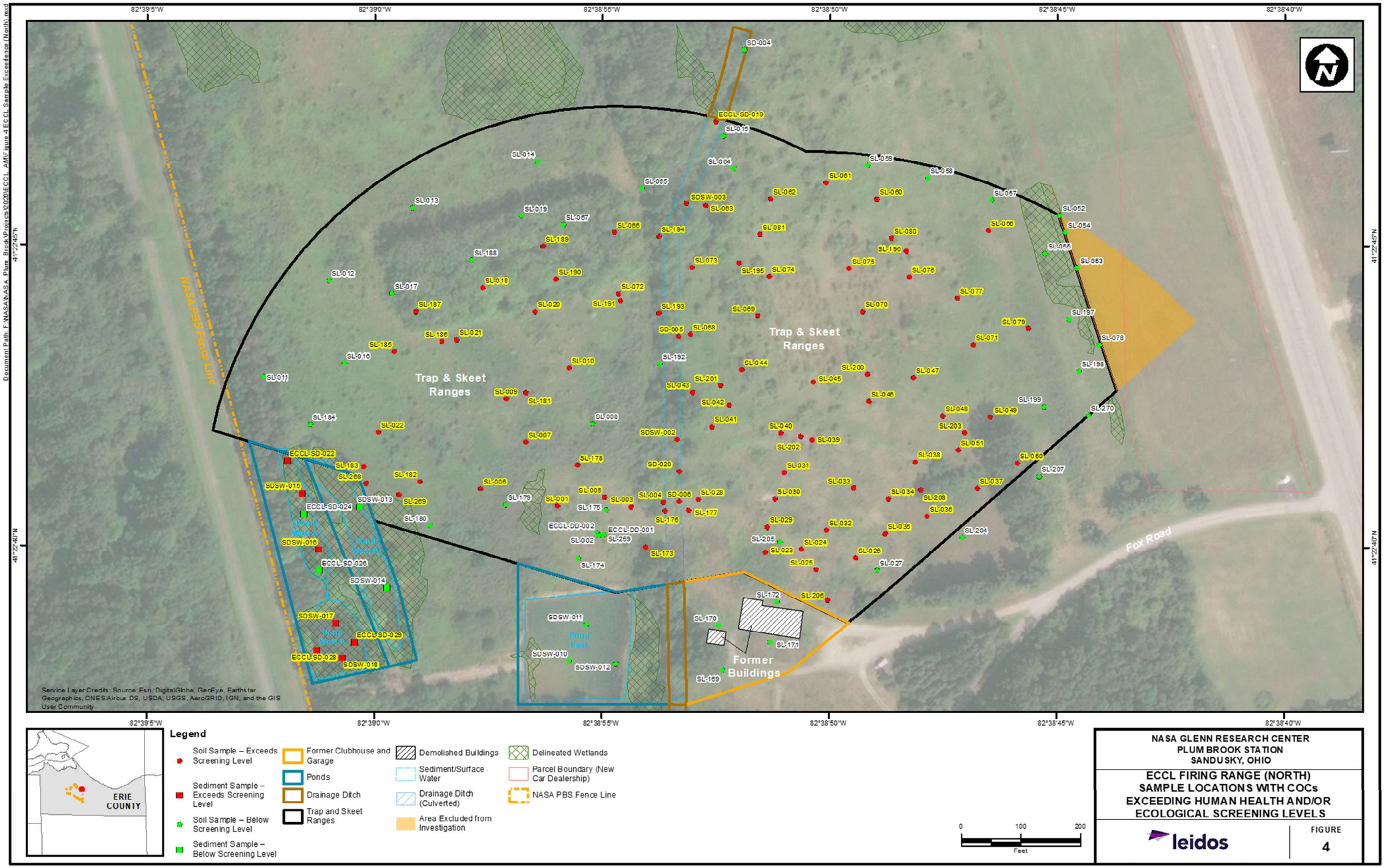

Figure 4. ECCL Firing Range (North) Sample Locations with COCs Exceeding Human Health and/or Ecological Screening Levels

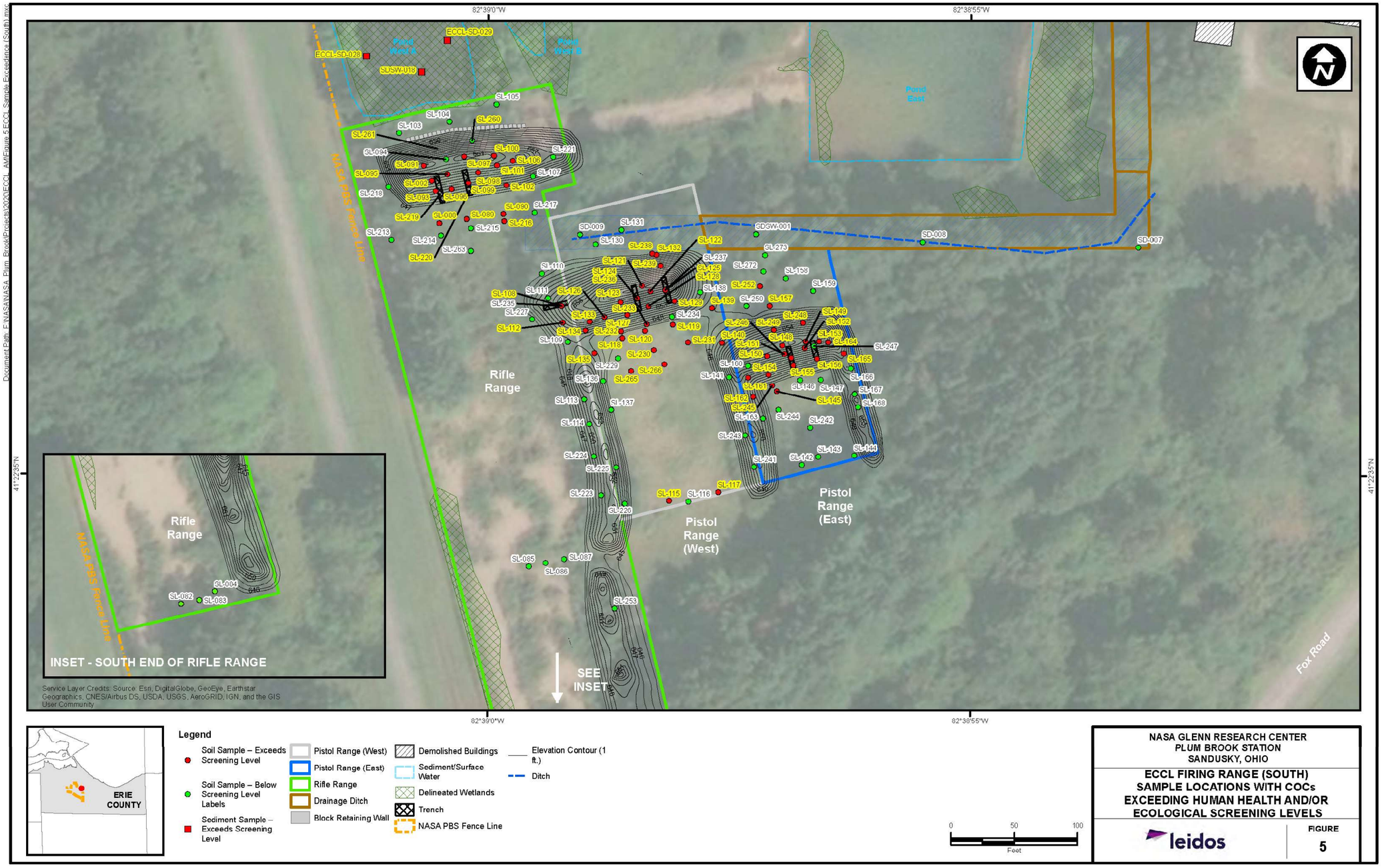

Figure 5. ECCL Firing Range (South) Sample Locations with COCs Exceeding Human Health and/or Ecological Screening Levels

During the RSE field investigation, representative samples of contaminated soils were collected for treatability studies in support of the RAWP. Sample collection involved collecting approximately 2/3 cubic feet (ft^3) (5-gallon bucket) of contaminated soil from three elevated contaminated areas of the ECCL Firing Range. The three areas where the composite samples were collected are the Trap and Skeet Ranges (highest lead concentrations at the ECCL Firing Range), Pistol Range East impact berm, and Pistol Range West impact berm. The treatability study was conducted by mixing a specific volume of untreated sample with stabilization reagents at different dosing rates (percent by wet soil weight). The reagents evaluated include Free Flow 200®, Enviroblend® CS, and Calciment® (Dolomitic). After reagent mixing, the treated samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) lead and total lead concentrations, and pH to determine the optimal dosage rate for each reagent. The results of the study indicated that all of the reagents were capable of reducing the leachability of lead below 5.0 milligrams per liter (mg/L), as determined by TCLP. However, the Free Flow 200®-treated materials indicated that higher dosage rates of the reagent will likely be required to meet the treatment criteria compared to Enviroblend® CS and Calciment® (Dolomitic).

A.2 Physical Location

The ECCL Firing Range is located on the eastern side of PBS near the intersection of U.S. Highway 250 and Fox Road. PBS is located in southern Erie County, Ohio, approximately 3 miles south of Sandusky, Ohio, and approximately 50 miles west of the NASA GRC at Lewis Field in Cleveland, Ohio (**Figure 2**). The PBS facility encompasses approximately 6,740 acres (Leidos 2018b) and is depicted in two adjacent U.S. Geological Survey (USGS) 7.5-minute series topographic maps: Sandusky Quadrangle (northern portion of the facility) and Kimball Quadrangle (southern portion of the facility). Most of PBS is in Perkins and Oxford Townships, with some lands in Huron and Milan Townships. The site boundaries are Bogart Road to the north, Mason Road to the south, U.S. Highway 250 to the east, and County Road 43 to the west. The northernmost point is at latitude 41°23’39”N, and the southernmost point is at 41°20’04”N. The westernmost point is at longitude 82°43’12”W, and the easternmost point is at 82°38’39”W (MK 1994).

PBS is situated in an area known for its agricultural productivity and is bordered by farmland, some of which is leased to local farmers by NASA. The area surrounding PBS is largely rural and agricultural, with some recent development. Some food processing facilities are located in the area, including dairy and meat processing operations. Tourism and recreation are important economic influences in the Sandusky area. The Erie County Perkins School District currently uses certain former NASA facilities, located near the former PBS main gate on Columbus Avenue and outside the fenced area, for transportation and storage purposes. Intensive commercial development, consisting of highway-oriented uses (e.g., motels, restaurants, and service stations) and shopping malls, predominate immediately to the north and east along U.S. Highway 250 and its intersections with Bogart Road and State Highway 2 in Sandusky. A U.S. Army Reserve Center is situated adjacent to the southeastern corner, just off Mason Road (Leidos 2018b).

An 8-foot security fence surrounds approximately 5,845 acres of PBS (Leidos 2018b). The ECCL facility is not located within the 8-foot security fence; however, a perimeter fence was installed in February 2019 to restrict public access. Most of the land at PBS consists of forestland and old fields with several streams that run across the property. An estimated 75 percent of NASA’s property at PBS is considered unused. The remaining land is used for offices, test facilities, roads, and infrastructure. Public access is restricted at PBS, and access to the site is gained through the security guard house located on East Scheid Road, which was newly constructed in 2016. The guard house is staffed by armed guards 24 hours per day (Leidos 2016a). The former main gate, which is located on Columbus Avenue, is only open for exiting traffic at peak afternoon hours.

The population in Erie County in the 2016 Census estimate was 75,107 with 37,679 total housing units (Leidos 2018b). The largest city is Sandusky, with a population of approximately 25,000 (Leidos 2018b). The population distribution within a 2-mile radius of the PBS boundary is listed in **Table 1**.

Table 1. Estimated Population Distributions in PBS Vicinity

Distance (miles)	Population
0 to 0.25	600
0.25 to 0.50	450
0.50 to 1.0	2,150
1.0 to 2.0	5,500

Source: U.S. Census Bureau 2016.
PBS = Plum Brook Station.

A site-wide species survey occurred at PBS in the fall of 2016 (EnviroScience 2017). The Final Protected Species Management Strategy for NASA Glenn Research Center at Lewis Field and Plum Brook Station, Volumes I–III (EnviroScience 2017) is an update to the original 2002 report (ODNR 2002). Three federally listed fauna species have been recorded to occur at PBS, but only one was noted in the 2016 surveys. In addition, 5 state endangered, 3 state threatened, and 21 state species of interest or concern have been noted since 1994 (EnviroScience 2017). Four state endangered, 6 state threatened, and 10 state potentially threatened flora species were recorded in the 2016 survey. One state threatened and one state potentially threatened species were note noted in the 2016 survey (EnviroScience 2017). One wetland area identified as W-07-028, located along the eastern side of Pond East, contained populations of two plant species listed as potentially threatened in the State of Ohio: handsome-Harry (Rhexia virginica, Obligate Wetland Plant [OBL]) and bog white violet (Viola lanceolata, OBL). However, no threatened or endangered species were observed at the ECCL Firing Range (EnviroScience 2019).

In 2011 and 2012, comprehensive wetlands and waterways delineations were conducted at PBS. The wetland delineations were completed in accordance with methods described in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: North-central and Northeast* (USACE 2012). Results of the delineations were presented in the *Wetlands and Other Waters Delineation Report* (EnviroScience 2012). Wetlands also were categorized using version 5 of ORAM for Wetlands. According to the *Wetlands and Other Waters Delineation Report* (EnviroScience 2012), a total of 421.958 acres of waterways and wetlands were delineated within PBS, including 1,050 wetlands; 373 waterways totaling 308,726 linear feet; and 15 ponds totaling 14.908 acres. As of 2013, the delineated wetland boundaries and ORAM quality scores have not been verified by the U.S. Army Corps of Engineers (USACE) or Ohio Environmental Protection Agency (Ohio EPA), respectively (Leidos 2016b).

A wetlands delineation was completed at the ECCL Firing Range in July 2019. The results of the study were reported in the *Final Wetland and Other Waters Delineation Report*(EnviroScience 2019). The study area consisted of open field, barren, scrub-shrub, forest, and wetland vegetative communities. Twelve wetlands were identified within the study area, accounting for approximately 4.357 acres of wetland onsite. The onsite wetlands consist of palustrine emergent (PEM) and palustrine scrub-shrub (PSS) vegetative communities. No streams were identified within the study area; however, three ditches were identified, accounting for approximately 1,600 linear feet and 0.199 acres of additional waterway. One open water pond was identified within the study area, accounting for 0.671 acres. The surrounding land use consists of forest, scrub-shrub, old field, and open field vegetative communities as well as agricultural and commercial

land use (EnviroScience 2019). A preliminary jurisdictional determination was requested by NASA for USACE to verify wetland boundaries if further excavation is needed during the RA.

NASA contacted the Ohio Historic Preservation Office to determine if any of the landmarks and/or structures onsite would be considered historically significant. Letters documenting NASA's request for consultation and responses from the Ohio Historic Preservation Office are included in Attachment 1. No historical landmarks and/or structures with historical significance were identified at the ECCL Firing Range. In addition, the Nottawaseppi Huron Band of Potawatomi, the Forest County Potawatomi Community of Wisconsin, and the Miami Tribe of Oklahoma Native American Tribes were consulted pursuant to Section 106 of the National Historic Preservation Act. The Nottawaseppi Huron Band of the Potawatomi and Miami Tribe of Oklahoma Native American Tribes responded that no Native American tribal interests are at the site. The Forest County Potawatomi Community of Wisconsin did not provide interests within the 30-day period. Letters documenting NASA's request for tribal consultation are included in Attachment 1.

A.3 Site Characteristics

PBS is operated as a satellite facility (or component installation) of the NASA GRC. Use of PBS by the Federal Government began in 1941 when the U.S. Army established Plum Brook Ordnance Works (PBOW) for the manufacture of munitions and related materials, including trinitrotoluene (TNT), dinitrotoluene, and pentolite (MK 1994). Munitions production was conducted from 1941 to 1945, after which buildings and production lines were decontaminated and decommissioned. In 1956, the National Advisory Committee for Aeronautics (NACA) (later NASA) obtained 500 acres in the northern portion of the site for construction of a nuclear test reactor (MK 1994). Between 1958 and 1960, NASA demolished hundreds of buildings, renovated approximately 41 buildings, and utilized 99 magazines (Gray & Pape 2008). In 1963, NASA acquired an additional 6,000 acres of PBOW and took control over what is now referred to as PBS (MK 1994). From 1967 through 1971, NASA purchased approximately 2,000 acres outside of the fence line from local farmers as "buffer." On April 18, 1978, NASA declared approximately 2,152 acres of PBS as excess. This excess included approximately 1,500 acres outside the fence and was sold as farmland (Leidos 2018b). NASA currently operates PBS as a space research facility in support of the NASA GRC. Most of the aerospace testing facilities built in the 1960s at PBS have been demolished or are currently on standby or inactive status. Additional tenants at PBS include the U.S. Department of Agriculture, the U.S, Department of the Interior (DOI), the Federal Bureau of Investigation, and the Ohio Air National Guard.

The ECCL was founded in 1948 with the purpose of conserving wildlife and improving hunting, fishing, and other outdoor activities in Erie County. In the late 1950s or early 1960s, NASA acquired the ECCL property through eminent domain to act as a security buffer and leased the property back to ECCL. The ECCL facility originally consisted of a single trap range, skeet range, and rifle range, respectively. In the early 1960s, the 50-yard pistol and rifle range was added. In the early to mid-1960s, the additional Trap and Skeet Ranges were added to the facility and the 25-yard pistol range was built in the mid-1980s (SAIC 2010). Structures located at the Trap and Skeet Ranges were removed sometime between 2006 and 2010 (SAIC 2011). The clubhouse and garage were demolished sometime between July 2012 and October 2015, based on review of more recent aerial photographs (Leidos 2019a). The facility was thought to have closed on or about August 18, 2007 (SAIC 2010).

Restoration activities at PBS are managed by the NASA GRC Environmental Management Office. This will be the first RA at the ECCL Firing Range. As noted in the 2010 PA, it is believed that reclamation of lead-impacted soils was conducted at the rifle range in approximately 2000; however, no documentation of this removal activity is available (SAIC 2010).

A.4 Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

Metals- and cPAH-contaminated soils and lead-contaminated sediments were identified at the ECCL Firing Range that pose a threat to human health and ecological exposure. Estimated quantities of contaminated soil, contaminated sediment, and construction debris are presented in **Tables 2, 3, and 4**. The RSE Report (Leidos 2020) presents a cost estimate of $8,380,099 for the RA. It is estimated that approximately 108 tons of construction debris, mostly concrete and scrap metal, will be generated for offsite recycling/disposal at Erie County Landfill in Huron, Ohio. It is estimated that approximately 48,520 tons of soil and sediment, including the amendment addition to the lead-contaminated soil and sediment to render it non-hazardous, will be generated and disposed of as non-hazardous waste offsite at Erie County Landfill.

A low likelihood of past and present contaminant migration exists, as sampling results presented in the RSE Report indicate that the contaminated soils and sediments are limited to the identified areas of the ECCL Firing Range (Leidos 2020). Potential future release or migration of contaminants will be eliminated by the NTCRA by achieving the removal action objective (RAO) and confirmed with confirmation sampling.

A.5 NPL Status

The ECCL Firing Range is not on USEPA's National Priorities List (NPL). The NPL is a list of hazardous waste sites that are prioritized for cleanup. PBS is not included in USEPA's Superfund Enterprise Management System (SEMS) database. SEMS contains information on hazardous waste sites, potential hazardous waste sites, and remedial activities across the nation.

Table 2. Estimated Soil Volumes Requiring Removal at ECCL Firing Range

Media	Depth (ft)	Width (ft)	Length (ft)	Volume (ft^3)	Volume (yd^3)	Tons
Pistol Range (East) Earthen Backstop Berm*	6	57	116	27,971	1,035	1,552
Pistol Range (East) Target Area	1	14	22	312	12	17
Pistol Range (East) Hotspot Behind Berm	1	23	29	646	24	36
Pistol Range (East) Discharge Area	1	19	57	1,071	40	59
Pistol Range (West) Earthen Backstop Berm	3.5	67	154	29,698	1,099	1,648
Pistol Range (West) Target Area	1	41	103	3,218	199	179
Pistol Range (West) Discharge Area	1	20	70	1,414	52	78
Rifle Range Earthen Backstop Berm	6	53	98	27,975	1,035	1,553
Rifle Range Target Area	1.5	40	83	4,988	185	277
Trap and Skeet Ranges Lead Fallout Zone (1 ft)	1	436	1,195	381,650	14,121	21,182
Trap and Skeet Ranges Lead Fallout Zone (1.5 ft)	1.5	227	380	130,220	4,818	7,227
Trap and Skeet Ranges Lead and PAHs Fallout Zone	1.5	123	715	108,528	4,016	6,023
Trap and Skeet Ranges PAHs Discharge Area	1.5	116	620	99,114	3,667	5,501
Trap and Skeet Ranges PAH Hotspot	2	33	37	2,397	89	133
			Total	**819,203**	**30,311**	**45,466**

*Earthen backstop dimensions based on land survey and ESRI ArcGIS Geospatial Tools during the RSE. Assume density of soil at 1.5 tons/yd^3 (bench test average).
ArcGIS = Aeronautical Reconnaissance Coverage Geographic Information System.
ECCL = Erie County Conservation League.
ESRI = Environmental Systems Research Institute.
ft = Feet.
ft^3 = Cubic Feet.
PAH = Polycyclic Aromatic Hydrocarbon.
RSE = Removal Site Evaluation.
yd^3 = Cubic Yard.

Table 3. Estimated Sediment Volume Requiring Removal at ECCL Firing Range

Media	Depth (ft)	Width (ft)	Length (ft)	Volume (ft^3)	Volume (yd^3)	Tons*
Pond West A (South only)	1	124	100	11,240	416	624
			Total	**11,240**	**416**	**624**

*Assume density of soil/sediment at 1.5 tons/yd^3.
ECCL = Erie County Conservation League.
ft = Feet.
ft^3 = Cubic Feet.
yd^3 = Cubic Yard.

Table 4. Estimated Construction Debris Volume Requiring Removal at ECCL Firing Range

Media	Volume[a] (ft^3)	Volume (yd^3)	Tons[b]
Concrete Retaining Wall (Blocks)	1,463	54	103
Trap and Skeet Range Traphouse Burned Wood and Fencing/Metal Debris	642	24	5
Total	**2,105**	**78**	**108**

[a] Concrete block volume based on visual survey during the RSE. Debris pile volume estimates are based on land survey results conducted during the RSE.
[b] Assume density of wood debris at 0.2 tons/yd^3 and density of concrete rubble at 1.9 tons/yd^3.
ECCL = Erie County Conservation League.
ft^3 = Cubic Feet.
RSE = Removal Site Evaluation.
yd^3 = Cubic Yard.

B OTHER ACTIONS TO DATE

B.1 Previous Actions

Private reclamation of lead-impacted soils was conducted at the ECCL Firing Range in approximately 2000; however, no documentation of this removal activity is available (SAIC 2010). No previous government actions have been undertaken specific to the metals and cPAH contamination at the ECCL Firing Range other than investigations discussed in this AM.

B.2 Current Actions

No government or private actions are currently being performed specific to the metals and cPAH contamination at the ECCL Firing Range.

C STATE AND LOCAL AUTHORITIES' ROLE

C.1 State and Local Actions to Date

State and/or local governments did not request USEPA's assistance to address contaminated media. Likewise, Ohio EPA determined the Consent Order with NASA self-terminated in 2000 and did not request involvement in the ongoing CERCLA activities. NASA continues to notify Ohio EPA of remedial activities at PBS by submitting all primary CERCLA documents.

NASA is developing a CIP for seven sites at PBS under the CERCLA process to ensure the public has convenient access to information regarding project progress. News releases and public meetings with local officials, interest groups, and the general public are conducted as part of the NASA PBS community relations program.

PART III: THREATS TO PUBLIC HEALTH, PUBLIC WELFARE, OR THE ENVIRONMENT

In accordance with Section 300.410 (b) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the RSE included an evaluation to determine whether an RA was necessary. NASA elected to use its CERCLA Section 104 authority for the site to determine if a release of hazardous substances has occurred or if the potential exists for a release or threat of release of CERCLA hazardous substances (Leidos 2020).

Actual or potential exposure to nearby populations, animals, or the food chain from hazardous substances, pollutants, or contaminants: As summarized in the human health and ecological risk evaluations in the RSE Report (Leidos 2020), a viable potential for human health exposure to lead and/or cPAH-contaminated soil exists at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Ranges; a viable potential for human health exposure also exists for exposure to lead-contaminated sediment at Pond West A. In addition, a viable potential for wildlife exposure to lead-, antimony-, arsenic-, copper- and/or PAH-contaminated soils exists at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range EUs; a viable potential also exists for wildlife exposure to lead and copper in soil and sediment at Pond West A.

Actual or potential contamination of drinking water supplies or sensitive ecosystems: At PBS, domestic water is supplied by the Erie County Water Division (ECWD). ECWD uses Lake Erie as its source of public, commercial, and industrial water supply. Neither local surface water nor wells are used for drinking water at PBS. The Facilities Division is responsible for the operation, maintenance, and long-term stewardship of the drinking water distribution system. Wells utilized at NASA PBS are solely intended for environmental monitoring purposes. Small ponds/wetland areas are present at the site. Lead was detected at less than 2 times the maximum contaminant level (MCL) at two of these ponds. Although lead did not exceed human health and ecological screening criteria in surface water, lead in sediment did exceed ecological screening criteria at the Pond West A wetland and was detected at 98 times the ecological screening value (ESV) and 74 times the Ohio sediment reference value (SRV); copper also was elevated above its ESV and SRV in this wetland.

Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release: No evidence of any drums, barrels, tanks, or other bulk storage containers was found at the ECCL Firing Range. However, the site contains the earthen backstop berms, which have been contaminated by historical operations at the ECCL Firing Range (Leidos 2020).

High levels of hazardous substances, pollutants, or contaminants in soils largely at or near the surface that may migrate: Sampling data indicate that most of the elevated contaminant concentrations are located in the surface soil of the EUs. Based on the elevated contaminant concentrations in Pond West A sediment, migration has already occurred at the ECCL Firing Range (Leidos 2020).

Weather conditions that may promote migration of hazardous substances: No unusual weather conditions occurred that may promote migration of hazardous substances. No potential for migration of contaminants via overland flow/runoff toward any low-lying surface features around the site exists (Leidos 2020).

Threat of fire or explosion: No known threat of fire or explosion exists.

Availability of other appropriate Federal or state response mechanisms to respond to the release: NASA will coordinate and engage with Ohio EPA, as necessary, regarding NASA's continuing obligations under CERCLA.

Other situations or factors that may pose threats to public health, public welfare, or the environment: Lead and cPAHs in soil and lead in sediment at concentrations exceeding residential RSLs and ESVs pose a threat to human health, wildlife, and the environment. Antimony, arsenic, and copper in soil and copper in sediment also pose a threat to wildlife and the environment. While access to the site is limited, a potential for current and future receptors to be exposed to this contamination exists. Thus, it is recommended that an appropriate RA (i.e., an NTCRA) be conducted to attain soil concentrations below the applicable SLs, prevent future exposure threats, and potentially allow for subsequent unrestricted reuse (i.e., residential) of the site (Leidos 2020).

PART IV: ENDANGERMENT DETERMINATION

Actual or threatened releases of contaminants (cPAHs, antimony, arsenic, copper, and lead) from the ECCL Firing Range, if not addressed by implementing the response action selected in this AM, may present an imminent and substantial endangerment to public health, public welfare, or the environment.

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PART V: PROPOSED ACTIONS AND COST ESTIMATES

A PROPOSED ACTIONS

The RSE Report (Leidos 2020), which is equivalent to an EE/CA, was prepared in accordance with USEPA guidance (USEPA 1993) to develop and evaluate RA alternatives. The RSE Report developed the following RAOs to protect the environment:

- Minimize the risk associated with exposure to soil contamination (lead and cPAHs) in and around the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Ranges.
- Minimize the risk associated with exposure to sediment contamination (lead) in and around Pond West A.

The RSE Report (Leidos 2020) was provided for public review and comment from May 4 to June 2, 2020. The Nottawaseppi Huron Band of Potawatomi, the Forest County Potawatomi Community of Wisconsin, and the Miami Tribe of Oklahoma also were consulted pursuant to Section 106 of the National Historic Preservation Act.

Proposed Action Description

The RSE Report identified RA alternatives and evaluated the alternatives based on effectiveness, implementability, and cost (Leidos 2020). The RA alternatives included no action; Soil Disposal Option 1 (excavation, onsite stabilization treatment, and non-hazardous waste disposal); and Soil Disposal Option 2 (excavation and hazardous waste disposal). The no action alternative was eliminated during the individual analysis due to the lack of effectiveness. Soil Disposal Option 1 was selected over Soil Disposal Option 2 due to cost. The selected RA alternative, Soil Disposal Option 1, includes the following: 1) remove soil from the earthen backstop berm, target area, and discharge area at the Pistol Range (East) such that residential RSLs are attained for lead and antimony contamination in soil; 2) remove soil from the earthen backstop berm, target area, and discharge area at the Pistol Range (West) such that residential RSLs are attained for lead and antimony contamination in soil; 3) remove soil from the earthen backstop berm and target area at the Rifle Range such that residential RSLs are attained for lead, antimony, and cPAH contamination in soil; 4) remove soil from the Trap and Skeet Ranges such that residential RSLs are attained for lead, antimony, arsenic, and cPAH contamination in soil; and 5) remove sediment from the southern portion of Pond West A such that residential RSLs are attained for lead contamination in sediment. Areas identified for excavation are depicted in **Figures 6 and 7**. In order to achieve the RAOs, soil concentrations must be below the remediation goals presented in **Table 5**. Completion of the RA will allow potential future unrestricted reuse at the ECCL Firing Range. The following sections describe the components of the selected RA.

Pre-Removal Activities—Prior to mobilizing for Phase 1 construction activities, detailed planning efforts will be undertaken to include updates to existing site-specific plans (e.g., health and safety plan, quality assurance project plans); developing an RAWP and stormwater pollution prevention plan; procuring necessary subcontracts (e.g., waste disposal facilities, analytical laboratory services, major construction equipment rental); and completing a pre-removal readiness review, including dig permits and utility clearances.

Table 5. Remediation Goals for Soils and Sediment at the ECCL Firing Range

COC	Remediation Goal (mg/kg)
Antimony	31
Arsenic	36.5[b]
Copper	3,100[d]
Lead	400[a]
cPAHs (as benzo[a]pyrene)	1.1[c]

[a] The arithmetic average lead concentration for each area <400 mg/kg is used as the remediation goal. The lead remediation goal correlates to the XRF remediation goal of 371 mg/kg.
[b] The non-cancer RSL for arsenic (35 mg/kg) (USEPA 2019) is less than the background criteria (36.5 mg/kg) (IT 1998); therefore, the background concentration for arsenic is used as the remediation goal.
[c] The remediation goal for cPAHs is conservatively set at the residential soil RSL for benzo(a)pyrene of 1.1 mg/kg (USEPA 2019). The equivalent concentration of benzo(a)pyrene will be calculated for each area to determine if benzo(a)pyrene <1.1 mg/kg.
[d] The RSL for copper will be used as remediation goal to be protective of ecological receptors (USEPA 2019).
COC = Chemical of Concern.
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbon.
ECCL = Erie County Conservation League.
Mg/kg = Milligrams per Kilogram.
RSL = Regional Screening Level.
XRF = X-Ray Fluorescence.

RA Activities – Phase 1—Prior to initiating removal of the earthen backstop berms and the Trap and Skeet Ranges soil, waste characterization sampling will be conducted. Five-part composite samples will be collected from the soil in the earthen berms and Trap and Skeet Ranges at a frequency of 1 sample per 300 cubic yards (yd^3) per landfill requirements. One five-part composite sample also will be collected from the concrete retaining block wall at the Rifle Range berm. The samples will be submitted for laboratory analysis for hazardous waste determination. In addition, the lateral earthen berms with no lead or cPAH exceedances will be sampled for full suite analyses to determine potential reuse as backfill onsite. Similarly, five-part composite samples also will be collected from the Trap and Skeet Ranges at a frequency of two samples per range for hazardous waste determination. All hazardous waste determination samples will be tested in the laboratory for TCLP SVOCs; TCLP volatile organic compounds (VOCs); TCLP metals; TCLP pesticides; TCLP herbicides; polychlorinated biphenyls (PCBs); paint filter test; and reactivity (total cyanide, total sulfide), corrosivity, and ignitability (RCI) analysis.

Based on the RSE bench test study results for the site, it is anticipated that the soil in the earthen backstop berms and the majority of the Trap and Skeet Range excavations will generally be characterized as hazardous waste; however, onsite lead stabilization treatment will allow for non-hazardous disposal. Based on historical soil sampling results, it is anticipated that the cPAH-contaminated soil (not co-located with lead contamination) in the Trap and Skeet Ranges will generally be characterized as non-hazardous waste. In summary, prior to actual removal of the earthen berms and range soils, a clear determination will be made as to the disposal of the berms and range soils.

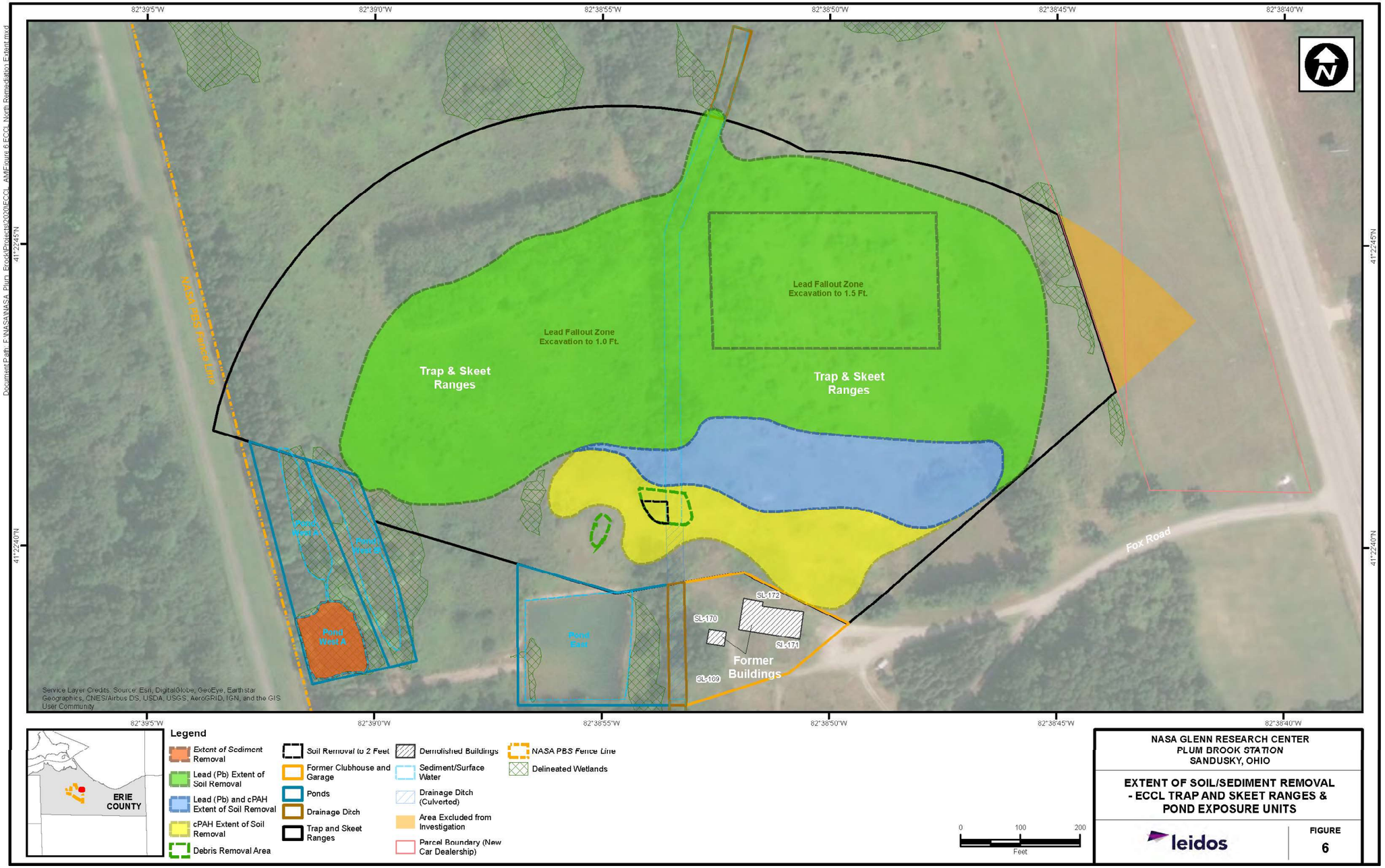

Figure 6. Extent of Soil/sediment Removal – ECCL Trap and Skeet Ranges and Pond Exposure Units

Figure 7. Extent of Soil Removal – ECCL Rifle and Pistol Ranges Exposure Units

Site preparation will involve vegetation clearing to facilitate efficient soil removal and set-up of erosion controls (e.g., filter logs, silt fences), as necessary, to protect surface drainage features. Vegetation clearing will occur at the majority of the Trap and Skeet Ranges; the earthen berms of the Pistol Range (East), Pistol Range (West), and Rifle Range; immediately surrounding the southern portion of Pond West A; surrounding the former clubhouse; and along the entry roads to the site. To protect the critical habitat for two bat species, the Indiana bat (Federal Endangered [FE]) and the Northern long-eared bat (Federal Threatened [FT]), tree clearing will be conducted outside of the restricted time frame of April 1st through September 30th; therefore, clearing was expedited in January through February 2020.

RA Activities – Phase 2—The removal activities will begin with removal and segregation, as needed, of the earthen berms and then proceed with the adjacent target areas and Trap and Skeet Ranges. In addition, the old fencing, gates, and signage at the Fox Road entrance to the Rifle and Pistol Ranges will be removed during Phase 2. The appropriate equipment (e.g., excavator with hydraulic extension, skid steer, bulldozer, front-end loader, off-road haul truck, soil sifting machine) will be mobilized to the site for the removal activities. The upper contaminated intervals of the earthen backstop berms will be removed first prior to the target areas (directly in front of the backstop berms). Once it has been confirmed that contaminated berm soils have been removed, staged, and treated to render them non-hazardous, the adjacent target areas will be excavated to the required depth, ranging from 1 to 1.5 feet bgs (or bedrock refusal) and treated. The soil at the Trap and Skeet Ranges will be removed to a depth ranging from 1 to 1.5 feet bgs (or bedrock refusal), treated (if lead-contaminated), staged, and ultimately loaded into dump trucks for offsite disposal. A cPAH hot spot excavation within the Trap and Skeet Ranges will be excavated deeper to 2 feet bgs (around SL-176). It is estimated that a total of approximately 45,466 tons of soil will be generated from the removal activities. The soil quantity estimate includes both the soil within the earthen berms and soil excavations to address specific lead and cPAH exceedances at the ECCL Firing Range.

Following the removal of the Rifle Range earthen backstop berm, a concrete block retaining wall will be removed from the backstop berm. It is anticipated that all non-hazardous concrete waste generated from the removal activities will be recycled/disposed of at the Erie County Landfill, which is located approximately 5 miles from NASA PBS. Based on the dimensions of the retaining block wall, it is estimated that approximately 103 tons of concrete debris will be generated for offsite recycling or disposal.

Following the removal of the Rifle Range earthen backstop berm, the contaminated sediment will be removed until bedrock refusal, estimated to be less than 1 foot deep, from the southern portion of Pond West A. A temporary cofferdam (not an earthen berm due to wetland requirements) may be installed in the channel between each portion of Pond West A. The surface water in the southern portion will be dewatered into the northern portion of Pond West A, or the adjacent Pond West B. It is estimated that a total of approximately 624 tons of sediment will be generated from the removal activities (refusal at less than 1 foot during RSE sampling activities).

Waste Management—Waste characterization sampling determined the waste to be hazardous due to TCLP results; thus, the soil will be excavated from the earthen berms, target areas, and Trap and Skeet Ranges; treated onsite; and temporarily stored in containers (as per Ohio Administrative Code [OAC] 3745-52-34 requirements) at an onsite staging location. The container will be made of, or lined with, materials that will not react with and are otherwise compatible with the waste to be stored, so that the ability of the container to contain the waste is not impaired. Sediment also will be staged similarly. An appropriate amendment (e.g., calcium or potassium phosphate amendment) will be thoroughly mixed with the soil or sediment in situ or in the containers to render it non-hazardous for disposal. Following confirmation TCLP sampling at a frequency of one sample per 300 yd^3, per landfill requirements to ensure that the soil waste is non-hazardous, the soil will be ultimately loaded into dump trucks for offsite disposal. The details regarding the type and quantity of each amendment were determined during bench-scale testing conducted as part of the RSE activities.

Under this disposal option, it is anticipated that the excavated soil and sediment from the ECCL Firing Range will be disposed of offsite at the Erie County Landfill as non-hazardous waste (either with or without amendment addition for soil stabilization). Areas identified in the RSE (Leidos 2020) that exhibit concentrations below amendment criteria (e.g., only cPAH contamination) will be live-loaded into dump trucks for offsite disposal at the Erie County Landfill. All haul trucks transporting bulk soil and sediment waste will be weighed both empty and loaded on a portable scale, and weight information will be recorded for reporting purposes.

Confirmation Sampling—Following completion of removal activities at each range at the site, confirmation soil sampling will be conducted at the Rifle and Pistol Range target excavation locations and Trap and Skeet Ranges excavations at the ECCL Firing Range. The Trap and Skeet Ranges will be subdivided into a grid due to the large area requiring soil removal. Discrete confirmation samples will be collected from below the total depth at each excavation area/grid (i.e., the floor). Samples will be collected and analyzed either for lead only, lead and other metals (antimony, arsenic, or copper), lead and PAHs, or only PAHs, depending on the remediation goals for each excavation area. Samples generally will be collected at an approximate spacing of one sample per every 50- to 75-foot grid of excavation, but final confirmation sampling locations will depend on actual field observations during the RA. Due to shallow refusal in Pond West A, no confirmation sediment samples are anticipated. The confirmation soil sampling will determine whether the RA was fully successful in attaining remediation goals (**Table 5**). Depending on the initial confirmation results, the potential need for extending the excavation footprint will be evaluated.

Site Restoration Activities and Reporting—Site restoration will be completed following completion of removal activities at each range of the site. Site restoration of the Rifle and Pistol Ranges and Trap and Skeet Ranges will include backfilling the removal areas with clean fill material obtained from a NASA-approved location and/or uncontaminated soil material from the earthen berms (all backfill material must pass NASA soil reuse standards); the top 6 inches will be backfilled with clean topsoil obtained from a NASA-approved location for vegetation re-establishment. Following completion of backfilling activities, the backfilled area will be seeded with NASA-approved seed mixture, and a post-removal inspection will be conducted. Site restoration of Pond West A will not include backfilling and will be limited to restoring any side banks disturbed during sediment removal. Erosion controls will be removed once at least 70 percent grass growth is observed during weekly inspections. An RA Completion Report will be prepared to document in detail the removal activities at the ECCL Firing Range.

A.2 Contribution to Remedial Performance

The RA will meet the RAOs and will achieve quick, protective results at the ECCL Firing Range. The time period to complete this RA is relatively short, and no further action will be required once the removal action is complete.

A.3 Engineering Evaluation/Cost Analysis

The RSE Report presented the parameters, assumptions, and estimated cost to implement the selected RA alternative (Leidos 2020). The estimated total cost for RA is $8,380,099. No written comments were received during the public comment period for the RSE Report, and this will be documented in the Responsiveness Summary in the Administrative Record.

A.4 Applicable or Relevant and Appropriate Requirements

USEPA classifies applicable or relevant and appropriate requirements (ARARs) as chemical-, action-, and location-specific to provide guidance for identifying and complying with ARARs (USEPA 1988). The RSE Report identified the following ARARs for the RA at the ECCL Firing Range (Leidos 2020).

Chemical-specific ARARs—Chemical-specific to-be-considered (TBC) ARARs include the USEPA residential RSLs and ESVs utilized in the human health and ecological risk evaluations. The RA will satisfy the chemical-specific ARARs once the remediation goals are met.

Action-specific ARARs—Under the recommended RA of the soil at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Ranges, and the sediment at Pond West A at the ECCL Firing Range, the following action-specific ARARs are considered:

- Because the RA of the soil at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Ranges, and the sediment at Pond West A would include generating and managing contaminated environmental media and materials, Resource Conservation and Recovery Act (RCRA) requirements would be considered potential ARARs for this activity. The RCRA requirements mandate that a generator must determine whether a material is (or contains in the case of environmental media) hazardous waste under OAC 3745-52-11. If a material is determined to be or contains a listed hazardous waste, or exhibits a hazardous waste characteristic, additional management requirements under RCRA must be followed as an ARAR under CERCLA. If the excavated soil is determined to be characteristically hazardous and requires stabilization to render it non-hazardous for disposal, the requirements under OAC 3745-52-34 would be applicable. OAC 3745-52-34 specifies that generators are allowed to treat and accumulate waste onsite up to 90 days without requiring a hazardous waste permit from Ohio EPA. Treatment as defined in OAC 3745-50-10(A) includes any method, technique, or process designed to change the physical, chemical, or biological composition of the waste to render the waste non-hazardous or less hazardous.
- In 1998, USEPA created a new unit for the temporary management of remediation wastes known as the staging pile. The staging pile is an accumulation of solid, non-flowing remediation wastes that may be used for storage of those wastes for 2 years. The requirements for staging piles include the performance criteria of 40 *Code of Federal Regulations* (*CFR*) 264.554(d) and OAC 3745-57-74. These standards require that the staging pile be designed to prevent or minimize releases of hazardous waste or hazardous constituents into the environment. Storage in a staging pile includes mixing, sizing, blending, or other similar physical operations as long as these operations are intended to prepare the wastes for subsequent management or treatment.
- Shipments of contaminated soils and materials will comply with Federal, state, and local rules, laws, and regulations. In addition to the identified ARARs for the selected action, NASA will comply with requirements applicable to offsite actions, including RCRA hazardous waste transportation requirements under OAC 3745-52-20 through 3745-52-33, offsite treatment prior to land disposal as required by RCRA's land disposal restrictions (LDRs) under OAC 3745-270, and alternative LDR treatment standards for contaminated soil under OAC 3745-270-49.
- Implementing excavation activities also would trigger potential ARARs associated with land disturbance and emission controls. OAC 3745-15-07 requires that nuisance air pollution emissions be controlled. This includes controlling potential fugitive dust from the soil and sediment excavation activities. In addition, any construction (i.e., soil disturbance activities that would encompass more than 1 acre) would trigger the stormwater requirements contained in 40 CFR Part 450. These requirements mandate that erosion and sedimentation control measures be designed and implemented to control erosion and sediment runoff. The proposed RA is anticipated to disturb

more than 1 acre; therefore, erosion controls and best management practices will be developed in a stormwater pollution prevention plan and utilized during the RA.

- In the event solid waste material is found to be contaminated but not a RCRA hazardous waste, management and disposal of this material would be subject to the requirements associated with managing and disposing of solid waste within the State of Ohio. The OAC 3745-27-05 requirements would be potential ARARs for disposing of non-hazardous contaminated waste material generated during excavation and subsequent disposal at an offsite location.

Location-specific ARARs—Location-specific requirements include those established for potential removal activities conducted within wetlands, within a floodplain area, or with respect to threatened and/or endangered species. The ECCL Firing Range is not within a floodplain area. Twelve wetlands have been identified and delineated and one open water pond was identified within the ECCL Firing Range boundary. One wetland area identified as W-07-028, located along the eastern side of Pond East, contained populations of two plant species listed as potentially threatened in the State of Ohio: handsome-Harry (*Rhexia virginica*, OBL) and bog white violet (*Viola lanceolata*, OBL) (EnviroScience 2019). However, no threatened and/or endangered species were encountered at the site. The following location-specific ARARs are TBC:

- Due to the presence of sensitive resources (e.g., wetlands) within the ECCL Firing Range, if any remedial activities affect these wetlands, EO 11990 (40 CFR 6, Appendix A) and OAC 3745-1-54 would be TBC guidance for the site. In that event, the following actions should be taken during the design and implementation of remedial actions: 1) identify potential wetland impacts (e.g., impact to water quality, impact to habitat quality, or impact to vegetative community); and 2) avoid wetland and water impacts where practicable, minimize potential impacts to wetlands and water, and compensate for any remaining unavoidable impacts to wetlands or waters through activities to enhance or create wetlands and/or waters (e.g., mitigation banks).
- Two plant species listed as potentially threatened in the State of Ohio have been identified at the ECCL Firing Range. If any remedial activities affect these plant species, requirements established under the Endangered Species Act (16 United States Code 1531 et seq., 50 CFR Parts 200 and 402) and the Ohio Revised Code (ORC) 1518 and 1525 would be TBC guidance for the site.
- The Endangered Species Act (50 CFR Part 17) requires action, including consultation with the U.S. Fish and Wildlife Service (USFWS), to conserve ecosystems, habitats, and endangered and threatened species. In addition, ORC 1531.25 and 1501:31-23 provide protections for endangered and threatened species in Ohio. To protect the critical habitat for two bat species (Indiana bat [FE] and Northern long-eared bat [FT]), tree clearing must be conducted outside of the restricted time frame of April 1st through September 30th. Consultation with USFWS and the Ohio Department of Natural Resources (ODNR) may occur, if tree clearing is required within the restricted time frame.

A.5 Project Schedule

The RSE Report was submitted in March 2020 (Leidos 2020), and the public notification and comment period was conducted from May 4 to June 2, 2020. Upon development, review, and approval of the RAWP, NASA will begin implementing the NTCRA at the ECCL Firing Range. The RA is anticipated to be completed over a duration of approximately 8 months. Tree clearing was expedited in January and February 2020, to be conducted outside of the restricted time frame of April 1st through September 30th (4 weeks); Phase 2 activities will occur during a second mobilization (7 months). An RA Completion Report will be prepared to document the RA.

B ESTIMATED COSTS

A cost analyses is provided in the RSE Report (Leidos 2020). This analysis includes an estimate of the capital cost in dollars and indicates the period of time to complete the proposed action.

The estimated cost to complete the recommended RA at the ECCL Firing Range is $8,380,099. These costs include implementing the removal, onsite stabilization treatment, offsite disposal, site restoration, and reporting. The time period to complete this RA is relatively short (estimated 8 months) and does not include an operations and maintenance period to assess impacts from excavating metal- and cPAH-contaminated soils and lead-contaminated sediments, as potential future unrestricted reuse of the ECCL Firing Range will be achieved.

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PART VI: EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If no action or a delayed action occurs, metals- and cPAH-contaminated soil and lead-contaminated sediment would remain in place. Therefore, this scenario would not provide for overall protection of the environment. Remediation goals would not be achieved, as this scenario provides for no long-term effectiveness and permanence. No mitigation of potential risks to human and ecological receptors from metals and cPAHs in soil and lead in sediment would exist under this scenario.

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PART VII: OUTSTANDING POLICY ISSUES

No outstanding policy issues are applicable to the former ECCL Firing Range located at NASA PBS.

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PART VIII: ENFORCEMENT

NASA is the lead agency that will oversee this NTCRA. The RSE Report (Leidos 2020) has been prepared following current USEPA guidance documents and was shared with Ohio EPA.

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PART IX: RECOMMENDATION

This AM documents the selected RA for the ECCL Firing Range at PBS in Sandusky, Ohio, developed in accordance with CERCLA as amended, and is consistent with the NCP. This decision is based on the Administrative Record for the site.

Conditions at the ECCL Firing Range meet the NCP Section 300.415(b)(2)(i–viii) criteria for an NTCRA. The total project cost of approximately $8,380,099 is approved by the undersigned.

AUTHORIZING SIGNATURE:

JOEL KEARNS Digitally signed by JOEL KEARNS Date: 2020.07.23 21:30:41 -04'00'

7/23/20

Joel K. Kearns, Director
Facilities, Test, and Manufacturing Directorate
NASA Glenn Research Center

Date

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ATTACHMENT 1.

OHIO HISTORIC PRESERVATION OFFICE AND NATIVE AMERICAN CONSULTATION DOCUMENTATION

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National Aeronautics and
Space Administration

John H. Glenn Research Center
Lewis Field
Cleveland, OH 44135-3191

May 5, 2020

Reply to Attn of: FXP

Ohio Historic Preservation Office
Attn: Ms. Joy Williams
Project Reviews Manager
Resource Protection and Review
800 East 17th Avenue
Columbus, OH 43211

Subject: Remediation of the Erie County Conservation League (ECCL) Firing Range Vacant Site at NASA Glenn Research Center's (GRC) Plum Brook Station (PBS)

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, NASA GRC is consulting with your office regarding the remediation of the ECCL Firing Range vacant site at GRC PBS in Erie County, Ohio.

The NASA GRC is also consulting with your office under Stipulation III, Archaeology, B, within the enclosed Programmatic Agreement (PA) between NASA and the Ohio Historic Preservation Office (OHPO) regarding Facilities, Infrastructure, and Sites at NASA GRC's PBS. The Stipulation states that NASA GRC must consult the OHPO for land disturbing activities where no previous survey has occurred. No previous survey has occurred in the area where the remediation work is located. Please refer to the enclosed PA. Therefore, I am requesting your concurrence with NASA GRC's determination of No Adverse Effect. If you have any questions please contact me at (216) 433-8960 or thomas.m.yohe@nasa.gov.

THOMAS YOHE
Digitally signed by THOMAS YOHE
Date: 2020.05.05 11:17:45 -04'00'

Thomas M. Yohe
Cultural Resources Manager

2 Enclosures
Background Information: Project No. E109
Programmatic Agreement Between NASA and the Ohio State Historic Preservation Office

bcc:
FX/S. M. Ahmed
FXP/T. M. Yohe
FX/Official File
FXP/Official File

June 3, 2020

In reply, please refer to:
2020-ERI-48339

Thomas M. Yohe, Cultural Resources Manager
NASA Glenn Research Center
Facilities Division
21000 Brookpark Road, Mail Stop 21-1
Cleveland, Ohio 44135

RE: Remediation of the Erie County Conservation League (ECCL) Firing Range at NASA Glenn Research Center's Plum Brook Station, Erie County, Ohio

Dear Mr. Yohe:

This letter is in response to correspondence received on May 5, 2020. Our comments are made pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the associated regulations at 36 CFR Part 800, and guided by the terms established in the *Programmatic Agreement Between the National Aeronautics and Space Administration and the Ohio State Historic Preservation Office Regarding Facilities, Infrastructure, and Sites at the National Aeronautics and Space Administration's Plum Brook Station, Erie County, Ohio*.

The John H. Glenn Research Center (GRC), a U.S. National Aeronautics and Space Administration (NASA) facility, is proposing the remediation of the ECCL Firing Range at GRC's Plum Brook Station (PBS) in Erie County, Ohio.

The ECCL Firing Range is recommended as not eligible for inclusion in the National Register of Historic Places. Our office agrees with the recommendation regarding eligibility.

We concur with your finding that the undertaking as proposed will have no adverse effect on historic properties. No further coordination with this office is necessary, unless the undertaking changes or archaeological remains are unexpectedly discovered. In such a situation, our office should be contacted as per Stipulation IV of the above-referenced Programmatic Agreement.

If you have any questions, please contact me at jwilliams@ohiohistory.org or (614) 298-2000. Thank you for your cooperation.

Sincerely,

Joy Williams

Joy Williams, Project Reviews Manager
Resource Protection and Review

"Please be advised that this is a Section 106 decision. This review decision may not extend to other SHPO programs."

RPR Serial No: 1084038

National Aeronautics and
Space Administration

John H. Glenn Research Center
Lewis Field
Cleveland, OH 44135-3191

May 5, 2020

Reply to Attn of: FXP

Mr. Douglas Taylor
Tribal Historic Preservation Officer
Nottawaseppi Huron Band of Potawatomi
1485 Mno-Bmadzewen Way
Fulton, MI 49052

Dear Mr. Taylor:

Pursuant to Section 106 of the National Historic Preservation Act and its authority, Title 36 Code of Federal Regulations Part 800, Protection of Historic Properties, NASA Glenn Research Center is consulting with you regarding an environmental remediation project at our Plum Brook Station (PBS) facility.

The undertaking's objective is to minimize risks and hazards associated with soil contamination in and around the former Erie County Conservation League firing range at PBS to protect human and ecological receptors. Please refer to the enclosed background information document for details regarding this project. If you have any questions, please contact me at (216) 433-8960 or thomas.m.yohe@nasa.gov.

Sincerely,

THOMAS YOHE

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Thomas M. Yohe
Cultural Resources Manager

Enclosure
Background Information: Project No. E109

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FXP/T. M. Yohe
FX/Official File
FXP/Official File

National Aeronautics and
Space Administration

John H. Glenn Research Center
Lewis Field
Cleveland, OH 44135-3191

May 5, 2020

Reply to Attn of: FXP

Mr. Ned Daniels
Chairman
Forest County Potawatomi Community of
Wisconsin
P.O. Box 340
Crandon, WI 54520

Dear Mr. Daniels:

Pursuant to Section 106 of the National Historic Preservation Act and its authority, Title 36 Code of Federal Regulations Part 800, Protection of Historic Properties, NASA Glenn Research Center is consulting with you regarding an environmental remediation project at our Plum Brook Station (PBS) facility.

The undertaking's objective is to minimize risks and hazards associated with soil contamination in and around the former Erie County Conservation League firing range at PBS to protect human and ecological receptors. Please refer to the enclosed background information document for details regarding this project. If you have any questions, please contact me at (216) 433-8960 or thomas.m.yohe@nasa.gov.

Sincerely,

THOMAS YOHE

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Thomas M. Yohe
Cultural Resources Manager

Enclosure
Background Information: Project No. E109

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FXP/T. M. Yohe
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FXP/Official File

National Aeronautics and
Space Administration

John H. Glenn Research Center
Lewis Field
Cleveland, OH 44135-3191

May 5, 2020

Reply to Attn of: FXP

Ms. Diane Hunter
Tribal Historic Preservation Officer
P.O. Box 1326
Miami, OK 74355

Dear Ms. Hunter:

Pursuant to Section 106 of the National Historic Preservation Act and its authority, Title 36 Code of Federal Regulations Part 800, Protection of Historic Properties, NASA Glenn Research Center is consulting with you regarding an environmental remediation project at our Plum Brook Station (PBS) facility.

The undertaking's objective is to minimize risks and hazards associated with soil contamination in and around the former Erie County Conservation League firing range at PBS to protect human and ecological receptors. Please refer to the enclosed background information document for details regarding this project. If you have any questions, please contact me at (216) 433-8960 or thomas.m.yohe@nasa.gov.

Sincerely,

THOMAS YOHE

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Thomas M. Yohe
Cultural Resources Manager

Enclosure
Background Information: Project No. E109

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FXP/T. M. Yohe
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