Naval Facilities Engineering Systems Command
Northwest
Silverdale, Washington

Final
Basewide Site Inspection Report for Munitions and Explosives of Concern at Naval Base Kitsap Bangor

Munitions MRP Sites

Naval Base Kitsap Bangor
Silverdale, Washington

October 2023

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FINAL
BASEWIDE SITE INSPECTION REPORT FOR MUNITIONS AND EXPLOSIVES OF CONCERN AT NAVAL BASE KITSAP BANGOR

MUNITIONS MRP SITES

NAVAL BASE KITSAP BANGOR
SILVERDALE, WASHINGTON

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY CONTRACT

Submitted to:
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Acronyms and Abbreviations

ºF	degrees Fahrenheit
µg/kg	micrograms per kilogram
AOC	area of concern
AOPC	area of potential concern
APP/SSHP	Accident Prevention Plan/Site Safety and Health Plan
APPL	Agriculture & Priority Pollutants Laboratories, Inc
APS	Applied Professional Services
BA	Biological Assessment
bgs	below ground surface
BOSC	Base Operating Services Contractor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CSM	Conceptual site model
DDESB	Department of Defense Explosives Safety Board
DIP	detonation in place
DGM	Digital geophysical mapping
DNT	Dinitrotoluene
DoD	Department of Defense
DQO	Data Quality Objective
ELAP	Environmental Laboratory Accreditation Program
EM61-HP	EM61-MK2-High Power
EOD	Explosive Ordnance Disposal
ESO	Explosive Safety Officer
ESS	Explosive Safety Submission
EZ	Exclusion Zone

FCR	Field Change Request
FS	Feasibility study
GPR	Ground Penetrating Radar
GPS	global positioning system
GSV	Geophysical System Verification
HE	High Explosive
HERO	Hazards of Electromagnetic Radiation to Ordnance
HMX	Cyclotetramethylene tetranitramine
IAS	Initial Assessment Study
IC	Institutional Control
ICMP	Institutional Controls Management Plan
ID	Identification
IDW	Investigation-derived Waste
IMF	Intermediate Maintenance Facility
INRMP	Integrated Natural Resources Management Plan
ISO	Industry Standard Object
IVS	Instrument Verification Strip
LOQ	Limit of quantitation
MC	Munitions constituents
MD	Munitions Debris
MDAS	Material documented as safe
MEC	Munitions and explosives of concern
MEC HA	MEC Hazard Assessment
MGFD	Munition with greatest fragmentation distance
MK	Mark
mm	millimeter
MMRP	Military Munitions Response Program

MPPEH	Material potentially presenting an explosive hazard
MRP	Munitions Response Program
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
NAD	Naval Ammunition Depot
NAVFAC	Naval Facilities Engineering Systems Command
NBK	Naval Base Kitsap
NCR	Non-Conformance Report
NEW	Net Explosive Weight
NMRD	Non-munitions related debris
NSWC IHD	Naval Surface Warfare Center Indian Head Division
NUWC	Naval Undersea Warfare Center
OB/OD	Open Burning/Open Detonation
OU	Operable Unit
PA	Preliminary Assessment
PETN	Pentaerythritol tetranitrate
PID	Photo Ionization Detector
POMFPAC	Polaris Missile Facility Pacific
PSL	Project Screening Level
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCA	Root Cause Analysis
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager

RSL	Regional Screening Level
RTK	real time kinematic
RTS	robotic total station
SAA	Small arms ammunition
SDG	Sample Delivery Group
SHPO	State Historic Preservation Officer
SI	Site Inspection
SRA	Saturated Response Area
SSL	soil screening level
SUXOS	Senior Unexploded Ordnance Supervisor
SVOC	semivolatile organic compound
SWFPAC	Strategic Weapons Facility Pacific
TEM	Time-domain electromagnetic
TNT	2,4,6-trinitrotoluene
TOI	Target of Interest
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Services
UXO	Unexploded ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
VOC	volatile organic compound
WIS	Waste Information Specification
WWTP	Wastewater Treatment Plant

Executive Summary

Tetra Tech performed a basewide Site Inspection (SI) at Naval Base Kitsap (NBK) Bangor for multiple munitions response sites (MRSs), under the Munitions Response Program (MRP), located in Silverdale, Washington. This SI report has been prepared by Tetra Tech on behalf of Naval Facilities Engineering Systems Command Northwest under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N6247016D9008, Contract Task Order N4425519F4112. SI activities at NBK Bangor were conducted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also known as Superfund).

NBK Bangor occupies approximately 6,130 acres and is located approximately 5 miles northwest of the Silverdale community in Kitsap County, Washington. The installation is situated on the eastern bank of Hood Canal, a long fjord-like body of marine water and arm of the Puget Sound. NBK Bangor is a component command of the larger NBK. The current primary missions of NBK are to support the warfighter by providing reliable and timely base operating services for ships, submarines, and shore commands in Bangor, Bremerton, Keyport, Manchester, and Jackson Park/Naval Hospital. NBK provides critical services, programs, and facilities that meet the needs of hosted commands and installation employees supporting and enhancing Fleet, Fighter, and Family readiness. NBK Bangor maintains and supports vessels home ported or moored at the installation and operates administrative and personnel support facilities.

There are 21 MRP sites that were included in part or in full during the SI. During the preparation of the Munitions and Explosives of Concern (MEC) Quality Assurance Project Plan (QAPP), a desktop study was conducted for all sites and based on the results of the desktop study, two sites (Unexploded Ordnance [UXO] 9B and UXO 17D) did not warrant SI field investigation but are included herein to present desktop study evaluation and the next step forward recommendations.

Of the remaining 19 sites, all were included as part of the SI for the Habitat and Endangered Species Survey (i.e., biological survey) conducted in August/September 2020, and the Historical and Cultural Resources Survey (i.e., cultural resources pedestrian survey) conducted in September 2020. These two survey reports, as well as two follow-on biological documents, a No Effect Determination and a Biological Assessment, were prepared in advance of and in support of the 2022 munitions related part of the SI field work by identifying necessary field constraints and providing recommendations for following best management practices.

Fifteen of the 19 sites were fully investigated during the munitions related portion of the SI field work, which was completed from March 2022 through November 2022. The four deferred sites were included in the planning documents and will be investigated during a

second phase of SI field work. The results of that field work will be documented in an SI Addendum.

The 15 sites investigated during the 2022 SI, the two sites where only the desktop study was conducted, and the four sites where only the biological and cultural surveys portion of the SI were conducted, are as follows:

Sites fully investigated under the 2022 SI field work:

- UXO 2 (Site CC)
- UXO 3 (Site D)
- UXO 4 (Site 9)
- UXO 6 (Site 22)
- UXO 7 (Site 23)
- UXO 7B (Operable Unit [OU] 1 Site A)
- UXO 9 (Site OO)
- UXO 11 (Site 14)
- UXO 11B (Site 8)
- UXO 2 (Site HH)
- UXO 13 (Site 4)
- UXO 14 (Site JJ)
- UXO 17 (Site 2)
- UXO 17B (Site 1)
- UXO 17C (Site BB)

Sites investigated under the SI desktop study only:

- UXO 9B (OU 7 Site B)
- UXO 17D (Site 13)

Sites with deferred investigation (biological and cultural surveys of the SI have been conducted):

- UXO 8 (Site NN)
- UXO 10 (Site 12)
- UXO 15 (Site KK)
- UXO 16 (Site LL)

The objective of the SI was to assess and verify the absence or presence of material potentially presenting an explosive hazard (MPPEH), and to support the decision-making process for future recommendations at each of the 15 MRSs as well as the two MRSs where only desktop studies were conducted. These SI activities were completed to meet the following objectives:

- Refine the conceptual site model and revise the site boundaries, as necessary.
- Gather data from desktop studies, biological surveys, and cultural surveys for each site and, for the two sites (UXO 9B and UXO 17D) that did not warrant munitions related SI field investigation, develop recommendations solely based on this information.
- Gather sufficient data to assess the presence of MEC/MPPEH at the surface for sites with no previously observed MEC/MPPEH; or assess the presence of additional MEC/MPPEH at the surface for sites where there was previously observed surface MEC/MPPEH.
- Gather data of known or suspected disposal areas and assess whether MEC/MPPEH may be present in the subsurface soil.
- Gather data as determined by the MEC QAPP (e.g., number of transects, or 100 percent coverage constituting complete surface clearance removal action) from analog UXO detector-aided surface surveys and three types of digital geophysical survey mapping to assist in the decision-making process regarding potential future actions/investigations at each MRS.
- Collect and analyze biased soil samples (anticipated maximum concentration locations) at three sites where a potential munitions constituents (MC) release, specifically explosives, may have occurred from a breached munitions item; and determine whether MC are present at concentrations greater than applicable screening criteria that may pose unacceptable risks to human health or the environment.
- Manage MEC/MPPEH including detonations and collect and analyze soil samples to determine whether MC significantly impacted subsurface soil associated with the demolition pits.

The MEC and MC investigation activities were conducted in accordance with the project specific planning documents including the MEC QAPP, MC QAPP, and Accident Prevention Plan/Site Safety and Health Plan. The sequence of 2022 field work began with vegetation management; followed by UXO detector aided surface surveys to determine the presence or absence of MEC or MPPEH at each of the MRSs on the ground surface, and identify the items, if present; then followed by geophysical surveys (EM61-MK2-High Power [EM61-HP], time-domain electromagnetic [TEM-8g], and/or Ground Penetrating Radar [GPR]), conducted where subsurface disposal was suspected. MEC/MPPEH management was completed at the end of the SI field work, using donor explosives to detonate MEC in demolition pits (and to demilitarize material

documented as safe [MDAS]); MDAS was certified and transported to a certified recycler. Lastly, MC sampling was conducted to determine if there were exceedances of criteria for MC in surface soil at sites where MC releases from breached MEC were suspected. In addition, at the end of SI field work, post demolition MC samples were also collected from the demolition pits to determine potential impacts of the donor explosives to the adjacent subsurface soil.

Vegetation management was performed at all 15 fully investigated sites. At UXO 6, vegetation management was not performed on the steep slopes, and at UXO 9 nominal vegetation management was conducted to create access pathway into, but not within, the wetland area. UXO detector aided surveys were conducted at all 15 sites. In total, 31 MEC and 1,236 MDAS items were identified during the SI. The total number of items found does not include the MEC/MPPEH observed on the slope at UXO 6 because these items were not fully inspected and remained in place. Access to the items at UXO 6 requires rappelling down the slope with rope and harness. It is anticipated the items will be removed during a subsequent field event.

Geophysical surveys were conducted as a combination of transects and full coverage surveys using grids, depending on site-specific data needs. The EM61-HP and TEM-8g surveys were conducted at eight sites (UXO 3, UXO 4, UXO 7, UXO 11, UXO 11B, UXO 13, UXO 17, and UXO 17B) to identify the locations of discrete geophysical targets of interest and the potential lateral extent of suspected subsurface disposal areas. Data from GPR geophysical surveys conducted at four sites (UXO 4, UXO 7, UXO 17, and UXO 17B), assisted with the delineation of potential subsurface disposal areas and assessment of cover soil thickness overlying potential disposal areas. Metallic anomaly targets of interest identified from the geophysical surveys were not resolved via intrusive investigation. Although sources of the anomalies are unknown, geophysical survey results added to the weight of evidence for site recommendations.

Thirty-one MEC items and two MDAS items to be demilitarized, were detonated using donor explosives at four demolition pits constructed at UXO 7. Fourteen drums of MDAS were generated during the course of SI field work. MDAS was certified as safe, transported, processed, and destroyed/recycled by a certified facility.

MC, composite soil samples were collected at UXO 3, UXO 7, and UXO 7B from 0 to 6 inches below ground surface (bgs). Exceedances of Project Screening Levels (PSLs) for explosives occurred only in UXO 3 samples. Post detonation composite subsurface soil samples, attributable to use of donor explosives, showed MC PSL exceedances. Further assessment of UXO 7 will be conducted.

The SI objective was achieved through the data quality and quantity collected. Those data are sufficient to support the following recommendations for each MRS:

Remedial Investigation:

- UXO 4 (Site 9)
- UXO 7 (Site 23)
- UXO 7B (OU1 Site A)
- UXO 17 (Site 2)

Interim Action:

- UXO 11B (Site 8)

No Further Action:

- UXO 9B (OU7 Site B)
- UXO 11 (Site 14)
- UXO 12 (Site HH)
- UXO 13 (Site 4)
- UXO 14 (Site JJ)
- UXO 17B (Site 1)
- UXO 17C (Site BB)
- UXO 17D (Site 13)

Step-Out Investigations (Recommendation will be provided in SI Addendum):

- UXO 2 (Site CC)
- UXO 3 (Site D)
- UXO 6 (Site 22)

Under Internal Navy Discussion

- UXO 9 (Site OO)

Note: Further recommendation for UXO 9 is pending resolution of Navy internal discussions and will be presented in the SI addendum.

Site Inspections (Pending Field Work/Recommendation will be provided in SI Addendum):

- UXO 8 (Site NN)
- UXO 10 (Site 12)
- UXO 15 (Site KK)
- UXO 16 (Site LL)

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1.0 Introduction

This basewide Site Inspection (SI) Report documents activities conducted at Naval Base Kitsap (NBK) Bangor for multiple munitions response sites (MRSs), under the Munitions Response Program (MRP), located in Silverdale, Washington (Figure 1-1). Tetra Tech prepared this report on behalf of the Naval Facilities Engineering Systems Command (NAVFAC) Northwest under Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N6247016D9008, Contract Task Order N4425519F4112. These sites are being addressed under the Navy's MRP under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

There are 21 MRSs that were included under the SI. During the preparation of the Munitions and Explosives of Concern (MEC) Quality Assurance Project Plan (QAPP), a desktop study was conducted for all the 21 sites. Based on the results, it was determined that two sites (Unexploded Ordnance [UXO] 9B and UXO 17D) did not warrant SI field investigation, and so this SI Report only includes the desktop study determination and next step forward recommendations for these two sites.

Of the remaining 19 sites, all were included as part of the SI for the Habitat and Endangered Species Survey (i.e., biological survey) conducted in August/September 2020, and the Historical and Cultural Resources Survey (i.e., cultural resources pedestrian survey) conducted in September 2020. These two survey reports, as well as two follow-on biological documents, a No Effect Determination and a Biological Assessment (BA), were prepared in advance of and in support of the munitions related part of the SI field work by identifying necessary field constraints and providing recommendations for following best management practices during field work. A Tetra Tech cultural monitor/escort was on site for the duration of the munitions related SI field activities; any discoveries of cultural and/or historical items during field work were adequately documented and the Navy Archaeologist was notified. Also, a Tetra Tech biologist was consulted prior to munitions related field work at each site to discuss any avoidance concerns and, similarly, the Tetra Tech biologist was consulted when ecological receptors were encountered.

Fifteen of the 19 sites were fully investigated during the munitions related portion of the SI field work, which was completed from March 2022 through November 2022 and included vegetation management, detector-aided surface surveys, three types of geophysical surveys, MEC management, and munitions constituents (MC) sampling. The reason that 4 of the 19 sites were included in the planning documents and completed biological and cultural surveys but were deferred to later field work due to additional coordination efforts as the sites are within mission critical areas. Subsequent

coordination efforts were made during the 2022 field event, and the four remaining sites will be investigated under a second phase of SI field work beginning in Spring 2023. The results of the second phase of SI field work will be documented in an SI Addendum.

Table 1-1 presents a crosswalk of MRSs and historical UXO site names.

1.1 Objective and Scope of Site Inspection

The objective of the SI was to assess and verify the absence or presence of material potentially presenting an explosive hazard (MPPEH) and to support the decision-making process for future recommendations at each of the 15 MRSs as well as the two MRSs where only desktop study were conducted. The results are included in this SI Report. The MEC and MC investigation activities were conducted in accordance with the project specific MEC QAPP (Tetra Tech, 2021a), Sampling and Analysis Plan (Field Sampling Plan and QAPP), simply referred to as the MC QAPP (Tetra Tech, 2021b), and Explosives Safety Submission (ESS). Table 1-2 presents a summary of the field work performed.

These SI activities were completed to meet the following objectives:

- Refine the conceptual site model (CSM) and revise the sites' boundaries, as necessary.
- Gather data from desktop studies, biological surveys, and cultural surveys for each site and, for the two sites (UXO 9B and UXO 17D) that did not warrant munitions related SI field investigation, develop recommendations solely based on this information.
- Gather sufficient data to assess the presence of MEC/MPPEH at the surface for sites with no previously observed MEC/MPPEH or assess the presence of additional MEC/MPPEH at the surface for sites where there was previously observed surface MEC/MPPEH.
- Gather data of known or suspected disposal areas and assess whether MEC/MPPEH may be present in the subsurface soil.
- Gather data as determined by the project delivery team (e.g., number of transects, or 100 percent coverage constituting complete surface clearance removal action) from analog UXO detector-aided surface surveys and three types of digital geophysical mapping (DGM) (time-domain electromagnetic [TEM-8g], EM61-MK2-High Power [EM61-HP], and Ground Penetrating Radar [GPR]) to

assist in the decision-making process regarding potential future actions/investigations at each MRS.

- Collect and analyze biased soil samples (anticipated maximum concentration locations) at three sites, where a potential MC (explosives) release may have occurred, for laboratory analysis of explosives; and determine whether concentrations are greater than applicable screening criteria that may pose unacceptable risks to human health or the environment.

- Manage MEC/MPPEH including detonations and collect and analyze soil samples to determine whether MC significantly impacted subsurface soil associated with the demolition pits.

1.2 Regulatory Framework and Project Stakeholder

This SI for the multiple MRP sites at NBK Bangor follows the CERCLA process and addresses the MEC/MPPEH at these sites. Based on the finding of this SI, immediate action (interim removal action), a remedial investigation, or no further action may be recommended. If the initial SI data is inconclusive, then additional SI activities and step-out sampling may be recommended to obtain the data to make a determination.

The project stakeholders include the Navy and the Washington State Department of Ecology. Because of the cultural concerns at NBK Bangor, the project was subject to compliance with Section 106 of the National Historic Preservation Act. The Navy Archaeologist conducted a consultation with the State Historic Preservation Officer (SHPO) and Skokomish Tribe, Jamestown S'Klallam Tribe, Port Gamble S'Klallam Tribe, Lower Elwha Klallam Tribe, and Suquamish Tribe as part of Section 106 compliance.

The United States Fish and Wildlife Services (USFWS) and National Marine Fisheries Service are the federal Stakeholder with regard to natural resources. Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the Navy completed an analysis of potential impacts to Endangered Species Act listed species within the investigation area. An effect determination was documented and approved by USFWS. A separate technical memorandum documented the project activities having no effecton other federally listed species or their designated or proposed crucial habits and would not adversely affect essential fish habitat for federally managed fisheries.

1.3 Report Organization

The SI for NBK Bangor is organized in the following sections:

- Section 2.0 - General background and physical setting
- Section 3.0 - SI activities
- Section 4.0 - Data Quality Assessment
- Section 5.0 - History and SI results for each site
- Section 6.0 - Updated CSM and screening level hazard evaluation
- Section 7.0 - Conclusions and recommendations
- Section 8.0 - References used in preparation of this document

2.0 Background and Physical Setting

The following sections describe the background and physical setting of NBK Bangor.

2.1 Facility Background

NBK Bangor occupies approximately 6,130 acres and is located roughly 5 miles northwest of the Silverdale community in Kitsap County, Washington and is a component command of the larger NBK, which is composed of NBK Bangor, Bremerton, Keyport, Manchester, and Jackson Park Housing Complex/Naval Hospital Bremerton. The installation is situated on the eastern bank of Hood Canal, a long fjord-like body of marine water and arm of the Puget Sound (Figure 1-1).

The current primary missions of NBK are to support the warfighter by providing reliable and timely base operating services for ships, submarines, and shore commands in Bangor, Bremerton, Keyport, Manchester, and Jackson Park/Naval Hospital. NBK provides critical services, programs, and facilities that meet the needs of hosted commands and installation employees supporting and enhancing Fleet, Fighter, and Family readiness. NBK Bangor maintains and supports vessels home ported or moored at the installation and operates administrative and personnel support facilities. Within NBK Bangor, there are various operational elements including Strategic Weapons Facility Pacific (SWFPAC) and Naval Undersea Warfare Center (NUWC) Keyport which maintains an ordnance annex (NUWC Ordnance Annex, otherwise known as Keyport Annex).

Major regional population centers near NBK Bangor include the cities of Bremerton (approximately 10 miles to the south), Seattle (approximately 15 miles to the east across the Puget Sound), and Tacoma (approximately 30 miles to the south) (see Figure 1-1). The town of Keyport is located approximately 4 miles east of NBK Bangor. In the Puget Sound area, the Navy has operations at Bangor, Bremerton, Everett, Indian Island, Keyport, Manchester, Jackson Park, and Whidbey Island.

Figure 2-1 presents the site map of MRS locations. The first use of land by the Navy at present day NBK Bangor began in 1942 with the establishment of a facility near the town of Bangor for shipping ammunition to the Pacific Theater during World War II. The initial mission of the facility was to receive, renovate, rework, maintain, store, and issue ammunition, explosives, expendable ordnance items, and/or weapons and technical ordnance material for the Navy.

In 1944, the Navy purchased a total of 7,676 acres at and around the facility. The military installation was first officially commissioned on August 10, 1945 as the United

States Naval Magazine Facility Bangor. The installation was re-designated as the Naval Ammunition Depot (NAD) Bangor in December 1947. In 1948, the Bremerton Annex (formerly NAD Puget Sound) and Indian Island Annex (formerly United States Naval Magazine and Net Depot Indian Island) came under control of NAD Bangor, under the overall management of the Bureau of Ordnance.

NAD Bangor was consolidated with United States Naval Torpedo Station Keyport in 1950, and the consolidated installation was renamed NAD Keyport. The relative activities of the two commands proved to be too substantially dissimilar, and NAD Bangor was re-established as an independent installation in 1952. Ordnance production facilities located at the Bremerton Annex were deactivated between 1958 and 1959, and these operations were moved to NAD Bangor. The ordnance production facilities from the Bremerton Annex that were not duplicated at NAD Bangor were: test, segregation, renovation, overhaul, and storage facilities.

NAD Bangor was selected in April 1962 as the Pacific Region Polaris missile assembly facility. Polaris missiles were two-stage, solid-fueled, nuclear-armed, submarine-launched ballistic missiles. Construction of Polaris Missile Facility Pacific (POMFPAC) began at the installation in March 1963, and POMFPAC was officially commissioned as a tenant command of NAD Bangor on September 11, 1964. POMFPAC made its first tactical outload of Polaris missiles (specifically Polaris A3 missiles) to the submarine USS Stonewall Jackson in March 1965.

NAD Bangor experienced a significant surge in operations during the Vietnam War, with nearly one third of all ordnance and ammunition shipped to Vietnam between 1965 and 1970 being loaded at the installation. Ship loading operations were transferred from NAD Bangor to Naval Weapons Station Concord in March 1970, and NAD Bangor was disestablished. Residual functions were consolidated with Naval Torpedo Station Keyport in October 1970. In 1972, NAD Bangor was reactivated. Notably, between 1970 and 1972, POMFPAC remained operational.

In 1973, the same year that the last shipment of munitions was sent to Vietnam, NAD Bangor was selected for submarine vessel support. POMFPAC was renamed SWFPAC in 1974 and NAD Bangor thereafter became Naval Submarine Base Bangor. The official activation of Naval Submarine Base Bangor occurred on February 1, 1977. Naval Submarine Base Bangor merged with Naval Station Bremerton in June 2004 to form the new command NBK (consisting of NBK Bangor and NBK Bremerton).

In support of historical munitions transshipment operations at NBK Bangor from the mid-1940s to the mid-1970s, munitions were brought to the installation via rail car from military ordnance manufacturing facilities. Munitions-related materials stored at the installation included (but were not limited to): inert materials, smokeless powder,

tracers, starter cartridges, fuzes, black powder, high explosive compounds, small arms ammunition (SAA), pyrotechnics, depth charges, bombs, missiles, torpedoes, and projectiles. Munitions were loaded onto railcars for subsequent transport to Hood Canal and loading onto docked ships. The installation also managed fleet return ammunition. Management of fleet return ammunition included: offloading the ordnance from ships; transporting it to sidings and magazines; renovating or reworking the material to be fleet ready; and demilitarizing, disposing, or transferring the material to other Navy installations (e.g., Bremerton) for renovation/rework or other disposition.

Ordnance transshipment operations at NBK Bangor were heaviest during the latter stages of World War II (1944 to 1945), the Korean War (1950 to 1953), and the Vietnam War (1963 to 1973). Ordnance transshipment operations at the installation during the Vietnam War ranged up to nearly 60,000 tons of ordnance per month.

The site-specific history for each MRS is included in Section 5 with available pertinent historical aerial photographs of the MRSs included in Appendix A-1.

2.2 Physical Setting

Pertinent information on the physical setting at NBK Bangor is included in this section and is applicable to all of the MRSs.

2.2.1 Physiography and Topography

The region that includes NBK Bangor lies on the western edge of the central Puget Sound Lowlands at its intersection with the western Upland Plateau physiographic region. The lowlands are part of a regional north-south trending structural trough extending from the Fraser River valley in British Columbia to Eugene, Oregon. The plateau is characterized by flat-topped ridges with steep flanks sloping to sea level.

The southern and eastern parts of NBK Bangor consist of a till plain, with several north-south trending drumlins (oval-shaped mounds and hills formed by glacial action). Till plains are nearly level or gently undulating areas that were formed when soils and rocks were transported and deposited by glacial ice sheets. The northern and western portions of the installation are consistent with the Upland Plateau, incised by north-south trending post-glacial drainages that discharge to Hood Canal and Puget Sound. Topographic ridges at NBK Bangor range in elevation from 300 to 500 feet above mean sea level.

The Toandos Peninsula on the western shore of Hood Canal is characterized by more ridges and sharp canyons compared to NBK Bangor. The Olympic Mountains begin

west of the Toandos Peninsula and rise to nearly 7,900 feet above mean sea level (Battelle, 2017).

2.2.2 Soils

Soil types found at NBK Bangor are associated with glacial till plains and glacial outwash terraces. Soils located on glacial till at NBK Bangor are moderately compacted, generally extend 20 to 40 inches below ground surface (bgs), and typically overlie very compacted till or hardpan. Soils formed from glacial lake sediments are also found in association with glacial till plains; these soils were deposited when ice dams caused lakes to form and deposit fine sediments. The glacial lake deposits were subsequently eroded, leaving remnant areas of fine sediments characterized by silt loam and silty clay loam soils occurring to depths up to 60 inches. Soils on glacial outwash terraces are predominantly composed of layers of gravel, sand, and silt that were deposited from glacial meltwater as glaciers retreated. These soils are very deep, and because of their coarse nature are well to excessively drained.

2.2.3 Geology

Several continental ice sheets covered the region that includes NBK Bangor during the Quaternary period, resulting in the complex deposition of glacial and interglacial deposits. The latest of these is called the Fraser glaciation and consisted of several ice advances, of which the Vashon Stade was the most extensive and was responsible for depositing many of the geologic strata that underlie the installation.

In general, the Puget Sound Lowlands are filled with unconsolidated sediments of Miocene to Recent age overlying volcanic bedrock. Six stratigraphic units comprise the geologic system at NBK Bangor. These units are, from youngest (shallowest) to oldest (deepest): Vashon recessional outwash; Vashon till; Vashon advanced outwash; Kitsap Formation; Older sand and gravel; and Tertiary volcanic bedrock.

The Vashon recessional outwash occurs generally as scattered surface deposits of unconsolidated sand and gravel, with localized silt layers. The Vashon till is a very dense, poorly sorted mixture of sand, silt, and gravel. The Vashon till contains layers of better sorted, less compact Ablation till, which were deposited above Lodgment till during glacial retreat. Scattered sand and gravel beds within the Vashon till represent subglacial or interglacial paleo stream channels. The Vashon advanced outwash unit is typically 20 to 200 feet thick. Vashon advanced outwash deposits are typically dense, well stratified lenses of silt and gravel, typically gray to brown in color, and underlie till throughout most of NBK Bangor. However, the Vashon advanced outwash unit is exposed at the surface in some locations, particularly in stream drainages or on terraces where till units have been eroded. The Kitsap Formation is hard, gray,

laminated to massive silt with scattered lenses and interbeds of clay, sand, peat, and gravel. This unit is non-glacial lacustrine in origin and ranges from 200 to 350 feet thick. The Older sand and gravel unit consists of sand and gravel with smaller amounts of silt and clay and is consistent with both glacial and non-glacial deposits. The Older sand and gravel unit is typically 300 to 350 feet thick and may be underlain by bedrock or a distinct layer of clay and silt known as the Older clay followed by bedrock. Bedrock consists of dark-colored, fine-grained basalts and other volcanic rock types, and is several thousand feet thick in the region.

2.2.4 Hydrology

Several substantial lakes/ponds and defined marsh areas are present at NBK Bangor. Other storm water retention basins, lagoons, reservoirs, minor impoundments, and wetland areas also exist at the installation.

Various Lakes are manmade. The area of these lakes totals approximately 30 acres. The primary functions of these water bodies are to provide storm water control, outdoor recreation opportunities, and habitat for a variety of wildlife species. The southern lakes were specifically constructed as storm water retention facilities to prevent large fluctuations in volume and speed of storm water entering Clear Creek southeast of the installation. A central pond is a natural, surface water fed pond approximately 3.5 acres in areal extent. A northeastern marsh, which is approximately 8 acres in extent, is a natural marsh with shallow ponded areas. A northwestern marsh is an approximately 2-acre manmade marsh. Several northern lakes and marshes were created in the 1950s when a main road was constructed along the installation waterfront at the Hood Canal (Battelle, 2017).

Surface drainage at NBK Bangor consists of five small streams flowing west to Hood Canal; and two tributaries of Clear Creek flowing from the installation to the southeast, ultimately emptying into Dyes Inlet. Clear Creek drains approximately 750 acres of the southeastern portion of NBK Bangor. Three of the streams that flow to Hood Canal pass through various lakes/marshes before entering the canal. Drainage areas for the streams vary from 0.03 to 3.68 square miles. Recorded stream flow ranges from a minimum flow of 0.01 cubic feet per second to a maximum flow rate of 4 cubic feet per second (Malcolm Pirnie, Inc., 2006). Overland flow from much of the western portion of NBK Bangor is routed to Hood Canal through a series of storm water outfalls.

2.2.5 Hydrogeology

Three distinct aquifer systems have been identified at NBK Bangor. These aquifers, designated in order of increasing depth, are the seasonal/perched aquifer, the shallow

aquifer, and the sea level aquifer. The general correlation between geologic and hydrogeologic units at NBK Bangor is:

- Vashon recessional outwash – seasonal/perched aquifer
- Vashon till – aquitard
- Vashon advanced outwash – shallow aquifer
- Kitsap Formation – aquitard
- Older sand and gravel – sea level aquifer

The seasonal/perched aquifer likely occurs in the Vashon recessional outwash above the Vashon till throughout much of NBK Bangor, although this can only be determined locally from subsurface explorations. Local precipitation is the primary source of water recharging the aquifers in the study area. The bulk of the precipitation occurs during the winter months. The precipitation and subsequent infiltration directly recharge the seasonal/perched aquifer in the Vashon recessional outwash and the shallow aquifer beneath the till. The Kitsap Formation, which functions overall as an aquitard between the shallow and sea level aquifers, contains relatively more transmissive intervals that yield intermediate water bearing zones. Regionally, recharge to the intermediate groundwater zones is through flow from the shallow aquifer, as indicated regionally by vertical pressure gradients that are primarily downward.

Regional groundwater flow in both the shallow and sea level aquifers is generally from surrounding upland areas in the center of the Kitsap peninsula, located along the eastern boundary of NBK Bangor, toward Hood Canal to the west and Liberty Bay to the east. The potentiometric surface of the shallow aquifer is affected by the presence of deep stream drainages and past channels in the till, which results in local flow directions differing from the regional flow directions. The local groundwater flow direction of the shallow aquifer could also be influenced by changes in permeability, aquifer thickness, and recharge and discharge boundaries.

Groundwater discharge occurs from the shallow aquifer at springs along the Hood Canal shoreline and in stream drainages where the shallow aquifer intersects the ground surface. The sea level aquifer regionally discharges to Hood Canal to the west and Puget Sound to the east.

2.2.6 Endangered Species, Sensitive Habitats

The wildlife composition at NBK Bangor is derived from the regional natural diversity and reflects the marine climate and diverse habitats defined by wetland and upland characteristics and varied vegetation assemblages. The habitats at NBK Bangor support a considerable variety of shellfish, fish, birds, mammals, and plants; and the respective habitats are managed to fully support the conservation and recovery of

federally and state-listed species, as outlined in the 2018 Integrated Natural Resources Management Plan (NAVFAC, 2018).

Habitat at NBK Bangor supports three listed federally endangered species: the Bocaccio, Southern Resident Killer Whale, and the Humpback Whale (Central America Designated Population Segment). In addition, nine species are considered federal threatened species: the Marbled Murrelet, Yellow-billed Cuckoo, Bull Trout, Hood Canal summer-run Chum Salmon, Puget Sound Chinook Salmon, Yelloweye Rockfish, Puget Sound Steelhead, Howellia, and Humpback Whale (Mexico Designated Population Segment) which has been observed in the Hood Canal adjacent to the installation.

2.2.7 Cultural Resources

The areas where culturally significant resources have the highest probability of being present at NBK Bangor are along the coastline and in areas of known historical use (such as the railroad). When culturally significant resources are found at the installation, the location and extent of the resources are not made public, nor are they provided to Navy personnel other than on a need-to-know basis, until such time as they may be displayed and interpreted in a manner that provides protection from vandalism.

The Point No point Treaty Council, a coalition of local Native American Tribes that had use of the area prior to European habitation, have treaty rights that include the use of environmental resources at NBK Bangor. Treaty-protected traditional uses (such as shellfish harvest by the Point No Point Treaty Council and cedar bark harvest by the Suquamish Tribe) are conducted at the installation (Malcolm Pirnie, Inc., 2006).

Orchard trees remaining at and around NBK Bangor may be from original stock brought to the United States by early settlers. Seed stock from these trees maybe an important historical and cultural resource.

2.2.8 Climate

The Olympic Mountains, which begin just west of Hood Canal and rise to 7,900 feet above mean surface level, create a significant orographic effect on the local climate. This area receives the full force of storms moving inland from over the Pacific Ocean, and heavy precipitation and gale force winds occur frequently, particularly during the winter. The southwestern and western slopes of the Olympic Mountains receive the heaviest precipitation in the continental United States. Annual precipitation ranges to 150 inches or more along the windward slopes of the mountains. Winter seasonal snowfall ranges from 10 to 30 inches in the lower elevations, and between 250 to 500 inches in the higher mountains. The easterly movement of moist air from the Pacific

Ocean produces downslope winds in the foothills along the eastern side of the Olympic Mountains, significantly reducing the amount of precipitation received.

NBK Bangor itself has a marine climate with generally mild temperatures and moderate to heavy precipitation. The area receives an average of 47 inches of precipitation annually. Precipitation occurs throughout the year; however, the heaviest rainfall typically is in the late fall and winter months and decreases into spring months. The total annual snowfall is light (approximately 16 inches), and snow usually melts shortly after reaching the ground. Icing conditions are not unusual in the winter months.

Summer temperatures average from 65 to 75 degrees Fahrenheit (ºF). Historical data indicate an average annual temperature of 52 °F, with extremes in daily temperature of 101 ºF and 7 ºF (Malcolm Pirnie, Inc., 2006).

The prevailing direction of the winds is from the south or southwest during the fall and winter, gradually shifting to west and northwest during the late spring and summer.

2.2.9 General Current and Future Land Use

This section discusses land use (current and anticipated future), and potential receptors and exposure pathways.

2.2.9.1 Current Land Uses

NBK Bangor is an active military installation with several distinct operational areas. Land uses associated with installation operational areas include (but are not limited to): light to relatively heavy industrial activities (including manufacturing, assembly, and maintenance); commercial activities; military exercises and training; transportation; and municipal and industrial waste handling, shipping, and storage. Various operational areas are present within NBK Bangor and specifically for this SI, areas of SWFPAC and Keyport Annex were accessed for the investigation.

Other areas at NBK Bangor include an administrate and public works area, a community core area, outdoor recreational areas, residential housing areas, and portions of the installation remain densely vegetated/forested. The area surrounding NBK Bangor is generally rural or semi-rural with undeveloped land, minor agriculture, and residential land use. Hood Canal borders the installation to the west and is used for recreational activities including boating, fishing, and shell-fishing. Security personnel from the installation observe and patrol the area offshore of the installation to monitor and prevent unauthorized incursion.

Several wharves and piers are located on the western side of NBK Bangor, on Hood Canal. These piers and wharves are used for various purposes and include Carderock

Pier constructed in 2009, the Service Pier constructed in 1981, the K/B Pier Complex constructed in 1951, and the Delta Pier constructed in the early 1980s. The two wharves at the installation were constructed in 1944 and 1953.

2.2.9.2 Anticipated Future Land Uses

Future land use at NBK Bangor is expected to remain the same as its present use as a military installation.

2.3 Previous Investigations

In 2017, a Military Munitions Response Program (MMRP) PA was conducted for NBK Bangor (Battelle, 2017). The MMRP PA Report summarized the areas of interest that were assessed, documented the areas of concern (AOCs) and areas of potential concern (AOPCs) that were determined to have resulted from munitions-related activities at NBK Bangor; documented whether the areas posed threats to human health and/or the environment; identified if the nature of the threat is from explosive hazards, MC contamination, or both; and set recommendations and priorities for further investigation or action. Twelve MMRP AOCs and 11 MMRP AOPCs were identified at the installation, some of which corresponded to sites previously identified and investigated and some of which corresponded to sites newly identified as part of the MMRP PA process. The future investigation/action recommendations for the AOCs and AOPCs at NBK Bangor included additional document research to better resolve potential site conditions, and removal activities for observed accumulations of MPPEH. The future investigation/action recommendations in the MMRP PA related to an immediate path forward for each MMRP AOC and AOPC and did not imply that additional investigation(s) and/or action(s) would or would not be required at any particular site. The 2017 MMRP PA findings for each MRS are included in Section 5.

Additionally, various other investigations unrelated to the MMRP have been conducted at NBK Bangor. Any relevant information from the previous investigations has been summarized in the site-specific site histories in Section 5.

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3.0 Site Inspection Field Work

This section describes the activities for the NBK Bangor SI field work of multiple MRSs. All SI activities were completed in accordance with the MEC QAPP (Tetra Tech, 2021a) and MC QAPP (Tetra Tech, 2021b). Field team members reviewed the approved planning documents prior to the start of project activities. The field forms generated from the SI field work are included in Appendix B.

3.1 Site Preparation

This section discusses the general methodologies used during the field work preparation tasks at NBK Bangor.

3.1.1 Mobilization and Demobilization

Prior to mobilization, Field Change Requests (FCRs) were issued based on decisions made by the Navy and Tetra Tech to modify field work related to the findings in the field or to add flexibility in order to complete the field work (see Appendix C and Section 3.5).

Field work included vegetation management followed by UXO detector-aided surface sweeps; and if warranted, geophysical surveys were conducted once the UXO sweeps were completed. This sequence was conducted at all sites except those that were large enough that two teams could work safely concurrently. Toward the end of the field work, MC soil sampling was conducted where a potential MC release was identified, in a single comprehensive effort, concurrently with MEC detonations so that post-detonation samples that were collected from the demolition pits to determine impacts of the donor explosives could be sent to the analytical laboratory at the same time.

Prior to all work conducted at sites UXO 2, UXO 6, UXO 7, UXO 7B, and UXO 9, the Navy Remedial Project Manager (RPM) contacted the necessary Navy personnel to confirm that Navy training operations did not overlap with the SI field activities. In addition, notifications were provided to various naval personnel in different areas of the base prior to field work occurring at most of the sites. The field team was flexible, as needed, in working around the restrictions by shifting to other sites.

Throughout the duration of the field work, draft daily summary reports were prepared and documented the personnel on site, work accomplished, issues/problems and resolution, important calls/meetings, and planned activities for the next workday was well as the associated photos.

All SI field work conducted for the 15 sites was generally completed under two mobilizations. The UXO team, vegetation management contractor, and cultural escort (see Section 3.1.8) mobilized on March 6, 2022 and begin field work on March 7, 2022. Once enough MRSs had vegetation management and UXO detector-aided surface surveys completed, the geophysics team mobilized to the site to begin the geophysics portion of work. Mobilization to NBK Bangor of geophysical survey field personnel occurred on July 11, 2022, and field work began on July 12, 2022. Other subcontractors (surveyor, utility locate, etc.) mobilized to the site multiple times over the duration of the project completing their respective tasks on an as needed basis. All necessary site-specific trainings were conducted as new personnel were brought onsite. As field work neared completion, site restoration (i.e., removing stakes, marking tape, flags, and geophysics Quality Control (QC) blind seeds at certain sites) were completed and demobilization preparation (i.e., securing the area, cleaning tools and equipment, shipping equipment offsite, etc.) began. Demobilization of personnel occurred as field tasks were completed. The vegetation management subcontractor's last day on site was November 4, 2022. Two geophysics personnel demobilized November 5, 2022, the cultural monitor demobilized on November 10, 2022, and two UXO techs demobilized on November 16 and 17, respectively. The remaining personnel on site (UXO team and two geophysics personnel) demobilized on November 18, 2022.

The material documented as safe (MDAS) containers were maintained secure throughout the project. MDAS containers were transferred to an authorized recycler with the completed DD1348. Investigation-derived Waste (IDW) generated from MC sampling rinsate was sampled for MC constituents. Upon evaluation of analytical results, Base Operating Services Contractor (BOSC) provided management of the IDW at the waste management facility (see Section 3.4).

Because a second phase of SI field work is planned beginning in Spring 2023, the Conex box at the laydown yard was secured, and remains on site. Placards with point of contact information for the Tetra Tech Field Operations Lead and Navy RPM were placed at the laydown yard. Additionally, the Navy RPM requested that flagging be placed at the site where MEC remained in place, UXO 6, with the length extending across the top of the slope above where MEC/MDAS and drum findings are located down the slope. Three point of contact signs were also affixed between pairs of trees using rope, which provided secure placement without using ground penetrating stakes. The Instrument Verification Strip (IVS) was also left in place for use during the second phase of SI field work.

3.1.2 Utility Clearance

Utility Clearances by a subcontractor were conducted in preparation of the geophysics field work for sites where intrusive QC blind seeding was planned. Prior to utility clearances, 811 was called. Utility clearances were completed at UXO 2, UXO 3, UXO 4, UXO 6, UXO 7, UXO 7B, UXO 11, UXO 17, UXO 17B and at the laydown yard.

3.1.3 Site Surveying

A Washington Professional Land Surveyor placed survey control points, which were established by using a combination of global positioning system (GPS) coordinates with ties to the Washington State Reference Network and Navy monuments. The control points were used for checking and establishing GPS positional accuracy by the UXO and geophysical teams. Surveying was conducted at the laydown area, UXO 3, UXO 4, UXO 7B, UXO 11, UXO 11B, UXO 13, UXO 17, UXO 17B. While the subcontractor was initially requested to place two survey control points at the MRSs, based on the robotic total station (RTS) used for the DGM, a third control point was placed at sites with TEM-8g surveys planned (i.e., UXO 3, UXO 11, UXO 11B, UXO 17 and UXO 17B), considering the sites were wooded and/or large and so needed additional site control. The site survey report is provided in Appendix D.

3.1.4 Site Accessibility and Exclusion Zones

Exclusion zones (EZs) were established in accordance with the DoD Explosives Safety Board (DDESB) approved ESS. Access to the EZ was limited to personnel essential to the operation being conducted; however, under specific conditions, and on a case-by-case basis, authorized visitors were granted access to the EZ when operations were conducted.

Upon establishment of the EZ, the area was controlled by wood barricades (i.e., saw horses) blaze orange in color so the EZ area was easily identifiable. The EZ distance was determined based on the munition with greatest fragmentation distance (MGFD). Barricades were moved when necessary, depending on the requirements of the field work in progress.

3.1.5 Governing Regulations/Guidance

The MEC investigation was performed in accordance the MEC QAPP (Tetra Tech, 2021a) and the DDESB approved ESS (Tetra Tech, 2020a) including ESS Amendment 1 Revision 1 (Tetra Tech, 2023a) as well as with local, state, and federal regulations and applicable DoD requirements. The MC investigation was conducted as described

in the MC QAPP (Tetra Tech, 2021b) in accordance with local, state, and federal regulations.

3.1.6 UXO Escort Operations

A UXO qualified personnel escorted all site visitors (see Appendix B-2 for visitor log) and non-UXO qualified team members on site as part of UXO and anomaly avoidance measures. The UXO escort conducted anomaly avoidance measures during using a hand-held metal detector to check for and avoid possible ordnance or ordnance-related material during these activities: placement of temporary control points by Tetra Tech or the land surveying subcontractor; vegetation management; conducting of DGM surveys; and collecting MC samples. The UXO escort was responsible for clearly marking areas where there was visible ordnance or MEC and reporting the location to the UXO Team Leader. When MEC/MPPEH was discovered by the UXO escort on the ground surface, this necessitated the UXO Team to travel to the location to identify and remove the suspect item.

3.1.7 Biological Surveys and Monitoring

The Habitat and Endangered Species Survey (i.e., biological survey) field work was conducted in August through September 2020, prior to the start of the munitions related SI field activities in 2022. The biological survey was conducted at 19 sites (i.e., no survey at UXO 9B and UXO 17D). Upon submittal of the biological survey report to the Navy (Tetra Tech, 2020b), it was determined that a Biological Assessment (BA) was needed. Because of limited availability by the Navy, who normally prepares these types of reports, Tetra Tech was tasked to complete the BA in December 2020. Two associated documents were prepared. The first document, the *Endangered Species Act and Essential Fish Habitat No Effect Determination*, was prepared to evaluate the SI field work activities and to verify that the activities did not jeopardize the continued existence of any threatened, endangered, or proposed species, or result in the destruction or adverse modification of critical habitat. Based on the evaluation, it was determined that the actions would have “no effect” on the species listed under the Endangered Species Act (Tetra Tech, 2021c). Although there were no formal restrictions, field work at UXO 9 was noted in the No Effects Determination to strive to be conducted between July 16 to February 15 to avoid the annual period of salmon spawning concerns. The second document was a separate technical memorandum, the *Final Biological Assessment*, documented the proposed project activities that “may affect, but are not likely to adversely affect” the only federally listed species potentially occurring in the action area that could be exposed to possible project impacts, the Marbled Murrelet (Navy, 2021c). As a result, best management practices were employed during the SI field work to avoid and minimize potential project effects to the

Endangered Species Act listed species or their habitat and are further outlined in the BA. The Marbled Murrelet was identified to possibly be present at six of the MRSs: UXO 2, UXO 6, UXO 7, UXO 7B, UXO 9 and UXO 11B. For field work conducted at these sites, activities were restricted to begin 2 hours after sunrise and operations ceased 2 hours before sunset during the murrelet nesting season (April 1 to September 23). No timing restrictions were needed for field activities that occurred outside of the murrelet nesting season. For UXO 13 and UXO 14, there were no similar diurnal restrictions; however, if night work were to be needed (it was not), lighting requirements included lighting shields and direction of lighting away from water bodies. The BA for the Marbled Murrelet required federal agencies to consult with the USFWS and concurrence from the USFWS was provided via email on September 13, 2021.

The biological survey effort included review and verification of general vegetation types (by polygon) and forestry prescriptions (by stand), as described in the 2018 Integrated Natural Resources Management Plan (INRMP) (NAVFAC, 2018), and used to verify current habitat conditions within each SI unit. Vegetation types outlined in the INRMP include upland forest types, upland successional habitats, grasslands and shrublands, orchards, deciduous forested wetlands, coniferous forested wetlands, shrub dominated wetlands, riverine ecological system wetlands, and open land habitat. Refer to the Tt habitat endangered species report for identification and mapping of the INRMP vegetation polygons and stand IDs (the subject SI report notes whether existing INRMP stands were confirmed and/or where changes to stand IDs are recommended.

The biological field survey results are summarized in Section 5 for each MRS. No large stick nests or forestry stands containing old-growth characteristics such as moss platforms were documented within or adjacent to any of the MRSs. Game trails and other notable wildlife sign were documented. Updated wetlands boundaries were incorporated into the figures made for each site; however, the wetlands boundaries are not formal. Any formal wetland delineation of any wetlands identified during the SI would occur, if required, as part of the future RI for a given site, and a Final Wetlands and Other Waters of the U.S. Delineation Report would be submitted to the Navy for future permitting activities.

Incidental wildlife observations, including migratory birds, were recorded during the biological survey to document the presence of listed or sensitive species within the project areas. Although the Marbled Murrelet was conservatively identified to possibly be present at six of the MRSs, including UXO 2, UXO 6, UXO 7, UXO 7B, UXO 9 and UXO 11B, and field work constraints were in place, none were observed during the entirety of the 2020 field work. The following wildlife species were documented during the biological survey:

Group	Scientific Name	Common Name
Birds	*Ardea Herodias*	great blue heron
	Haliaeetus leucocephalus	bald eagle
	Accipiter cooperii	Cooper's hawk
	Bubo virginianus/Strix varia	great horned owl/barred owl (pellets only)
	Sphyrapicus nuchalis	red-naped sapsucker
	Colaptes auratus	northern flicker
	Dryocopus pileatus	pileated woodpecker
	Empidonax difficilis	Pacific-slope flycatcher
	Cyanocitta stelleri	Steller's jay
	Corvus corax	common raven
	Poecile atricapillus	black-capped chickadee
	Turdus migratorius	American robin
	Pandion haliaetus	osprey
	Junco hyemalis	dark-eyed junco
Mammals	*Scapanus orarius*	coast mole
	Tamiasciurus douglasii)	Douglas' squirrel
	Sylvilagus floridanus	Eastern cottontail rabbit
	Ursus americana	black bear (sign only)
	Odocoileus hemionus columbianus	Columbian black-tailed deer
	Lontra canadensis	River Otter
	Castor canadensis	Beaver
Amphibians	*Pseudacris regilla*	Pacific treefrog

Source: Tetra Tech, 2020b.

During the 2020 biological survey, three species considered either sensitive or species of concern were documented; specifically, great blue heron (Ardea Herodias) and bald eagle (Haliaeetus leucocephalus) were documented directly adjacent to UXO 9 and one pileated woodpecker (Dryocopus pileatus) call was heard directly west of UXO 2. Although the Marbled Murrelet was conservatively of potential presence at several of the sites, none were observed during the entirety of the 2020 biological survey.

During SI munitions related field work in 2022, the Tetra Tech project biologist was consulted by the Tetra Tech project manager prior to field work at each site to discuss wetlands, types of trees present, etc. and any avoidance concerns; these were then passed along to the field team. Similarly, the Tetra Tech biologist was consulted if ecological receptors were encountered during field work. No Marbled Murrelets were observed during the entirety of 2022 munitions related field work. Black bears were observed at UXO 3, UXO 7B, and UXO 17C; Oregon Junco birds and ground nests containing eggs were encountered, and avoided, at UXO 3; and, for UXO 9, a small beaver pond was present upstream, and a single river otter was spotted foraging near the bridge.

3.1.8 Cultural Resources Surveys and Monitoring

The Historical and Cultural Resources Survey (i.e., cultural resources survey) pedestrian field work was conducted in September 2020, prior to the start of the munitions related SI field activities in 2022. The cultural resources survey was conducted at 19 sites (i.e., no survey at UXO 9B and UXO 17D). As part of the historical and cultural resources survey, the Navy Archaeologist consulted with the SHPO and Indian Tribes as part of the Section 106 compliance. The results of the survey were documented in a separate historical and cultural resources survey report (Tetra Tech, 2021e).

The recommendation included in the survey report was that archaeological monitoring should be conducted during vegetation management, MEC/MPPEH removal, geophysical surveys, and any tasks extending into the subsurface (i.e., burying QC blind seeds for geophysics, excavation of demolition pits, etc.). Therefore, a cultural monitor/escort was on site for the duration of the 2022 SI field activities. Any discoveries of cultural and/or historical items during the 2022 SI field work were adequately documented and the Navy Archaeologist was notified. The cultural SI findings are considered sensitive information (see Section 2.2.7) and are documented in a separate report (Tetra Tech, 2023b) with all cultural monitoring logs for field work included as an attachment to that report.

3.2 Site Inspection Methodology for MEC

This section describes the SI methodology completed for the MEC portion of this investigation. The MEC SI activities were conducted in accordance with the MEC QAPP (Tetra Tech, 2021a). The daily MEC activity logs, daily safety logs, and safety sign in sheets are included in Appendix B-3, B-4, and B-5, respectively.

3.2.1 Vegetation Reduction

Vegetation reduction was performed in advance of analog surface surveys, geophysical surveys (EM61-HP, TEM-8g, and GPR), and MC sampling (for specific sites) where site conditions restricted safe access to the site and where the vegetation height and thickness would compromise data quality.

Vegetation reduction was also conducted along access routes to the survey areas when a site was located relatively far from an access road. Access pathways to a site were reviewed by UXO field personnel and UXO management to determine the safest and most convenient route permissible for vegetation reduction. Within the survey area, an approximate 5-foot buffer area around the SI perimeter was cleared to allow data

collection to the SI perimeter and to provide physical space for field personnel to maneuver equipment at the SI boundary.

Vegetation was cleared or trimmed using a combination of hand tools and mechanical methods by the vegetation management subcontractors. Vegetation clearance were addressed using shielded equipment or MEC avoidance procedures implemented by Tetra Tech UXO escort personnel. Vegetation clearance operations were conducted to facilitate clearance within 6 inches of the ground surface to minimize the chances of accidental ground strike with hand tools or mechanized equipment. Trees and other vegetation with diameters of 3 inches or less were cut, as needed, to facilitate access to the site. Tree branches, limbs, vines and other vegetation above the ground surface were removed to heights of approximately 7 feet to facilitate safe passage of personnel and equipment through the survey areas, and to facilitate line of sight when using RTS positioning systems during data collection. Per the MEC QAPP, cut vegetation was mulched on site and then removed off site. When the field team began the vegetation management, the site conditions were denser than during the site visit conducted several years prior, which resulted in equipment not being able to traverse some areas. After discussion with the NBK Forester, a FCR (FCR-02) was issued (see Section 3.5) to modify how vegetation management would be conducted. Upon direction of the NBK Forester, Tetra Tech was given permission to remove any sized trees (even trees larger than 3 inches diameter at breast height), as needed, to clear the path for the chipping equipment, if essential to the work effort. In addition, chipped material could be spread on the forest floor as long as the chipped material did not pile up. Any material that was too large to fit into the chipper was able to be scattered onto the forest floor outside the cleared area, as needed. Any piles made for later chipping had to be chipped by the end of August 2022 to avoid any spontaneous fires during the dry season.

3.2.2 Quality Control Seeding

A blind seeding program was implemented at the MRSs with analog instrument-assisted surface surveys and at those with full coverage DGM surveys. The blind seeding program included surface seeds placed in advance of analog surface surveys by the UXO team and subsurface seeds placed within planned full coverage DGM survey areas:

3.2.2.1 UXO Surface Seeds

For the detector aided surveys, surface seeds consisted of small Schedule 80 industry standard objects (ISOs) and were placed on the surface by the UXO Quality Control Specialist (UXOQCS). Surface seeds were placed at a rate that facilitated 1 to 6 seeds encountered per operator per daily lot of work. The daily UXO QC reports from the SI field work are included in Appendix B-6.

3.2.2.2 DGM Subsurface Seeds

For the geophysical surveys, QC subsurface blind seeds were only for full coverage geophysics; for those sites with only transects (versus full coverage), blind subsurface seeds were not placed along DGM transects because transect surveys were intended to primarily delineate either the lateral extent of suspected disposal areas or assisted with potential refinement of the site boundaries.

At the five sites where full coverage geophysics of any method (EM61-HP and/or TEM-8g) was conducted, subsurface seeds were emplaced at varying depths and orientations within the subsurface with the intent that each DGM field team would encounter at least one blind seed per day of data collection. UXO personnel assisted with seed placement and implemented anomaly avoidance measures to avoid placement of a QC seed too close to another metallic object in the ground. The maximum burial depth for small ISOs was 6 inches in a horizontal orientation, and 12 inches in a vertical orientation. All medium ISOs used as seeds were emplaced in a horizontal orientation at variable depths, which did not exceed 18 inches. The maximum achievable seed depth was governed in the field by digging conditions.

The seeds were clearly identified as inert and affixed with identification labels. Subsurface seed IDs were discernably different from surface seed IDs to avoid confusion between the two data sets. The seed locations were recorded using a handheld GPS instrument, and the coordinates were recorded in the blind seed register. The seed register was firewalled from UXO and DGM production personnel at the time of field work. After the geophysics field work was completed and the third-party QA approval of the geophysics data was provided, the geophysics team removed the QC subsurface blind seeds during the site restoration efforts.

The final version of the geophysics master database is included in Appendix F, and Appendix H to the DGM Survey Report includes the QC blind seed details. Blind QC seed registry details were firewalled during the SI field work. However, the seed details no longer need to be firewalled now that the SI geophysical survey field work is complete.

3.2.3 UXO Detector-Aided Surface Survey

The UXO team conducted detector-aided surface surveys at each MRS to identify, map, and photograph MPPEH/MEC found at the surface so that it could then be removed. For sites where no geophysical surveys were conducted, the UXO team removed all MEC/MPPEH from the ground surface and non-munitions-related metal (NMRD) debris remained in place. For those sites where geophysical surveys were conducted, the UXO team additionally removed NMRD on the surface that would interfere with the

ground-based DGM surveys (any piece of metal 2 inches or greater in any dimension) to the extent practical. Metallic NMRD too heavy to move without assistance of mechanized equipment remained in place, as did existing infrastructure such as fencing and railroad tracks.

The UXO team established a fiducial positioning system for the detector-aided surveys by creating a labeled system of survey stakes. The UXO team established 5-foot lanes to survey selected accessible portions of the site. A Schonstedt magnetic locator and a Vallon VMH 3 all-metals detector were used to locate surface metal and debris. The disposition of recovered MPPEH was handled in accordance with the approved ESS.

When a suspect MEC/MPPEH item was encountered, its location was recorded using a GPS instrument. Each MEC/MPPEH item was marked with flagging tape and assigned a unique number. Available information about the item was recorded, including location, identification, item number, and whether the item was suspect MEC/MPPEH. A digital photograph was taken of each MEC/MPPEH item. After dual inspection, a determination about the item was made by the SUXOS and UXOQCS/ Unexploded Ordnance Safety Officer (UXOSO) and, subsequently, the Tetra Tech project manager and Navy RPM were notified of the find. If the MEC/MPPEH was determined safe to move, and upon consult with the NBK ESO, the Navy RPM and/or SUXOS coordinated transport to a facility magazine for temporary storage until the item could be detonated at the end of the field work. If the MEC/MPPEH was determined to be unsafe to move, NBK Explosive Ordnance Disposal (EOD) was contacted who assumed custody of the item and addressed its final disposition through either detonating the item in place (DIP) or moving the item for detonation (at UXO 7) (see Section 3.2.6). MDAS items were secured by Tetra Tech in a locked container at the laydown area until transfer and final disposition by a certified recycler (see Section 3.2.6).

3.2.4 Geophysical System Verification

A geophysical system verification (GSV) process, consisting of the Instrument Verification Strip (IVS) and blind seeding program, for the DGM systems was implemented during the SI. See Appendix F, Digital Geophysical Mapping Survey Report, for additional information, specifically Appendix F to the DGM Survey Report.

3.2.4.1 IVS Establishment

Prior to construction of the IVS, the UXO team conducted detector-aided surface sweeps at areas around the laydown area to select candidate locations for the IVS. Utility clearances were also completed in the laydown area ahead of IVS construction (see Section 3.1.2). The geophysics team then performed a pre-seeded survey of the proposed IVS area using the Geonics, Ltd. EM61-HP. The data were processed and

reviewed to assess suitability of the site for an IVS, and to avoid placement of ISOs near existing metallic objects in the subsurface. Once a location large enough to accommodate testing with the TEM-8g towed array (i.e., large turn radius), the IVS was constructed at the laydown yard to provide known targets for QC testing of the geophysical survey equipment to verify that the DGM systems were functioning properly and as intended.

Once the IVS was constructed, each DGM system conducted a post-seeded survey of the IVS and the results of this process were documented in the IVS Technical Memorandum (see Appendix F).

One of the EM61-HP sensors was replaced as the original system was not functioning properly at the end of August/beginning of September. The replacement system was tested at the IVS and the IVS Technical Memorandum was revised to include the replacement EM61-HP's functionality. This revision was documented under the IVS Technical Memorandum Addendum 01 (see Appendix F).

3.2.4.2 Blind Seeding

The IVS included two small Schedule 80 ISOs and one medium Schedule 40 ISO, consistent with the make and model ISOs to be used as QC seeds. The small ISOs were buried at depths of approximately 3 times and 7 times their diameter (3 inches and 6 inches, respectively). Both small ISOs were buried in a horizontal orientation. The medium ISO was buried at a depth of approximately 10 inches and also in a horizontal orientation.

3.2.5 DGM Surveys

The following subsections describe the type of DGM surveys conducted during the SI field investigation. A separate Digital Geophysical Mapping Survey Report (DGM Report) was prepared to document the DGM surveys in detail (Appendix F). Daily DGM reports are included as an attachment to the DGM Survey Report (Appendix A).

Because no intrusive investigation of DGM targets of interest (TOIs) was included in the scope of work for the SI (intrusive investigation is normally deferred until the subsequent Remedial Investigation [RI]), there is no information available on the vertical extent of the discrete anomaly sources or the nature of these sources. Based on the surface clearance findings, where MEC/MPPEH was encountered on the ground surface, there may also be MEC/MPPEH present within the subsurface, either as discrete objects or co-mingled with other debris. Without intrusive investigation of TOI locations, however, the nature of the anomaly sources remains unknown.

3.2.5.1 EM61-HP Field Surveys

The purpose of the DGM survey was assess the presence of metal in the subsurface, which may potentially be subsurface MEC/MPPEH, and determine the potential lateral extent (i.e., footprint) of suspected disposal areas within the SI investigation boundaries in support of the overall SI objective to assess the absence or presence of MEC/MPPEH and to support the decision-making process for next steps at each site. The EM61-HP surveys were conducted as either transects or full coverage. Transect collection included a single pass with the geophysics sensor along each transect, marked out using flagging. Deviations from the planned transect alignment occurred in order to navigate around trees or other obstructions. Minor gaps in full coverage surveys were also present due to trees and other obstructions. See Appendix F for detailed information regarding the EM61-HP surveys, including mapping (Appendix E) to the DGM Survey Report.

EM61-HP surveys, transects and/or full coverage were conducted at eight MRSs: UXO 3, UXO 4, UXO 7, UXO 11, UXO 11B, UXO 13, UXO 17, and UXO 17B.

3.2.5.2 TEM-8g Field Surveys

The SI TEM-8g survey was conducted using Tetra Tech's TEM-8g system attached to a ground-towed platform. Like the EM61-HP, the purpose of the TEM-8g survey was to show the locations of discrete geophysical TOIs that could be potential MEC/MPPEH and determine the potential lateral extent (i.e., footprint) of suspected disposal areas within the SI investigation boundaries in support of the overall SI objective to assess and verify the absence or presence of MPPEH and support the decision-making process for next steps at each site. The TEM-8g surveys were conducted as either transects or full coverage. Transect collection included a single pass with the geophysics sensor along each transect, marked out using flagging. Deviations from the planned transect alignment occurred in order to navigate around trees or other obstructions. Minor gaps in full coverage surveys were also present due to trees and other obstructions. See Appendix F for detailed information regarding the TEM-8g Surveys, including mapping (Appendix E) to the DGM Survey Report.

TEM-8g surveys, transects and/or full coverage were conducted at five MRSs: UXO 3, UXO 4, UXO 7, UXO 17, and UXO 17B.

3.2.5.3 GPR Field Surveys

The purpose of the GPR survey was to assist with delineation of potential disposal areas, and to assess (to the extent practical) the thickness of cover soil overlying potential disposal areas, maintaining positional data similar to DGM methods. The GPR surveys were conducted as transects only. Transect collection included a single pass

with the geophysics sensor along each transect and were marked out using flagging. Deviations from the planned transect alignment occurred in order to navigate around trees or other obstructions. See Appendix F for detailed information regarding the GPR Surveys, including mapping (Appendix G) to the DGM Survey Report.

GPR surveys, transects only were conducted at four MRSs: UXO 4, UXO 7, UXO 17, and UXO 17B.

3.2.5.4 DGM and GPR Data Processing and QC

Data processing was conducted in accordance with the MEC QAPP (Tetra Tech, 2021a) and is further detailed in the DGM Survey Report (Appendix F), which includes the electronic Master Project Database as Appendix H to the DGM Survey Report. The task was to process DGM and GPR data, select targets from DGM data, and update the project GIS and Access database. DGM data were processed, and target picking was performed. In some cases, the density of subsurface anomalous response is so high that the selection of individual TOIs was not possible. These areas, identified as saturated response areas (SRAs), were bounded by polygons in the processed DGM results. Refer to the DGM Survey Report (Appendix F) for DGM and GPR for resultant mapping.

The QC Geophysicist was responsible for final QC of the DGM and GPR data and completion of QC prior to delivery to the Navy. Various QC checks were performed in the field (i.e., through the field QC program) and by the data processors (e.g., check of sample separation and survey coverage) during analysis of data. Completed data processing SOP checklists are provided in the DGM Survey Report. The QC Geophysicist performed necessary checks of blind seed performance with each data package submitted by the data processors. Weekly QC DGM reports were prepared and submitted to the Navy and the third-party QA, NSWC IHD, which are included in the DGM Survey Report in Appendix F.

3.2.6 MEC/MPPEH and MDAS Management

MEC/MPPEH was managed in accordance with the DDESB approved ESS. When suspect MEC was identified, a temporary work stoppage was called for the team discovering the item, and then the SUXOS inspected the item to identify or verify the identity of the item and the hazards associated with it. Upon inspection, the SUXOS and UXOQCS/UXOSO made the determination if the item was MEC, MPPEH to be handled as MEC, or MDAS. If the item was MDAS, it was stored in drums at the laydown yard until the end of the project. If the item was MEC safe to move or MPPEH to be handled as MEC, which was documented in writing prior to movement, the Tetra Tech project manager was notified who then provided the notification with necessary

information (i.e., item type, description, location, etc.) to the Navy RPM. The Navy RPM then contacted the NBK ESO, and direction was provided on a case-by-case basis.

Suspect MEC determined by the SUXOS and UXOSO to be safe to move were relocated to a collection point within the MRS where they were either guarded overnight or sandbagged in place (after direction from the Navy was given) until they were transferred to the facilities explosives' temporary storage magazine the next morning for later detonation at the end of the project. For items that needed to be moved to the magazine, the magazine manager was also contacted and a date/time to transport the item(s) to the magazine was coordinated. Suspect MEC and MPPEH items that were not safe to move remained secured in place, and the Navy RPM or the SUXOS contacted NBK Bangor EOD mobile unit for an emergency response. Upon arrival of the EOD mobile unit, custody of the item was then transferred from Tetra Tech to EOD mobile unit.

At the end of the SI field work, all MEC/MPPEH located in the temporary storage magazine and MDAS needing to be demilitarized were detonated using donor explosives prior to being transferred to a qualified recycler. Detonations were conducted as outlined in the MEC QAPP (Tetra Tech, 2021a) with the Navy RPM coordinating all notifications of detonations with the NBK Public Affairs Officer. Donor charges were delivered on call to the detonation area. Based on FCR-04, UXO 3 and UXO 7 were added as detonation locations to add greater flexibility. One detonation event, which occurred on November 3, 2022, was conducted at UXO 7. Four shots, each using a separate demolition pit, were conducted as per the ESS. During detonation, the EZ was established, and access was limited to essential personnel only. Photos showing the management of MEC, and detonations, are included in Appendix B.

Recovered MPPEH was dual inspected and, after determined to be free of explosive hazards, was secured in the MDAS containers at the laydown yard. MDAS was certified and verified free of explosive material by qualified Tetra Tech UXO personnel prior to transfer to the qualified recycler.

The MDAS process was conducted under chain of custody. The DD form 1348-1A, which verifies the MDAS status, was signed upon Tetra Tech transfer of items and is included in Appendix E-2. As per the certificate of destruction, 5,000 pounds of material were destroyed.

3.3 Site Inspection Methodology for Munitions Constituents

This section describes the SI methodology completed for the MC portion of this investigation. The MC investigation activities were conducted in accordance with the MC QAPP (Tetra Tech, 2021b).

3.3.1 Soil Sampling Procedure

For each site requiring MC sampling, each sample was collected as a composite sample. Each of the composite samples collected consisted of up to five sample aliquots, with the aliquot pattern being similar to the five dots on the face of a game die. The soil samples were biased (anticipated maximum concentration locations) toward locations where a breached MEC/MPPEH item was identified, which is indicative of potential MC contamination. As per the MC QAPP, MC sampling was tentatively anticipated at the following three sites: UXO 2 (Site CC); UXO 3 (Site D); and UXO 6 (Site 22). However, based on the actual locations of the MEC/MPPEH identified in the field, the Navy RPM and LANT munitions technical expert were consulted and the details for sampling were agreed upon (see Section 3.5); note an FCR was not issued as the agreed upon sampling was consistent with the MC QAPP approach. The sites selected for sampling, number of samples collected, and rationale for sampling are outlined in Table 3-1.

A UXO escort used a hand-held metal detector to perform anomaly avoidance during soil MC sampling activities as outlined in Section 3.1.6. Each of the aliquots for the composite surface soil samples was collected at 0 to 6 inches bgs. The sample material from each aliquot was initially placed in a 1-quart Ziploc plastic bag that was marked with the sample identification number and aliquot identifier (i.e., A through E), corresponding to the five aliquots for a given composite soil sample. Upon collection of the maximum five individual aliquots for a given composite sample, each sample bag was then thoroughly mixed by shaking and kneading. The resultant composite sample was then formed by taking an equal amount of soil from each of the five individual aliquot bags and placing it in a larger 1-gallon Ziploc plastic bag. Again, this bag was thoroughly mixed by shaking and kneading. A portion of the homogenized sample was then transferred to the appropriately labeled sample container and placed on ice for shipment to the laboratories. Nominal unused portions of a collected sample were returned to the location from which they were collected.

Each soil sample container was uniquely labeled, identified on a laboratory chain-of-custody form, and stored on ice in a cooler. Soil samples were analyzed for all explosives except for nitrocellulose by Eurofins TestAmerica Denver; the nitrocellulose analysis conducted by Agriculture & Priority Pollutants Laboratories, Inc (APPL) (see Section 3.3.5). Chain-of-custody forms and soil sample log sheets are provided in Appendix B-7 and B-8.

3.3.2 Post-Detonation Sample Collection

One post-detonation subsurface soil sample was collected and submitted for explosives analysis from each of the four detonation locations at UXO 7. Detonations of all MEC encountered during the span of the SI field work and two MDAS items needing to be demilitarized were performed in four separate demolition pits, followed by MC sampling to determine impacts of the donor explosives. UXO Technicians conducted a post detonation inspection and confirmed all the energetic materials were consumed. Post-detonation soil samples were collected from each of the four demolition pits (4 samples total) and sent to the analytical laboratories for explosives analysis. Each sample was collected as a composite sample with one aliquot collected from the middle of the demolition pit and the remaining four aliquots from each side wall. A summary of post-detonation samples collected is included in Table 3-1.

3.3.3 Quality Control Sample Collection

Soil QC samples (matrix spike/matrix spike duplicate) were collected at a frequency of 1 per 20 total combined samples for this investigation for laboratory QC purposes. Field duplicates were collected at a rate of 1 per 10 samples across all sampled sites. In addition, one aqueous rinsate blank sample was collected for field QC purposes and analyzed for explosives. A summary of QC samples collected is included in Table 3-1.

3.3.4 Decontamination Procedures

Soil sampling tools were decontaminated by scrubbing them in a solution of potable water and non-phosphate detergent and then double rinsing to address both organic and inorganic parameters. Sampling tools that were not immediately used after decontamination were allowed to air dry. Decontamination procedures were conducted in accordance with the MC QAPP (Tetra Tech, 2021b).

3.3.5 Laboratory Analysis

All soil samples and post-detonation soil samples were analyzed for explosives (SW-846 8330B). The analysis for explosives was completed by Eurofins TestAmerica Denver, while APPL completed the analysis for nitrocellulose (United States Environmental Protection Agency [USEPA] 353.2 modified) (see Section 3.5). Eurofins TestAmerica Denver and APPL are current DoD ELAP-approved laboratories.

3.3.6 Project Screening Levels

The MC sampling results were compared to human health and ecological screening criteria. The human health Project Screening Level (PSL) for each parameter is the

lowest of these values: State of Washington Method A Soil Cleanup Level for Unrestricted Land Use; Method B Soil Cleanup Level for Unrestricted Land Use; Soil Cleanup Level Protective of Groundwater Vadose at 13 °C; USEPA Regional Screening Level (RSL) for residential soil, industrial soil; and risk-based soil screening levels (SSL) for protection of groundwater (USEPA, 2022). USEPA risk-based SSLs for protection of groundwater (USEPA, 2022) correspond to a dilution attenuation factor of 1; carcinogenic values represent an incremental cancer risk of $1x10^{-6}$, and noncarcinogenic values correspond to a hazard quotient of 1. For 3,5-dinitroaniline, no screening values were available at the time of the 2020 MC QAPP preparation; however, when the results were evaluated in 2022, a screening value was available and was used to evaluate the MC sample results. For all explosives analytes, the selected PSL (lowest of the values) was the USEPA SSLs for protection of groundwater.

The ecological screening values were selected from the following sources listed in order of preference: WAC – Washington State Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals (Table 749-3); Draft Ecological SL – Draft Ecological SSL (SERDP, 2012); Draft Ecological SSL (1) – Draft Ecological SSL (Checkai et al., 2012); LANL – Los Alamos National Laboratory (LANL, Intellus New Mexico, 2022); and Region 4 – USEPA Region 4 SSL (USEPA, 2018).

The PSLs used to screen the MC sampling results are included in the Section 5 MC soil results table (Table 5-3). The most recent updated PSLs included in the 2020 MC QAPP were reviewed and updated (November 2022 criteria values) to evaluate the MC sample results.

3.3.7 Field Sample Documentation and Shipping

Documentation of field observations were recorded in a field logbook (see Appendix B-9) and included on daily field forms and sample collection logs by the MC sampler. Sample log sheets for the soil samples and post-detonation samples recorded the sample ID number, sample time and date, location, and analytical matrix and are included in Appendix B-8.

Samples were packed into coolers with ice for transport to the analytical laboratory under chain-of-custody. The samples were taken to the local FedEx drop off location and shipped for next day delivery at Eurofins TestAmerica Denver, located in Arvada, Colorado for explosives analysis. Once the samples were received at Eurofins TestAmerica Denver, a portion of the samples (approximately 10 grams) were sent to APPL located in Clovis, California for nitrocellulose analysis (see Section 3.5 for details on analytical laboratory differing from the MC QAPP).

3.4 Management of IDW and Other Waste

Concerning IDW management, the aqueous decontamination water generated during MC field sampling operations was collected and containerized for disposal. Nominal unused portions of a collected soil sample were returned to the location from which they were collected; therefore, only aqueous IDW was generated. All IDW generated during the MC sampling effort was containerized in a 5-gallon bucket and then stored in a Department of Transportation-approved 55-gallon drum with the necessary WIS form attached until final disposition. The IDW was stored on base in the secure Conex box at Tetra Tech's laydown area until the waste characterization analytical data were received from the laboratory. Approximately 3 gallons of IDW were generated and once sampled, only approximately 1-gallon of IDW remained. The IDW was analyzed by Eurofins TestAmerica Denver and deemed as nonhazardous. The WIS form and IDW analytical results were submitted to Base Environmental. Once the Navy-signed WIS form was provided, the WIS pending label was removed from the IDW bucket and replaced with a NBK Bangor Non-Haz label with identification per the WIS form. On December 16, 2022, the IDW bucket was transported to the BOSC waste management facility. The BOSC reviewed the WIS and accepted the labeled IDW water bucket. The 55-gallon drum the IDW water bucket was stored in was inverted with lid removed and staged behind the Conex box. A summary of analyses of the IDW sample is included in Table 3-1. The IDW documentation (i.e., WIS form) is included in Appendix E-1.

In addition to the IDW, on September 24, 2022, there was a hydraulic leak from the subcontractors' mini excavator and less than approximately 16 ounces of hydraulic fluid were spilled onto the ground at UXO 2. The area of the leak was addressed using the spill kit, the ground was cleared with a metal detector, and then the small amount of impacted soil was removed and containerized. Clean soil from another area was collected to replace the soil removed to restore the area. Photographs were also taken during this process (see Appendix B-1). The impacted soil was stored in a 5-gallon bucket and labeled with a WIS form pending direction from the Navy. The WIS form was submitted to Base Environmental, who signed the paperwork for disposal requirements. The 5-gallon bucket with impacted soil and the WIS form were taken to the BOSC, who reviewed the paperwork and accepted the waste. The WIS forms are included in Appendix E-1.

3.5 Deviations from the Planning Documents

The SI field work was originally scoped to be conducted during the day, versus night work. During planning document preparation, because of facility critical mission activities, all planned field activities were instead stated as requiring or likely requiring night operations for all sites. As such, a project modification was made to eliminate four

sites (UXO 8, UXO 10, UXO 15, and UXO 16) to balance the extra costs for night work; however, these four sites remained in the planning documents and biological and cultural field surveys of 2020. Subsequently, the SI munitions portion of the field work was all implemented entirely as day work, after obtaining permissions on a site-by-site basis as the field work rolled out, and/or conducting the field work on weekends or starting work in daylight after normal base work hours ended. An additional phase of SI field work will be conducted beginning in Spring 2023 at these remaining four sites. The results of that field work will be documented in an SI Addendum.

In summary, field constraints regarding workdays were conducted as follows, based on Navy instruction:

- Field work was conducted as day work for the following sites: UXO 3, UXO 6, UXO 7, UXO 7B, UXO 9 (also because of wetland concerns/cattails present at the site), UXO 11, UXO 11B, UXO 17, UXO 17B, and UXO 17C.
- Field work was conducted during the day on Saturday or Sunday or weekdays after the workday ended for base personnel at 3:00 p.m. at these sites: UXO 4, UXO 12, UXO 13, and UXO 14.
- Field work could only be conducted during the day on Sunday or Saturday at UXO 2.

Prior to all work conducted for UXO 2, UXO 6, UXO 7, UXO 7B, and UXO 9, the Navy RPM contacted the necessary Navy personnel to ensure Navy training operations did not overlap with the SI field activities. In addition, notifications were provided to various naval personnel in different areas of the base prior to field work occurring at most of the sites.

Various field change requests (FCRs) were complete either prior to the start of field work or during field work, which resulted in updates or revisions to the planning documents:

<u>Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP):</u>

- FCR-01 (Navy Approved 06/30/2020): Implemented COVID-19 procedures and requirements needed for field work to address control/mitigation procedures in response to COVID-19 pandemic.
- FCR-02 (Navy Approved 10/22/2020): Replaced clinic for non-emergency care because the original location closed.

- FCR-03 (Navy Approved 10/22/2020): Added the rope access fall protection requirements for the steep slope located at UXO 6 to address the safety of field personnel.

- FCR-04 (Navy Approved 03/03/2022): Implemented personnel changes and medical center changes.

MEC QAPP, MC QAPP, and/or ESS:

- FCR-01 (Navy Approved 03/03/2022): Implemented personnel changes.

- FCR-02 (Navy Approved 03/21/2022): Documented vegetation management revisions per the NBK Forester as the site conditions were denser than during the site visit conducted several years ago in 2019, which resulted in equipment not being able to traverse some areas. Upon direction of the NBK Forester, Tetra Tech was given permission to remove any size trees, as needed, to clear the path for chipping equipment, even trees larger than 3 inches diameter at breast height if essential to the work effort. In addition, chipped material could be spread on the forest floor as long as the chipped material did not pile up, and any material that was too large to fit into the chipper was able to be scattered onto the forest floor outside the cleared area, as needed. Any piles made for later chipping had to be chipped by the end of August 2022 to avoid any spontaneous fires during the dry season.

- FCR-03 (Navy Approved 04/13/2022): Reflected the change of the SUXOS.

- FCR-04 (Navy Approved 07/21/2022): Reflected geophysics personnel changes and, to provide more flexibility, the expansion of allowable detonation locations at the end of project to add UXO 3 and/or UXO 7 as potential detonation locations at the direction of the Navy; original planned location was the base EOD training range.

- FCR-05 (Navy Approved 07/27/2022): Changed geophysics EM61-HP battery voltage levels to meet daily production goals and maintain schedule efficiently. The manufacturer Geonics was consulted and concurred with the change.

- FCR-06 (Navy Approved 02/07/2023): Reflected updates, including elimination of full coverage GPR surveys from MRSs and specified conducting focused GPR profile surveys across anomaly footprints of interest instead of blanket GPR transect surveys at a pre-planned uniform spacing. The revised agreed-upon updates with the Navy concurrence for the GPR work was: UXO 4: 12 transects, UXO 7: 7 transects, UXO 17: 9 transects, and UXO 17B: 10 transects.

Historical and Cultural Resources Survey Report: FCR-01 (Navy Approved 02/28/2022): Reflected personnel changes.

MC QAPP:

- FCR-01 Revision (Navy Approved 01/06/2023): Changed one of the analytical laboratories. As per the MC QAPP (Tetra Tech, 2021b), Eurofins TestAmerica Denver was to conduct the analysis for explosives with Eurofins TestAmerica Sacramento conducting the analysis for the explosive analyte nitrocellulose. Between the time between when the MC QAPP was finalized and the MC sampling was conducted in the field, neither of the Eurofins TestAmerica locations retained the ability to support the analysis of nitrocellulose. This information was provided to the Navy RPM to determine the path forward for nitrocellulose analysis. After discussion with the Navy Chemist, the Navy wanted to move forward with the nitrocellulose analysis using a different analytical laboratory. FCR-01 was prepared identifying the new lab, APPL, which conducted the analysis using the same method, EPA 353.2, as identified in the MC QAPP. FCR-01 was reviewed by Navy LANT Chemist and the Navy RPM, and Navy Chemist comments were provided and resolved, then upon submittal, was approved by Navy LANT. Rather than resampling in the field, there was enough residual sample remaining after Eurofins TestAmerica Denver conducted the explosives analysis that approximately 10 grams of each sample were able to be sent from Eurofins TestAmerica Denver to APPL for the nitrocellulose analysis, while still meeting holding time requirements.

The MC QAPP stated that MC sampling would be implemented based on results from the detector-aided survey findings of any breached MEC that could potentially be a source(s) of MC contamination. Navy and Tetra Tech consulted to determine sites where MC sampling should, be planned, based on the MEC/MDAS findings and the sampling rationale included in the MC QAPP which instructed that the collection of soil samples be biased (anticipated maximum concentration locations) toward locations where breached MEC/MPPEH item(s) were identified. (As initially specified in the MC QAPP, MC sampling was to be conducted at UXO 3 (Site D); and MC sampling was tentatively planned at UXO 2 (Site CC) and UXO 6 (Site 22)). Based on consult with the Navy upon evaluation of MEC found during the SI, MC sampling was conducted at UXO 3 (Site D), UXO 7 (Site 23), and UXO 7B (OU 1 Site A). The rationale for the MC sampling is included on Table 3-1. MC samples were also collected from each of the four demolition pits at UXO 7 after detonation to determine impacts of the donor explosives on the subsurface soils at these four locations.

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4.0 Data Quality Assessment

This section assesses the success of the project in meeting Data Quality Objectives (DQOs) and summarizes the quality of resultant analytical data. The project objective (see Section 1.1) was met, and the results met the quality requirements. The assessment of analytical data is supported by the analytical laboratory results and data validation reports that are included in Appendix G, specifically, Appendix G-1 and Appendix G-2, respectively. The assessment of geophysical survey data is detailed in Appendix F.

The field work activities for the SI were planned and executed to collect as much information as possible to meet the DQOs by optimizing the field efforts and allowing dynamic flexibility for field decisions. Tetra Tech operated in close contact with the Navy by providing daily field summary reports and weekly calls; therefore, the field work schedule was modified where necessary and the initial field work execution plans were revised to increase productivity. Deviations and/or updates from the MEC QAPP and MC QAPP were authorized by the Navy through this coordination and are explained in Section 3.5.

4.1 Data Quality Objectives Review

DQOs for the SI field work were presented in the MEC QAPP (Tetra Tech, 2021a) and MC QAPP (Tetra Tech, 2021b). All field work activities were conducted by qualified personnel, and the data collected fulfilled the procedure, coverage, and accuracy requirements of the MEC and MC QAPPs and associated FCRs.

4.1.1 Information Inputs to Assess SI

All field work was completed in accordance with the procedures described in the MEC and MC QAPPs. The data used as input to meet the stated SI objective (Section 1.1) are:

- Previous collected historical data.
- SI QC/QA data.
- UXO Detector-aided surface survey results.
- Geophysical survey results (EM61-HP, TEM-8g, and GPR).
- Site surface soil sampling results for explosives.

The survey results for the DGM surveys are included in Appendix F. The field forms associated with the MEC intrusive investigation are included in Appendix B with the results of the DGM surveys and intrusive investigation further evaluated in Sections 5

and 7. The MEC Baseline Risk Assessment is included as Appendix H and described in Section 6.

All MC investigation field forms related to the MC sampling effort are included in Appendix B. Soil samples were analyzed by USEPA-approved laboratories with all results verified (Appendix G) and further described in Sections 5 and 7.

4.1.2 Defined Boundaries of the Study

Spatial and temporal boundaries were established for the MRSs at NBK Bangor:

- Spatial boundaries were based on the development of the CSM for each site and were biased to areas where MEC/MPPEH was most likely to be encountered in order to determine absence or presence of MPPEH/MEC as per the SI objective. The purpose of the SI is not to determine extent of MEC/MPPEH, this would be an objective for an RI, not an SI. The lateral boundaries of the investigations of each site were within the boundaries of the MRS sites as identified on Figure 2-1 and at select sites, step-out investigations were conducted, as warranted, where additional SI information was needed. Geophysical surveys were conducted at the ground surface as part of the SI at select sites, where the potential for subsurface disposal existed based on the CSM. Results indicate that subsurface anomalies are present; however, geophysical surveying identification of anomalies in the subsurface is limited by the maximum detection depth of the instrumentation. Intrusive subsurface resolution of anomalies as MEC/MPPEH or NMRD was not conducted; therefore the vertical depth of MEC/MPPEH at a given site is unknown.

- Temporal boundaries were established as required or necessitated by base activities (which restricted site access at times), weather, ecological resources restrictions identified by the Habitat/Threatened and Endangered field survey results (e.g., Marbled Murrelet/Juncos – see Section 3.1.7), which resulted in updated vegetation stands and wetlands mapping; updated wetlands mapping was used in the field to avoid vegetation management of value wetlands. Moreover, cultural field survey resulted in updated cultural resources (see Section 3.1.8), and these cultural resource areas of concern being removed from the SI investigation footprints. Similarly, additional cultural resources identified in the field by a Tetra Tech cultural monitor were removed from SI investigation footprints. Note that sensitive cultural resource areas are not shown on the SI report mapping because of sensitivity of the information.

4.1.3 Specified Performance Checks/Verifications or Acceptance Criteria

The following are the specified performance checks/verifications or acceptance criteria as outlined in the MEC QAPP (Tetra Tech, 2021a):

- UXO detector-aided surveys verified correct assembly, initial and ongoing instrument function tests, ongoing instrument settings checks, verified analog survey repeatability and coverage, and verified surface MEC removal.
- DGM surveys (EM61-HP and TEM-8g) verified correct assembly, initial and ongoing instrument function tests, initial dynamic positioning accuracy, ongoing detection survey positioning precision (IVS), in-line measurement spacing, transect and full coverage, line and fiducial positioning, sensor separation, battery voltage, valid position data (real time kinematic [RTK] GPS), valid position data (post-processed GPS), and dynamic DGM survey performance. See Appendix F for details.
- GPR surveys verified correct assembly, instrument function test, odometer function test, transect and full coverage, line and fiducial positioning, and valid position data (RTK GPS). See Appendix F for details.
- MC sampling was conducted to determine if there were exceedances of criteria (PSLs) for MC in surface soil at sites with significant potential for MC contamination from breached MEC/MPPEH items.

All field work was completed fully in accordance with the DQOs in the MC and MEC QAPP.

During field work, FCRs and non-conformance reports (NCRs) documented non-conformance to the specific performance checks/verifications or acceptance criteria during the DGM surveys. Two FCRs to the MEC QAPP were generated specific to geophysical surveys, FCR-05 and FCR-06, as described in Section 3.5 and provided in Appendix C of this SI Report. Five NCRs were prepared and, in all cases, documented nonconformances have been addressed with a root cause analysis (RCA), and an appropriate corrective action has been implemented, as necessary. The NCRs are further described in the DGM Survey Report in Appendix F.

4.2 Analytical Data Quality

The analytical laboratory data reports are included in Appendix G-1 and analytical data quality was acceptable and none of the analytical results were rejected during data validation (see Appendix G-2 for data validation reports).

Eurofins TestAmerica Denver submitted the soil chemical data under Sample Delivery Group (SDG) number J168718-1 with the results of explosives analysis. APPL submitted the soil chemical data under SDG number 22K0110 with the results of nitrocellulose analysis. The SDG packages are included in Appendix G-1. Note, IDW sample results are not included in the SDG package as the IDW sample results were not validated but were simply for disposal requirements determination as hazardous or nonhazardous waste.

For SDG J168718-1, associated with Eurofins Test America Denver, one initial calibration verification percent difference was outside the QC limits for the select semivolatile organic compounds (SVOC) (2,4-dinitrophenol, diphenylamine and N-nitrosodiphenylamine) analyses and several surrogates were outside the QC limits for SVOC analyses. Several hold times were exceeded for the nitroguanidine analyses, and several matrix spike/matrix spike duplicate percent recoveries were outside the QC limits for explosives analyses. Results below the limit of quantitation (LOQ) were estimated. Field duplicate imprecision was noted for sample pair X3-SS-C05-0006/FD-11022201.

The SDG package, J168718-1, also included the aqueous QC sample, the rinsate blank. The rinsate blank results for nitroguanidine was qualified with a “UX”. The qualification was applied because the extraction holding time was exceeded (i.e., greater than 2X the required time in the QAPP). The data results are recommended to be retained as the sample was a rinsate blank with no expectation of a detection for nitroguanidine. Additionally, the compound was not detected in associated soil samples.

The explosives compounds 2,4-diamino-6-nitrotoluene and 2,6-diamino-4-nitrotoluene were reported by the laboratory but were not included in the list of analytes required in the project QAPP and were not included in the final project database. All results were non-detect. The rationale for exclusion is that these two analytes were originally included in the analytical laboratory scope of work; however, there are no screening criteria for these two analytes nor were either of the two project laboratories certified for the analysis. This was discussed during a November 7, 2019 telecon between the Navy and Tetra Tech; the Navy RPM at the time directed removal of these two analytes.

Therefore, the data were inadvertently collected by the analytical laboratory and are not being reported.

For SDG 22K0110, associated with APPL analysis of nitrocellulose, the 48-hour hold time from sample preparation to analysis was exceeded for all samples and field duplicate imprecision was noted for sample pair X3-SS-C05-0006/FD-11022201. Matrix spike/matrix spike duplicate percent recoveries and the relative percent difference were outside the QC limits.

4.3 Completeness and Usability

This section describes the evaluation of the completeness of each stage of the field work conducted during the SI and usability of the data.

4.3.1 UXO Surface Sweeps

The UXO surface sweeps were planned to be conducted at 15 sites in order to verify the presence or absence of MPPEH/MEC at the MRSs at NBK Bangor. The actual UXO surface sweeps varied based on site conditions (e.g., unsafe terrain, obstructions, etc.). The UXO surface sweeps data quality and quantity are sufficient to support the overall project objectives of the SI. The following table includes a breakdown of the planned versus the actual UXO surface sweeps:

Completeness of UXO Surface Sweeps

Site Name	Planned UXO Surface Sweeps (acres)	Actual UXO Surface Sweeps (acres)	Completeness (percent)
UXO 2 (Site CC)	3.5	4.54[1]	130[4]
UXO 3 (Site D)	20	20	100
UXO 4 (Site 9)	3.3	3.3	100
UXO 6 (Site 22)	1	1.65[1]	165[4]
UXO 7 (Site 23)	1	1	100
UXO 7B (Operable Unit [OU] 1 Site A)	9.5	9.91[1]	104[4]
UXO 9 (Site OO)	7	6.07[2]	87
UXO 11 (Site 14)	1.3	1.19[1,2]	92
UXO 11B (Site 8)	2	2	100
UXO 12 (Site HH)	0.25	0.27[3]	108[4]
UXO 13 (Site 4)	2.5	1.7[2]	68
UXO 14 (Site JJ)	0.33	0.33	100
UXO 17 (Site 2)	9.3	9.3	100
UXO 17B (Site 1)	13.3	13.3	100
UXO 17C (Site BB)	11.8	13.7[3]	116[4]

[1] The UXO sweeps were also conducted in the Step-out Investigation Boundaries; the step-out investigation acreages are as follows: UXO 2 – 1.04 acres, UXO 6 – 0.65 acres, UXO 7B – 0.41 acres, and UXO 11 – 0.23 acres. The value in the table reflects the combined acreage of the planned investigation area and the step-out investigation area.
[2] The following sites had inaccessible areas where UXO sweeps were not conducted, which included the following acreages: UXO 9 – 0.93 acres, UXO 11 – 0.30 acres, UXO 11 Step-out – 0.04 acres, and UXO 13 – 0.80 acres. The value in the table reflects the inaccessible area subtracted from the planned UXO sweep area.
[3] The actual siding location did not match the siding location shown in the QAPP; however, both the planned and actual siding locations had detector-aided surface surveys completed increasing the total acreage.
[4] The completeness is greater than 100-percent due to either a step-out investigation added or because both the planned and actual rail siding locations were investigated.

4.3.2 Geophysical Surveys

The geophysical surveys were planned to be conducted at eight sites with various types of survey coverage (i.e., EM61-HP, TEM-8g, GPR). Survey data were collected as either transects, full coverage, or a combination of both survey types. The actual geophysical survey coverage varied based on site conditions (e.g., unsafe terrain, obstructions, etc.). GPR surveys were evaluated prior to the field work being conducted to determine if GPR surveys were warranted based on the EM61-HP and TEM-8g results. The geophysics verification and validation confirm the data quality and quantity are sufficient to support the overall project objectives of the SI. The NCR/RCA process was followed for QC variances associated with the dynamic surveys and processing, and corrective actions were developed to ensure the usability of the data was not adversely impacted. The following table includes a breakdown of the planned versus the actual geophysical survey coverage:

Completeness of Geophysical Surveys

Site Name	Planned Geophysical Survey Coverage			Actual Geophysical Survey Coverage[1]			Completeness (percent)
	EM61-HP (acres)	TEM-8g (acres)	GPR[2] (linear feet)	EM61-HP (acres)	TEM-8g (acres)	GPR (linear feet)	
UXO 3 (Site D)	T (5.4)	FC (0.5)	N/A	T (0.69) & FC (0.042) = 0.732 Total	FC (0.32)	N/A	EM61: 14 TEM-8g: 64 GPR: N/A
UXO 4 (Site 9)	T & FC (1.1)	T & FC (0.5)	T (1,256)	T (0.12) & FC (0.149) = 0.269 Total	T (398 feet) & FC (0.37) = 0.42 Total	T (1,255.55)	EM61: 24 TEM-8g: 84 GPR: 100
UXO 7 (Site 23)	T (0.1)	FC (0.8)	T (354)	T (0.11)	FC (0.67)	T (353.96)	EM61: 110[3] TEM-8g: 84 GPR: 100
UXO 11 (Site 14)	T (0.3)	N/A	N/A	T (0.21)	N/A	N/A	EM61: 70 TEM-8g: N/A GPR: N/A
UXO 11B (Site 8)	T (0.3)	N/A	N/A	T (0.67)	N/A	N/A	EM61: 223[4] TEM-8g: N/A GPR: N/A

Site Name	Planned Geophysical Survey Coverage			Actual Geophysical Survey Coverage[1]			Completeness (percent)
	EM61-HP (acres)	TEM-8g (acres)	GPR[2] (linear feet)	EM61-HP (acres)	TEM-8g (acres)	GPR (linear feet)	
UXO 13 (Site 4)	T (0.3)	N/A	N/A	T (0.22)	N/A	N/A	EM61: 73 TEM-8g: N/A GPR: N/A
UXO 17 (Site 2)	FC (5)	FC (9.3)	T (1,121)	FC (1.94)	FC (6.13)	T (1,120.59)	EM61: 39 TEM-8g: 66 GPR: 100
UXO 17B (Site 1)	FC (13.3)	FC (13.3)	T (1,371)	FC (9.15)	FC (8.16)	T (1,370.47)	EM61: 69 TEM-8g: 61 GPR: 0. 100

T: Transect
FC: Full Coverage
N/A: Not Available

Notes:
[1] Please see following notes regarding data collected per each geophysical survey:

UXO 3:
- EM61-HP: Numerous obstacles such as, trees, streams, ditches, cultural features, and marshes (i.e. swamp). Data gaps were not filled due to rough terrain and per team discussion. Acreage includes using the EM61-HP to survey two potential demolition sites at UXO 3.
- TEM-8g: One open and accessible area at UXO 03 for TEM-8g survey. Transect collection was not possible, one mini grid was collected at this location.

UXO 4:
- EM61-HP: Three mini grids were surveyed (one mini grid was on the restricted side of the base and two mini grids were on the non-restricted side).
- TEM-8g: One transect collected with the addition of one mini-grid.

UXO 11B:
- EM61-HP: Obstructions were present at the site and so the survey was conducted around these obstacles.

UXO 17:
- EM61-HP: Data gaps caused by numerous trees and one bee hives.

UXO 17B:
- EM61-HP: Data gaps are due to steep terrain, significant brush encountered, bee hives, soil mounds, and a large pit in the north section of 17B.
- TEM-8g: TEM-8g data gaps due to steep terrain, significant brush, bee hives, soil mounds, ditches/swales, stumps, and a large pit in the north section of 17B.
- GPR: In addition to transects, one GPR mini grid (20 foot by 20 foot with 1 foot spacing) was collected at UXO 17B due to surface evidence of an underground cavity that may have been covered up by concrete slabs.

[2] For sites with GPR, the EM61-HP and/or TEM-8g results for each site were discussed prior to the GPR surveys and the Navy/NSWC IHD/Tetra Tech consulted and determined whether GPR was warranted at a site based on the SI results. Based on team discussions, FCR-06 (see Section 3.5) was issued and the revised agreed-upon scope for the GPR work was as follows: UXO 4 – 12 profiles, UXO 7 – 7 profiles, UXO 17 – 9 profiles, and UXO 17B – 10 profiles. The values listed in the above table of planned GPR surveys reflect the values presented in FCR-06 and not the QAPP.
[3] The total acreage slightly exceeds the planned acreage due to site conditions.
[4] The total acreage exceeds the planned acreage due to site conditions and obstructions.

4.3.3 MC Sampling

As outlined in Section 3.5, the MC sampling specifics were refined based on the SI UXO findings and discussed and determined in consult with the Navy RPM and LANT munitions technical expert. A total of 15 composite samples were collected at UXO 3, UXO 7, and UXO 7B, which included 9 soil samples and 2 field duplicate samples, as well as 4 post-detonation samples. Based on the Navy consult, which was determined by the Navy and Tetra Tech, MC sampling was conducted at 100-percent completeness.

5.0 Site History and Summary of Site Inspection Results

This section summarizes the site-specific history, field investigation, and results of the SI field work at each MRP site included in this SI, including the vegetation management, UXO detector-aided surface survey, geophysical surveys (EM61-HP, TEM-8g and/or GPR), and MC soil sampling results (where conducted). Tetra Tech and the Navy coordinated closely to make decisions as the field work unfolded to complete the SI field work to meet the SI objectives. The MRP sites investigated during this SI have been used for munitions disposal (authorized and unauthorized), open burning of munitions, and UXO (as indicated by the MPPEH that has been found).

Field work tasks were documented daily in daily reports, which were submitted to the Navy. The photographs of MEC/MDAS and other significant features (I.e., NMRD, shipping containers, debris, disposal areas, etc.) and vegetation management are included in Appendix B-1.

5.1 UXO 2 (Site CC)

This section provides the site history and results of the SI field work for the UXO 2 MRS.

5.1.1 Site History

The CSM for this surface debris site indicates that there is the potential for surface MPPEH/MEC to be present. UXO 2 was a disposal area located within Keyport Annex in the southeastern portion of NBK Bangor (Figure 5-1). The overall site comprises approximately 19 acres along a railroad line which operated from 1946 to present day (Figure 5-1).

In February 2015, EOD responded to the site because MPPEH was observed on the ground surface along the railroad tracks during routine vegetation management activities. Four discrete areas were observed with metallic debris; and three of these areas were observed to contain various MPPEH including ammunition cans, ordnance storage containers, 40-millimeter (mm) cartridge casings, .50-caliber cartridge casings, and a potential smoke pot. The EOD response team reportedly did not specifically identify explosives or explosive residue within the inspected MPPEH; however, the MPPEH were not designated as MDAS, and the area was not completely investigated and delineated. Based on the presence of MPPEH and the potential presence of MC contamination, the area was classified by the Navy as an MMRP AOC requiring further investigation (Battelle, 2017).

The 2017 PA (Battelle) recommended that a removal action for the surface removal of MPPEH/MEC be performed followed by confirmatory MC soil sampling. A previously planned detector-aided survey was not completed because of the presence of very dense vegetation and other obstacles.

During the SI planning phase site visit conducted in September 2019, an ammo box was identified within the area of investigation on the ground surface.

The primary area of concern investigated during the SI covered an area of approximately 3.5 linear acres that was approximately 80 feet wide and approximately 1900 feet in length along the railroad tracks. The width, from the center of the active rail line was approximately 30 feet on one side, and 50 feet to the swale on the other side. Vegetation observed at the site during the September 2019 site visit included Young Alder, Cedar, and Douglas-fir which create a dense tree canopy along both sides of the railroad line. Uneven terrain was obscured by dense understory, and deadfall with the ground cover consists primarily of ferns, mullen, and scattered Scots Broom. A ditch was present along the east side that may be wetland for at least a portion of the length that was visited. The western side of the rail bed was bordered by a steep slope extending down from the rail line.

5.1.2 Field Investigation

UXO 2 (Site CC) is located in Keyport Annex. In addition, UXO 2 was identified as a site with ecological field constraints. For field work conducted between April 1 through September 23, field work started 2 hours after sunrise and ceased 2 hours before sunset because of the potential for Marbled Murrelet (birds) to be present at or near the site. The SI field investigation activities included vegetation management and UXO sweeps. In accordance with the MEC QAPP (Tetra Tech, 2021a), geophysical surveys were not conducted considering that only surface disposal, versus subsurface disposal, is associated with the site. Based on the results of the field work, it was determined that a step-out investigation would be conducted at UXO 2. Field work was conducted on the following dates:

- Vegetation management: June 19 to July 16, 2022.
- UXO Sweeps: July 30 to August 7, 2022.
- Third-Party QA: August 7, 2022.
- Step-out Vegetation management: September 24-25, 2022.
- Step-out UXO sweeps: October 8-9, 2022.
- Step-out Third-Party QA: October 8-9, 2022.
- Site Restoration: October 8-9, 2022.

During the step-out investigation vegetation management, there was a hydraulic oil spill at UXO 2 (photos included in Appendix B-1). All impacted soil was removed from the site and then accepted the by BOSC for final disposition (see Section 3.4). The impacted area was restored using clean fill.

5.1.3 MEC/MDAS Results

The UXO detector-aided surface surveys identified a total of 660 items identified as MDAS. The findings included 582 Mark (MK) 2/3 40-mm cartridge cases and 78 unknown model 20-mm cartridge cases. All 660 items were located in the southern portion of UXO 2 with 658 items located together near a dump site that also contained visible ammo cans and other shipping containers. These were left on site and demilitarized in accordance with Navy guidance (OP 5) (NAVSEA, 2020) by obliterating any markings and stenciling "empty" on them after verifying that they were empty. Other munitions-related items may be present on the ground surface beneath the shipping containers that were not moved. The remaining two MDAS items were located approximately 200 feet south of the dump site near the southern central site boundary of UXO 2. All MDAS was secured in drums at the laydown yard.

Based on the results of the SI field investigation, a step-out investigation was warranted per decision rules included in the MEC QAPP (Tetra Tech, 2021a). The step-out was conducted to address the dump site area east of the shipping containers and numerous MDAS items encountered within the site boundary. The step-out extended 50 feet to the east and west of the SI investigation area on the southern end of UXO 2. If MEC/MDAS was encountered in the step-out, a contingency step-out was planned in the east, west, north, or in combination and was to extend an additional 50 feet, however; the UXO detector-aided surface surveys did not identify any additional MDAS and/or MEC in the step-out. The UXO team did encounter four empty shipping containers across three locations in the southern portion of the step-out that needed to be demilitarized. After a visual inspection, all visible marks were obliterated and "empty" was stenciled on them. The containers were left on site as NMRD. Based on the step-out findings, it was determined that the contingency step-out was not warranted and was not completed.

The list of MDAS findings at UXO 2 is included in Table 5-1 and presented on Figure 5-1. Photos of the UXO 2 MDAS and shipping containers are included in Appendix B-1.

5.1.4 Habitat/Endangered Species Survey Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 2 includes young alder, cedar, and Douglas-fir

along both sides of the railroad tracks, which is the portion of the site identified for SI investigation. Overall, within the site UXO 2 site boundary, ground cover consists primarily of ferns, common mullein, and scattered Scotch broom. The UXO 2 SI investigation area is bounded by a ditch along the east side, which was reviewed during the biological survey and determined to be upland. (The survey determined that no forestry stand number changes from the 2018 INRMP were needed.) No wetlands were present within UXO 2 (see Appendix A-3).

5.2 UXO 3 (Site D)

This section provides the site history and results of the SI field work for the UXO 3 MRS.

5.2.1 Site History

The CSM for this Open Burning/Open Detonation (OB/OD) site indicates that there is the potential for surface and subsurface MPPEH/MEC. UXO 3 is located within the Lower Base in the central portion of NBK Bangor (Figure 5-2). The overall site comprises approximately 37 acres (Figure 5-2). Between 1944 and 1957, explosive D (ammonium picrate) sludge from tanks used in the steam cleaning of projectiles from other areas was transferred to Site D for disposal. It is not known if this material was burned or buried (B&V, 1990). Site D is a former ordnance disposal area and served as the principal area for ordnance burning and detonating (i.e., OB/OD) at NBK Bangor from 1946 until 1963 when such activities were transferred to another site (i.e., Site A [Hart Crowser, 1989]). However, indications are that sporadic use of the area for these activities likely occurred as late as 1965. On-site locations of waste disposal included a small arms incinerator, a trench, and smaller burn areas or mounds. Based on historical aerial photos, the dimensions of the trench are estimated to be 15 to 20 feet wide and 200 feet long. The trench was located during the RI using geophysical techniques (NAVFAC Northwest, 1994). There were six mounds reported to be at the site ranging in size from approximately 15 feet square to approximately 40 feet wide and 80 feet long (B&V, 1990).

As per the 1989 Situation Report, an interviewee recalled the explosive ordnance team detonating “thousands” of photoflash bombs in trenches as well as ammonium nitrate blocks (Hart Crowser, 1989). Based on a historical features map (see Appendix A-2), it appears that Site D extends underneath and to the east of the road near the site, which appears to be constructed after 1957. Other items burned or detonated at Site D may have included smokeless powder, black powder, rocket propellant, white phosphorous shells, compound B (2,4,6-trinitrotoluene [TNT] and hexahydro-1,3,5-trinitro-1,3,5-triazine [RDX]), Amatol (ammonia nitrate and trinitrotoluene), and ordnance wastes containing TNT and RDX. Propulsion missile grains from approximately 600 obsolete

rocket motors were destroyed in a series of trenches at the site. The missile grains were ignited with smokeless powder, and upon completion of the burning the trenches were soaked with water. In conjunction with these activities, a small arms incinerator was in operation prior to 1964 (B&V, 1990). The quantities of wastes deposited at Site D could not be determined from available data (NAVFAC Northwest, 1994).

Much of Site D is seasonally wet, and the lower portion of the site is beneath standing water during the wet season (Navy, 2005). Groundwater monitoring wells do exist at the site, and the direction of groundwater flow at Site D is to the west-northwest. The surficial aquifer at Site D ranges from 15 to 30 feet bgs (B&V, 1990).

In 1991, a geophysical investigation was conducted at Site D using a magnetometer, GPR and electrical resistivity to determine the location and depth of the burn trench and the presence of any other undocumented trenches. Using a grid system, the suspected burn trench was identified and magnetic anomalies within the trench appeared to be associated with minor amounts of metallic debris. Data from the magnetometer did not show anomalies in the northern 40-percent of the site. The smaller burn mounds were not positively identified during the geophysical survey; however, scattered metallic debris were detected across portions of the site (see Appendix A-2). No buried or abandoned drums were identified. Visual identification of subsurface soils from soil borings and monitoring wells did not verify the existence of scattered metal debris; however, during surface soil sampling for ordnance field screening and confirmation, scattered metal debris was observed within the upper 6 inches of soil. The burn trench was confirmed at an estimated depth of 4 feet (URS Consultants, 1993).

A RI/Feasibility Study (FS) was conducted for OU 6, Site D, in December 1993 and ordnance compounds were detected at concentrations exceeding the regulatory requirements. The RI/FS identified three areas requiring remediation including the large burn trench that was approximately 60 feet wide by 125 feet long by 3 feet deep. The other two areas were 25 feet by 25 feet by 1 foot deep, designated as grids G-1 and M-12 (see Appendix A-2) (SES-TECH, 2008).

A Record of Decision (ROD) for OU 6, Site D, was signed in September 1994 and the following remedy was selected (NAVFAC NW, 1994):

- Soils: Excavate and stockpile soils containing the highest concentrations of ordnance compounds and then remediate the excavated soils by composting technology. Treated soils will be backfilled in the excavations, covering them with clean soil, and revegetating affected areas with native vegetation.
- Surface Water: Conduct confirmation sampling of on-site and downgradient surface water.

- Groundwater: Conduct short-term monitoring of the shallow aquifer to confirm previous exceedances of health-based criteria.
- Conduct review of soil remediation data and short-term monitoring data to evaluate the effectiveness of the remedy and confirm that human health and the environment are protected.

As part of the soil remedy, soil excavation occurred in 1996. Prior to excavation, composite samples were collected from the perimeter and bottom of the two grids. Results were below the cleanup levels and after Washington State Department of Ecology discussion, no further action was required for the two grids. In June 1996, the burn trench was excavated and approximately 880 cubic yards of material were removed for composting. As excavation occurred, TNT field test kits were used to delineate the extent of contamination and if exceedances of screening criteria were detected, the excavation boundary was expanded and then resampled. Once all contamination material was removed per the TNT testing, composite samples were collected. After results were available, one confirmation sample from the south wall exceeded twice the cleanup level for TNT and an additional 10 to 12 inches of soil were excavated. The results from the second round of confirmation samples from the south wall location still exceeded the cleanup level and after discussion with Washington State Department of Ecology, it was agreed that the site had met the cleanup criteria and would not require additional excavation. Soil was treated by composting technology and sampling. Once sampling results were below the cleanup level for each of the contaminant of concern, treated material was returned to Site D and used as fill material (SES-TECH, 2008).

Surface water samples were collected from nine locations at Site D in December 1997 and analyzed for target analyte list metals and ordnance compounds. Two rounds of groundwater samples were collected for volatile organic compound (VOC) and SVOC analyses; one round prior to soil excavation and the second after soil treatment and backfilling were completed. Results indicated that ordnance compounds were not detected nor were elevated metals concentrations detected in the nine surface water samples. The second round of groundwater sampling data showed no detection above the groundwater cleanup levels. Operational maintenance and monitoring were not required by the OU 6 ROD and while there are no formal institutional controls (ICs) for OU 6, the site has restrictions in place under wetland regulations, which were determined to provide sufficient protection in the ROD (NAVFAC NW, 1994). Wetlands laws are used to restrict the current wetland area to remain a wetland. As per the ICMP (Navy, 2018), although there are no formal ICs, excavation permits and construction review are required for work within the Site D boundary. Additionally, all disturbed or excavated soils at or from the site need to be properly categorized and disposed, and

workers are required to be protected during any such disturbance or excavations. The IC boundary (i.e., OU 6 boundary) for Site D is shown on Figure 5-2 and partially covers the UXO 3 boundary.

During the PA, a masonry block structure was observed that appears likely to have been the SAA incinerator; adjacent to this structure was an accumulation of .30-caliber and 20-mm munitions residues and an area of staining and little vegetation (Battelle, 2017).

During the September 2019 SI planning phase site visit, 20-mm caps were observed on the ground surface within the area of investigation.

The primary area of concern investigated during the SI included a heavily wooded area of approximately 20 acres that contained the burn trench, burn mounds, and small arms incinerator. Note that the OU 6 Site D boundary, shown on Figure 5-2, extends further to the north and west of the UXO 3 site boundary, but does as far as the UXO 3 southern site boundary. Vegetation observed at the site during the September 2019 site visit included alder hillside that was mostly more than 50 years old, and a large wetland complex downslope of the small arms incinerator. Snags were present with dense grasses including reed canary grass. There was a light to moderate tree canopy, and a gently sloping area east of the site.

5.2.2 Field Investigation

UXO 3 (Site D) is located in Lower Base, which did not have any field work restrictions (i.e., Marbled Murrelet constraints, work schedule constraints, and/or Navy escort requirements) during the SI. The SI field investigation activities included vegetation management and UXO sweeps followed by geophysical surveys (EM61-HP and TEM-8g). Because of the large size of the site, field tasks were conducted concurrently as the teams could be safely separated enough to complete multiple tasks. Field work was conducted on the following dates:

- Vegetation management: April 5 to July 7, 2022.
- UXO Sweeps: May 1 to July 27, 2022.
- Third-Party QA: August 10, 2022.
- Geophysics:
  - EM61-HP: July 20 to September 23, 2022 (transects).
  - TEM-8g: August 23, 2022 (full coverage).

  - Follow-on/Data Gap Recollection: October 17 and October 28,2022 (TEM-8g).
  - Third-Party QA: November 8, 2022 (EM61-HP/TEM-8g).

- Site Restoration: September 26-28, 2022 (UXO) and November 16, 2022 (Geophysics).
- MC Sampling: November 1-3, 2022.

Dense vegetation and wet ground conditions were encountered at this site. As field work progressed into the summer months, the area that was initially very wet dried out and because of the more favorable conditions, manual vegetation management was able to be conducted more readily. Because of the dense vegetation, the mechanical vegetation management equipment could not access all portions of the site and so vegetation had to be manually removed.

5.2.3 MEC/MDAS Results

The UXO detector-aided surface surveys identified a total of 416 items (14 MEC and 402 MDAS). The MEC findings included 13 AN-M46 Photoflash Bombs/AN-M46 Photoflash Bomb Booster Cups and 1 Mk 19 Base Detonating Fuze. On May 15, 2022, an unfuzed AN-M46 Photoflash bomb (ID #0301) was identified and based on the item type, the NBK Explosive Safety Officer (ESO) was contacted to discuss the MEC Net Explosive Weight (NEW). The following day, upon recommendation of the NBK ESO, EOD was consulted for determination assistance and the decision was made for EOD to destroy the item in place, which was conducted the same day (Mary 16, 2022). Based on this find, the ESS was amended to include the new contingency distances for the AN-M46 100 lb Photoflash bomb (see Section 3.1.5). On June 1, 2022, a partial, unfuzed AN-M46 Photoflash Bomb with flash powder exposed (ID #0306) was identified and determined not safe to move as the exposed photoflash powder fill was highly sensitive to heat, shock, and friction. This item was found with two other MEC: AN-M46 Photoflash Bomb Booster (ID #0305 and 0307). EOD completed final disposition by DIP for all three items on June 2, 2022. On August 17, 2022, one AN-M46 Photoflash Bomb (ID #0314) was identified and determined not safe to move. The MEC was near a washout area, and since the vegetation landscape had changed due to erosion regrowth management and inclement weather, the item was barely visible from the ground surface. EOD was contacted and on the same day detonated the item in place (i.e., DIP). All other MEC encountered were determined safe to move and were transported to the magazine for temporary storage until the end of the project when detonations were conducted (see Section 3.2.6).

The MDAS findings included one pile of 8 pounds of suspect MDAS, 1 unknown projectile Munitions Debris (MD), and 400 100-pound Photoflash Bomb MD. All MDAS was secured in drums at the laydown yard.

The MEC/MDAS were found scattered all over UXO 3 along with some areas of saturated findings, including near the suspected burn trench and in the northwest portion of the site. The list of MEC/MDAS findings at UXO 3 is included in Table 5-1 and presented on Figure 5-2. Photos of the UXO 3 MEC and MDAS are included in Appendix B-1.

5.2.4 Geophysical Survey Results

Geophysical surveys were conducted at UXO 3 and included EM61-HP transects and TEM-8g full coverage surveys. The TEM-8g experienced equipment issues so the EM61-HP was used to collect the remaining surface area. The surveys acreages are summarized in Table 5-2. Details of the geophysical surveys are included in Appendix F.

In summary, UXO 3 EM61-HP and TEM-8g data exhibit the presence of widespread metallic debris across most of the site, consistent with historical disposal activities.

5.2.5 MC Results

As outlined in the MC QAPP, MC sampling was definitely planned to be conducted at UXO 3 biased (anticipated maximum concentration locations) toward locations where munitions items of potential release were identified to determine if MC contamination was present. At UXO 3, a total of seven composite soil samples were collected from 0 to 6 inches bgs based on the results of the UXO detector-aided surface survey results. Samples were collected at locations where MEC and/or MDAS were identified, on the west side of the incinerator area, and at the reported mound locations as outlined in Table 3-1. The soil analytical results are summarized in Table 5-3 in comparison to the PSLs (described in Section 3.3.6) and exceedances of PSLs are shown on Figure 5-3. The QC soil sample results are included on Table 5-4.

Of the seven composite samples, three samples and one corresponding duplicate had exceedances of the human health PSLs or both the human health and ecological PSLs. Sample X3-SS-C05-0006 and the duplicate sample, which was collected near the incinerator, exceeded human health PSLs for TNT, 2,4-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 3,5-dinitroaniline, and 4-amino-2,6-dinitrotoluene. Sample X3-SS-C07-0006, collected in the high density MEC/MDAS area at UXO 3, exceeded the human health PSL for TNT. Sample X3-SS-C08-0006, collected at the location of a Mk19 Base Detonating Fuze (ID #0308), exceeded the human health PSLs for TNT, 2,4-

dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 3,5-dinitroaniline, and N-nitrosodiphenylamine and the ecological PSLs for TNT, 2,4-dinitrotoluene, and N-nitrosodiphenylamine. The remaining samples had concentrations either below the PSLs or were nondetect.

5.2.6 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 3 was described as surrounded by dense Douglas-fir stands outside of the UXO 3 boundary, whereas most of the investigation area has moderate canopy cover with scattered patches of open canopy and dense understory. The canopy is dominated by 10- to 20-inch alder with sparse 10-inch average cedar and Douglas-fir. The understory has moderate cover with sword fern, large holy bushes up to 10 feet tall, salmonberry, nettle, horsetail and tall fescue and reed canary grass. (The biological survey determined that the forestry stand in this area is contiguous, with only slight changes throughout, and that changes from the 2018 INRMP were not drastic enough in this area to constitute a different habitat.) Concerning wetlands, fresh water forested/shrub were confirmed within the greater portion of UXO 3, and the survey added one new ephemeral stream and one new wetland in the northwest corner of UXO 3 within the overall UXO 3 boundary but outside of the SI investigation area. Also, during the survey, one small wetland was mapped just outside of the eastern edge of the UXO 3 site boundary, across the road, and mapping for two existing wetlands areas was also expanded east of the road, as compared to the existing 2018 INRMP. In summary, for UXO 3, 16.73 acres of wetlands and 0.09 acres of waters were determined (see Appendix A-3).

5.3 UXO 4 (Site 9)

This section provides the site history and results of the SI field work for the UXO 4 MRS.

5.3.1 Site History

The CSM for this surface/subsurface disposal area indicates the potential for surface and subsurface MPPEH/MEC. UXO 4 straddles both the Upper Base and Lower Base in the south-central portion of NBK Bangor (Figure 5-4). The overall site comprises approximately 6 acres which operated between 1951 and 1977 (Figure 5-4). Site 9 was used for the disposal of inert ordnance-related items, scrap metal, and railroad ties (Battelle, 2017).

The 2017 PA (Battelle) recommended a detailed surface inspection be conducted to identify the extent of MPPEH at the surface based on a single 40-mm projectile observed.

During the SI planning phase, an area of interest was identified on historical aerial photographs as shown on Figure 5-4 and included in Appendix A-1.

The primary area of concern investigated during the SI covered an area of approximately 3.3. acres. Vegetation observed in the southern portion of the site during the September 2019 site visit included moderate understory, ferns, and rhododendron. A second growth of Douglas-fir with Cedar was located in the understory. Similar dense vegetation was located north of the road. The potential for wetlands exists in the lower elevations of the southeast corner of the site. The uneven terrain was obscured by dense understory and deadfall along with a dense tree canopy.

5.3.2 Field Investigation

UXO 4 (Site 9) is split with a portion of the site in Upper Base and other portions in Lower Base. Because of Upper Base restrictions, field work was conducted on the weekends or after 3:00 pm during the weekdays after Naval personnel completed their workday. Partway through the field work at this site, Tetra Tech was given permission to enter into the Lower Base portions of UXO 4 during the day. The SI field investigation activities included vegetation management and UXO sweeps followed by geophysical surveys (EM61-HP, TEM-8g, and GPR). Field work was conducted on the following dates:

- Vegetation management: April 24 to June 5, 2022 (Sunday work only).
- UXO Sweeps: May 22 to June 13, 2022 (Sunday work only).
- Third-Party QA: June 13, 2022.
- Geophysics:
  - EM61-HP: July 24 to September 13, 2022 (transects), August 24 to September 27, 2022 (full coverage).
  - TEM-8g: August 6, 2022 (transects), August 24, 2022 (full coverage).
  - GPR: October 24-26, 2022.
  - Follow-on/Data Gap Recollection: August 24-30, 2022 and September 27, 2022 (EM61-HP full coverage); and August 29 to September 13, 2022 (EM transects).
  - Third-Party QA: October 21, 2022 (EM61-HP/TEM-8g); and February 21, 2023 (GPR).

- Site Restoration: September 28, 2022 and October 4, 2022 (UXO); and November 7, 2022 (Geophysics).

5.3.3 MEC/MDAS Results

The UXO detector-aided surface survey identified a total of 101 items identified as MDAS. The findings included one M25 Dummy 40-mm Cartridge, six unknown Fuze/Fuze adaptors MD, 40 unknown various MD, and 54 AN-M109A1/AN-M103A1 Fin Assemblies. One MDAS item, a M25 Dummy 40-mm Cartridge (ID #UXO04-05), was identified as MDAS needing to be demilitarized and so the item was stored separately at the laydown yard and then later detonated (see Section 3.2.6). The remaining MDAS was secured in drums at the laydown yard.

All MDAS items were located in Upper Base. MDAS was scattered within the southern portion of the site with a large number (saturated area) of findings located in the center of UXO 4 and along the railroad tracks. In addition to the MDAS, various trash piles and shipping containers were identified. Most of the MDAS was located in and around the trash piles and shipping containers with a few stray items present. All shipping containers were demilitarized by marking each as “empty” with spray paint, and they all remained on site as NMRD. The list of MDAS findings at UXO 4 is included in Table 5-1 and presented on Figure 5-4. Photos of the UXO 4 MDAS and disposal areas are included in Appendix B-1.

5.3.4 Geophysical Survey Results

Geophysical surveys were conducted at UXO 4 and included EM61-HP transects and full coverage surveys, TEM-8g transects and full coverage surveys; and GPR transects were conducted. The surveys acreages are summarized in Table 5-2. Details of the geophysical surveys are included in Appendix F.

In summary, UXO 4 EM61-HP and TEM-8g data depict extensive SRA footprints across much of the site, but it is not known whether the high-amplitude DGM responses are associated with non-munitions metallic debris disposed from rail cars or with metallic, mineral-rich ballast rock associated with the rail spur extending along the western edge of the site. Based on historical images of the site that depict a clearing, the area has undergone significant disturbance associated with the construction of the road.

The UXO 4 GPR data indicates an absence of interpretive features (other than just the bottom of the noise floor). This observation is likely the result of the aforementioned railroad ballast in the shallow subsurface and increase in the clay mineral content of subsurface soils. These conditions typically limit overall efficacy of GPR surveying at

the site, where the GPR signal attenuation was too high in the shallow subsurface (e.g., upper 1 foot) to provide meaningful interpretation at depth.

5.3.5 Habitat/Endangered Species Survey Report

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 4 includes a canopy consisting of 5- to15-inch Douglas-fir, scattered alder, western white pine, and some cedar saplings in understory with variations of moderate to dense understory cover consisting of various mixes of sword fern, Oregon grape, creeping blackberry, bracken fern, rhododendron, geranium, huckleberry and salal. (The survey determined that no forestry stand number changes from the 2018 INRMP were needed.) No wetlands were present in UXO 4 (see Appendix A-3).

5.4 UXO 6 (Site 22)

This section provides the site history and results of the SI field work for the UXO 6 MRS.

5.4.1 Site History

The CSM for this surface disposal area indicates that there is the potential for surface MPPEH/MEC. UXO 6 is located within the Lower Base in the northern portion of NBK Bangor (Figure 5-5). The overall site comprises approximately 1 acre and was used from 1965 to 1973 (Figure 5-5) as an area for the disposal of old paint cans and drums, ammunition and boxes, and other metal debris (Battelle, 2017).

Based on a RI/FS conducted for OU 1 Site A, a former dumping site (i.e., Debris Area 2/Site 22) was identified located at the top of the hillside (Hart Crowser, 1991) (associated with UXO 6). The Site 22 area was used along with the main burn area (OU 1 Site A) for munitions disposal. Soil samples were collected in October 1988 and MC were identified in the upper region of this area. In the lower region, closer to the hillside, MC concentrations in soil declined to background values; therefore, it appeared as though soil contamination was limited in areal extent to the upper half of the area. The primary contaminants of concern driving estimated human health risks were identified as lead and 2,4,6-TNT in the soil (Hart Crowser, 1991).

As per the ICMP (Navy, 2018), there are both ICs and engineering controls for the Debris Area 2 under OU 1 Site A, which overlap the northeastern portion of the UXO 6 investigation boundary. The contaminants of potential concern for OU 1 Site A Debris Area 2 include TNT (an explosive) and lead. Land use is restricted to outdoor recreational use which includes hiking, bird watching, hunting, nature watching, or any other short-term, non-intrusive activity on the land. Excavation permits, consistent with

NBK Bangor instructions, are required to be reviewed and approved by the Navy, as are construction project reviews. Additionally, other than removal of vegetation only, all disturbed or excavated soils at or from the site need to be properly categorized and disposed, and workers are required to be protected during any such disturbance or excavations. In 1995, an extensive stand of blackberries was planted along the upper portion of the steep ravine containing Debris Area 2 to restrict access to the ravine. A warning sign was also installed as an additional means of preventing access to Debris Area 2 from the top of the ravine (Navy, 2018). As per the ICMP (Navy, 2018), the engineering control includes access control and maintenance of signage and maintenance of thorny vegetation (blackberries).

During the PA, an area of metallic debris and MPPEH (including ammunition boxes, ordnance storage containers, and large cartridge casings [generally 40-mm]), was observed in a locally steep hillside area between Site A and UXO 9 (Battelle, 2017). The PA recommended that a removal action for MPPEH be performed in the steep hillside area followed by confirmatory geophysical surveying and MC soil sampling.

The primary area of concern investigated during the SI included the entire 1-acre site, which is located in a heavily wooded area. Vegetation observed at the site during the site visit of September 2019 included the steep hillside with mature Western Hemlock and Douglas-fir creating a dense tree canopy, with light understory. During the September 2019 SI planning phase site visit, paint cans and metal strapping were observed in the northeast portion of the site from afar due to steep slope concerns. Historical documents were reviewed in preparation of the SI and UXO 6 was identified on historical aerial photographs as shown in Appendix A-1.

5.4.2 Field Investigation

UXO 6 (Site 22) is located on the northern portion of Lower Base. UXO 6 was identified as a site with ecological field constraints. For field work conducted between April 1 through September 23, field work was not started until 2 hours after sunrise and ceased 2 hours before sunset because of the potential for Marbled Murrelet (birds) to be present at or near the site. Field work was conducted on the following dates:

- Vegetation management: October 4-10, 2022 (anchor point tie down area and top of hill only).
- UXO Sweeps: October 10-11, 2022 (anchor point tie down area and top of hill only) and October 24 to November 4, 2022 (sloped hillside).

- Third-Party QA: October 12, 2022 (anchor point tie down area and top of hill only); due to site conditions (sloped hillside) third-party QA was performed alongside UXO sweeps.
- Step-out Vegetation Management: November 4, 2022.
- Step-out UXO Sweeps: November 7-9, 2022.
- Step-out Third-Party QA: Due to site conditions (sloped hillside) third-party QA was performed alongside UXO sweeps.
- Site Restoration: November 7, 2022.

Field work at UXO 6 required the use of a subcontractor (Gravitec) to train Tetra Tech UXO and NSWC IHD personnel to scale down the steep slope using rope access techniques for fall protection. Prior to the start of field work at UXO 6, a kickoff meeting was held on October 3, 2022 to discuss the upcoming work and conduct a site visit so that the subcontractor could be refamiliarized with the site. One week of in-class training was held October 17-21, 2022 for rope access certification, which was followed by 1 week of field work under subcontractor oversight (at which point further field work did not warrant subcontractor oversight). A corridor was cleared at the top portion of the site to serve as the anchor point tie down area, where the field team could tie off rope at trees. This corridor ran along the entire portion of the slope and vegetation management was conducted for easy tie offs to trees and for safety purposes. UXO sweeps were also conducted within the corridor prior to the field team using rope access to scale down the hill. Based on site conditions, QA was either conducted as "over the shoulder QA" as well as rope access to rappel down hill to QA certain areas. The UXO Technicians visually identified boundaries of the items found downslope and determined that MPPEH is present. In accordance with the MEC QAPP (Tetra Tech, 2021a), geophysical surveys were not conducted considering that only surface disposal, versus subsurface disposal, is associated with the site.

5.4.3 MEC/MDAS Results

The UXO detector-aided surface surveys identified a total of 16 items with six MEC and 10 MDAS items. MEC findings included five unfired Mk 22 percussion primers fitted into empty Mk 2 cartridge cases and one unfired Mk 2 Mod 1 primer from an unknown item. All items were determined safe to move and transported to the magazine the next day for temporary storage until the end of the project when detonations were conducted (see Section 3.2.6). The 10 MDAS items were determined to be various unknown pieces of MD which were secured in drums at the laydown yard. All 16 items were

found in the rope access tie down area located at the top of the slope in the northern boundary of UXO 6.

Detector-aided surface surveys were conducted down the slope at UXO 6 via rope access. When conducting UXO sweeps along the northern portion of the UXO 6 slope, a cascading swath of metal debris, drums, and ammo cans were observed scattered down the slope. Among the various debris were scattered MDAS and MEC. In one grouping, at least 11 MEC (unfired percussion primers for various caliber artillery cartridge cases) were observed. Two similar MEC were observed farther up the hillside. Many MDAS items were scattered down the slope as well; these items were empty/fired cartridge cases and various signaling devices. No staining was present at the site among all the observed debris, drums, ammo cans, and MEC/MPPEH. MEC/MPPEH appeared to be intact. All observed items were on an inaccessible, near vertical slope that required fall protection for access by rope and are irretrievable at present. All items were inspected by UXO Tech III Team Leader and UXOQCS/UXOSO. A 'safe to move' determination was not made by concurrence of SUXOS and UXOQCS/UXOSO and the items were left in situ. Based on a decision by the Navy, with Tetra Tech and NSWC IHD consensus, all items remained in place down the slope, considering the items are inaccessible and there are safety concerns regarding bringing them up the hillside. None of the items found down the slope were documented in detail nor are the items included in the summary of MEC and MDAS findings table (Table 5-1).

Based on the results of the SI field investigation, it was determined that a step-out investigation was warranted per the decision rules included in the MEC QAPP (Tetra Tech, 2021a). The step-out investigation was conducted to address the swath of metal debris, drums, and ammo cans identified along the slope at the northern site boundary of UXO 6. The step-out extended approximately 150 feet to the north and covered a portion of area that was flat at the top of the slope as well as a portion of the sloped hillside. The UXO sweeps were conducted along 20-foot transects moving south to north. The UXO detector-aided surface surveys did not identify any additional MDAS and/or MEC during the step-out investigation. Various, unknown/unmarked drums were identified within the southern portion of the step-out. All observed drums were open and empty. There were no remnants in the drums, no staining, and no noticeable odors associated with, or near the drums.

The list of MEC/MDAS findings at UXO 6 is included in Table 5-1 and presented on Figure 5-5. Photos of the UXO 6 MEC, MDAS, and range-related debris located on the slope are included in Appendix B-1.

5.4.4 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 6 includes steeper hillside with mature western hemlock and Douglas-fir. Understory consists of scattered ferns and rhododendron. (The survey suggested forestry stand number changes from the existing stands that had been identified from the INRMP, considering the stands appear to be a continuation of and better represented by the larger stand surrounding UXO 6.) Concerning wetlands, mapping of wetlands areas barely extends inside the western boundary of UXO 06. The wetland, of less than 0.01 acre, is located near the toe of a very steep forested slope. The wetland was not delineated because SI field work was not conducted in the area (see Appendix A-3).

5.5 UXO 7 (Site 23)

This section provides the site history and results of the SI field work for the UXO 7 MRS.

5.5.1 Site History

The CSM for this surface/subsurface disposal area, Debris Area 1, indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 7 is located within Lower Base in the northern portion of NBK Bangor (Figure 5-6). The overall site comprises approximately 1 acre and was operational between 1965 and 1973 (Figure 5-6). Site 23 was used for burying inert ordnance-related items, including ammunition cans (Battelle, 2017).

Based on a RI/FS conducted for OU 1 Site A, a former scrap area (i.e., Debris Area 1/Site 23, associated with UXO 7) was identified and used in conjunction with the encompassing burn area, OU 1 Site A (i.e., UXO 7B). Soil samples were collected in October 1988. The soil analyses indicated that little contamination had occurred, and no unacceptable risks were identified for Debris Area 1 (Hart Crowser, 1991). As per the ICMP (Navy, 2018), there are both ICs and engineering controls associated with groundwater and the leach basin liner for OU 1 Site A Burn Area. The leach basin is encompassed by UXO 7B but is beyond the UXO 7 boundary, and groundwater ICs cover all of the UXO 7 boundary. ICs include prohibition of groundwater use (shallow and perched aquifers). Also required are excavation permits, construction project review, and review for changes in land use or activity. The ICs and engineering controls are a result of activities conducted at OU 1 Site A but overlap the UXO 7 Debris Area Site 1 site boundary.

In addition, an old paint can and drums site, which was designated as Site 7, was identified along the ravine near UXO 9 and near UXO 7B (see Figure 5-6). The hillside

area and creek bed at the base of the slope were included within Site 7, which was identified in the PA Report as also being associated with UXO 9. During demolition of an old paint shop in the mid-1970s, the contents of the shop were transported and discarded over the side of an embankment (see Appendix A-2). The containers were either empty or partially filled with liquid and/or hardened materials and ranged from 1-gallon cans to 55-gallon drums. Potential contaminants possibly included various amounts of paint, thinners, and solvents. The cans and drums were removed from the site in 1981 to an unknown destination with no visible evidence of disposal remaining (URS Consultants, 1991).

The 2017 PA (Battelle) recommended that a detailed surface inspection and geophysical survey be conducted to identify potential surface and subsurface MPPEH. While site-related MPPEH was generally not expected at the ground surface, it is possible that MPPEH items may have been identified historically on the ground surface at the northern end of the site; however, research indicates that the larger concern is with buried munitions items that could possibly contain RDX/TNT, pentaerythritol tetranitrate (PETN), Black Powder, Smokeless Powder, and explosive “D”.

The primary area of concern during the SI covered an area of approximately 1 acre that had approximately 5- to 6-foot high earthen mounds located along the eastern boundary of the site. During the site visit of September 2019, a wooded area made up of predominately alder trees was identified in the southern portion of the site. At the southern boundary the possibility for wetlands exists, and the remainder of the site was composed of disturbed grasslands. The site was relatively flat compared to the hummocky terrain.

5.5.2 Field Investigation

UXO 7 (Site 23) is located on the northern portion of Lower Base. UXO 7 was identified as a site with ecological field constraints. For field work conducted between April 1 through September 23, field work started 2 hours after sunrise and ceased 2 hours before sunset because of the potential for Marbled Murrelet (birds) to be present at or near the site.

The SI field investigation activities included vegetation management and UXO sweeps followed by geophysical surveys (EM61-HP, TEM-8g, and GPR) and soil MC sampling. Field work was conducted on the following dates:

- Vegetation management: March 8-11, 2022.
- UXO Sweeps: March 13, 2022.

- Third-Party QA: March 13, 2022.
- Geophysics:
  - EM61-HP: August 6-26, 2022 (transects).
  - TEM-8g: August 18, 2022 (full coverage).
  - GPR: October 27, 2022 (transects).
  - Follow-on/Data Gap Recollection: August 26, 2022 (EM61-HP transects).
  - Third-Party QA: October 21, 2022 (EM61-HP/TEM-8g), and February 21, 2023 (GPR).
- Site Restoration: October 3, 2022 (UXO) and November 10, 2022 (Geophysics).
- MC Sampling: November 2, 2022.

During field work, earthen mounds were identified within the boundary of UXO 7 located along the eastern boundary of the site and extending outside the site boundary to the north. Based on research following the UXO 7 geophysical survey, the current-day earthen mounds are not suspected to be part of the historical munitions-related operations conducted at UXO 7. A separate earthen mound is located east of UXO 7 partially within and partially outside of the SI investigation boundary of UXO 7B (see Section 5.6). Based on historical aerial photos, the earthen mounds were first present subsequent to the end of the UXO 7 operational period. The UXO 7 earthen mound area is of interest only in that it covers the UXO 7 disposal area, which presented a challenge in obtaining subsurface geophysics data.

5.5.3 MEC/MDAS Results

The UXO detector-aided surface surveys identified a total of one MEC and two MDAS items. The MEC was identified as a M69 incomplete incendiary bomb with residue that was located in the north-central portion of UXO 7. The MEC was determined safe to move and transported to the magazine for temporary storage until the end of the project when detonations were conducted (see Section 3.2.6). The two MDAS items, a L-60 40-mm cartridge case and broken remains of a M48 series fuze, found in the southern and northwest portions of the site, respectively, were stored in drums at the laydown yard. The list of MEC/MDAS findings at UXO 7 is included in Table 5-1 and presented on Figure 5-6. Photos of the UXO 7 MEC and NMRD are included in Appendix B-1.

5.5.4 Geophysical Survey Results

Geophysical surveys were conducted at UXO 7 and included EM61-HP transects; TEM-8g full coverage surveys; and GPR transects. The survey acreages are included in Table 5-2. Details of the geophysical surveys are included in Appendix F.

In summary, consistent with historical disposal activities at UXO 7, EM61-HP and TEM-8g data depict widespread subsurface metallic debris across the majority of the site. The DGM results demonstrate the mounds contain buried metal.

The UXO 7 GPR data collected at this site focused on suspected disposal areas identified in the DGM data, with key focus on the mounds in the eastern portion of the site. GPR data indicate suspected buried debris to be within the upper 5 feet of the subsurface. GPR data collected across the mounds in the eastern portion of the site indicate an approximate 2- to 2.5-feet thick soil cover atop buried debris. Buried debris appears to extend to depths of between 7.5 feet and 10 feet bgs beneath the mounds.

5.5.5 MC Results

Based on the results of the UXO detector-aided surface surveys, it was determined that MC sampling was warranted to determine if MC contamination was present (see Section 3.5). At UXO 7, one composite surface soil sample was collected from 0 to 6 inches bgs because of the MEC identified (a M69 incomplete incendiary bomb with residue) (see Table 3-1). The soil analytical results (explosives) are summarized in Table 5-3; no site-specific exceedances of PSLs are noted in Table 5-3 or Figure 5-7 The QC soil sample results are included in Table 5-4.

The results were non-detect for all explosives except for nitrocellulose which was detected, but at a concentration that did not exceed the PSL.

Also, detonations took place in demolition pits at UXO 7 at the end of the field work followed by MC sampling within the pits, as discussed in Section 5.22. Because these detonations occurred at UXO 7, the resultant MC concentration exceedances (discussed in Section 5.22, including the tag map Figure 5-26), which are attributable to the donor explosives used, and are to be addressed moving forward as part of UXO 7.

5.5.6 Habitat/Endangered Species Survey Report

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 7 consists of the wooded area to the south of the site, which is predominately alder, and the remainder consists of disturbed grassland, described as having been cleared and planted with mostly weedy grassland species. (The survey suggested forestry stand number changes from the existing

stands identified in the 2018 INRMP. Specifically, during the survey, the forested portion was split out from the cleared portion that appears to have been planted and mostly contains weedy grassland species.) No wetlands were present in UXO 7 (see Appendix A-3).

5.6 UXO 7B (OU 1 Site A)

This section provides the site history and results of the SI field work for the UXO 7B MRS.

5.6.1 Site History

The CSM for this surface/subsurface disposal area, Site A Debris Area, indicates the potential for surface and subsurface MPPEH/MEC to be present. UXO 7B, which includes OU 1 Site A, is located within the Lower Base in the northern portion of NBK Bangor (Figure 5-8). The overall site comprises approximately 37 acres and operated from 1962 to 1975 (Figure 5-8). Site A is located within OU 1 and was used by the Navy to detonate and incinerate various ordnance materials. Emergency disposal of ordnance items was conducted by EOD (see Section 5.9) (Battelle, 2017). Debris Areas 1 and 2 (UXO 7 and 6) are located within the boundary of UXO 7B, and an EOD training area is located within the site boundary. The EOD training range located in middle of UXO 7B is operational and is excluded from the UXO 7B site boundary and related SI investigation.

Site A is located on an elevated plateau (approximately 160 feet above mean sea level), approximately 1 mile east of Hood Canal and is surrounded by dense timber. The burn area covers approximately 8 to 10 aces and contains several munitions storage bunkers, detonation pits, and raised berms.

Site A originally consisted of a burn area; a stormwater discharge area; burn mounds; facilities for personnel, fire suppression vehicles and equipment; an incinerator for SAA; and a blast pit for ordnance detonation. Buildings at the site were demolished and burned on site in 1977. Grading and redistribution of soil at the Site A burn area continued through 1984 (Navy, 2005). According to the Final RI/FS (Hart Crowser, 1991), beginning in June 1983 several hundred truckloads of soil were inadvertently transported from the vicinity of the Burn Area to a SUBASE building site along Hood Canal. Most of the soil had reportedly been excavated from the diversion trench along the adjacent road. When this information became known in May 1984 by Navy personnel responsible for Site A, the soil in question was excavated from the Hood Canal site and returned via dump truck to the northeast corner of the Burn Area. The dumping of the soil is what accounts for the hummocky nature of that area.

A RI completed at the site included the collection and chemical analysis of surface and subsurface soil, groundwater, surface water, marine sediment, and fish and shellfish tissue to characterize the nature and extent of contamination at the site. The risk assessment concluded that contaminants in groundwater in the shallow aquifer beneath the burn area and in soil in the burn area and Debris Area 2 (UXO 6) pose an unacceptable risk to human health, assuming residential site use. The primary contaminants of concerns driving estimated human health risks were identified as TNT, 2,6-dinitrotoluene, and RDX in the soil; and RDX in the groundwater. No unacceptable risks were identified for the stormwater discharge area (Navy, 2005).

A ROD was completed in December 1991 and then modified through three Explanations of Significant Differences. Based on the soil contamination and remedy, in 1997, approximately 1,100 cubic yards of material were excavated from an area that was 125 feet by 75 feet with an average depth of 4 feet bgs (3 feet of soil/sand mix and 1 foot of sand filter layer) in a portion of the Site A leach basin. In addition, as per the ROD, three small hot spots were identified totaling in 40 cubic yards of material that were identified in the main base and excavated (see Appendix A-2). The soil was treated with composting technology and the cleanup goals for the burn area soils were achieved by September 2008; the treated soils were returned to Site A and placed just south of the leach basin (SES-TECH, 2008).

As per the ICMP (Navy, 2018), there are both ICs and engineering controls associated with groundwater and leach basin liner for OU 1 Site A Burn Area. The leach basin is encompassed by UXO 7B and groundwater ICs cover most, but not all, of the UXO 7B boundary. The contaminants of potential concern for OU 1 Site A are explosives (RDX, TNT, and dinitrotoluene [DNT]) and lead. ICs include prohibition of groundwater use (shallow and perched aquifers) and land use restrictions, which prevent land uses that interfere with the ongoing groundwater clean efforts. Land uses of the leach basin are restricted to those that do not jeopardize puncturing the leach basin liner or exposing the perched aquifer. Also required are excavation permits, construction project review, and review for changes in land use or activity. The engineering control includes a soil cover of the leach basin liner and protection of the treatment system. Fencing is present to prevent access to the leach basin liner.

The 2017 PA (Battelle) recommended that geophysical surveying in the former detonation area be performed to identify potentially buried MPPEH. Most of the former OB/OD area activities appear to have been located in the open area as shown on Figure 5-8. However, because of ICs for OU 1 that cover most of UXO 7B, only the surface of this site was investigated during the SI.

During the SI planning phase, the OB/OD area was identified on historical aerial photographs (See Appendix A-1).

The primary area of concern during the SI included approximately 9.5 acres located around the former open burning area. Vegetation observed at the site during the site visit of September 2019 included a combination of grass and gravel cover over a relatively flat terrain. Tall grasses grow primarily around the perimeter of the area.

5.6.2 Field Investigation

UXO 7B (OU 1 Site A) is located on northern portion of Lower Base. UXO 7B was identified as a site with ecological field constraints. For field work conducted between April 1 through September 23, field work started 2 hours after sunrise and ceased 2 hours before sunset because of the potential for Marbled Murrelet (birds) to be present at or near the site. The SI field investigation activities included vegetation management, UXO sweeps, and MC soil sampling. In accordance with the MEC QAPP (Tetra Tech, 2021a), geophysical surveys were not conducted, as discussed in Section 5.6.1, considering the ICs for OU 1 that cover most of UXO 7B. Based on the results of the field work, it was determined that a step-out investigation would be conducted at UXO 7B. Field work was conducted as follows:

- Vegetation management: May 24 to June 21, 2022.
- UXO Sweeps: June 28 to July 24, 2022.
- Third-Party QA: July 24, 2022.
- Step-out Vegetation management: September 12-20, 2022.
- Step-out UXO sweeps: September 21-22, 2022.
- Step-out Third-Party QA: September 23, 2022.
- Site Restoration: October 3, 2022.
- MC Sampling: November 2, 2022.

During field work, earthen mounds were identified within the boundary of UXO 7B located along the southwestern boundary of the site and extending outside the site boundary to the west. A separate earthen mound is located west of UXO 7B within and north of UXO 7. Based on research, the current-day earthen mounds are not suspected to be part of the historical munitions-related operations conducted at UXO 7 (see Section 5.5).

5.6.3 MEC/MDAS Results

The UXO detector-aided surface surveys identified a total of 47 items with four MEC and 43 MDAS items. MEC findings included three types of projectiles (unknown model 40-mm projectile, Mk 2 High Explosive (HE)-I HE 40-mm projectile, and unknown model

HE 75-mm projectile) and one Mk 25 Mod 1-3 Marine Location Marker. One MEC, Mk 25 Mod 1-3 Marine Location Marker (ID #07B03) appeared to have remnants of red phosphorous deeming it unsafe to store and required special disposal. EOD was notified to manage disposition. The item, determined safe to move, was transported to a conspicuous location on the EOD training range for EOD to address during a planned training operation that was scheduled the next day. The NBK ESO provided authorization to leave the MEC unattended at UXO 7B until EOD disposed of the item. The remaining three MEC were determined safe to move and were transported to the magazine for temporary storage until the end of the project when detonations were conducted (see Section 3.2.6). The MDAS findings included one unknown model bomb MD, one Mk 19 Mod 1 Exploder Mechanism MD, four types of cartridge cases (Mk 2 cartridge case, unknown model 75-mm cartridge MD, unknown model cartridge case), three types of fuzes (unknown fuze MD, Mk 376 Tail Fuze MD, and M48 Series Fuze MD), and 31 unknown MD items. All MDAS was secured in drums at the laydown yard.

Based on the results of the SI field investigation, it was determined that a step-out investigation was warranted per the decision rules included in the MEC QAPP (Tetra Tech, 2021a). The step-out was conducted to address a debris pile and potential additional MEC/MDAS located to the north of the investigation boundary. The step-out investigation was conducted 50 feet on each side, east and west, of the road to determine if items were deposited to either side of the road. The UXO detector-aided surface surveys identified two MDAS items, unknown Model Cartridge Cases, which were located to the west of the road along with a debris pile.

The MEC/MDAS were scattered around the EOD training area, indicating the MEC/MDAS may have been kickout from detonations at the active EOD training area, an MD item identified as MDAS found was scribed: “Bangor NBK EOD” (see photo in Appendix B-1). The list of MEC/MDAS findings at UXO 7B is included in Table 5-1 and presented on Figure 5-8. Photos of the UXO 7B MEC, MDAS, and shipping end caps are included in Appendix B-1.

5.6.4 MC Results

Based on the results of the UXO detector-aided surface surveys, it was determined that MC sampling was warranted to determine if MC contamination was present (see Section 3.5). At UXO 7B, one composite soil sample was collected from 0 to 6 inches bgs because of the MEC identified: a Mk 25 Mod 1-3 Marine Location Marker (see Table 3-1). The soil analytical results (explosives) are summarized in Table 5-3 and no site-specific exceedances of PSLs are noted in Table 5-3 or on Figure 5-9. The QC soil sample results are included in Table 5-4.

The results were non-detect for all explosives except for nitrocellulose which was detected, but at a concentration that did not exceed the PSL.

5.6.5 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 7B is primarily weedy grassland with clover and dandelions, which is likely a seed mix that didn't take, and scotch broom dominating the edges. Another area is dominated by tall fescue and sword fern. This area also includes forest dominated by second-growth Douglas-fir, and minimal red cedar. The survey recognized the developed and cleared portions of the site and a retention treatment pond, as well as the continuation of the forest stand to the northwest of the site. (The survey suggested several forestry stand number changes from the existing stands identified in the 2018 INRMP to reflect the development and clearing in the area.) Concerning wetlands, the only wetland observed within the UXO 7B SI investigation area was a drainage ditch located along the west side of the site and an old water treatment pond, neither of which are unlikely to be considered formal wetlands. There was water in the ditch along with wetland plants. The ditch would not be impacted and so was not accessed during the biological survey and was not included in the SI effort. Within the extreme southwest corner of the UXO 7B site boundary is a small portion of the wetland, located at the toe of a very steep forested slope (the same wetland noted for UXO 6 that lies within UXO 7B). The wetland was not delineated because no work would occur in the area (see Appendix A-3).

5.7 UXO 8 (Site NN)

This section provides the site history and results of the SI desktop study and biological survey for the UXO 8 MRS.

5.7.1 Site History

The CSM for this surface/subsurface disposal area indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 8 is located within the waterfront restricted area on Lower Base in the northwest portion of NBK Bangor (Figure 5-10). The overall site comprises approximately 9 acres and was operational between 1951 and 1973 as a disposal area. Historical EOD response actions to retrieve MPPEH were reported for this area. Ammunition cans, SAA, and M115 Artillery Simulators were found (Battelle, 2017).

The 2017 PA (Battelle) recommended that an additional document/records research effort be completed to better define the site location and MPPEH discovery history. A search of historical documents and aerial photographs was conducted during the SI

planning phase. While UXO 8 was located in the historical aerial photographs, important site features were not observed (see Appendix A-1).

5.7.2 Habitat/Endangered Species Survey Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), this area has been recently cleared for base mission activities. It encompasses a mix of planted grasses, a few small clumps of western hemlock, western redcedar, and red alder. Small snags showed evidence of sapsuckers. (The survey suggested a forestry stand number change from the 2018 INRMP. The survey documented Pacific-slope flycatcher new retention area and numerous mole mounds.) Concerning wetlands, the survey modified the existing 2018 INRMP wetlands area mapping on the north end of the UXO 8 SI investigation area. Wetlands at UXO 8 were determined by the survey as 0.13 acre (see Appendix A-3).

5.7.3 Pending SI

As discussed in Section 1.0, munitions related SI field work was not conducted at four MRSs including UXO 8 (Site NN). UXO 8 will be investigated during a second phase of SI field work beginning in Spring 2023. The results of that field work will be documented in an SI Addendum.

5.8 UXO 9 (Site OO)

This section provides the site history and results of the SI field work for the UXO 9 MRS.

5.8.1 Site History

The CSM for this surface disposal area indicates that there is the potential for surface MPPEH/MEC to be present. UXO 9 is located within Lower Base in the northern portion of NBK Bangor (Figure 5-11). The overall site comprises approximately 7 acres (Figure 5-11). The lake, restored in 2012, is approximately 12 acres and is habitat for a variety of wildlife species. The site was created in the 1950s when a main road was constructed along the installation waterfront at the Hood Canal. A historical EOD response action to retrieve MPPEH was reported for this area. Items found include a signal flare in its original container (L312), and a smoke grenade which was found in the marsh area during its construction. Records also indicate that old ammunition was observed “popping off” during a controlled burn (Battelle, 2017). Site 7, a disposal site for Old Paint Cans and Drums, was also documented in the PA Report as being associated with the site. The site was located along the hillside near the south end of the site and the old paint shop was demolished during the mid-1970s. The contents of the shop (containers including one-gallon cans to 55-gallon drums that were either

empty or partially filled with liquid and/or hardened materials) were transported and discarded over the side of an embankment near the south end of the site. The cans and drums were subsequently removed from the site in 1981 to an unknown destination, with no visible evidence of disposal remaining (URS Consultants, 1991).

As per the ICMP (Navy, 2018), there are both ICs and engineering controls associated with groundwater and leach basin liner for Site A Burn Area (OU 1). OU 1 groundwater ICs cover a portion (eastern side) of the UXO 9 boundary, but the leach basin is outside the UXO 9 boundary. The OU 1 Site A contaminants of potential concern are explosives (RDX, TNT, and DNT) and lead. ICs include prohibition of groundwater use (shallow and perched aquifers). Also required are excavation permits, construction project review, and review for changes in land use or activity. The ICs and engineering controls are a result of activities conducted at OU 1 Site A, but overlap a portion of the UXO 9 site boundary.

The 2017 PA (Battelle) recommended a detailed surface inspection of accessible portions of the site to be performed to identify potential MPPEH at the surface.

The primary area of concern during the SI included approximately 7 acres of the large wetland area. Vegetation observed during the site visit of September 2019 included a large wetland with a the site boundary, and a small beaver pond was identified. A tree canopy did not exist in this area.

5.8.2 Field Investigation

UXO 9 (Site OO) is located on north Upper Base. UXO 9 was identified as a site with ecological field constraints. For field work conducted between April 1 through September 23, field work started 2 hours after sunrise and ceased 2 hours before sunset because of the potential for Marbled Murrelet (birds) to be present at or near the site. There were no formal restrictions regarding salmon, but field work was conducted within the window of July 16 through February 15 to avoid spawning concerns in the wetland areas. The SI field investigation activities included only UXO sweeps. Vegetation management was only conducted at this site to cut an access path of a non-wetlands area from a recreational trail that is located outside the investigation site boundary south of UXO 9 to the southern portion of the site. Vegetation management was not conducted in any wetland areas. In accordance with the MEC QAPP (Tetra Tech, 2021a), geophysical surveys were not conducted considering that only surface disposal, versus subsurface disposal, is associated with the site. Field work was conducted on these dates:

- Vegetation management: August 15-16, 2022 (access path only).
- UXO Sweeps: March 10- 15, 2022 and August 15 to September 19, 2022.
- Third-Party QA: August 15 to September 19, 2022 (due to site conditions QC/A were performed simultaneously).
- Site Restoration: September 20, 2022.

The UXO sweeps were initially started in March 2022; however, site conditions were exceedingly swampy and only 0.5 acres of the site were accessible at that time. Because of the site conditions, GPS coordinates were recorded for the areas where UXO sweeps were completed, then the field team ceased work temporarily with the plan to return to UXO 9 when the site conditions were dry to complete the UXO sweeps. Upon inspection of the site, the UXO sweeps resumed mid-August when the site dried out and had less water present in the wetlands. The UXO sweep team used waders to conduct the UXO sweeps of the site as the water was up to and above the sweep team's ankles. Because of these conditions, the UXOQCS/UXOSO provided direct oversight of operations and QC/QA as the sweeps were occurring, from both a quality and safety perspective. All swept areas successfully passed QC/QA. An approximate 0.93 acre was inaccessible because of a sloped hillside.

5.8.3 MEC/MDAS Results

The UXO detector-aided surface survey, covering all accessible portions of the site, identified only one MEC, a M18 Smoke Hand Grenade (ID #0901), that was located in the northeastern corner of the investigation area. Upon inspection, the item was determined not safe to move and NBK EOD was contacted to address the item. The same day, EOD arrived on site to remove the MEC to the EOD training range for further disposition; detonation of the item was completed successfully by EOD. The MEC finding at UXO 9 is included in Table 5-1 and presented on Figure 5-11. A photo of the UXO 9 MEC is included in Appendix B-1. No MDAS was identified.

In addition to the MEC, other findings at the site included two drums that were identified within the investigation boundary (see Figure 5-11). Drum 1 was located in the northern portion of the site and there was no staining in or around the drum. Drum 2 did not have any markings nor any staining in or around the drum. Both drums were open, and Drum 2 was filled with water.

5.8.4 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 9 is a large freshwater wetland with a cattail

boundary. Surrounding forested stands consist of mature Douglas-fir with red cedar. (No changes to the existing forestry stand numbers from the 2018 INRMP were suggested during the survey.) As documented from the nearby bridge during the survey, a small beaver pond was present upstream, and a single river otter was spotted foraging near the bridge. Concerning wetlands, the survey confirmed that the existing wetlands areas mapping from the 2018 INRMP was correct. No new or modified wetlands were mapped. Wetlands for UXO 9 were determined as freshwater totaling 5.79 acres (see Appendix A-3).

5.9 UXO 9B (OU 7 Site B)

This section provides the site history and results of the SI field work for the UXO 9B MRS, which was investigated under a desktop study and biological survey only.

5.9.1 Site History

The CSM for this subsurface disposal area indicates that there is the potential for subsurface MPPEH/MEC to be present. UXO 9B is located within Lower Base in the northwest portion of NBK Bangor (Figure 5-12). The overall site comprises approximately 6 acres of natural shoreline along Hood Canal (Figure 5-12). The site is located within OU 7, and pyrotechnic testing was reportedly completed in the 1950s and 1960s. Black powder was also reportedly burned. The site was also used for station dumping (including pit disposal, landfilling, and trash burning) from approximately 1950 to 1968. In 1966 and 1967, the site was also reportedly used for open burning of RDX and TNT residuals from Site F (Navy, 2005). Two Polaris missile motors are reportedly entombed in a retaining wall at the site (Battelle, 2017). Detonators and primers, star signals, smoke cans (aluminum types), smoke pots, and hand grenades were reportedly disposed in this area.

There are no surface water drainages, and groundwater beneath the shoreline site is saline (non-potable) as a result of tidal mixing. The site is used as a recreational area (boat ramp) by base personnel. The beach south of the site is currently used by base personnel for shellfish harvesting and fishing every 3 to 5 years, on a rotational basis with other base beaches.

A remedy was implemented at this site (i.e., cap and erosion controls) in 1997, and a ROD is in place. The remedy for Site B included covering areas of contaminated soil, installing shoreline protection and stormwater drainage systems to control erosion, monitoring sediment and clam tissue, and installing signs notifying visitors that the site is to be used for recreational purposes only and approval is required for digging or mowing. As per the ICMP (Navy, 2018), ICs and engineering controls prevent exposure

to contaminated soil at Site B. The contaminants of concern in soil were identified as arsenic, polynuclear aromatic hydrocarbons, and polychlorinated biphenyls. ICs include use of the site restricted to outdoor recreational use only, and requirements for excavation permits. Notifications to Washington State Department of Ecology and USEPA prior to any development or redevelopment of the site are required. Engineering controls include maintenance of vegetative soil cover, protection from soft bank (beach mix) erosion, and maintenance of signage (Navy, 2018). Recreational boating was restricted within 500 feet of the mean lower low water (URS Consultants, Inc., 1996a).

The 2017 PA (Battelle) recommended geophysical surveying and exploratory test pits to further define the extent of subsurface waste and potential MPPEH. During the SI planning phase, UXO 9B was identified on historical maps and aerial photographs (See Appendix A-1).

Vegetation observed during the site visit of September 2019 included moderate to dense understory and tall grasses with a moderate to dense tree canopy. The terrain was relatively flat. Remnant structures were present and included a concrete pad and a guard/observation shed (shack) at the north end of the site.

Based on the desktop investigation of UXO 9B evaluation of historical aerial photographs and mapping during QAPP preparation (see Appendix A-1), field investigation of this site was eliminated from the SI munitions related field investigation, although a biological survey was conducted. Although the PA recommended geophysical surveying and exploratory test pits, a remedy has been implemented at this site (i.e., cap and erosion controls) and the cap covers the entirety of UXO 9B. Additionally, approval is required prior to any intrusive activities (i.e., digging) at the site. Therefore, in accordance with the MEC QAPP (Tetra Tech, 2021a), SI field investigation was not warranted.

5.9.2 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 9B is a fairly disturbed area, including access roads throughout. A portion of the area is covered with Himalayan blackberry. (No changes to the existing forestry stand numbers from the 2018 INRMP were suggested during the survey.) Concerning wetlands, during the survey two known wetland areas within the UXO 9B site boundary depicted in the 2018 INRMP were confirmed as accurate and no new or modified wetlands were delineated. The southern saltmarsh wetland area is within the tidal flood zone, and the nearby northern wetland is a depressional area surrounded by a gravel access road. Water from an undetermined source(s) is apparently periodically drained into the wetland from an observed culvert

outfall. Wetlands area for UXO 9B was determined by the survey as 0.39 acres (see Appendix A-3).

5.10 UXO 10 (Site 12)

This section provides the site history and results of the SI desktop study and biological survey for the UXO 10 MRS.

5.10.1 Site History

The CSM for this surface/subsurface disposal area indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 10 is located within the waterfront restricted area on Lower Base in the northwest portion of NBK Bangor (Figure 5-13). The overall site comprises approximately 7 acres and was operational from 1950 to 1970 (Figure 5-13). Site 12 was used for the disposal of ordnance dunnage, scrap metal, and potentially ammonium picrate (Battelle, 2017).

Between approximately 1970 and 1973, the site served as a disposal area for wood, metals, rubber, and other wastes. A large portion of the approximately 5-acre ravine was filled with solid wastes and partially covered with unconsolidated soil. Although use of the site for waste disposal was curtailed in 1973, smaller quantities of wastes including drums labelled as containing antifreeze, Freon, and Otto fuel were disposed at the site since that time (Hart Crowser, 1989).

The 2017 PA (Battelle) recommended a detailed surface inspection to identify additional potential MPPEH at the surface based on the identification of munitions which have been recovered there (3-inch projectiles, Mark 22 fuzes, MK1 and MK2 40-mm projectiles, and ammonium picrate).

During the SI planning phase, the former disposal area was identified on historical aerial photographs (See Appendix A-1).

5.10.2 Habitat/Endangered Species Survey Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), this area landscape is a forested slope with a dense understory of sword fern, stinging nettle, broadleaf maple (36-inch), alder (10- to 12-inch), hemlock snag with nest holes (50”), scattered cedar, deer trails and beds. This area was described as very healthy and could support cougars. (No forestry stand number changes from the 2018 INRMP were suggested during the survey.) Concerning wetlands, the survey confirmed the boundary of the existing wetlands areas 2018 INRMP mapping as a narrow swath at the north end of the UXO 10 site boundary,

extending south into inside the SI investigation area. Wetlands were determined as 0.09 acre. The survey was unable to locate a wetland in the southwest corner of the UXO 10 site boundary, outside the SI investigation area, where an existing wetland area is depicted in the 2018 INRMP (see Appendix A-3).

5.10.3 Pending SI

As discussed in Section 1.0, munitions related SI field work was not conducted at four MRSs including UXO 10 (Site 12). UXO 10 will be investigated during a second phase of SI field work beginning in Spring 2023. The results of that field work will be documented in an SI Addendum.

5.11 UXO 11 (Site 14)

This section provides the site history and results of the SI field work for the UXO 11 MRS.

5.11.1 Site History

The CSM for this surface/subsurface disposal area indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 11 is located within Lower Base in the southeast portion of NBK Bangor (Figure 5-14). The overall site comprises approximately 2 acres and was operational between 1946 and 1973 (Figure 5-14). Site 14 was used as a disposal area for drums and inert ordnance-related items including ammunition cans and boxes (Battelle, 2017).

The 2017 PA (Battelle) recommended that an additional document/records research effort be performed to define the site location and site history/use, and that a detailed surface inspection be performed to identify surface MPPEH. A single ammunition can was observed during the PA.

During the September 2019 SI planning phase site visit, metal drums were observed in the west-central part of the investigation area. UXO 11 was identified on historical aerial photographs as shown in Appendix A-1.

The primary area of concern during the SI included an area of approximately 1.3 acres located north of the railroad tracks. Vegetation observed during the site visit of September 2019 included an uneven terrain obscured by dense ground vegetation/understory, and a dense tree canopy. The southern boundary was along a steep area along the adjacent road to the south.

5.11.2 Field Investigation

UXO 11 (Site 14) is located in Lower Base, and did not have any field work restrictions (i.e., Marbled Murrelet constraints, work schedule constraints, and/or Navy escort requirements) during the SI. The SI field investigation activities included vegetation management and UXO sweeps followed by a geophysical survey (EM61-HP). Based on the results of the field work, it was determined that a step-out investigation was warranted and was conducted at UXO 11. Field work was conducted on the following dates:

- Vegetation management: May 11-19, 2022.
- UXO Sweeps: May 23-31, 2022.
- Third-Party QA: May 31, 2022.
- Geophysics:
  - EM61-HP: August 2, 2022 (transects).
  - Follow-on/Data Gap Recollection: August 30, 2022 (transects).
  - Third-Party QA: October 21, 2022 (EM61-HP).
- Step-out Vegetation Management: October 12, 2022.
- Step-out UXO Sweeps: October 13, 2022.
- Step-out Third-Party QA: October 26, 2022.
- Site Restoration: November 1, 2022 (UXO) and November 14, 2022 (Geophysics).

During the step-out UXO sweeps, the UXO techs noticed an odor (burnt plastic and/or popcorn) in the southwest corner of UXO 11 near the southwest boundary stake. After discussion among the Navy, NSWC IHD, and Tetra Tech, the field operations lead and Navy technical representative conducted an inspection of UXO 11 in response to the noted odor. A Photo Ionization Detector (PID) was used during the inspection to monitor for the presence of volatiles. At the time of the inspection, the weather was overcast, calm, and approximately 50˚F. No odors were noted by the field operations lead, Navy technical representative, or UXO escort during the inspection. PID detections were not registered anywhere within the site or in/around the drums and railroad ties. Further QA work at the site was conducted while using the PID.

There was a portion (approximately 0.30 acres) of the investigation area that was inaccessible because of a steep sloped hillside along the southern portion of the investigation area extending into the step-out investigation area; therefore, UXO detector-aided survey sweeps could not be conducted in this inaccessible area of the site.

5.11.3 MEC/MDAS Results

The UXO detector-aided surface survey identified only one MDAS item, and no MEC. The MDAS item was a Mk2 40-mm cartridge case located at the western base of the inaccessible slope. The MDAS item was secured in a drum at the laydown yard. The MDAS item was located near a pile of drums that were identified along the western investigation boundary.

In addition to MDAS item found, drums were also observed near the southern portion along the base of the slope. Approximately 2 dozen drums were noted all along the bottom of the slope. The drums were old and rusted, mostly on the ground surface, but some were partially buried. All drums were of the same size, approximately 55 gallons. No markings or notations were observed on any of the drums. A few drums appeared to have a bung top while most appeared to be open top drums with lids missing, however, no lids were observed within the area. Most of the drums had man made puncture marks (hatchet slice marks or square puncture holes) in the bottom ends. No ground staining was observed, and no signs of stressed vegetation were noted. No surface water was present. No odors were noted throughout the drum area. A PID was used to test the drum interiors where there were openings or through access holes; but volatile vapors were not detected within any drum or from the ground surface surrounding the drums. Additionally, no debris or other material was observed within or around the drums. As such, there was no evidence of a chemical hazard associated with the drums. The deteriorated drums remain in place as NMRD. Based on input from the Navy, it is likely the drums are old burn barrels.

Based on the results of the SI field investigation, it was determined that a step-out investigation was warranted per the decision rules included in the MEC QAPP (Tetra Tech, 2021a). The step-out was conducted to address the remainder of the rusted/deteriorated drum area identified outside the site/investigation boundary to the west and it determine if any MEC or additional MDAS were present. If MEC/MDAS was encountered in the step-out, a contingency step-out was planned in any given direction (i.e., north, south, or west) and to be extended an additional 50 feet. The step-out UXO detector-aided surface survey did not identify any MEC/MDAS; however, old, rusted drums were observed within the inspection area. No staining or stressed vegetation was noted within the site or within/near the drums. A few deteriorating railroad ties were

also observed within the drum area. Based on the step-out findings, it was determined that the contingency step-out was not warranted and was not completed.

The MDAS finding at UXO 11 is included in Table 5-1 and presented on Figure 5-14. A photo of the deteriorated drum located at UXO 11 is included in Appendix B-1.

5.11.4 Geophysical Survey Results

An EM61-HP transect geophysical survey was conducted at UXO 11. The survey acreage is summarized in Table 5-2. Details of the geophysical surveys are included in Appendix F.

In summary, UXO 11 EM61-HP data depict SRAs coincident with non-munitions related surface obstructions (i.e., burn barrels and cultural features).

UXO 11 overhead power line corridor bisects the northern portion of the site; impacts to the DGM data include additional noise, which may locally increase the number of false positives in the target list based on the established target picking threshold. The steep slope to the south of the site limits the extent to which digital data can be safely collected.

5.11.5 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 11 is a cleared area (associated with the overhead power line), which is dominated by grasses, blackberry, tansy ragwort, scotch broom. (One change to an existing forestry stand number from the 2018 INRMP was suggested during the survey.) No wetlands were present at UXO 11 (see Appendix A-3).

5.12 UXO 11B (Site 8)

This section provides the site history and results of the SI field work for the UXO 11B MRS.

5.12.1 Site History

The CSM for this surface/subsurface disposal area, the Ammunition Can/Tank Disposal Site, includes the potential for surface and subsurface MPPEH/MEC. UXO 11B is located within Lower Base in the southeast portion of NBK Bangor (Figure 5-15). The overall site comprises approximately 2 acres and was operational between 1946 and 1973 (Figure 5-15). Site 8 was used for the disposal of inert ordnance-related items,

including ammunition cans and tanks. The tanks are briefly described by Battelle as propellent tanks (Battelle, 2017).

The 2017 PA (Battelle) recommended a detailed surface inspection be conducted to identify the extent of MPPEH at the surface based on the observation of a single ammunition box.

During the SI planning phase, the former disposal area was identified based on historical aerial photographs (See Appendix A-1).

The primary area of concern investigation during the SI included an area of approximately 2 acres. Vegetation observed during the site visit of September 2019 included a dense tree canopy with understory.

5.12.2 Field Investigation

UXO 11B (Site 8) is located in Lower Base, and was identified as a site with ecological field constraints. For field work conducted between April 1 through September 23, field work was not started until 2 hours after sunrise and ceased 2 hours before sunset because of the potential for Marbled Murrelet (birds) to be present at or near the site. The SI field investigation activities included vegetation management and UXO sweeps followed by geophysical surveys (EM61-HP). Field work was conducted on the following dates:

- Vegetation management: May 18-25, 2022.
- UXO Sweeps: May 24-31, 2022.
- Third-Party QA: May 31, 2022.
- Geophysics:
  - EM61-HP: August 15 to October 4, 2022 (transects).
  - Follow-on/Data Gap Recollection: August 26 and 29, 2022 and October 4, 2022.
  - Third-Party QA: October 21, 2022 (EM61-HP).
- Site Restoration: November 1, 2022 (UXO) and November 14, 2022 (Geophysics).

5.12.3 MEC/MDAS Results

The UXO detector-aided surface survey identified only one MDAS item, and no MEC. The MDAS item was a Mk 2 cartridge case, which was located in the central/west-central portion of the investigation area. The MDAS item was secured in a drum at the laydown yard. In addition to the identified MDAS item, a pile of ammo cans (also located in the central/west-central portion), and a pile of shipping containers (located near the southern boundary of the site) were identified. The ammo containers were discovered in a visible underground pit that led to a subsurface structure. The UXO team retrieved as many exposed wooden ammo containers as possible that could be reached from the surface without entering the structure. The ammo containers were empty and there were no MEC/MPPEH concerns; however, the underground pit extends underneath a large tree and was unsafe area to enter to remove the remaining items that were visible from the surface (that may or may not include ammo cans). The MDAS item identified was located near the ammo can pile. The accessible ammo cans were demilitarized (i.e., all markings covered with spray paint and then the word “empty” stenciled on the can) and then left in place as NMRD. Similarly, shipping containers were demilitarized and left in place as NMRD.

The MDAS finding at UXO 11B is included in Table 5-1 and presented on Figure 5-15. Photos of the ammo containers found at UXO 11B are included in Appendix B-1.

5.12.4 Geophysical Survey Results

An EM61-HP transect geophysical survey was conducted at UXO 11B. The survey acreage is summarized in Table 5-2. Details of the geophysical surveys are included in Appendix F.

In summary, UXO 11B EM61-HP data depict SRAs coincident with non-munitions related surface obstructions (i.e., burn barrels and cultural features).

5.12.5 Habitat/Endangered Species Survey Report

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the general habitat at UXO 11B is described as having a fairly open canopy of 12- to 15-inch red cedar and Douglas-fir, some 3- to 10-inch alder, and western white pine. The understory is fairly open with creeping blackberry, some salal, sword fern, rhododendron, holly, and scotch broom. (No changes to the existing forestry stand numbers from the 2018 INRMP were suggested during the survey.) No wetlands were present at UXO 11B (see Appendix A-3).

5.13 UXO 12 (Site HH)

This section provides the site history and results of the SI field work for the UXO 12 MRS.

5.13.1 Site History

The CSM for this surface disposal area, Barricade Siding P-1, indicates that there is the potential for surface MPPEH/MEC to be present. UXO 12 is located within Lower Base in the west-central portion of NBK Bangor (Figure 5-16). The overall site, which is an area of approximately 0.72 acres, operated as a rail car siding between 1946 and 1973 (Figure 5-16). Site HH was identified on historical drawings as a single barricaded railroad siding in proximity to the waterfront. Historically, rail cars on the Western Barricaded Sidings, may have been used to temporarily store various metallic debris/wastes including ordnance-related materials (Battelle, 2017); therefore, surface disposal was of concern.

The 2017 PA (Battelle) recommended that a detailed SI be conducted in order to verify that the siding does not contain debris and MPPEH.

During the SI planning phase, the Barricade Siding P-1 was identified on historical aerial photographs (See Appendix A-1).

The primary area of concern during the SI included an 0.25-acre area along the siding and 5 feet buffer around the siding. Vegetation observed during the site visit of January 2020 around the siding included a relatively flat terrain with dense ground vegetation and tree canopy. Within the siding area, only small trees and other smaller vegetation were observed to be growing.

5.13.2 Field Investigation

UXO 12 (Site HH) is located on Lower Base, and there were no field work restrictions (i.e., Marbled Murrelet constraints, work schedule constraints, and/or Navy escort requirements) during the SI. The SI field investigation activities included vegetation removal and UXO sweeps. In accordance with the MEC QAPP (Tetra Tech, 2021a), geophysical surveys were not conducted considering that only surface disposal, versus subsurface disposal, is associated with the site. Field work was conducted on the following dates:

- Vegetation management: July 26, 2022.
- UXO Sweeps: August 9, 2022.

- Third-Party QA: August 10, 2022.
- Site Restoration: September 14, 2022.

The actual siding location did not exactly match the siding location shown in the MEC QAPP (Tetra Tech, 2021a); therefore, both the planned siding location and actual siding location had vegetation management and detector-aided surface surveys completed on them. The planned and actual siding boundaries are included on Figure 5-16.

5.13.3 MEC/MDAS Results

MEC, MPPEH, and/or MDAS were not identified during the UXO detector-aided surface survey.

5.13.4 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), UXO 12 is described as an area that runs along an old railroad with cement walls covered in vines and moss, with an understory consisting of sword fern, blackberry, ivy, ribes sp., and upper canopy of 6- to 12-inch alder and 12-inch big leaf maple. The survey recognized that this area was previously used as a railroad siding but since has grown over and is now forested. (No changes to the existing forestry stand numbers from the 2018 INRMP were suggested during the survey, but only a suggestion made that wetlands presence should be noted.) Concerning wetlands, the survey confirmed that the depicted 2018 INRMP wetlands exist within the southern portion of the UXO 12 site boundary and, although existing mapping showed the wetland extending into the extreme southwestern corner of the SI investigation area, the survey found that the wetland was actually smaller than the existing mapping. Also, the survey delineated a new ephemeral channel within the UXO 12 site boundary, which is directly connected to this wetland and adjacent to the old railroad grade but is located outside of the SI investigation area. UXO 12 wetlands were determined to be less than 0.01 acre and waters were determined as 0.03 acre (see Appendix A-3).

5.14 UXO 13 (Site 4)

This section provides the site history and results of the SI field work for the UXO 13 MRS.

5.14.1 Site History

The CSM for this surface/subsurface disposal area indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 13 is located within Lower Base in the west-central portion of NBK Bangor (Figure 5-17). The overall site

comprises approximately 4.1 acres and was operational between 1946 and 1973 (Figure 5-17). Site 4 was potentially a former detonation area for the disposal of fuzes, and also an OB/OD area. During the PA Site Visit, the site was identified to be entirely paved except for very near the shoreline (Battelle, 2017).

Based on a RI/FS conducted for OU 7, Site 4 disposal (UXO 13) was identified. (URS Consultants, 1994). Historical aerial photos from the vicinity of the site were identified, which showed scattered round holes in the area that was alleged to be the result of the disposal of ordnance ignition devices. During the RI, an ordnance screening survey, twenty surface (0 to 6 inches bgs) soil samples, and three subsurface (approximately 3 feet bgs) soil samples (see Appendix A-2 for surface and subsurface locations) were collected to verify whether speculations of past ordnance testing at the site were true, and to determine if such activities had resulted in elevated concentrations of inorganics and ordnance compounds in soils. No evidence of ordnance testing and no ordnance compounds were detected in surface or subsurface soil samples during ordnance screening. Only aluminum at two locations and barium at one location were detected in subsurface soil. The historical locations of the three subsurface soil samples and ordnance screening locations are presented on Figure 5-17. Additionally, there were no known or calculated unacceptable risks to human health for recreational use, future recreational use, or to biota at the site (URS Consultants, 1994).

As documented in the 1996 OU 7 ROD, there were no ordnance compounds detected at the disposal site. The detected inorganic analytes presented no significant risk and no remedial action was warranted (URS Consultants, Inc., 1996a).

The 2017 PA (Battelle) recommended that a detailed SI be performed, and that geophysical surveying be performed in the wooded areas where ordnance disposal was reportedly conducted.

A search of historical documents and aerial photographs was conducted during the SI planning phase. While UXO 13 was located in the historical aerial photographs, the only feature to note was a road located east of the area of investigation (see Appendix A-1).

The primary area of concern during the SI was an area of approximately 2.5 acres located along the eastern site boundary. Vegetation observed during the site visit of September 2019 included a dense tree canopy and understory. The wooded portions of the site were located in a moderately sloped area. The shorelines were lined with driftwood and riprap.

5.14.2 Field Investigation

UXO 13 (Site 4) is located in Lower Base. In addition, UXO 13 was identified as a site with ecological field constraints. For field work conducted between April 1 through September 23, field work started 2 hours after sunrise and ceased 2 hours before sunset because of the potential for Marbled Murrelet (birds) to be present at or near the site. The SI field investigation activities included vegetation management and UXO sweeps followed by a geophysical survey (EM61-HP). Field work was conducted on the following dates:

- Vegetation management: June 20-29, 2022.
- UXO Sweeps: August 1-3, 2022.
- Third-Party QA: August 9, 2022.
- Geophysics:
  - EM61-HP: August 8-10, 2022 (transects).
  - Follow-on/Data Gap Recollection: October 12, 2022.
  - Third-Party QA: November 2, 2022 (EM61-HP).
  - Site Restoration: September 26-27, 2022 (UXO); geophysical site restoration was not conducted as UXO 13 did not require the use of traveler's points to mark out the transects.

There was a portion (approximately 0.80 acres) of the investigation area that was inaccessible because of a sloped hillside.

5.14.3 MEC/MDAS Results

MEC, MPPEH, and/or MDAS were not identified during the UXO detector-aided surface survey. There were various areas that were inaccessible because of steep slopes (see Figure 5-17).

5.14.4 Geophysical Survey Results

An EM61-HP transect geophysical survey was conducted at UXO 13. The survey acreage is summarized in Table 5-2. Details of the geophysical surveys are included in Appendix F.

In summary, UXO 13 EM61-HP survey transects data did not demonstrate any SRAs or other features that would be consistent with a disposal site. Discrete geophysical

anomalies were identified along the survey transects. Localized steep slopes within the project area limit the ability to collect 100 percent digital DGM data across the entire site.

5.14.5 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the UXO 13 habitat is described as dominated by cedar and maple, with a sparse understory of sisal, Oregon grape, some tall fescue and bracken fern, as well as scotch broom. (The survey noted that the forested habitat in this area is contiguous and no longer includes developed areas. Therefore, a change to the existing forestry stand number from the 2018 INRMP was suggested during the survey.) Concerning wetlands, the survey confirmed that the existing wetlands mapping from the 2018 INRMP was generally accurate; the wetlands are estuarine and marine deep water and are limited to the shoreline zone of UXO 13, outside of the SI investigation area. No new wetland or wetland boundary modifications were made during the survey. However, the existing wetlands mapping from the 2018 INRMP does not reflect site conditions encountered during the survey, considering that the 2018 INRMP mapping shows the wetlands extending over a portion of the existing developed parking area and northern edge of upland forest, within the UXO 13 SI investigation area. As stated in the 2020 survey, the parking area was likely filled in the past to accommodate a vehicle causeway to an offshore dock (see Appendix A-3).

5.15 UXO 14 (Site JJ)

This section provides the site history and results of the SI field work for the UXO 14 MRS.

5.15.1 Site History

The CSM for this surface disposal area, Barricade Siding P-2, includes the potential for surface MPPEH/MEC. UXO 14 is located within the waterfront restricted area on Lower Base in the northwest portion of NBK Bangor (Figure 5-18). The overall site comprises approximately 0.5 acres and was operational as a rail car siding between 1946 and 1973 (Figure 5-18). Site JJ was identified on historical drawings as a single barricaded railroad siding in close proximity to the waterfront. Historically, rail cars on the Western Barricaded Railroad Sidings may have been used to temporarily store munitions items (Battelle, 2017); therefore, surface disposal is of concern.

The 2017 PA (Battelle) recommended that a detailed SI be conducted to verify that the siding does not contain debris or MPPEH.

During the SI planning phase, the siding was identified on historical maps and aerial photographs (See Appendix A-1).

The primary area of concern during the SI included a 0.33-acre area along the siding and 5 feet buffer around each siding wall. Vegetation observed at the site during the site visit of September 2019 included approximately 22 alders ranging from 6- to 14-inches diameter, creating a dense tree canopy. The understory was light with some blackberry bushes identified. Within the siding area, only small trees and other smaller vegetation were observed growing.

5.15.2 Field Investigation

UXO 14 (Site JJ) is located in the waterfront restricted area. In addition, UXO 14 was identified as a site with ecological field constraints. For field work conducted between April 1 through September 23, field work was not started until 2 hours after sunrise and ceased 2 hours before sunset because of the potential for Marbled Murrelet (birds) to be present at or near the site. The SI field investigation activities included vegetation management and UXO sweeps. In accordance with the MEC QAPP (Tetra Tech, 2021a), geophysical surveys were not conducted considering that only surface disposal, versus subsurface disposal, is associated with the site. Field work was conducted on the following dates:

- Vegetation management: July 25-26, 2022.
- UXO Sweeps: August 8, 2022.
- Third-Party QA: August 8, 2022.
- Site Restoration: September 16, 2022.

The boundary of the siding included in the MEC QAPP matched the actual boundary of the siding with a 5-foot buffer (see Figure 5-18). Logistical issues were encountered as the field work was being conducted at UXO 14.

5.15.3 MEC/MDAS Results

MEC, MPPEH, and/or MDAS were not identified during the UXO detector-aided surface survey.

5.15.4 Habitat/Endangered Species Survey Report

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), UXO 14 is described as a rail car siding with concrete sides. During the survey, vegetation observed included approximately 22 alders, ranging from 6- to 14-inch. Scattered understory consisted of some English ivy and Himalayan blackberry.

(A change to the existing forestry stand number from the 2018 INRMP was suggested during the survey, which noted that because of its distance from the road, this area will likely always be managed for hazard trees.) Concerning wetlands, the survey confirmed that the existing wetlands area 2018 INRMP mapping in the extreme southeast corner of the UXO 14 site boundary, extending into the southeast corner of the SI investigation area, is correct. The UXO 14 wetlands area was determined to be less than 0.01 acre. No new or modified wetlands were mapped (see Appendix A-3).

5.16 UXO 15 (Site KK)

This section provides the site history and results of the desktop study and biological survey for the UXO 15 MRS.

5.16.1 Site History

The CSM for this surface/subsurface disposal area indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 15 is located within Lower Base in the northwest portion of NBK Bangor (Figure 5-19). The overall site comprises approximately 12 acres and was operational between 1951 and 1977 (Figure 5-19). Site KK was identified as a disposal area and on historical drawings as a dunnage yard. Historical EOD response actions to retrieve MPPEH were reported at a building in the same vicinity (Battelle, 2017).

The 2017 PA (Battelle) recommended performing a detailed SI to identify potential MPPEH at the surface because these MEC/MPPEH were found at the site: MK 22 dummy fuzes, 3-inch projectiles, MK1 40-mm dummy projectiles, MK2 40-mm projectiles, and other 40-mm projectiles.

During the SI planning phase, UXO 15 was identified on historical maps and aerial photographs (See Appendix A-1).

5.16.2 Habitat/Endangered Species Survey Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the habitat includes 24-inch Douglas-fir (smaller than northern adjacent stand), an additional hemlock component to the northern stand, cedar, some alder. And bigleaf maple as well. A sparse understory of sword fern, salal, and Oregon grape as well as deer trails with no snags were present. Another stand area is a mature stand of 36-inch Douglas-fir and cedar with some alder and bigleaf maple. (A forestry stand number change from the 2018 INRMP was suggested during the survey, considering the forest boundary should be shifted slightly east where it ends along a north-south gravel road). No wetlands were present in UXO 15 (see Appendix A-3).

5.16.3 Pending SI

As discussed in Section 1.0, munitions related SI field work was not conducted at four MRSs including UXO 15 (Site KK). UXO 15 will be investigated during a second phase of SI field work beginning in Spring 2023. The results of that field work will be documented in an SI Addendum.

5.17 UXO 16 (Site LL)

This section provides the site history and results of the SI desktop study and biological survey for the UXO 16 MRS.

5.17.1 Site History

The CSM for this surface/subsurface disposal area indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 16 is located within the waterfront restricted area on Lower Base in the northwest portion of NBK Bangor (Figure 5-20). The overall site comprises approximately 10 acres (Figure 5-20). The burn site was operational between 1951 and 1977 and was identified in historical drawings as a burn pit. Site LL may have been used for ordnance-related disposal (Battelle, 2017).

The 2017 PA (Battelle) recommended that an additional document/records research effort be conducted to better define the site location and site history/use, and also that a detailed SI be performed to identify the site. Munitions recovered at the site include 3-inch projectiles, MK1 40-mm dummy projectiles, MK2 40-mm projectiles, and other 40-mm projectiles.

During the SI planning phase, a former burn site was identified in historical maps and aerial photographs as shown on Figure 5-20 and included in Appendix A-1.

5.17.2 Habitat/Endangered Species Survey Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), the habitat includes Douglas-fir and hemlock with moderate understory. (One forestry stand number change from the 2018 INRMP was suggested during the survey, along a north-south paved road, which is not forested in this area.) Concerning wetlands, the survey was unable to locate any depicted 2018 INRMP wetlands at the western central area within the UXO 16 site boundary where an existing wetlands area was mapped as 0.49 acres. No wetlands were present within the SI investigation area during the survey (see Appendix A-3).

5.17.3 Pending SI

As discussed in Section 1.0, munitions related SI field work was not conducted at four MRSs including UXO 16 (Site LL). UXO 16 will be investigated during a second phase of SI field work beginning in Spring 2023. The results of that field work will be documented in an SI Addendum.

5.18 UXO 17 (Site 2)

This section provides the site history and results of the SI field work for the UXO 17 MRS.

5.18.1 Site History

The CSM for this surface/subsurface disposal area, the Classification Yard, indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 17 is located within the Upper Base in the far southern portion of NBK Bangor (Figure 5-21). The overall site comprises approximately 9.3 acres and was used as a classification yard and storage area from 1964 to 1973 (Figure 5-21). A former landfill is also located within the site boundary in the northern portion of the site.

Site 2 is located within UXO 17 in a north-south-trending ravine along the shoulders of a gravel road near the Classification Yard parking area. Site 2 was used for the disposal of steel scrap and other waste, including empty drums, ordnance dunnage, waste oils, and paints (Battelle, 2017).

Surface water from Site 2 flows through an artificial channel into a nearby lake. Site 2 was divided into two subareas designated Sites 2A and 2B. Site 2A was a disposal area for small-caliber projectiles. Site 2B is located down an embankment adjacent to a road and was an unauthorized disposal area for wastes that included paint sludge, waste oil, inert ordnance, and drums. A cleanup of surface debris at Site 2A was completed in 1986 and 1987. A removal action for debris and drums from Site 2B was completed in 1993. The drum trench was approximately 12 feet deep at the south end, sloping up to about 6 feet deep at the north end (see Appendix A-2). Soils excavated during this action were placed in two stockpiles on site, referred to as Containment Cell #1 and #2 (Navy, 2005). The potentially contaminated soils removed from the drum trench were stockpiled in Containment Cell #1 and stumps and brush debris were stored in Containment Cell #2. Approximately 54 55-gallon drums were recovered from the excavated slope and trench areas. Of these, 34 drums containing unknown materials were removed, placed in overpack drums, and stored in Containment Cell #1. The large amounts of debris encountered during the excavation process consisted of metal banding, small containers, empty drums, shell casings, launch tubes, large

demilitarized projectiles, and .50-caliber bullets. After the interim drum removal was completed, the drum excavation area was backfilled with site soils and regraded to direct drainage to a retention pond north of Containment Cell #1 (see Appendix A-2). As part of the removal action, a third phase of excavation was completed. Drums were not encountered; however, debris consisted of projectile transportation tubes, demilitarized projectiles, and shell casings, which were found on the surface of the area. Debris was transported with the excavated soils and stockpiled in Containment Cell #2 after the material was screened through a 0.25-inch screen to remove the .50-caliber slugs, which were stockpiled separately and covered with plastic in Containment Cell #2 (URS Consultants, Inc., 1996b).

Polychlorinated biphenyls detected in stockpiled site soils were estimated to have a cancer risk of approximately 1 in 100,000 for assumed future residents of the site. Site soils (in-place) and site groundwater pose no unacceptable risk under unrestricted site use.

The selected remedy for Site 2 involved screening of the stockpiled materials in the containment cells to separate the native soil from the metal debris allowing for characterization and disposal of both waste streams. Various screens were utilized to allow for the 50-cal projectiles to be removed from the material and then stockpiled (see Appendix A-2). No live ordnance was discovered while screening the stockpiled material; however, 1,200 inert fuzes were removed (Foster Wheeler Environmental Corporation, 1997).

Aerial photograph analysis and historical investigations conducted indicates extensive land disturbing activities. Specifically, the northern portion of UXO 17 was reworked in the Site 2 cleanup efforts. As shown on Figure 5-22, the topography of UXO 17 has changed from 1949 to present day conditions. The northern portion of UXO 17 is extensively sloped with the northernmost corner of UXO 17 at a higher elevation above mean sea level than the 1949 site conditions.

The 2017 PA (Battelle) recommended that a detailed SI and geophysical survey be conducted to identify the extent of surface and potentially buried MPPEH, and also that confirmatory MC soil sampling be performed in areas with identified MPPEH. SAA and a single 40-mm cartridge were observed during the PA. Munitions historically recovered on the surface of the site include 40-mm, 57-mm anti-tank, 50-cal projectiles, M168 bomb fuzes, 5-inch shells, and 3-inch shells (Battelle, 2017).

During the SI planning phase, the classification yard was identified on historical maps and aerial photographs (See Appendix A-1).

The primary area of concern during the SI included the entire 9.3 acres of the site. Vegetation observed at the site during the site visit of September 2019 included the area north of the fields that contained a ditch which is likely a wetland. The hillside area was scattered Douglas fir with moderate understory and was characterized by moderate slopes. The remainder of the site consisted of roadway, open grassy areas, and a ball field.

5.18.2 Field Investigation

UXO 17 (Site 2) is located on Upper Base. Crane testing operations do occur in the area and so prior to field work at UXO 17, the Navy RPM and/or Tetra Tech SUXOS would contact the crane testing personnel to ensure that their schedule did not overlap with the field work schedule. The field team was flexible as needed and worked around crane testing operations. The SI field investigation activities included vegetation management and UXO sweeps followed by geophysics surveys (EM61-HP, TEM-8g, and GPR). Field work was conducted on the following dates:

- Vegetation management: May 2-31, 2022.
- UXO Sweeps: May 3 to June 20, 2022.
- Third-Party QA: June 20, 2022.
- Geophysics:
  - EM61-HP: September 22 to October 10, 2022 (full coverage).
  - TEM-8g: August 3 to September 9, 2022 (full coverage).
  - GPR: November 1, 2022 (transects).
  - Follow-on/Data Gap Recollection: September 9, 2022 (TEM-8g); October 25, 2022 (EM61-HP).
  - Third-Party QA: October 21, 2022 (TEM-8g), November 10, 2022 (EM61-HP), and February 21, 2023 (GPR).
- Site Restoration: November 10, 2022 (UXO and Geophysics).

Prior to UXO detector-aided surface surveys of the crane testing area, Navy personnel moved all equipment (i.e., crane testing pad and equipment) from the area so that a full coverage survey without any gaps could be conducted.

5.18.3 MEC/MDAS Results

The UXO detector-aided surface surveys identified a total of 20 items with 5 MEC and 15 MDAS items. MEC findings included 1 Mk 6 unknown Mod 5 inch warhead and 4 projectiles (1 Mk 38 Mod 3 Special Common 5 inch projectile and 3 Mk 46 Mod 2 Special Common 5 inch projectiles). The MEC were determined to be safe to move and were transported to the magazine for temporary storage until the end of the project when detonations were conducted (see Section 3.2.6). The MDAS items included 1 Mk 6 Mod 7 Practice 5 inch warhead and 14 cartridge cases of various types (Mk 2 cartridge case, Mk 3 cartridge case, unknown cartridge case, Mk 2 40-mm cartridge case, Mk 3 40-mm cartridge case, and a Mk 7 Mod 1 3 inch cartridge case). One MDAS item, the Mk 6 Mod 7 Practice 5 inch warhead (Item #UXO017-09), needed to be demilitarized and so the item was stored separately at the laydown yard and then detonated with the MEC for demilitarizing. The remaining MDAS was secured in drums at the laydown yard.

Most of the MEC/MDAS was found in the northern portion of the site near and around the approximate location of the former landfill. Also, in the northern portion of the investigation boundary there was a trash pile with various MDAS in or around the pile and MEC around the outside of the pile. One MDAS item and a rebar pit was found in the central portion of the site; however, no items were recovered in the southern portion of UXO 17. The list of MEC/MDAS findings at UXO 17B is included in Table 5-1 and presented on Figure 5-22. Photos of the UXO 17 MEC and MDAS items are included in Appendix B-1.

5.18.4 Geophysical Survey Results

Geophysical surveys were conducted at UXO 17 and included EM61-HP and TEM-8g full coverage surveys and GPR transect surveys. The survey acreages are summarized in Table 5-2. Details of the geophysical surveys are included in Appendix F.

In summary, UXO 17 EM61-HP and TEM-8g data depict large areas of elevated DGM response, consistent with a former disposal site, based on the lateral extent of the SRAs and high amplitude of the responses. The UXO 17 data suggest debris was disposed in pits or trenches or was subjected to spreading due to earthwork activities. Metallic debris was observed protruding from the ground in the northern portion of the site. Delineated SRAs indicate a high-response area in the DGM data within the current site boundary.

GPR surveys were focused in the central and northern portions of the MRS. GPR data shows in the northwest portion of the site collected closest to the northwestern site boundary, debris at the top of the slope is approximately 5 feet bgs. For all other GPR

survey locations collected within the site, the GPR data suggest the top of the buried debris is relatively shallow at approximately 2 to 2.5 feet bgs. The GPR data and observations indicate disposal area materials were likely pushed to the north and east portion of UXO 17 during earthwork activities. Historical topographic maps demonstrate the steep slopes to the west and north were likely built to accommodate construction of existing structures at the top of the slope. The site's subjection to earthworks is further supported by metal debris protruding from the ground in the area to the east of the dirt road that extends through the site.

The base of the suspected debris at UXO 17 cannot be reliably imaged in the GPR data. The data indicate undisturbed soils may range from approximately 5 to 10 feet bgs.

5.18.5 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), UXO 17 habitat includes young alder, cedar, and Douglas-fir along the sides of the site. Ground cover consists primarily of ferns, common mullein, and scattered Scotch broom. The hillside is scattered 10- to 14-inch diameter Douglas-fir at breast height with moderate understory of rhododendron and salal. The UXO 17 Investigation area is bounded by a ditch along the east side which was reviewed during the survey and determined to be upland. (No changes to the existing forestry stand numbers from the 2018 INRMP were suggested during the survey.) Concerning wetlands, an existing wetlands area from the 2018 INRMP was confirmed as 0.73 acre. Also, the survey delineated an ephemeral channel/excavated ditch on the northeast edge of the ball field, which roughly follows the configuration of existing wetlands mapping (the channel continues to the southeast outside of the UXO 17 site boundary); waters were determined as 0.07 acre. Vegetation within the channel is predominantly composed of non-wetland plants (see Appendix A-3).

5.19 UXO 17B (Site 1)

This section provides the site history and results of the SI field work for the UXO 17B MRS.

5.19.1 Site History

The CSM for this surface/subsurface disposal area, the Western Side Car Barricade, indicates that there is the potential for surface and subsurface MPPEH/MEC to be present. UXO 17B is located within the Upper Base in the southern portion of NBK Bangor (Figure 5-23). The overall site comprises approximately 67 acres and includes a central railroad line with several spurs branching off both sides of the line. The

sidings were previously used for loading and unloading ordnance and were used from 1946 to 1973 (Figure 5-23). In approximately 1963, the railroad tracks were abandoned and the area, designated as Site 1, was used as a disposal area (URS Consultants, 1992a). Site 1 was used as a disposal area for mostly inert items, including building rubble and metal scrap. Polaris missile motors were reportedly disposed in the former sidings area (Battelle, 2017). The sidings currently contain fill material up to depths of approximately 15 feet.

As per the ICMP (Navy, 2018), there are IC and engineering controls for Site F/OU 2 groundwater and infiltration barrier. The ICs overlap UXO 17B and UXO 17C. The contaminants of potential concern for Site F/OU 2 include explosives (RDX, TNT, DNT, 1,3,5-trinitrobenzene, and 1,3-dinitrobenzene), manganese, nitrates, and nitrites. ICs include prohibition of groundwater use and land use is not restricted except for items covered by engineering controls. Also, excavation permits and construction project reviews are required. The engineering control is a land use restriction boundary, which encompasses a small portion of the overall Site F/OU 2 (beyond UXO 17B and UXO 17C boundaries) associated with maintenance and protection of an infiltration barrier and treatment system protection.

Also, Site E/11 is included within OU 2 and monitored under OU2, but is addressed under OU 7 (i.e., UXO 9B). Site E was an acid disposal site used for electroplating wastes and Otto fuel from 1960 to 1973; approximately 1,500 to 2,000 gallons of electroplating wastes originating from NUWES Keyport were dumped quarterly, and in 1970 a minimum of 2 truckloads of Otto Fuel were dumped at this site. Site 11 was a pesticide/herbicide disposal area with a time-critical removal action completed in 1992, which removed 85 containers (reportedly containing 2,4-dichlorophenoxyacetic acid, dichlorodiphenyltrichloroethane, and Tordon) and 400 cubic yards of soils containing pesticides. The two sites were initially separate sites but as per the ICMP, Sites E and 11 are contiguous, and there was concern that pesticide/herbicide drums may also have been disposed of at Site E. Therefore, the two sites are addressed together (Site E/11) in the OU 7 ROD and ICMP (Navy, 2018). Engineering controls (secure boundary) and ICs requirements are covered as part of Site F/OU2. Site E/11 contaminants of potential concern for Site E/11 in groundwater are Otto fuel and the pesticide, DDT.

Also relevant to UXO 17B, a former metallurgy laboratory was used from 1958 to 1973 for testing of brass shell casings, which is a procedure that involved heating casings coated with mercurous nitrate. The procedure apparently reduced and volatized the mercury, which condensed on the walls of the building. The former metallurgy laboratory was reported to be demolished in approximately 1973 and the resulting debris were disposed in an abandoned local barricade siding identified as Site 5 (UXO 17B) (see Appendix A-2) (Hart Crowser, 1989; R.R. Spencer, 1983). The 1982 IAS

identified Site 5 and determined further investigation to determine whether the site was contaminated (NEESA, 1982). The IAS estimated that 100 pounds of mercury were present in the building rubble. A 1983 Annual Summary report estimated that 75 pounds of mercury may be present in the building rubble. Additionally, a water sample was collected from a drainage ditch at the south (downgradient) end of the old barricaded siding. The results indicated a concentration of mercury at levels that would have been expected in normal surface drainage. As stated in the 1983 report, further investigations were planned to locate the source of the potential mercury contamination (R.R. Spencer, 1983).

A 1992 SI was conducted to investigate Site 5, which was the suspected location of the demolition debris from the former metallurgy laboratory. Seventy-two soil gas probes totaling 748.5 feet were installed during the 1992 SI (URS Consultants, 1992b). Mercury vapor was the principal contaminant found in the soil gas survey. Most of the mercury gas detected was in the central portion of the former barricaded railroad siding area, which indicated that the rubble from the former metallurgy laboratory was likely located in this area. Mercury vapor was also detected at one isolated location at the northern end of the area. No major concentrations of volatiles were found in the soil gas, and the stormwater and sediment samples showed no contamination above background levels.

In 1992, the RI/FS was conducted at Site 5/OU 5 (URS Consultants, 1992a). The rubble of the building was believed to be buried in the northern portion of Site 5 and several years later, the foundation of the Metallurgy Laboratory was believed to be buried in the southern portion of Site 5. Based on the RI, surface water runoff and sediment samples were collected at selected locations within the barricaded railroad siding area during a storm and results indicated that mercury was not found at concentrations above the method detection limits in the surface water or stormwater sediment samples. Soil mercury vapor surveys were conducted using field instrumentation to isolate the source(s) of any mercury-containing rubble. Mercury was detected at several locations during the initial survey and test pits were excavated based on areas of elevated concentrations; however, former metallurgy laboratory rubble was not found. A follow-up survey was conducted at selected locations for laboratory confirmation. The purpose of this survey was to determine whether the readings represented local accumulations or whether mercury was present in the subsurface within large areas of the fill. Only very low concentrations of mercury were detected. The results of the various analyses conducted at the barricaded railroad sidings, including soil, groundwater, and surface water did not indicate the presence of mercury above natural background concentrations or PSLs. The results of the long-term vapor monitoring indicated the presence of low concentrations of mercury. Based

on the risk evaluation results, no further action was required for OU 5 and a FS was not prepared for the site (URS Consultants, 1992a).

As documented in the OU 5 ROD, the selected remedial action at OU 5 was the no action alternative. The associated risk assessment for noncancer and cancer risks at OU 5 showed that Site 5 did not present any significant threats to human health or the environment. As per the ROD, risks for mercury in any environmental medium at Site 5 were determined to be within the National Contingency Plan's acceptable risk range and did not warrant further action (NAVFAC Northwest, 1993).

In addition to the laboratory debris, a wide variety of other waste items were reported to have been deposited during the 1970s within the abandoned barricaded siding area (possibly within the northern regions), including inert ordnance constituents and general refuse (Hart Crowser, 1989).

The 2017 PA (Battelle) recommended a detailed SI, geodetic surveying, and MC sampling to identify potential MC contamination.

The primary area of concern during the SI included an area of approximately 13.3 acres consisting of the main railroad line and the 20 spurs that run the length of the central line. Vegetation observed during the site visit of September 2019 included dense ground vegetation and a tree canopy to the south within the area. Moderate ground vegetation density was present in the northern area. The terrain was relatively flat within the siding areas, but steep slopes surrounded the sidings in the northern portion of the site. Railroad tracks were potentially present in the siding areas but have been removed along the primary axis of the siding alignment. Concrete barricades may line individual sidings and backfilled sidings have higher elevations that coincide with the top of the barricades.

5.19.2 Field Investigation

UXO 17B (Site 1) is located on Upper Base, which did not have any field work restrictions (i.e., Marbled Murrelet constraints, work schedule constraints, and/or Navy escort requirements) during the SI. The SI field investigation activities included vegetation management and UXO sweeps followed by geophysical surveys (EM61-HP, TEM-8g, and GPR). Field work was conducted on the following dates:

- Vegetation management: March 20 to April 24, 2022.
- UXO Sweeps: March 29 to May 1, 2022.
- Third-Party QA: May 1, 2022.

- Geophysics:
  - EM61-HP: July 21 to October 23, 2022 (full coverage).
  - TEM-8g: July 20 to August 25, 2022 (full coverage).
  - GPR: November 7-9, 2022 (transects).
  - Follow-on/Data Gap Recollection: August 25, 2022 (TEM-8g), and October 26 to November 3, 2022 (EM61-HP).
  - Third-Party QA: November 23, 2022 (EM61-HP/TEM-8g/) and February 21, 2023 (GPR).
- Site Restoration: November 14-15, 2022 (UXO); and November 15-16, 2022 (Geophysics).

5.19.3 MEC/MDAS Results

The UXO detector-aided surface survey identified only one MDAS item and no MEC. The MDAS item was a M212 practice cartridge case, which was located along the northern portion of the former main rail line. The MDAS was secured in drums at the laydown yard. The MDAS finding at UXO 17B is included in Table 5-1 and presented on Figure 5-23. A photo of the UXO 17B MDAS item is included in Appendix B-1.

5.19.4 Geophysical Survey Results

Geophysical surveys were conducted at UXO 17B and included EM61-HP and TEM-8g full coverage surveys and a GPR transect survey. The survey acreages are summarized in Table 5-2. Details of the geophysical surveys are included in Appendix F.

In summary, UXO 17B data indicate presence of metallic debris across most of the site, with a large number of discrete TOIs and mapped SRAs. DGM results depict large areas of elevated DGM response. While Site UXO 17B includes laterally extensive elevated DGM amplitudes, the results suggest the presence of remaining rail track and ballast in the northern sidings at the site. The DGM responses from the remainder of the site also suggest the source(s) of the geophysical response have been spread across the site, potentially scrap, debris and/or ballast material from the former rail tracks. The responses appear similar to the extensive SRA region south of the road, which bisects UXO 4. The DGM anomaly footprints suggest there is less indication at UXO 17B of debris in the form of pits or trenches due to general lack of definition of the high-amplitude response areas and SRAs. The DGM anomaly response patterns

suggest one or more of the following: (1) evidence of debris or scrap offloaded and dumped from rail cars; (2) more recent earthwork activities spread metal within the shallow subsurface; and (3) the responses are predominately associated with demolition and removal of the former rail line and ballast rock.

The GPR data for UXO 17B appear to depict changes in subsurface geology and hydrogeology throughout the site and less evidence of widespread disposal of buried debris. In the northern section of the site, data collected in the former rail car sidings are likely evidence of the remaining track and ballast, as suggested by the DGM data from this part of the site. In the southern portion of the site, shallow groundwater and saturated surface soils may limit the efficacy of GPR. These results are consistent with the indication in the DGM data that spreading of metallic objects (manmade or geologic) within the shallow subsurface has likely occurred at UXO 17B.

Changes in the site topography around the middle of the site, also suggest soil may have been pushed around the site, thus further resulting in the seemingly haphazard appearance of the high metallic responses in the DGM and general lack of discernable features in the GPR data.

5.19.5 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), UXO 17B habitat consists of a large relatively weedy grassland dominated by scotch broom, reed canary grass, dandelion, tansy ragwort, scattered/trace plantago lancealate, horsetail, juncus spp., and apple trees. The forested portion of this area has moderate canopy cover of 8- to 12-inch Douglas-fir, cedar, sparse, western white pine; and a moderately open cover understory within the railroad of reed canary grass with interspersed surrounding understory species such as sword fern, salal, creeping blackberry, and scotch broom. (The boundary lines between the forested portions of this area and the developed portions, depicted in the 2018 INRMP, did not match well with on-ground SI during the survey and new suggested stand boundary adjustments were provided.) Concerning wetlands, the survey delineated four new wetlands not indicated in the 2018 INRMP. Also, the survey identified one ephemeral ditch of 0.01 acre, connected to one of the newly delineated wetlands within the UXO 17B site boundary. Wetlands was determined during the survey as 0.45 acre (see Appendix A-3).

5.20 UXO 17C (Site BB)

This section provides the site history and results of the SI field work for the UXO 17C MRS.

5.20.1 Site History

The CSM for this surface disposal area, the Eastern Side Car Barricade, indicates that there is the potential for surface MPPEH/MEC to be present. UXO 17C is located within Upper Base in the south-central portion of NBK Bangor (Figure 5-24). The overall site comprises 71 acres and was operational between 1946 and 1973 (Figure 5-24). The site appears on numerous installation drawings and is still present; the sidings may have been filled with various debris/wastes including ordnance-related material (Battelle, 2017). All sidings but one contained fill material and vegetation.

The 2017 PA (Battelle) recommended that a detailed SI be performed to verify that the sidings do not contain debris/MPPEH, and to further evaluate one siding that appears to contain concrete rubble.

As per the ICMP (Navy, 2018), there are IC and engineering controls for Site F/OU 2 groundwater and infiltration barrier. The ICs overlap UXO 17B and UXO 17C. The contaminants of potential concern for Site F/OU 2 include explosives (RDX, TNT, DNT, 1,3,5-trinitrobenzene, and 1,3-dinitrobenzene), manganese, nitrates, and nitrites. ICs include prohibition of groundwater use and land use is not restricted except for items covered by engineering controls. Also, excavation permits and construction project reviews are required. The engineering control is a land use restriction boundary, which encompasses a small portion of the overall Site F/OU 2 (beyond UXO 17B and UXO 17C boundaries) associated with maintenance and protection of an infiltration barrier and treatment system protection.

Also, Site E/11 is included within OU 2 and monitored under OU2, but is addressed under OU 7 (i.e., UXO 9B). Site E was an acid disposal site used for electroplating wastes and Otto fuel from 1960 to 1973; approximately 1,500 to 2,000 gallons of electroplating wastes originating from NUWES Keyport were dumped quarterly, and in 1970 a minimum of 2 truckloads of Otto Fuel were dumped at this site. Site 11 was a pesticide/herbicide disposal area with a time-critical removal action completed in 1992, which removed 85 containers (reportedly containing 2,4-dichlorophenoxyacetic acid, dichlorodiphenyltrichloroethane, and Tordon) and 400 cubic yards of soils containing pesticides. The two sites were initially separate sites but as per the ICMP, Sites E and 11 are contiguous, and there was concern that pesticide/herbicide drums may also have been disposed of at Site E. Therefore, the two sites are addressed together (Site E/11) in the OU 7 ROD and ICMP (Navy, 2018). Engineering controls and ICs requirements are covered as part of Site F/OU2. Site E/11 contaminants of potential concern for Site E/11 in groundwater are Otto fuel and the pesticide, DDT.

The primary area of concern during the SI included an area of approximately 11.8 acres consisting of the main railroad line and the 19 spurs that run the length of the central

line. Two currently used sidings on the south side of the site are active and so are not considered part of the site (eliminated from the SI scope). Vegetation observed during the site visit of September 2019 included dense ground vegetation and a tree canopy. The terrain was relatively flat. Concrete barricades bound individual sidings, and backfilled sidings have higher elevations that coincide with the top of the barricades.

5.20.2 Field Investigation

UXO 17C (Site BB) is located on Upper Base, and there were no field work restrictions (i.e., Marbled Murrelet constraints, work schedule constraints, and/or Navy escort requirements) during the SI. The SI field investigation activities included vegetation management and UXO sweeps. In accordance with the MEC QAPP (Tetra Tech, 2021a), geophysical surveys were not conducted; although subsurface disposal was noted for the site, existing railroad tracks at the site make geophysics impractical due to metal interference from the railroad tracks obscuring any identification of other subsurface anomalies. During project planning, it was of the opinion that SI results from similar UXO 17B, where geophysics was included, would be useful in determining the next step forward recommendation for this site. Field work was conducted on the following dates:

- Vegetation management: March 11 to April 12, 2022.
- UXO Sweeps: March 15 to April 21, 2022.
- Third-Party QA: April 21, 2022.
- Site Restoration: September 13, 2022.

The actual siding locations did not exactly match the siding locations shown in the MEC QAPP (Tetra Tech, 2021a); therefore, both the planned siding locations and actual siding locations had vegetation management and detector-aided surface surveys completed on them.

5.20.3 MEC/MDAS Results

No MEC, MPPEH, and/or MDAS items were identified during the UXO detector-aided surface survey.

5.20.4 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), UXO 17C habitat within the barricade centers was observed during the survey as highly vegetated and contiguous with surrounding habitat vegetation. Moderate canopy cover was observed during the survey of 8- to 12-inch western white pine, alder, Douglas-fir, and some western hemlock with an understory of dense sword

fern, sisal, creeping blackberry, and scotch broom. (The boundary lines between the forested portions of this area and the developed portions depicted in the 2018 INRMP did not match well with on-ground SI during the survey and new suggested stand boundary adjustments were provided.) No wetlands were present at UXO 17C (see Appendix A-3).

5.21 UXO 17D (Site 13)

This section provides the site history and results of the SI field work for the UXO 17D MRS, which was investigated under a desktop study and cursory biological survey only.

5.21.1 Site History

UXO 17D is located within Upper Base in the southeast portion of NBK Bangor (Figure 5-25). The overall site comprises approximately 90.6 acres with the former brass yard comprising approximately 20.8 acres. The site was operational between 1946 and 1973 (Figure 5-25). Site 13 was used as a storage area primarily for brass and other metals (Battelle, 2017). The area may have been decontaminated prior to 1979 at the start of site development. This site is highly developed, and the area contains commercial buildings, roads, parking lots, and landscaped areas.

The 2017 PA (Battelle) recommended that an additional document/records research effort be performed to better define the site location, site history, and use.

As part of the SI planning phase, historical documentation was reviewed including aerial photographs. A former brass yard was identified on historical maps and aerial photographs (See Appendix A-1) as shown on Figure 5-25.

Based on the desktop investigation of UXO 17D, evaluation of historical aerial photographs and mapping during QAPP preparation (see Appendix A-1), investigation of this site was eliminated from the SI field investigation since the area of concern is in a highly developed area, and any potential munitions onsite would have been identified during development of the area.

5.21.2 Habitat/Endangered Species Survey Report Results

As per the Summary Report Habitat/Endangered Species Survey for MEC SI (Tetra Tech, 2020b), this area was not reviewed in the field as it is a highly disturbed, active part of the base. Only a cursory evaluation was needed. There are no wetlands and limited value wildlife habitat at UXO 17D (see Appendix A-3).

5.22 Post-Detonation MC Sampling Results

Four post-detonation samples were collected from four demolition pit locations in UXO 7 after the demolition operations on November 3, 2022 to determine impacts of the donor explosives on the surrounding soil. The post-detonation samples were collected from the subsurface, which was anticipated to be the most contaminated soil interval, if any. All four shots were performed in four demolition pits. Post-detonation sample log sheets are provided in Appendix B-8. The soil analytical results (explosives) are summarized in Table 5-3 in comparison to the PSLs (described in Section 3.3.6) and exceedances of PSLs are shown on Figure 5-26.

All four composite samples had exceedances of the both the human health and ecological PSL of RDX. Two of the four composite samples had exceedances of the human health PSL for cyclotetramethylene tetranitramine (HMX) (see Table 5-3); the other two composite samples had detections of HMX but did not exceed PSLs. The maximum concentration detected for HMX and RDX was 4,200 microgram per kilogram (µg/kg) and 65,000 µg/kg, respectively, with both concentrations detected at X7-TP-C02-3648. Nitrocellulose was detected but at concentrations below the PSL and all other parameters were nondetect. The PSL exceedances are associated with the donor explosives used to conduct the detonations and are unlikely to present a significant exposure/risk to receptors considering that the contamination is subsurface and that ICs for OU 1 Site A (UXO 7B) restrict groundwater use.

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6.0 Updated Conceptual Site Models and Screening Level Hazard Evaluation

The CSM is a "picture" of site conditions that illustrates contaminants, contaminant release mechanisms, migration pathways, affected environmental media, receptors potentially exposed to contaminated environmental media, and the mechanism by which the receptors could be exposed (i.e., receptor exposure pathways or routes). The CSMs for MEC and MC exposure at the 17 MRSs at NBK Bangor are summarized in this section and were developed based on historical qualitative information and results of the SI. The CSM for potential exposure to MEC and MC from MEC release is presented on Figure 6-1 and updated CSM information for the 17 MRSs is included in Table 6-1.

The need for remedial action at an MRS is evaluated through conducting a qualitative hazard assessment. The purpose of a screening level hazard assessment is to evaluate the potential current and future risk of injury caused by the explosive hazards (i.e., MEC) at an MRS in the absence of any actions to control or mitigate interaction between a receptor and the explosive hazard. In addition, the assessment evaluates the magnitude of the potential hazard at the site and the primary causes of those potential hazards. The results of the hazard assessment aid in the development, evaluation, and selection of appropriate response alternatives.

6.1 Updated Conceptual Site Model

The following subsections describe the updated site-specific CSMs.

6.1.1 UXO 2 (Site CC)

Prior to the SI, the CSM identified the UXO 2 MRS as having the potential for surface MPPEH/MEC because it was designated as an operational rail line with surface disposal evident. Based on the SI field work, the area of concern was identified to be the southern portion of UXO 2 along both sides of the rail line; and up to less than approximately 100 feet laterally from the rail line based on the SI step-out investigation. Although MEC was not identified during the SI field work, large amounts of MDAS (Mk 2/3 40-mm cartridge cases, 20-mm cartridge cases, ammo cans and shipping containers) were found, which were similar to the historical munitions-related findings (40-mm and .50 caliber casings, ammunition containers labelled explosive D, RDX, smokeless powder, and TNT, as well as potential smoke pot). These SI findings support the CSM that UXO 2 is a disposal site with surface concerns. Although surface items were removed from the UXO 2 ground surface during the SI, the extent has not

been determined to the south; and considering the site history and multitude of MDAS items, MEC/MPPEH may be present beyond the current southern UXO 2 site boundary. Also, there is a possibility that MEC/MPPEH may be present on the ground surface under the pile of shipping containers encountered during the SI that were left in place. The shipping containers were demilitarized as NMRD (see Section 5.1.3).

The updated CSM identifies an incomplete exposure pathway for human receptors to MEC on the ground surface. The presence of a multitude of MDAS items encountered at UXO 2 during the SI suggests that MEC may also be present. The site is located within Lower Base – Keyport Annex. Current and potential future human receptors include installation personnel (limited activity rail line operation by Keyport Annex), site workers (including limited activity rail line maintenance and vegetation management at the railroad tracks), and Keyport Annex visitors. If surficial MEC exist at the site under shipping containers or beyond the southern site boundary, a receptor could contact it through persons picking it up/direct contact.

6.1.2 UXO 3 (Site D)

Prior to the SI, the CSM identified the UXO 3 MRS as having the potential for surface/subsurface MPPEH/MEC because it was designated as an OB/OD with a former small arms incinerator, trench, and smaller burn areas were historically present. Based on the SI field work, the entire site was found to have munitions-related concerns in the surface and concerns were suspected in the subsurface. On the surface, MEC (AN-M46 photoflash bombs/booster cups) and MDAS (AN-M46 100 lb photoflash bomb MDs) were identified and support the CSM based on the historical accounts that thousands of photoflash bombs were reportedly detonated at UXO 3. In the subsurface, geophysical survey results indicate the presence of widespread metallic debris across most of the site, consistent with historical disposal activities. These SI findings support the CSM that UXO 3 was an OB/OD and disposal area with surface and subsurface concerns. Although surface items were removed from the UXO 3 ground surface during the SI, the extent has not been determined in any direction beyond the SI investigation boundary; and considering the site history and multitude of MEC/MDAS encountered, MEC/MPPEH is likely present beyond the current UXO 3 SI investigation boundary. Also, it is likely that MEC/MPPEH may be present in the subsurface considering site history, geophysical survey results, and marshy site conditions leading to possible erosion/redeposition between surface and subsurface MEC. During the SI, one MPPEH item was discovered (during geophysical surveying) due to erosion following removal of all surface material at the SI area.

The updated CSM identifies a complete exposure pathway for human receptors to MEC on the ground surface, if present, beyond the SI investigation boundary, considering

MEC was identified at UXO 3 during the SI; also, subsurface MEC is of potential concern both within and beyond the SI investigation boundary. The site is located within Lower Base. Current and potential future receptors include installation personnel, site workers (including utility maintenance in subsurface utilities/culverts and road maintenance), site visitors, and installation traffic from the road intersecting the site. If surficial MEC exist at the site, beyond the SI investigation boundary, a receptor could contact it by picking it up/direct contact. The most likely scenario for a receptor to encounter subsurface MEC (if present) would be through soil-disturbing activities such as construction activities or utilities/culvert work. Munitions items (if present as expected) may be transported by erosion/redeposition, land disturbance such as construction activities, or by persons picking it up/direct contact. Also, per the informal ICs set covering most of UXO 3, permits are needed for excavation and construction review is required by the Navy (see Section 5.2.1). Based on the site conditions (soft wetlands soils), it is likely that MEC in the subsurface, if present, can be uplifted to the surface.

The updated CSM identifies a complete exposure pathway for human and ecological receptors to MC in soil. Based on exceedances of PSLs, the results of the MC sampling effort indicated that MC contamination is present at discrete locations of breached MEC, and at key site features (i.e., incinerator and mounded area); MC could likely be present at other breached MEC locations in the surface, beyond the current SI site boundary, and/or subsurface, throughout and beyond the current SI site boundary. Current and future receptors include current and future industrial workers, future construction workers, and terrestrial ecological receptors. MC (if present) exposure pathways include incident ingestion and dermal contact of soil from the 0 to 2 feet bgs for industrial and construction workers. Exposure to potential contaminants in groundwater is also possible for construction workers during excavation activities through direct contact (i.e., incidental ingestion, dermal contact). Terrestrial ecological receptor exposure pathways include incidental ingestion of and direct contact with soil and ingestion of plants/animals. The primary MC of concern are explosives based on the types of MEC/MPPEH observed at the site.

6.1.3 UXO 4 (Site 9)

Prior to the SI, the CSM identified the UXO 4 MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as a disposal area for inert ordnance-related items, scrap metal, and railroad ties. Based on the SI field work, the area south of the road was identified as having munitions-related concerns on the surface; however, the entire site was identified as potentially having subsurface concerns. Although MEC was not identified during the SI field work, large amounts of MDAS (AN-M109A1/AN-M103AI Fin Assembly, unknown Fuze/Fuze adapter MD, M25

Dummy 40-mm Cartridge, and unknown (various) MD) were found on the surface, which is similar to the historical munitions-related finding (40-mm projectile). Additionally, various trash piles and shipping containers were identified, which support the CSM as a disposal area. Although surface items were removed from the UXO 4 ground surface during the SI, except for beneath the trash piles and shipping containers, MDAS was encountered near the investigation boundary to the south and west. Considering the site history and multitude of MDAS encountered, MEC/MPPEH may be present beyond the current UXO 4 SI investigation boundary. Also, there is a possibility that MEC/MPPEH may be present on the ground surface under the trash piles and shipping containers encountered during the SI. The shipping containers are now considered NMRD because they were demilitarized (see Section 5.3.3). Also, it is possible that MEC/MPPEH may be present in the subsurface considering site history and geophysical survey results. In the subsurface, geophysical survey results indicate the presence of widespread metallic debris across most of the site, consistent with historical disposal activities; however, subsurface anomalies are most likely associated with metallic debris from rail cars potentially disposed in the area, or with metallic, mineral-rich ballast rock associated with the rail spur extending along the western edge of the site. Geophysical surveys delineated SRAs in the data suggesting that high response areas extend beyond the current site boundary. Also, an aerial photograph analysis indicates site conditions have changed at UXO 4 and land disturbing activities occurred between 1973 and 1977 including the construction of a road which intersects the site (see Appendix A-1). The road was constructed after UXO 4 was used as a disposal area; it is unknown if any munitions-related items were found during the construction. These SI findings support the CSM of a disposal area with surface and subsurface concerns, although the possibility of MEC is uncertain (none were encountered during the SI).

The updated CSM identifies an incomplete exposure pathway for human receptors to MEC on the ground surface. Although MEC was not encountered during the SI, the presence of a multitude of MDAS items encountered at UXO 4 suggests that MEC may also be present. The site is split by a road with the northern portion of the site located in Lower Base; and the southern portion of the site located in Upper Base. Current and potential future receptors for Lower Base include installation personnel, site workers (including utility maintenance in subsurface utilities/culverts, road maintenance, road/active rail maintenance), site visitors, security gate personnel, and installation traffic from the road intersecting the site. Current and potential future receptors for Upper Base include installation personnel, site workers (active rail maintenance, utility maintenance in subsurface utilities/culverts, and road maintenance), and visitors (limited because it is a wooded area with no reason for visitors). If surficial MEC exist at the site, a receptor could contact it by picking it up/direct contact. The most likely scenario

for a receptor to encounter subsurface MEC (if present) would be through soil-disturbing activities such as construction activities or utilities/culvert work. Munitions items (if present) may be transported by erosion/redeposition, land disturbance such as construction activities, or by persons picking it up/direct contact.

6.1.4 UXO 6 (Site 22)

Prior to the SI, the CSM identified the UXO 6 MRS as having the potential for surface MPPEH/MEC as it was designated as a surface disposal area for surface disposal of paint cans, drums, ammunition and boxes, and other metal debris. Based on the SI field work, an area of concern was identified along the northern portion of the site boundary. A step-out investigation was conducted to the north of the site and the extent of the area of concern was determined. On the surface, MEC (Mk 22 Percussion Primer and Mk 2 Mod 1 Primer) was identified at the top of the hill and a cascading swath of material was observed scattered down the slope, which included various MDAS and MEC (more than 13 items). Items found during the SI were similar to the historical munitions-related findings (metallic debris, MPPEH including ammunition cans, 40-mm cartridge casings, and various other unopened ordnance storage containers). These SI findings support the CSM of a disposal area with surface concerns.

UXO 6 is located in Lower Base. A portion of the site is located at the top of a steep hill and is accessible to current and potential future receptors such as installation personnel, site workers, site visitors (limited because there is no reason to visit); however, a UXO surface survey was conducted at the top of the hill that identified and led to the removal of surface MEC that eliminated any exposure to surface MEC. The other portion of the site is the steep hillside, where MEC, MDAS and debris were identified, that is inaccessible to all receptors, except possibly for personnel in training. Therefore, the updated CSM identifies no (remaining) source of MEC and an incomplete exposure pathway for human receptors to MEC in soil for the portion of the site at the top of the hill, and a source of MEC but very limited exposure pathway, possibly for personnel in training, for the steep hillside portion of the site. New signage was installed during the SI along the top of the hill at UXO 6 where the swath of MEC/MPPEH was encountered down the hillside; the signage identifies the hillside as a restricted area, deterring the exposure pathway. Also, although no subsurface disposal of MEC is suspected at UXO 6, ICs for Debris Area 2 under the OU 1 ROD, which encompass the northwest portion of UXO 6, include land use restrictions for soil that restrict land use to outdoor recreational use and that require excavation permits be obtained for any intrusive activities at the site.

6.1.5 UXO 7 (Site 23)

Prior to the SI, the CSM identified the UXO 7 MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as a debris area where inert ordnance-related items and ammunition cans were reportedly buried on site. Based on the SI field work, surface MEC (M69 incomplete incendiary bomb with residue) was identified in the north-central portion of the site, which is consistent with historical munitions-related findings of MPPEH that had been observed on the surface at the northern end of the site. The source of the MPPEH remains unknown but could be kick-outs from the active EOD range. Additionally, MDAS (M48 series fuze remains and L-60 40-mm cartridge case) were also present on the surface in the northwest and south-central portion of UXO 7. Originally, the main concern of UXO 7 was not the surface, but subsurface as earthen mounds are present within the UXO 7 site boundary and extend to the north and east into the UXO 7B. In the subsurface, UXO 7 EM61-HP and TEM-8g data depict widespread subsurface metallic debris across most of the site, consistent with historic disposal activities; suspected disposal features are consistent with the topographic mounds in the eastern portion of this site containing buried metal. Geophysics data confirm the lateral extent of this feature extends beyond the northern limit of the UXO 7 boundary (i.e., into UXO 7B), as evidenced by TEM-8g data collected when the towed array was turned around, and still collecting data. GPR data indicate suspected buried debris to be within the upper 5 feet of the subsurface and, across the mounds in the eastern portion of the site, indicate an approximate 2- to 2.5-feet thick soil cover atop buried debris. Buried debris appears to extend to depths of between 7.5 feet and 10 feet bgs beneath the mounds. These SI findings support the CSM of a debris area and burial area with both surface and subsurface MEC concerns.

The updated CSM identifies a complete exposure pathway for human receptors to MEC on the ground surface beyond the SI investigation boundary, considering MEC was identified at UXO 3 during the SI; also, subsurface MEC is of potential concern both within and beyond the SI investigation boundary. The site is located within Lower Base. Current and potential future receptors include installation personnel, site workers (no utilities within work area), and site visitors (limited because no reason to visit). If surficial MEC exist at the site beyond the SI investigation boundary, a receptor could contact it through picking it up/direct contact. Because UXO 7 is located nearby the active EOD range; it is unknown if any kickouts from the range impacted UXO 7. Contributions and/or future recontamination of MEC/MPPEH from the EOD range operations kickouts are uncertain but suspected (also see Section 6.1.6 regarding UXO 7B). The most likely scenario for a receptor to encounter subsurface MEC would be through soil-disturbing activities such as construction activities. Munitions items, if present, may be transported by erosion/redeposition, land disturbance such as construction activities, or by persons picking it up/direct contact. Moreover, OU 1 Site A

ICs for groundwater encompass all of UXO 7 and require that excavation permits be obtained for any intrusive activities at the site.

The updated CSM identifies a potentially complete exposure pathway for human and ecological receptors to MC in surface soil. However, the results of the MC sampling effort indicated that site-related MC contamination was not present at the location of the sample with breached MEC, and there was only one breached MEC finding; therefore, MC is not perceived to be a concern in surface soil.

Since exceedances of PSLs were identified during the SI for the demolition pits excavated at UXO 7, and attributable to donor explosives (see Section 5.22), a potential human health risk from subsurface MC is potentially of concern. Current and future receptors overall for UXO 7 include current and future industrial workers, future construction workers, and terrestrial ecological receptors. However, the MC contamination associated with the demolition pits is approximately 4 feet bgs and so current and future industrial workers and ecological receptors would not have an exposure pathway. Within the demolition pit areas, exposure to MC contamination in subsurface soil/groundwater is possible for construction workers during excavation activities through direct contact (i.e., incidental ingestion, dermal contact). The primary subsurface MC of concern would be explosives (HMX and RDX) based on the MC results and type of donor explosives utilized.

Because the PSLs were developed based on most stringent screening criteria, SSLs for groundwater protection were selected as the human health PSL. Examining other more relevant criteria for UXO 7 for human health direct contact suggests that risks are acceptable for the industrial (and residential) receptor as per table provided below; although the ecological PSL for RDX is exceeded, ecological receptors would not be expected to encounter soils at these depths of 36 to 48 inches bgs:

Assessment of Screening Criteria Exceedances for Demolition Pit Samples

Explosives (ug/kg)	Human Health			Ecological PSL[2]	Maximum Demolition Pit Concentration (X7-TP-C02-3648 collected from 36 to 48 inches bgs)
	Resident Soil Direct Contact	Industrial Soil Direct Contact	Protection of Groundwater SSL[1]		
HMX	8,300	38,000	1,300	16,000	**4200**
RDX	3,900,000	57,000,000	0.37	2,300	***65000***

Black shading indicates an exceedances of the Human Health PSL.

Italicized and black shading indicates an exceedances of the Human Health and Ecological PSL.

[1] USEPA Regional Screening Levels risk-based soil screening levels for protection of groundwater were most stringent, therefore, served as the PSL. Direct contact Resident Soil and Industrial Soil shown correlating with carcinogenic values (RDX) represent an incremental cancer risk of 1x10-6, and noncarcinogenic values (HMX) correspond to a hazard quotient of 1.

[2] Ecological screening value selected from the following sources listed in order of preference: Washington State Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals (Table 749-3), Draft Ecological Soil Screening Levels (SERDP, 2012), Draft Ecological Soil Screening Levels (Checkai et al., 2012), Los Alamos National Laboratory (2022), and Region 4 - USEPA Region 4 Soil Screening Levels (March 2018).

6.1.6 UXO 7B (OU 1 Site A)

Prior to the SI, the CSM identified the UXO 7B MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as a debris area, which included an OB/OD area, incinerator for SAA, and blast pit for ordnance detonation. Additionally, UXO 7B surrounds an active EOD training area (excluded from the SI). Based on the SI field work, surface MEC (various projectiles and Mod 1-3 Marine Location Maker) were identified north and south of the EOD training area and MDAS (unknown item MD, various fuzes, various cartridge cases, Mk 19 Mod 1 Exploder MD, unknown Model Bomb MD, Mk 25 Mod 1-3 Marine Location Marker MD, and various projectiles) were identified in the area surrounding the EOD range extending across UXO 7B. A step-out investigation was conducted to the north of the investigation boundary to investigate a debris pile, and MDAS was also found. The source of MEC/MPPEH is unknown and could be the active EOD range, considering that most of MEC/MDAS identified at UXO 7B were scattered around the EOD training area, which indicates there could be kickouts from the EOD training area. To further support this, a piece of MD found during the field work had the following writing scribed on it: “Bangor NBK EOD.”

There have been extensive investigations in the subsurface at OU 1 Site A, which is located within the boundary of UXO 7B. Based on the ICs for groundwater resulting from the previous investigations, only a surface investigation was conducted during the SI; however, during the UXO 7 TEM-8g survey, data were collected beyond the UXO 7 site boundary into UXO 7B because of the need for the towed array to turn around and still maintain coverage at the site. Based on this, some subsurface data are available for UXO 7B in the southwest corner of the site. An SRA was identified in the area underneath the earthen berm within the UXO 7B investigation area in addition to subsurface TOIs (see Section 6.1.5 for UXO 7 for details).

These SI Findings support the CSM of a disposal area and OB/OD with MEC surface and subsurface concerns. Potential impacts to UXO 7B from the EOD range are unknown.

The updated CSM identifies a complete exposure pathway for human receptors to MEC on the ground surface, if present, beyond the SI investigation boundary, considering MEC was identified at UXO 7B during the SI; also, subsurface MEC is of potential concern both within and beyond the SI investigation boundary. The site is located within Lower Base. Current and potential future receptors include installation personnel, site workers (including wastewater treatment plant [WWTP] operation and maintenance,

monitoring well sampling and maintenance, vegetation management, and ICs inspections, and utility maintenance), and site visitors. If surficial MEC exist at the site beyond the SI investigation boundary, a receptor could contact it by picking it up/direct contact. The most likely scenario for a receptor to encounter subsurface MEC (if present within or beyond the SI investigation area) would be through soil-disturbing activities such as construction activities, utility activities, and operations related to the WWTP. Munitions items (if present) may be transported by erosion/redeposition, land disturbance, or by persons picking it up/direct contact.

The updated CSM (see Figure 6-1) identifies a complete exposure pathway for human and ecological receptors to MC in surface soil. However, the results of the MC sampling effort indicated that site-related MC contamination was not present at the location of the sample with breached MEC, and there was only one breached MEC finding; therefore, MC is not perceived to be a concern in surface soil.

6.1.7 UXO 9 (Site OO)

Prior to the SI, the CSM identified the UXO 9 MRS as having the potential for surface MPPEH/MEC to be. Based on the SI field work, only a single MEC (M18 smoke hand grenade) was located on the surface in the northeast portion of the site, which is similar to the historical munitions-related findings (signal flare in its original container (L312) and a smoke grenade found during construction). The SI finding was located near the road/bridge located to the north of the site; it is unknown if the item was disposed of into the wetlands from the road/bridge or if additional items were also disposed in the same manner.

The updated CSM identifies absence of a remaining MEC source and an incomplete exposure pathway remaining for human receptors to MEC in soil because the surface items were removed from the UXO 9 ground surface. The site is located within Lower Base. Current and potential future receptors are mostly the same and include installation personnel, United States Army Corps of Engineers (USACE) ecological management personnel (seeding/tree planting), site workers, installation traffic on adjacent roads, and site visitors (limited; however, there is a walking trail on the west side of the site). Although receptors can access UXO 9, most of the site is wetlands, and receptors accessing the site would be infrequent and would not occur without reason. An additional receptor has been identified for potential future use, harvesting by Tribe, which would entail purposeful access of the site. The most likely scenario for a receptor to encounter subsurface MEC, if present, would be through soil-disturbing activities such as USACE planting activities. Munitions items, if present, may be transported by erosion/redeposition, land disturbance activities, or by persons picking up an item/direct contact. However, UXO 9 is only a surface disposal concern.

Therefore, subsurface contact is unexpected unless a surface MEC sank downward in the marsh, in which case based on the site conditions (wetlands and tidal influences), if MEC is present in the subsurface (unlikely), it could be uplifted to the surface.

6.1.8 UXO 9B (OU 7 Site B)

Prior to the SI, the CSM identified the UXO 9B MRS as having the potential for subsurface MPPEH/MEC as it was designated as a subsurface disposal area. Based on the desktop investigation of UXO 9B, evaluation of historical aerial photographs (see Appendix A-1) and mapping during the MEC QAPP preparation, investigation of this site was eliminated from the SI field investigation. A remedy was previously implemented at OU 7 (i.e., cap and erosion controls) in 1997. Only outdoor recreational land use for short-term, non-intrusive activity is allowed at the site. Additionally, approval is required prior to any intrusive activities (i.e., digging) at the site.

The updated CSM identifies an incomplete exposure pathway for human receptors to MEC in soil because of the remedy currently in place.

6.1.9 UXO 11 (Site 14)

Prior to the SI, the CSM identified the UXO 11 MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as a disposal area for drums and inert ordnance-related items including ammunition cans and boxes. Based on the SI field work, the area of concern was identified as a drum disposal area along the western portion of the site boundary. A step-out investigation was conducted to the west to expand the investigation area to include the remaining portion of the drum pile. Although MEC/MPPEH was not identified during the SI field work, a single MDAS item (Mk 2 40-mm cartridge case) was identified on the surface at the bottom of the inaccessible slope (no MEC was encountered during the SI or historically). There were no ammunition cans and boxes found during the SI, only the single cartridge case. Additionally, a pile of deteriorated drums was also identified along the west-central boundary of UXO 11: some were on the ground surface and others were buried in the near surface. In the subsurface, geophysical survey results indicate the presence of SRAs coincident with known surface obstructions (excessive metal from drum piles not removed during UXO surface survey) and do not indicate a disposal site based on data available to date. These SI findings support the CSM of a surface disposal area for drums; it is suspected that the deteriorated drums were burn barrels. For the MDAS item, however, it is suspected to be a stray item that was thrown down the hillside from the railroad tracks based on its location near the bottom of the hill from the railroad tracks and not in the drum disposal area. Based on the SI activities and UXO surface survey, including step-out investigation, additional MDAS items or MEC (none were

encountered) are not a concern on the ground surface. Also, the absence of MEC (or a multitude of MDAS on the ground surface) and site conditions (the steep hillside) do not suggest a subsurface concern for MEC/MPPEH.

The updated CSM identifies absence of a MEC source, an incomplete exposure pathway for human receptors to MEC on the ground surface because of the UXO surface survey of UXO 11, and unlikelihood of MEC in the subsurface.

6.1.10 UXO 11B (Site 8)

Prior to the SI, the CSM identified the UXO 11B MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as a disposal area for inert ordnance-related items including ammunition cans and propellent tanks. Based on the SI field work, an area of concern was identified on historical aerial photos as a former disposal area, which was located in the central portion of the site. Additionally, piles of ammo cans and shipping containers were identified on the surface in the south-central and southern portions of the site, respectively, and demilitarized recharacterizing the items as NMRD (see Section 5.12.3). Although MEC was not identified, a single MDAS item (Mk 2 cartridge case) was identified on the surface near the ammo cans. The recovered ammo cans and shipping containers identified were similar to the historical munitions-related findings (ammunition box). Also, inaccessible items were observed remaining in an underground pit at the site (which is also a cultural site) leading to a subsurface structure that could not be safely inspected and so it is uncertain if MEC/MPPEH is present (ammo cans were observed during the SI). In the subsurface, geophysical survey results indicate the presence of SRAs coincident with known surface obstructions (excessive metal debris piles not removed during UXO surface survey, or cultural sites) and do not indicate a disposal site based on data available to date; the underground pit was not surveyed. These SI findings support the CSM of a surface disposal area with a subsurface disposal concern present in the underground pit.

Based on the SI activities and UXO surface survey, except for the underground pit and under shipping containers, additional MDAS items or MEC (none were encountered during the SI) are not a concern on the ground surface. Although the UXO 11B ground surface was largely surveyed during the SI, there is a possibility that MEC/MPPEH may be present on the ground surface under the pile of shipping piles. Also, there is a possibility that MEC/MPPEH is present in the subsurface, mixed within the remaining ammo cans, and possibly other items, in the subsurface structure of the underground pit. The underground pit is a subsurface concern with direct accessibility, albeit unsafe, from the ground surface without the need for intrusive means. However, the absence of

MEC and only a single MDAS finding during the SI, versus a multitude of MDAS on the ground surface, suggests that neither surface or subsurface MEC would be anticipated.

The updated CSM identifies absence of a MEC source and an incomplete exposure pathway for human receptors to MEC at the ground surface because of the largely completed UXO surface survey at UXO 11B. However, a potential MEC source, if present, is possible but unlikely under shipping containers or within the underground pit. Current and potential future receptors for Lower Base include installation personnel, site workers, and site visitors (limited because no reason to visit). If MEC exists at the site (none were encountered during the SI) at the ground surface under piles of shipping containers or in the underground pit within the remaining pile of ammo cans, a receptor could contact by picking it up/direct contact. Munitions items, if present, could also be transported by land disturbance such as construction activities.

6.1.11 UXO 12 (Site HH)

Prior to the SI, the CSM identified the UXO 12 MRS as having the potential for surface MPPEH/MEC as it was designated as a single railcar siding, which was used to store munitions items. Based on the SI field work, MEC and MDAS were not identified on the surface at the site, which indicates that the barricade siding could have been used to temporarily store munitions items in a railcar; however, items were not disposed of within the siding. This is supported by the lack of any MEC/MDAS findings historically within the siding.

The updated CSM identifies absence of a MEC source and an incomplete exposure pathway for human receptors to MEC on the ground surface because of the lack of munitions-related findings at UXO 12.

6.1.12 UXO 13 (Site 4)

Prior to the SI, the CSM identified the UXO 13 MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as a former OB/OD and disposal area for fuzes and other unspecified objects. Based on the SI field work, MEC and MDAS were not identified on the surface at the site. Based on previous investigations conducted at the site, there was no evidence that historical ordnance testing or inorganics associated anthropogenic activities were found at the site. Aerial photograph analysis conducted indicates that UXO 13 has been redeveloped extensively throughout the years. During the PA site visit, the site was identified to be entirely paved except for very near the shoreline. In the subsurface, geophysical survey results did not indicate SRAs or other features consistent with a disposal site. Moreover, historically during the OU 7 RI/FS (including biased 3 test pits in suspect areas of the site allegedly where holes were located as the result of disposal of ordnance ignition devices), no MEC

hazard or MC issue were identified. Therefore, MEC/MPPEH presence is not indicated based on data collected to date. Based on the SI findings and the extensive redevelopment of the site, munitions-related concerns no longer exist at the site.

The updated CSM identifies absence of a MEC source and an incomplete exposure pathway for human receptors to MEC for both the ground surface and the subsurface based on historical information and the lack of munitions-related findings at UXO 13 during the SI investigation.

6.1.13 UXO 14 (Site JJ)

Prior to the SI, the CSM identified the UXO 14 MRS as having the potential for surface MPPEH/MEC because it was designated as a single railcar siding, which was used to temporarily store munitions items in a railcar. MEC and MDAS were not identified at the site during SI field work, which indicates that the barricade siding could have been used to store munitions items; however, munitions-related items were not disposed of within the siding. This is supported by the lack of any MEC/MDAS findings historically within the siding.

The updated CSM identifies absence of a MEC source and an incomplete exposure pathway for human receptors to MEC on the ground surface because of the lack of munitions-related findings at UXO 14.

6.1.14 UXO 17 (Site 2)

Prior to the SI, the CSM identified the UXO 17 MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as a classification yard and storage and disposal area. Based on the SI field work, MEC (Mk 6 unknown Mod 5 inch Warhead, Mk 38 Mod 3 Special Common 5 inch projectile and Mk 46 Mod 2 Special Common 5 inch projectile) and MDAS (various types of cartridge cases and Mk 6 Mod 7 practice 5 inch warhead) were found on the ground surface, which were similar to the historical munitions-related findings (40-mm, 57-mm anti-tank rounds, M168 bomb fuzes, 5 inch shells, 3 inch shells, and small arms). Although surface items were removed from the UXO 17 ground surface during the SI, the extent has not been determined, particularly for the northern end of the SI investigation area to the north and east.

In the subsurface, EM61-HP and TEM-8g geophysical survey results depict large areas of SRAs, which appear to be consistent with a former disposal site; data suggest that debris was disposed in pits or trenches or was subjected to earthwork activities. Moreover, metallic debris was observed protruding from the ground in the northern portion of the site. Delineated SRAs indicate a high-response area in the DGM data in

the SI investigation area. GPR geophysical survey results, focused in the central and northern portions of UXO 17, show in the northwest portion of the site collected closest to the northwest site boundary, debris at the top of the slope is approximately 5 feet bgs. For all other GPR survey locations collected within the site, the GPR data suggest the top of the buried debris is relatively shallow at approximately 2 to 2.5 feet bgs. The GPR data and observations during field work indicate the site was subjected to earthwork activities, with materials likely pushed towards the north and eastern portion of the site during re-development since its prior use as a disposal area. GPR geophysical data results suggest that likely undisturbed soils range from approximately 5 to 10 feet bgs, although it is possible that the water table is within this depth interval, which would impact data mapping (existing site-specific hydrogeologic information reportedly indicates the presence of a perched water table at UXO 17). Aerial photograph analysis and historical investigations conducted indicate that the site has been reworked over the years. Specifically, the northern portion of UXO 17, has been reworked during the Site 2 cleanup efforts. As shown on Figure 5-22, the topography of UXO 17 has changed from 1949 to present day conditions. The northern portion of UXO 17 is extensively sloped with the northernmost corner at a higher elevation than 1949 site conditions. These SI findings support the CSM of a storage and disposal area with both surface and subsurface concerns.

The updated CSM identifies a complete exposure pathway for human receptors to MEC on the ground surface, if present, beyond the SI investigation boundary, considering MEC was identified at UXO 17 during the SI; also, subsurface MEC is of potential concern both within and beyond the SI investigation boundary. Current and potential future receptors for this Upper Base MRS include installation personnel (including crane testing and dog training), site workers (including those performing utility maintenance and vegetation management of the ballfield), and site visitors (general public and recreational uses [ballfields/walking trail]). If surficial MEC/MPPEH exist at the site, beyond the SI investigation boundary, a receptor could contact by picking it up/direct contact. The most likely scenario for a receptor to encounter subsurface MEC (if present within or beyond the SI investigation boundary) would be through soil-disturbing activities such as construction activities. Munitions items, if present, may be transported by erosion/redeposition, land disturbance such as construction activities, or by persons picking it up/direct contact. In fact, during the SI geophysical surveying at this MRS, following the UXO survey of the SI investigation area, one MPPEH item was found to have lifted from the subsurface to the ground surface (during geophysical surveying).

6.1.15 UXO 17B (Site 1)

Prior to the SI, the CSM identified the UXO 17B MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as rail car sidings where

temporary storage of munitions items in railcars and loading/unloading of munitions occurred. Additionally, disposal of building rubble and metal scrap, including debris from a former offsite metallurgy laboratory, and disposal of Polaris missile motors reportedly occurred in the subsurface of the site. Based on the SI field work, only a single MDAS item (M212 practice cartridge case) was identified on the surface in the northern portion of the site. In the subsurface, geophysical survey results indicated the presence of widespread subsurface metallic debris across most of the site; however, it is assumed to be from non-MEC/MPPEH sources. Review of historical information regarding disposal at UXO 17B of debris from former metallurgy building indicates that the debris was demolition rubble from the building (brass shell casings were tested in the building) with no evidence of ordnance disposal, as per the Site 5/OU 5 RI/FS. The CSM supports that the single MDAS item identified likely can be attributed to the historical use of the sidings for loading and unloading munitions. Based on the SI activities and UXO surface survey, additional MEC/MDAS items are not anticipated to be a concern on the ground surface.

The updated CSM identifies absence of a munitions source and an incomplete exposure pathway for human receptors to MEC on the ground surface because of the UXO surface survey that was conducted at UXO 17B sidings. Also, historical research, the absence of MEC or a multitude of MDAS on the ground surface, and similar site UXO 17C findings, do not indicate a subsurface concern for MEC.

6.1.16 UXO 17C (Site BB)

Prior to the SI, the CSM identified the UXO 17C MRS as having the potential for surface MPPEH/MEC as it was designated as railcar sidings, which were used to store munitions items in railcars. (Two sidings at UXO 17C are currently in use on the south side of the site and were eliminated from the SI.) During the SI field work, UXO sweeps were conducted at each of the sidings; MEC and MDAS were not identified at the site, which indicates that the barricade sidings likely were used to store munitions items in railcars; however, there is no evidence that munitions items were disposed of within the sidings. This is also supported by the lack of any MEC/MDAS findings historically within the siding.

The updated CSM identifies absence of a munitions source and an incomplete exposure pathway for human receptors to MEC on the ground surface because of the lack of munitions-related findings during the UXO surface survey that was conducted at UXO 17C sidings. Also, historical research, the absence of MEC/MDAS on the ground surface, and similar site UXO 17B findings, do not indicate a subsurface concern.

6.1.17 UXO 17D (Site 13)

Prior to the SI, the CSM identified the UXO 17D MRS as a former brass yard recommending additional documents/records be researched to better define the site location, site history, and use. Based on the desktop investigation of UXO 17D, evaluation of historical aerial photographs (see Appendix A-1) and mapping during the MEC QAPP preparation, investigation of this site was eliminated from the SI field investigation because the area of concern is located in a highly developed area, and any potential munitions on site would have been identified during development of the area.

The updated CSM identifies absence of a munitions source and an incomplete exposure pathway for human receptors to MEC on either the ground surface or in the subsurface, based on the extensive development of the area, which would have removed munitions-related concerns, if any, at that time.

6.2 Screening Level Hazard Assessments

This section presents the screening level hazard assessments conducted for the NBK Bangor MRSs using historical data and data collected during the SI. The methodologies applied during these screening level hazard assessments correspond to the known or suspected MEC releases at the MRSs. Only those MRSs with confirmed MEC releases were subject to a preliminary MEC Hazard Assessment (MEC HA) that can be updated if or when additional data is collected during future investigation activities of those sites. The MRSs where a MEC release has not been confirmed and the SI results indicate that a MEC release was unlikely were subject to a qualitative hazard evaluation. For several of the MRSs where no MEC was encountered but the extensive presence of MDAS suggests a MEC release is possible, additional investigation data are needed to appropriately evaluate the explosive hazards potentially present.

6.2.1 MEC Hazard Assessments

The qualitative hazard assessment technique used for the MRSs where a MEC release has been confirmed follows the MEC HA method, which assesses the acute explosive hazards associated with remaining MEC at an MRS by analyzing site-specific conditions and human issues that affect the likelihood that a MEC accident will occur. The MEC HA method focuses on hazards to human receptors and does not directly address environmental or ecological concerns that might be associated with MEC. The process for conducting the MEC HA is described in the MEC HA interim guidance document (USEPA, 2008) and uses input from: historical documentation; field observations made

during this SI and previous studies; and results of the intrusive investigations conducted during previous investigations and this SI. The MEC HA results are qualitative references only and do not represent quantitative measures of explosive hazard at any of the NBK Bangor MRSs.

The MEC HAs presented in this report were conducted to establish a preliminary assessment of the explosive hazard for the MRSs where MEC has been encountered. The MEC HA results are considered preliminary because they will likely change when the nature and extent of MEC impacts are characterized during future investigations, where recommended. Appendix H-1 of this report provides the MEC HA results for the applicable MRSs, which are also briefly summarized in the following sections.

6.2.1.1 Overview of the MEC HA Primary Input Factors

Under the MEC HA method, the potential hazards posed by MEC are characterized qualitatively by evaluating three primary factors. These primary factors are related to the three critical elements of a potentially complete MEC exposure pathway:

- Severity – the potential consequences to a human receptor should MEC detonate.
- Accessibility – the likelihood that a human receptor will be able to encounter MEC.
- Sensitivity – the likelihood that MEC will detonate if a human receptor interacts with it.

To complete the preliminary MEC HAs for the applicable MRSs, the various input factors were reviewed, and suitable categories were selected based on historical documentation and field observations made during the SI and previous studies. These input factors included such details as energetic material type, site accessibility, potential receptor contact hours, and MEC classification/size. Each category for each of the MEC HA input factors has an assigned score that relates to the relative contributions of the different input factors to the overall MEC hazard.

6.2.1.2 Overview of the MEC HA Output Factors

Once the categories and scores for input factors were determined for the applicable MRSs, the related scores for each category were totaled to calculate an overall MEC HA score. Scores for the categories are in multiples of five, with a total maximum possible score for all factors of 1,000 and a minimum possible score of 125. These MEC HA scores are qualitative references only and should not be interpreted as

quantitative measures of explosive hazard. The MEC HA method describes associated hazard levels for these scores, which range from 1 (highest) to 4 (lowest).

6.2.2 Qualitative Hazard Evaluations

The MRSs where a MEC release has either not been confirmed or the presence of MPPEH suggest a release is possible were subject to a qualitative hazard evaluation to assess the potential explosive hazards at the MRS. The purpose of these hazard evaluations is to qualitatively determine whether a potential hazard is present at the MRS and the primary causes of that potential hazard. The hazard evaluations presented are based on the historical research and data generated during the SI.

The approach for evaluating the magnitude of the potential explosive hazard involves evaluating site-specific CSM data to relate accessibility, munitions sensitivity, and the severity of an explosive event if it were to occur. The evaluation includes the following qualitative considerations:

- The likelihood of a receptor to encounter MEC based on the amount potentially present and the accessibility of the site.
- The likelihood MEC will detonate based on the sensitivity of the MEC potentially present and the energy imparted on the MEC by the receptor.
- The severity of the explosive incident based on the properties of the MEC potentially present.

6.2.3 Screening Level Hazard Evaluation Results

The following sections present the screening level hazard assessment results for those six MRSs where MEC was documented; information is also provided explaining why MEC HAs were not conducted for each of the remaining MRSs.

6.2.3.1 UXO 2 (Site CC)

The presence of hundreds of MDAS items suggests the possibility that MEC may be present beyond the SI investigation boundary or under shipping containers within the SI investigation boundary; however, no MEC was encountered during the SI and so a MEC HA was not prepared. Additional data is needed to evaluate the explosive hazard.

6.2.3.2 UXO 3 (Site D)

The explosive hazard at UXO 3 was characterized using the MEC HA method described in Section 6.2.2. Table 6-2 summarizes the results of the preliminary MEC HAs for the current land uses for the MRS; future use is presumed the same as current use,

considering the site has an informal IC boundary over most of the site, considering the site is a wetlands and should remain so. Based on the MEC HA characterization, UXO 3 has a total MEC HA score of 750, which corresponds to a hazard level of 2.

6.2.3.3 UXO 4 (Site 9)

The presence of previously encountered MPPEH and MDAS encountered during the SI suggests that MEC may be present in the MRS; however, no MEC was encountered during the SI and so a MEC HA was not prepared. Additional data is needed to evaluate the explosive hazard.

6.2.3.4 UXO 6 (Site 22)

The explosive hazard at UXO 6 was characterized using the MEC HA method described in Section 6.2.2. Table 6-2 summarizes the results of the preliminary MEC HAs for the current land uses for the MRS; future use is presumed the same as current use, considering that the site is located in a highly secure area, and the inaccessibility of the portion of UXO 6 with steep slope, which is of little use. Based on the MEC HA characterization, UXO 6 has a total MEC HA score of 560, which corresponds to a hazard level of 3.

6.2.3.5 UXO 7 (Site 23)

The explosive hazard at UXO 7 was characterized using the MEC HA method described in Section 6.2.2. Table 6-2 summarizes the results of the preliminary MEC HAs for the current land uses for the MRS; future use is presumed the same as current use, considering ICs for groundwater. Based on the MEC HA characterization for the current land use, UXO 7 has a total MEC HA score of 560, which corresponds to a hazard level of 3.

6.2.3.6 UXO 7B (Site OU 1 Site A)

The explosive hazard at UXO 7B was characterized using the MEC HA method described in Section 6.2.2. Table 6-2 summarizes the results of the preliminary MEC HAs for the current land uses for the MRS, future use is presumed the same as current use, considering implemented ICs and land use restrictions. Based on the MEC HA characterization, UXO 7B has a total MEC HA score of 780, which corresponds to a hazard level of 2.

6.2.3.7 UXO 8 (Site NN)

The presence of previously encountered MPPEH prior to the SI suggests that MEC may be present in the MRS; however, this has not been confirmed through the data collected

to date and so a MEC HA was not prepared. As such, additional data are needed to evaluate the explosive hazard presented by any potential MEC within the MRS.

6.2.3.8 UXO 9 (Site OO)

The explosive hazard at UXO 9 was characterized using the MEC HA method described in Section 6.2.2. Table 6-2 summarizes the results of the preliminary MEC HAs for the current land uses for the MRS; future use is presumed the same as current use, considering the site is a wetlands. Based on the MEC HA characterization, UXO 9 has a total MEC HA score of 515, which corresponds to a hazard level of 4.

6.2.3.9 UXO 9B (OU 7 Site B)

There is no unacceptable explosive hazard at UXO 9B because of the remedy implemented under the ROD (URS Consultants, Inc., 1996a). A MEC HA was not prepared.

6.2.3.10 UXO 10 (Site 12)

The presence of previously encountered MPPEH suggests that MEC may be present in the MRS; however, this has not been confirmed through the data collected to date and so a MEC HA was not prepared. As such, additional data are needed to evaluate the explosive hazard presented by any potential MEC within the MRS.

6.2.3.11 UXO 11 (Site 14)

The presence of MDAS encountered during the SI suggests that MEC may be present in the MRS; however, no explosive hazard was identified during SI, or historically, and MEC presence is not indicated based on data available to date. Geophysics data do not indicate a disposal site. Deteriorated drums on site are believed to be burn barrels. A MEC HA was not prepared.

6.2.3.12 UXO 11B (Site 8)

The presence of MDAS encountered during the SI suggests that MEC may be present in the MRS; however, no explosive hazard was identified during SI, or historically, and MEC presence is not indicated based on data available to date. Geophysics data do not indicate a disposal site. A MEC HA was not prepared.

6.2.3.13 UXO 12 (Site HH)

The results of the SI indicate that a MEC release has not occurred at UXO 12. As such, there is no unacceptable explosive hazard at the MRS. A MEC HA was not prepared.

6.2.3.14 UXO 13 (Site 4)

No explosive hazard was identified during the SI. Also, no explosive hazard was identified historically during the OU 7 RI/FS (including biased 3 test pits in suspect areas of the site allegedly where holes were located as the result of disposal of ordnance ignition devices) and no remedial action was warranted for OU 7 for either MEC hazard or MC. Geophysics data do not indicate a disposal site. Therefore, MEC/MPPEH presence is not indicated based on data collected to date. A MEC HA was not prepared.

6.2.3.15 UXO 14 (Site JJ)

The results of the SI indicate that a MEC release has not occurred at UXO 14. As such, there is no unacceptable explosive hazard at the MRS. A MEC HA was not prepared.

6.2.3.16 UXO 15 (Site KK)

The presence of previously encountered MPPEH suggests that MEC may be present in the MRS; however, this has not been confirmed through the data collected to date and so a MEC HA was not prepared. As such, additional data are needed to evaluate the explosive hazard presented by any potential MEC within the MRS.

6.2.3.17 UXO 16 (Site LL)

The presence of previously encountered MPPEH suggests that MEC may be present in the MRS; however, this has not been confirmed through the data collected to date and so a MEC HA was not prepared. As such, additional data is needed to evaluate the explosive hazard presented by any potential MEC within the MRS.

6.2.3.18 UXO 17 (Site 2)

The explosive hazard at UXO 17 was characterized using the MEC HA method described in Section 6.2.2. Table 6-2 summarizes the results of the preliminary MEC HAs for the current land uses for the MRS; future use is presumed the same as current. Based on the MEC HA characterization for the current land use, UXO 17 has a total MEC HA score of 600, which corresponds to a hazard level of 3.

6.2.3.19 UXO 17B (Site 1)

No explosive hazard was identified during SI, or historically, and MEC/MPPEH presence is not indicated based on data available to date. SI geophysics indicates widespread buried metallic debris; however, it is assumed to be from non-MEC/MPPEH sources. Review of historical information regarding disposal at UXO 17B of debris from former metallurgy building indicates that the debris was demolition rubble from the building (brass shell casings were tested in the building) with no evidence of ordnance

disposal, as per the Site 5/OU 5 RI/FS. The procedure involved heating casings coated with mercurous nitrate and apparently reduced and volatized the mercury, which condensed on the walls of the building. The results of the various historical analyses conducted at UXO 17B railroad sidings, including soil, groundwater, and surface water did not indicate the presence of mercury above natural background concentrations or PSLs. The results of the long-term vapor monitoring indicated the presence of low concentrations of mercury. Based on the Site 5/OU 5 risk evaluation results, no further action was required, and a FS was not prepared. As documented in the OU 5 ROD, the selected remedial action at OU 5 was the no action alternative. A MEC HA was not prepared.

6.2.3.20 UXO 17C (Site BB)

No explosive hazard was identified during SI, or historically, and MEC/MPPEH presence is not indicated based on data available to date. Also, similar site UXO 17B findings do not indicate MEC concerns, which were also considered for UXO 17C decision making. A MEC HA was not prepared.

6.2.3.21 UXO 17D (Site 13)

The reported site use as a former brass yard suggests that any MPPEH released in the MRS would likely be limited to empty cartridge casings. These casings would not pose an explosive hazard. While the potential that MEC may have inadvertently been comingled with these casings cannot be ruled out, it is an unlikely scenario. Furthermore, the site development that has occurred in the MRS would likely have resulted in the removal of any MPPEH that was released. If any MPPEH was not removed, the existing infrastructure (i.e., buildings, roads, parking lots, etc.) serves as a barrier for any receptors to encounter the MPPEH. Because there is a low likelihood that an explosive hazard is present in the MRS and a low likelihood that any receptors will encounter any potential residual MPPEH, there are no unacceptable explosive hazards at UXO 17D. A MEC HA was not prepared.

6.3 Munitions Response Site Prioritization Protocol

The Munitions Response Site Prioritization Protocol (MRSPP) assigns a relative priority for munitions response actions based on the overall conditions at an MRS. The MRSPP requires the DoD to do the following:

- Apply the protocol to each MRS under its control and assign the MRS a relative priority.

- Use the MRS priority and consider other factors (e.g., stakeholder, economic, programmatic) to sequence munitions response actions.
- Fulfill specific procedural and administrative requirements (e.g., QA, documentation, reporting, reviewing).

The MRSPP priority ratings range from Priority 1 (highest) to Priority 8 (lowest). The MRSPP data for the 17 MRSs at NBK Bangor is provided in Appendix H-2.

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7.0 Conclusions and Recommendations

The objective of this SI was to assess and verify the absence or presence of MPPEH and determine the next step forward recommendations at each of the 17 individual sites fully studied for the SI. The SI objective was met. The remaining four sites, which were removed from the SI munitions related portion of the field work scope (biological surveys and cultural surveys portion of the SI field work were conducted), will be investigated under the SI during a second phase of field work beginning in Spring 2023 and documented in an SI Addendum. A summary of the SI results, data gaps identified, and recommendations are included in Table 7-1.

7.1 UXO 2 (Site CC)

The SI results confirmed the CSM of a disposal site at UXO 2 with surface munitions related concerns.

MDAS was encountered both before the SI (40-mm and .50 caliber casings; ammunition containers labelled explosive D, RDX, smokeless powder, and TNT; and a potential smoke pot) and during the SI (660 MDAS items, including 582 Mark (MK) 2/3 40-mm cartridge cases and 78 unknown model 20-mm cartridge cases; and shipping containers). MDAS encountered during the SI was located in the southern portion of UXO 2, and the surface extent of additional munitions-related items farther to the south is unknown. Also, there is a possibility that MEC/MPPEH may be present on the ground surface beneath the shipping containers demilitarized during the SI that were subsequently left in place on site as NMRD.

Recommendation for an RI will be reevaluated based on the results of the 2023 field work and will be presented in an addendum to this report.

7.2 UXO 3 (Site D)

The SI results confirmed the CSM of an OB/OD site at UXO 3 with surface and subsurface munitions related concerns.

Historically, munitions-related items (.30-caliber and 20-mm munitions related materials) have been identified at the site, and historical accounts report thousands of photoflash bombs being detonated at UXO 3. During the SI, 14 MEC and 402 MDAS items were encountered over the surface of the entire site, with most of the items found being AN-M46 Photoflash Bombs. Although surface items were removed from the UXO 3 ground surface during the SI, the extent has not been determined in any direction beyond the SI investigation boundary; and considering the site history and multitude of MEC/MDAS

encountered, MEC/MPPEH is likely present beyond the current UXO 3 SI investigation boundary.

Also, it is likely that MEC/MPPEH may be present in the subsurface considering site history, geophysical survey results, and marshy site conditions leading to possible erosion/redeposition between surface and subsurface MEC. In fact, during the SI, one MPPEH item resurfaced during geophysical surveying following the UXO survey of the SI investigation area.

The qualitative, preliminary MEC HA resulted in a score of 750 (Level 2), which is consistent with the weight of evidence evaluation of UXO 3 as an explosive hazard.

Additionally, based on the MC sampling results, exceedances of the PSLs for select explosives were detected at some of the MC sampling locations (i.e., incinerator area and areas where there were breached MEC and/or MDAS items). It is uncertain if human health and ecological overall risks from point source MC contamination is acceptable or not.

Recommendation for an RI will be reevaluated based on the results of the 2023 field work and will be presented in an addendum to this report.

7.3 UXO 4 (Site 9)

The SI results confirmed the CSM of a disposal area at UXO 4 with surface and subsurface munitions related concerns, although the possibility of MEC is uncertain (none were encountered during the SI).

Historically, a munitions-related item (40-mm projectile) was identified at the site, and during the SI, 101 MDAS items (1 M25 Dummy 40-mm Cartridge, 6 unknown Fuze/Fuze adaptors MD, 40 unknown various MD, and 54 AN-M109A1/AN-M103A1 Fin Assemblies, and 1 M25 Dummy 40-mm Cartridge; and various debris piles) were encountered in the portion of the site located south of the road bisecting the site. Although surface items were removed from the UXO 4 ground surface during the SI, except for beneath the trash piles and shipping containers, extent has not been determined, particularly to the south and west of the SI investigation area. Also, there is a possibility that MEC/MPPEH may be present on the ground surface under the demilitarized shipping containers and trash pile left in place on site during the SI. Considering the site history and multitude of MDAS encountered, MEC/MPPEH may be present beyond the current UXO 4 SI investigation boundary.

Also, it is possible that MEC/MPPEH may be present in the subsurface considering site history, although SI geophysical survey results are unresolved. Geophysical survey

results indicate the presence of widespread metallic debris across most of the site, consistent with historical disposal activities; moreover, SRAs in the data suggest that subsurface concerns extend beyond the current site boundary. However, subsurface anomalies are associated with non-munitions related metallic debris disposed from rail cars or with metallic, mineral-rich ballast rock associated with the rail spur extending along the western edge of the site. Also, the road which bisects the site was constructed after UXO 4 ended operations as a disposal area; it is unknown if any munitions-related items were found during the construction of the road.

An RI is recommended for UXO 4 to determine the nature and extent of explosive hazard.

7.4 UXO 6 (Site 22)

The SI results confirmed the CSM of a disposal area at UXO 6 with surface munitions related concerns.

Historically, munitions-related items (metallic debris, MPPEH including ammunition cans, 40-mm cartridge casings, and various other unopened ordnance storage containers) have been identified at the site. During the SI, a total of six MEC (five unfired Mk 22 percussion primers fitted into empty Mk 2 cartridge cases and one unfired Mk 2 Mod 1 primer from an unknown item) and 10 MDAS items (various unknown pieces of MD) were identified at the top of the hill within the UXO 6 investigation boundary. Additionally, a cascading swath of metal debris, drums, ammo cans, MDAS (various), and MEC (more than 13 items including unfired percussion primers for various caliber artillery cartridge cases) were identified scattered down the steep hillside.

The qualitative, preliminary MEC HA resulted in a score of 560 (Level 3), which overestimates explosive hazard considering the weight of evidence. Specifically, during the SI, a UXO surface survey was conducted for the portion of the site located at the top of the hill that identified and led to the removal of surface MEC that eliminated any exposure to surface MEC. The other portion of the site is the steep hillside, where MEC, MDAS and debris were identified, but the hillside is largely inaccessible to all receptors, except possibly for personnel in training; warning signage was installed during the SI as a deterrence. Regardless of determined removed and remaining explosive hazard, there is potential for recontamination from the active EOD range.

An additional phase of SI is warranted to remove the MEC/MPPEH during the 2023 field work. The recommendation for UXO 6 will be reevaluated based on the results of the 2023 field work and will be presented in an addendum to this report.

7.5 UXO 7 (Site 23)

The SI results confirmed the CSM of a disposal and burial area at UXO 7 with surface and subsurface munitions related concerns.

Historically, unspecified possible MPPEH has been observed on the surface at the northern end of site. During the SI, 1 MEC (M69 incomplete incendiary bomb with residue) and 2 MDAS items (L-60 40-mm cartridge case and broken of remains of a M48 series fuze) were encountered. Although surface items were removed from the UXO 7 ground surface during the SI, extent has not been determined in any direction. Moreover, because UXO 7 is located nearby the active EOD range, it is unknown if any kickouts from the EOD range impacted UXO 7. Past contributions and/or future recontamination of MEC/MPPEH from EOD range operations kickouts are uncertain but suspected. Although any explosive hazard was removed during the UXO surface survey, there is potential for recontamination from the active EOD range.

Also, it is possible that MEC/MPPEH may be present in the subsurface considering site history and geophysical survey results, although SI geophysical survey results are unresolved. Geophysical survey results indicate the presence of widespread metallic debris across most of the site, consistent with historical disposal activities. The suspected disposal features are consistent with the topographic mounds in the eastern portion of this site containing buried metal beneath the mounds. Vertically, geophysics data indicate suspected buried debris to be within the upper 5 feet of the subsurface and, across the mounds in the eastern portion of the site, indicate an approximate 2- to 2.5-feet thick soil cover atop buried debris. Buried debris appears to extend to depths of between 7.5 feet and 10 feet bgs beneath the mounds located in the eastern portion of the site. The nature of the buried metal is unresolved.

The qualitative, preliminary MEC HA resulted in a score of 560 (Level 3), which overestimates the explosive hazard considering surface MEC/MPPEH has been removed.

Based on the MC sampling results, there were no exceedances of the PSLs for explosives at the MC sampling location of breached MEC. However, exceedances of PSLs were identified for the demolition pits excavated at UXO 7 attributable to donor explosives, which were used to conduct the detonations. The PSL exceedances do not present exposure/risk to receptors as OU 1 institutional controls are in place at UXO 7. Although the ecological PSL for RDX was exceeded, ecological receptors would not be expected to encounter soils at these depths (36 to 48 inches bgs).

Although any explosive hazard was removed during the UXO surface survey, there is potential for recontamination from the active EOD range. The presence of subsurface

MEC/MPPEH is unresolved; however, OU 1 Site A ICs for groundwater encompass all of UXO 7 (see Section 5.5.1) and require that excavation permits to be obtained for any intrusive activities at the site. An RI is recommended for UXO 7 to determine the nature and extent of explosive hazard.

7.6 UXO 7B (OU 1 Site A)

The SI results confirmed the CSM of a disposal area and OB/OD at UXO 7B with surface and subsurface concerns.

Historically, no munitions-related findings were identified at the site. During the SI, four MEC (unknown model 40-mm projectile, Mk 2 HE 40-mm projectile, unknown model HE 75-mm projectile, and Mk 25 Mod 1-3 Marine Location Marker) and 43 MDAS items (one unknown model bomb MD, one Mk 19 Mod 1 Exploder Mechanism MD, various cartridge cases, three types of fuzes, and 31 unknown MD) were encountered.

Also, it is possible that MEC/MPPEH may be present in the subsurface considering site history and geophysical survey results from adjacent UXO 7 SI investigation area (see Section 7.5) that extended into UXO 7B. Also, earthen mounds are present within the UXO 7B SI investigation area that are an extension of those encountered at UXO 7.

The qualitative, preliminary MEC HA resulted in a score of 780 (Level 2), which is consistent with the weight of evidence. The explosive hazard for surface MEC/MPPEH was removed during the SI; however, partially buried MEC was encountered.

Based on the MC sampling results, there were not exceedances of the PSLs for explosives at the MC sampling location for breached MEC.

Although any explosive hazard was removed during the UXO surface survey, there is potential for recontamination from the active EOD range. The presence of subsurface MEC/MPPEH is unresolved; however, OU 1 Site A ICs/land use restrictions encompass the entire UXO 7B, restricting groundwater use and include a soil cover to maintain the leach basin liner, which is located within a portion of UXO 7B. Additionally, excavation permits are to be obtained for any intrusive activities at the site. The institutional and engineering controls for OU 1 Site A encompassing most of UXO 7B (see Section 5.6.1). An RI is recommended for UXO 7B to determine the nature and extent of explosive hazard.

7.7 UXO 9 (Site OO)

The SI results do not support the CSM of UXO 9 having munitions related concerns associated with reported use as a potential burn or disposal site. Prior to the SI, UXO 9

was initially identified as having the potential for surface MEC to be present. During the SI, only a single MEC (M18 smoke hand grenade) was located on the surface in the northeast portion of the site, which is similar to the historical munitions-related findings (signal flare in its original container [L312] and a smoke grenade found during construction). Additionally, the SI finding was located near the road/bridge located to the north of UXO 9; it is suspected that the item was disposed of into the wetlands from the road/bridge.

The qualitative, preliminary MEC HA resulted in a score of 515 (Level 4), which overestimates the explosive hazard, considering that the UXO surface survey was completed for the entirety of UXO 9 accessible area during the SI.

The ICs for OU 1 Site A cover a portion of UXO 9 (see Section 5.8.1). Further recommendation for UXO 9 is pending resolution of Navy internal discussions and will be presented in the SI addendum.

7.8 UXO 9B (OU 7 Site B)

A remedy was implemented at OU 7 (i.e., cap and erosion controls) in 1997 (Battelle, 2017) and a ROD is in place. The cap covers the entirety of UXO 9B and approval is required prior to any intrusive activities (i.e., digging) at the site (URS Consultants, Inc., 1996a). Based on the desktop investigation of UXO 9B, evaluation of historical aerial photographs and mapping, investigation of this site was eliminated from the SI field investigation.

The OU 7 remedy and ROD adequately addresses explosive hazard UXO 9B. Therefore, no further action is recommended for UXO 9B. Additionally, the ICMP addresses OU 7 adequately without need for revision.

7.9 UXO 11 (Site 14)

Prior to the SI for UXO 11, the CSM concern was related to surface and subsurface disposal of drums, and inert ordnance related items including ammunition cans and boxes at UXO 11, suggesting a possible explosive hazard could also be present from unknown MEC. However, there were no ammunition cans and boxes found during the SI. No MEC was found, only the single cartridge case. There was no evidence of an explosive hazard.

Historically, a single ammunition can was observed during the PA and metal drums fragments were identified during the September 2019 site visit. During the SI, completed UXO surface survey was conducted of accessible areas and only one MDAS item (Mk2 40-mm cartridge case) was encountered at the ground surface and a pile of

deteriorated drums believed to be burn barrels were identified. For the MDAS item, it is suspected to be a stray item that was thrown down the hillside from the railroad tracks based on its location near the bottom of the hill from the railroad tracks and not in the drum disposal area. Considering that UXO surface survey was completed for the entirety of UXO 11 accessible area during the SI, additional munitions related items are not expected.

In the subsurface, geophysical survey results indicate the presence of SRAs coincident with non-munitions related surface obstructions (i.e., burn barrel drums and cultural features) and do not indicate a disposal site based on data available to date. Also, the absence of MEC (or a multitude of MDAS on the ground surface) and site conditions (the steep hillside) do not suggest a subsurface concern for MEC/MPPEH.

No further action is recommended for UXO 11.

7.10 UXO 11B (Site 8)

Prior to the SI for UXO 11B, the CSM concern was related to surface and subsurface disposal of inert ordnance-related items, including ammunition cans and propellent tanks, suggesting a possible explosive hazard could also be present from unknown MEC. The SI results confirmed surface disposal of ammo cans and shipping containers; however, there was no evidence of any explosive hazard. Limited subsurface concerns for possible MEC/MPPEH were noted associated with the visible underground pit leading to a subsurface structure.

Historically, an ammunition box was observed on the surface during the PA. During the SI, one MDAS item (Mk 2 cartridge case) was identified on the surface near a pile of ammo cans. Additional unknown items are visible from the surface within the underground pit structure that could not be safely inspected. Additionally, a pile of shipping containers was found near the southern boundary of the investigation area. Although surface items were removed from the UXO 11B ground surface during the SI, there is a possibility that MEC/MPPEH may be present on the ground surface under the pile of shipping piles and/or mixed within the remaining ammo cans in the subsurface structure of the underground pit. Shipping piles and accessible ammo cans were demilitarized during the SI and subsequently left on site as NMRD.

In the subsurface, geophysical survey results indicate the presence of SRAs coincident with non-munitions related surface obstructions (i.e., burn barrel drums and cultural features) and do not indicate a disposal site based on data available to date; the underground pit was not surveyed. Although the absence of MEC (or a multitude of MDAS on the ground surface) do not suggest a subsurface concern for MEC for most of

the site, the underground pit is a subsurface concern with direct accessibility, albeit unsafe, from the surface without the need for intrusive means.

An interim action is recommended for UXO 11B to address observed but inaccessible MPPEH remaining in the underground pit, which is subsurface but accessible from the ground surface. Site-specific safety procedures addressing confined space entry would need to be implemented in order to safely remove the subsurface items.

7.11 UXO 12 (Site HH)

The SI results did not confirm the CSM of a disposal site at UXO 12 with surface munitions related concerns. Historically and during the SI, MEC and/or MDAS were not identified. Considering the UXO surface survey was completed for the entirety of UXO 12 during the SI, there are no unacceptable explosive hazards at the MRS.

No further action is recommended for UXO 12.

7.12 UXO 13 (Site 4)

Prior to the SI for UXO 13, the CSM identified the MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as a former OB/OD and disposal area for fuzes and other unspecified objects. The SI results, however, showed no evidence of an explosive hazard.

During the SI, UXO detector-aided UXO surface survey was conducted of all accessible areas within the SI investigation boundary. No munitions related findings (MEC or MDAS) were identified on the ground surface.

In the subsurface, geophysical survey results did not indicate SRAs or other features consistent with a disposal site. Historically during the OU 7 RI/FS (including at 3 test pits biased at locations of alleged ordnance ignition device disposal hoses), no MEC hazard or MC issue were identified. Therefore, MEC/MPPEH presence in the subsurface is not evident. Moreover, aerial photograph analysis conducted indicates that UXO 13 has been redeveloped extensively throughout the years, which resulted in land disturbing activities. If MEC/MPPEH was present in the subsurface, it would have likely been encountered during construction activities.

No further action is recommended for UXO 13.

7.13 UXO 14 (Site JJ)

The SI results did not confirm the CSM of a disposal site at UXO 14 with surface munitions related concerns. Historically and during the SI, MEC and/or MDAS were not identified. Considering the UXO surface survey was completed for the entirety of UXO 14 during the SI, there are no unacceptable explosive hazards at the MRS.

No further action is recommended for UXO 14.

7.14 UXO 17 (Site 2)

The SI results confirmed the CSM of storage and disposal areas at UXO 17 with both surface and subsurface concerns.

Historically, munitions-related items (40-mm, 57-mm anti-tank rounds, M168 bomb fuzes, 5 inch shells, 3 inch shells, and small arms) have been identified at the site. During the SI, 5 MEC (1 Mk 6 unknown Mod 5 inch warhead, 1 Mk 38 Mod 3 Special Common 5 inch projectile, and 3 Mk 46 Mod 2 Special Common 5 inch projectiles) and 15 MDAS items (1 Mk 6 Mod 7 Practice 5 inch warhead and 14 cartridge cases of various types) were encountered; all but one MDAS item was located in the northern portion of the site. Additionally, a trash pile and rebar pit were identified in the northern and central portions of the site, respectively. Although surface items were removed from the UXO 17 ground surface during the SI, the extent has not been determined, particularly for the northern end of the SI investigation area to the north and east. Considering the site history and multitude of MEC/MDAS encountered, MEC/MPPEH may be present beyond the current UXO 17 SI investigation boundary.

Also, it is likely that MEC/MPPEH may be present in the subsurface considering site history, geophysical survey results, and wet site conditions leading to possible erosion/redeposition between surface and subsurface MEC. In fact, during the SI, one MPPEH item resurfaced during geophysical surveying following the UXO surface survey of the SI investigation area. In the subsurface, geophysical survey results depict large areas of SRAs consistent with a former disposal site; data suggest that debris was disposed in pits or trenches or was subjected to spreading due to earthwork activities. Moreover, metallic debris was observed protruding from the ground in the northern portion of the site. Also, delineated SRAs indicate a high-response area in the DGM data in the current SI investigation area. GPR geophysical survey results provide depth information of buried debris, indicating that the site was subjected to earthwork activities, with materials likely pushed towards the north and eastern portion of the site during re-development since its prior use as a disposal area. SI results are supported

by aerial photograph analysis and historical investigations conducted indicate that the site has been reworked over the years.

The geophysical mapping results depict a linear feature bisecting the southern portion of UXO 17 near the current ballfield. The feature is characterized by high-amplitude sensor response and is consistent with an underground pipe (e.g., sewer, stormwater drain culvert, etc.). Both the person portable and towed array mapping results depict this feature in the open portion of Site UXO 17. Near the eastern side boundary, the EM61-HP survey results depict additional sections of underground pipes; the TEM-8g towed array system could not navigate this portion of the site. The depth of the pipe or culvert is not known.

The qualitative, preliminary MEC HA resulted in a score of 600 (Level 3), which is consistent with the weight of evidence. MEC was encountered during the SI with erosion/redeposition potential and the MRS is public accessible.

An RI is recommended for UXO 17 to determine the nature and extent of explosive hazard.

7.15 UXO 17B (Site 1)

Prior to the SI, the CSM identified the UXO 17B MRS as having the potential for surface/subsurface MPPEH/MEC as it was designated as rail car sidings where temporary storage of munitions items in railcars and loading/unloading of munitions occurred. The SI results, however, showed no evidence of an explosive hazard.

Historically, no munitions related items were identified and, during the SI field work, only a single MDAS item (M212 practice cartridge case) was identified on the surface in the northern portion of the site. Considering the UXO surface survey was completed for the entirety of all the UXO 17B sidings during the SI, there is no evidence of an explosive hazard.

The sidings currently contain fill material up to depths of approximately 15 feet. In the subsurface, geophysical survey results indicated the presence of subsurface metallic debris across most of the site; however, it is assumed to be from non-MEC/MPPEH sources. Review of historical information regarding disposal at UXO 17B of debris from former metallurgy building indicates that the debris was demolition rubble from the building (brass shell casings were tested in the building) with no evidence of ordnance disposal, as per the Site 5/OU 5 RI/FS. This is further supported by historical documentation of only inert ordnance constituents disposed of at UXO 17B.

The weight of evidence for UXO 17B absence of an explosive hazard includes: SI results from UXO surface survey of the ground surface for all the sidings (only 1 MDAS item encountered); SI geophysical surveys of the subsurface indicating that anomalies are not likely munitions related; and historical research indicating disposal of only metal/scrap and inert ordnance. Therefore, no further action is recommended for UXO 17B.

7.16 UXO 17C (Site BB)

Prior to the SI, the CSM identified the UXO 17C MRS as having the potential for surface and subsurface MPPEH/MEC as it was designated as rail car sidings where temporary storage of munitions items in railcars and loading/unloading of munitions occurred. The SI results, however, showed no evidence of an explosive hazard.

Historically and during the SI, no munitions-related findings were identified. Considering the UXO surface survey was completed for the entirety of all the UXO 17C sidings during the SI, there is no evidence of an explosive hazard.

The weight of evidence for UXO 17C absence of an explosive hazard includes: SI results from UXO surface survey of the ground surface for all the sidings (no munitions related items were encountered); SI results from similar sidings site UXO 17B (lack of MEC, one MDAS item encountered, and subsurface findings are not likely munitions related); historical research indicating disposal of only debris/waste and inert ordnance; and, for the one siding that is identified as containing fill material and vegetation, the PA noted this siding as containing concrete rubble. Therefore, no further action it is recommended for UXO 17C.

7.17 UXO 17D (Site 13)

Prior to the SI, the CSM identified the UXO 17D MRS as a former brass yard, recommending additional documents/records be researched in order to better define the site location, site history, and use. Based on the SI desktop investigation of UXO 17D, evaluation of historical aerial photographs (see Appendix A-1) and mapping during the MEC QAPP preparation, investigation of this site was eliminated from the SI field investigation. Because the area of concern is in a highly developed area, any potential munitions on site would have been identified during development of the area.

No further action is recommended for UXO 17D.

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TABLES

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Table 1-1: Crosswalk Table

Munitions Response Site	Alternative Site Names
UXO 000002 – Keyport Annex Rail Line (Site CC)	Keyport Annex Rail Line Site CC Keyport Annex Railroad AOC Keyport Annex Railroad Disposal Site
UXO 000003 – Escolar Road OB/OD (Site D)	Escolar Road OB/OD Site D OU 6 Former Ordnance Burning Ground Munitions Burn Area Escolar Road Burning and Disposal Area Site
UXO 000004 – Trigger Ave Disposal (Site 9)	Trigger Avenue Disposal Site 9 Storage Area Trigger Avenue Disposal Area Site
UXO 000006 – Debris Area 2 (Site 22)	Debris Area 2 Site 22 Paint Cans/Drums #2 Debris Area 2 at Site A Debris Area 2 Site
UXO 000007 – Debris Area 1 (Site 23)	Debris Area 1 Site 23 Debris Area 1 at Site A Debris Area 1 Site
UXO 000007B – Site A Debris Area (OU1 Site A)	Site A Debris Area OU1 Site A EOD Test Range Burn Area/EOD Test Range Open Burn and Disposal Area Site
UXO 000008 – Flier/Tang Road Disposal (Site NN)	Flier/Tang Road Disposal Site NN Construction Site Flier/Tng Road Disposal Area Site
UXO 000009 – Cattail Lake/Marsh (Site OO)	Cattail Lake/Marsh Site OO Cattail Lake/Marsh Site
UXO 000009B – Floral Point (OU7 Site B)	Floral Point OU7 Site B Floral Point Disposal Site
UXO 000010 – Dunnage Canyon (Site 12)	Dunnage Canyon Site 12 Site 12 Dunnage Canyon Disposal Area Site
UXO 000011 – Luoto Road Disposal (Site 14)	Luoto Road Disposal Site 14 Luoto Road Disposal Site Disposal Site Site 14 Luoto Road Disposal Area Site
UXO 000011B – Ammunition Can/Tank Disposal Site (Site 8)	Ammunition Can/Tank Disposal Site Site 8 Ammo Cans/Tanks
UXO 000012 – Barricade Siding P-1 (Site HH)	Barricade Siding P-1 Site HH Site HH Barricaded Siding P-1 Site

Table 1-1: Crosswalk Table

Munitions Response Site	Alternative Site Names
UXO 000013 – Site 4 Carlson Spit Disposal (Site 4 Carlson Spit)	Site 4 Carlson Spit Disposal Site 4 Carlson Spit OU 7 Site 4 Carlson Spit Disposal Site
UXO 000014 – Barricade Siding P-2 (Site JJ)	Barricade Siding P-2 Site JJ Site JJ Barricaded Siding P-2 Site
UXO 000015 – Tinian Road Dunnage (Site KK)	Tinian Road Dunnage Site KK Dunnage Yard Site KK Tinian Road Dunnage Area Site
UXO 000016 – Boundary Road Burn Site (Site LL)	Boundary Road Burn Site Site LL Burn Pit Site LL NW Boundary Road Burn Area Site
UXO 000017 – Classification Yard (Site 2)	Classification Yard Site 2 OU 7 Classification Yard Site
UXO 000017B – Western Side Car Barricade (Site 1)	Western Side Car Barricade Site 1 Western Barricaded Railroad Sidings Old Barricaded Rail Sidings Site 1 Western Barricaded Railroad Sidings Site Site 5
UXO 000017C – Eastern Side Car Barricade (Site BB)	Eastern Side Car Barricade Site BB Eastern Barricade Railroad Sidings Site BB Eastern Barricade Railroad Sidings Site
UXO 0000017D – Brass Yard (Site 13)	Brass Yard Site 13 Old Brass Yard Site 13 Brass Yard Area Site

AOC: Area of Concern
EOD: Explosive Ordnance Disposal
OB/OD: Open Burning/Open Detonation
OU: Operable Unit
UXO: Unexploded Ordnance

Table 1-2: Summary of SI Activities by Site

Site Name		Location	Site Size (acres)	Vegetation Clearance	Detector-aided Surface Sweep	Geophysical Survey	Type of Geophysical Survey Coverage						MC Sampling	Step-out Investigation
							EM61-MK2 HP		TEM-8g		GPR			
							Transects	Full Coverage	Transects	Full Coverage	Transects	Full Coverage		
UXO 02	Keyport Annex Rail Line (Site CC)	Keyport Annex	19	✓	✓	---	---	---	---	---	---	---	---	✓
UXO 03	Escolar Road OB/OD (Site D)	Lower Base	37	✓	✓	✓	✓	---	---	✓	---	---	✓	---
UXO 04	Trigger Ave Disposal (Site 9)	Upper Base/ Lower Base	6	✓	✓	✓	✓	✓	✓	✓	✓	---	---	---
UXO 06	Debris Area 2 (Site 22)	North Lower Base	1	✓[1]	✓	---	---	---	---	---	---	---	---	✓
UXO 07	Debris Area 1 (Site 23)	North Lower Base	1	✓	✓	✓	✓	---	---	✓	✓	---	✓	---
UXO 07B	Site A Debris Area (OU1 Site A)	North Lower Base	37	✓	✓	---	---	---	---	---	---	---	✓	✓
UXO 09	Cattail Lake/Marsh (Site OO)	North Lower Base	7	---[2]	✓	---	---	---	---	---	---	---	---	---
UXO 11	Luoto Road Disposal (Site 14)	Lower Base	2	✓	✓	✓	✓	---	---	---	---	---	---	✓
UXO 11B	Ammunition Can/Tank Disposal Site (Site 8)	Lower Base	2	✓	✓	✓	✓	---	---	---	---	---	---	---
UXO 12	Barricade Siding P-1 (Site HH)	Lower Base	0.72	✓	✓	---	---	---	---	---	---	---	---	---
UXO 13	Site 4 Carlson Spit Disposal (Site 4 Carlson Spit)	Lower Base	4.1	✓	✓	✓	✓	---	---	---	---	---	---	---
UXO 14	Barricade Siding P-2 (Site JJ)	Waterfront Restricted Area	0.5	✓	✓	---	---	---	---	---	---	---	---	---
UXO 17	Classification Yard (Site 2)	Upper Base	9.3	✓	✓	✓	---	✓	---	✓	✓	---	---	---
UXO 17B	Western Side Car Barricade (Site 1)	Upper Base	67	✓	✓	✓	---	✓	---	✓	✓	---	---	---
UXO 17C	Eastern Side Car Barricade (Site BB)	Upper Base	71	✓	✓	---	---	---	---	---	---	---	---	---

✓: Task completed
---: Task not conducted

[1] Vegetation management was only conducted in anchor point tie down area and at the top of the hill at UXO 6.
[2] Vegetation management was only conducted at this site to cut an access path of a non-wetlands area from a recreational trail that is located outside the investigation site boundary south of UXO 9. Nominal vegetation management was conducted from the trail to the end of the UXO 9 boundary to create an access path to the southern portion of the site; vegetation management was not conducted in any wetland areas.

Table 3-1: MC Sampling Overview and Rationale

Site	MC Sampling per MC QAPP (Yes/No) [1]	MEC/MDAS Item ID from SI	MEC/MDAS Item Description	NEW	Disposition	MC Sampling Rationale	Sample ID	Date Collected	Medium	Analysis	Actual Number of Composite Samples Collected
UXO 3	Yes, up to 6 composite samples	0301 (1)/ 0305 (1)/ 0306 (1)/ 0307 (1)/ 0314 (1)	MEC (5), DIP locations of AN-M46 photoflash bombs	NA	DIP by EOD	All same MEC item type. Any contamination from DIPs could be from original condition or from the DIP itself. Collected 1 composite sample including all 5 locations.[2]	X3-SS-C01-0006[3]	11/1/2022	Surface Soil	Explosives	7
		0310 (1)/ 0311 (1)/ 0312 (1) (See Rationale column for 0302 and 0303)	MEC (3), AN-M46 Photoflash Bomb Booster (isolated MEC findings)	9 gm black powder (for each MEC item - 5 total)	Tt transport to Keyport Annex Magazine	All same MEC item type beyond high density MDAS areas. Collected 1 composite sample including all 3 locations.[2]	X3-SS-C02-0006	11/1/2022	Surface Soil	Explosives	
		High density MDAS area w/ MEC encompassing 0313 (1), NW area of site	Numerous MDAS AN-M46 photoflash bombs w/ MEC (1)	9 gm black powder	Tt transport to Keyport Annex Magazine	Collected 1 composite sample at MEC item 0313.[2]	X3-SS-C04-0006	11/1/2022	Surface Soil	Explosives	
		Incinerator area, west side	Washout area and location of observed caps	NA	NA	Suspect area for MC. Collected 1 composite sample.[2]	X3-SS-C05-0006[3]	11/2/2022	Surface Soil	Explosives	
		Burn mounds	Suspect munitions area as per QAPP	NA	NA	Suspect area, large coverage. Collected 1 composite sample intended to represent the MEC high density area including what appeared to be potential drainage/pooling locations.[2] During sampling, no mounds were visibly present in the field; therefore, one sample was collected at the location of the mound identified on the site figure and was collected at a flat area above a slope.	X3-SS-C06-0006	11/2/2022	Surface Soil	Explosives	
		High density MEC area including MEC 0304 (1)/ (0305 - see above DIP)/ 0309 (1)	Numerous MDAS AN-M46 bombs w/ MEC (2)	9 gm black powder (each MEC item - 2 total	Tt transport to Keyport Annex Magazine (0304/0309)	Aliquots from MEC 0304 and 0309 locations and potential drainage/pooling area associated with these locations. Collected 1 composite sample MEC items 0304 and 0309.[2]	X3-SS-C07-0006	11/3/2022	Surface Soil	Explosives	
		0308 (1)	MEC (1), unique item, MK19 base detonating fuze; also downhill from incinerator	6 gm black powder	Tt transport to Keyport Annex Magazine	Item warranting sampling. Collected 1 composite sample.[2]	X3-SS-C08-0006	11/3/2022	Surface Soil	Explosives	
UXO 7	No	0701 (1)	MEC (1), M69 incomplete incendiary bomb with residue	< 1 lb unknown filler	Tt transport to Keyport Annex Magazine	Item with potential for MC residue release warranting sampling. Collected 1 composite sample.[2]	X7-SS-C01-0006	11/2/2022	Surface Soil	Explosives	1
UXO 7B	No	07B03 (1)	MEC (1), Marine Location Marker, Mk 25 Mod 1-3	NA	EOD addressed MEC item during training	Item with potential for MC release warranting sampling. Collected 1 composite sample.[2]	X7B-SS-C01-0006	11/2/2022	Surface Soil	Explosives	1
Detonation Holes at UXO 7	No	NA	NA	NA	NA	Collected 1 composite sample from bottom of each of four detonation holes at UXO 7. [2]	X7-TP-C01-5460	11/2/2022	Subsurface Soil	Explosives	4
							X7-TP-C02-3648	11/2/2022	Subsurface Soil	Explosives	
							X7-TP-C03-4248	11/2/2022	Subsurface Soil	Explosives	
							X7-TP-C04-4248	11/2/2022	Subsurface Soil	Explosives	
IDW	Yes	NA	NA	NA	NA	IDW sample for decon water as per MC QAPP for various aqueous analytical parameters.[4]	WW-11082201	11/8/2022	Aqueous	Ignitability, Corrosivity/pH, Reactive sulfide and cyanide, TCLP Organics and Inorganics	1

(1) The MC QAPP outlined biased soil sampling (anticipated maximum concentration locations) at locations where breached MEC/MPPEH item(s) were identified. Based on the sampling rationale included in the MC QAPP and MEC/MDAS detector-aided survey findings, MC sampling was conducted at UXO 3, UXO 7, and UXO 7B, noting an FCR was not required. MC samples were also collected from each of the four detonation holes at UXO 7 post detonation to determine impacts of the donor explosives. In the MC QAPP, MC sampling at UXO 2 and UXO 6 was tentatively planned, but was not performed after evaluation of the detector-aided survey findings.

Table 3-1: MC Sampling Overview and Rationale

(2) As per the MC QAPP, each surface soil composite sample consisted of 5 aliquots. Surface soil sample collection depth was surface soil from 0 to 6 inches. Surface soil samples were collected using UXO avoidance.
(3) Field duplicate samples were collected.
(4) IDW sample was aqueous and collected and analyzed for parameters in MC QAPP.
(5) In addition to composite samples collected, one aqueous QA/QC rinsate blank sample (RB-11012201) was collected on 11/1/2022 and analyzed for explosives.

DIP: Disposal in Place
EOD: Explosive Ordnance Disposal
gm: gram
IDW: Investigation Derived Waste
lb: pound
MC: Munitions Constituents
MDAS: Material Documented as Safe
MEC: Material and Explosive of Concern
NA: Not Available
NEW: Net Explosive Weight
NW: Northwest
QAPP: Quality Assurance Project Plan
SI: Site Inspection
TCLP: Toxic Characteristic Leaching Procedure
Tt: Tetra Tech
UXO: Unexploded Ordnance

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 2 - Keyport Annex Rail Lind (Site CC)									
UXO 2	7/31/2022	NA	UXO02-01 (658)	658	--	Case, Cartridge, 40mm, MK 2/3 (580) / Case, Cartridge, 20mm, Unknown model (78)	Placed in MDAS drum at laydown yard	NA	NA
UXO 2	8/6/2022	NA	UXO02-02	1	--	Case, Cartridge, 40mm, MK 2/3	Placed in MDAS drum at laydown yard	NA	NA
UXO 2	8/6/2022	NA	UXO02-03	1	--	Case, Cartridge, 40mm, MK 2/3	Placed in MDAS drum at laydown yard	NA	NA
UXO 3 - Escolar Road OB/OD (Site D)									
UXO 3	4/11/2022	NA	UXO03-01	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/11/2022	NA	UXO03-02	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/11/2022	NA	UXO03-03	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/11/2022	NA	UXO03-04	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/12/2022	NA	UXO03-05	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/12/2022	NA	UXO03-06	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/12/2022	NA	UXO03-07	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/12/2022	NA	UXO03-08	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/12/2022	NA	UXO03-09	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/12/2022	NA	UXO03-10	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/12/2022	NA	UXO03-11	1	--	MD, AN-M46, 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/13/2022	NA	UXO03-12	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/14/2022	NA	UXO03-13	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/18/2022	NA	UXO03-14	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/18/2022	NA	UXO03-15	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/20/2022	NA	UXO03-16	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/20/2022	NA	UXO03-17	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/20/2022	NA	UXO03-18	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/21/2022	NA	UXO03-19	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/21/2022	NA	UXO03-20	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/26/2022	NA	UXO03-21	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/26/2022	NA	UXO03-22	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/26/2022	NA	UXO03-23	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/26/2022	NA	UXO03-24	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/26/2022	NA	UXO03-25	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/27/2022	NA	UXO03-26	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	4/27/2022	NA	UXO03-27	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/1/2022	NA	UXO03-28	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/1/2022	NA	UXO03-29	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/1/2022	NA	UXO03-30	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/1/2022	NA	UXO03-31	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/1/2022	NA	UXO03-32	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/1/2022	NA	UXO03-33	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/2/2022	NA	UXO03-34	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/2/2022	NA	UXO03-35	1	--	MD, AN-M46 100lb Photoflash Bomb	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/8/2022	NA	UXO03-36	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/8/2022	NA	UXO03-37	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/8/2022	NA	UXO03-38	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-39	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-40	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-41	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-42	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 3	5/9/2022	NA	UXO03-43	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-44	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-45	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-46	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-47	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-48	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-49	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-50	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-51	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/9/2022	NA	UXO03-52	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-53	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-54	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-55	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-56	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-57	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-58	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-59	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-60	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-61	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-62	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-63	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-64	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-65	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-66	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-67	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-68	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-69	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-70	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-71	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/10/2022	NA	UXO03-72	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	NA	UXO03-73	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	NA	UXO03-74	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	NA	UXO03-75	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	NA	UXO03-76	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	NA	UXO03-77	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	NA	UXO03-78	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	NA	UXO03-79	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	NA	UXO03-80	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/15/2022	5/16/2022	0301	--	1	Bomb, Photoflash, AN-M46	DIP by EOD	DIP by EOD	5/16/2022
UXO 3	5/16/2022	NA	UXO03-81	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/16/2022	NA	UXO03-82	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/16/2022	NA	UXO03-83	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/16/2022	NA	UXO03-84	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/16/2022	NA	UXO03-85	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/16/2022	NA	UXO03-86	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-87	1	--	8lbs suspect MDAS	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-88	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-89	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-90	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 3	5/17/2022	NA	UXO03-91	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-92	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-93	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-94	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-95	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-96	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-97	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-98	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	NA	UXO03-99	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/17/2022	5/18/2022	0302	--	1	Booster cup, Bomb, Photoflash, AN-M46	Tt transport to Keyport Annex magazine for storage until detonation	9 gm black powder / 0.01	11/2/2022
UXO 3	5/18/2022	NA	UXO03-100	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/18/2022	NA	UXO03-101	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/18/2022	5/19/2022	0303	--	1	Booster cup, Bomb, Photoflash, AN-M46	Tt transport to Keyport Annex magazine for storage until detonation	9 gm black powder / 0.01	11/2/2022
UXO 3	5/18/2022	5/19/2022	0304	--	1	Booster cup, Bomb, Photoflash, AN-M46	Tt transport to Keyport Annex magazine for storage until detonation	9 gm black powder / 0.01	11/2/2022
UXO 3	5/31/2022	NA	UXO03-102	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/31/2022	NA	UXO03-103	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/31/2022	NA	UXO03-104	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/31/2022	NA	UXO03-105	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/31/2022	NA	UXO03-106	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	5/31/2022	NA	UXO03-107	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-108	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-109	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-110	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-111	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-112	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-113	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-114	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-115	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-116	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-117	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-118	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-119	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-120	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-121	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-122	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-123	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-124	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-125	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-126	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-127	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-128	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-129	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-130	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-131	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-132	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-133	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-134	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 3	6/1/2022	NA	UXO03-135	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-136	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-137	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-138	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-139	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-140	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-141	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-142	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-143	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-144	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-145	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-146	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-147	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-148	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-149	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-150	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-151	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-152	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-153	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-154	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-155	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-156	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	NA	UXO03-157	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/1/2022	6/2/2022	0305	--	1	Booster, Bomb, Photoflash, AN-M46	DIP by EOD	DIP by EOD	6/2/2022
UXO 3	6/1/2022	6/2/2022	0306	--	1	Bomb, Photoflash, AN-M46	DIP by EOD	DIP by EOD	6/2/2022
UXO 3	6/1/2022	6/2/2022	0307	--	1	Booster, Bomb, Photoflash, AN-M46	DIP by EOD	DIP by EOD	6/2/2022
UXO 3	6/2/2022	NA	UXO03-158	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/2/2022	NA	UXO03-159	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/2/2022	NA	UXO03-160	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/2/2022	NA	UXO03-161	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/2/2022	NA	UXO03-162	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/6/2022	6/7/2022	0308	--	1	Fuze, Base Detonating, Mk 19	Tt transport to Keyport Annex magazine for storage until detonation	6 gm black powder / 0.01	11/2/2022
UXO 3	6/13/2022	6/14/2022	0309	--	1	Booster, Bomb, Photoflash, AN-M46	Tt transport to Keyport Annex magazine for storage until detonation	9 gm black powder / 0.01	11/2/2022
UXO 3	6/13/2022	NA	UXO03-163	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/13/2022	NA	UXO03-164	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/13/2022	NA	UXO03-165	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/21/2022	NA	UXO03-166	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/21/2022	NA	UXO03-167	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/21/2022	NA	UXO03-168	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/21/2022	NA	UXO03-169	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/21/2022	NA	UXO03-170	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/22/2022	NA	UXO03-171	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/22/2022	NA	UXO03-172	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/22/2022	NA	UXO03-173	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/22/2022	NA	UXO03-174	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/22/2022	NA	UXO03-175	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/22/2022	NA	UXO03-176	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 3	6/22/2022	NA	UXO03-177	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/22/2022	NA	UXO03-178	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	6/28/2022	0310	--	1	Booster, Bomb, Photoflash, AN-M46	Tt transport to Keyport Annex magazine for storage until detonation	9 gm black powder / 0.01	11/2/2022
UXO 3	6/27/2022	NA	UXO03-179	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-180	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-181	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-182	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-183	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-184	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-185	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-186	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-187	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-188	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-189	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-190	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-191	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/27/2022	NA	UXO03-192	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/28/2022	6/29/2022	0311	--	1	Booster, Bomb, Photoflash, AN-M46	Tt transport to Keyport Annex magazine for storage until detonation	9 gm black powder / 0.01	11/2/2022
UXO 3	6/28/2022	NA	UXO03-193	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/28/2022	NA	UXO03-194	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/28/2022	NA	UXO03-195	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	6/28/2022	NA	UXO03-196	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/7/2022	NA	UXO03-197	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/7/2022	NA	UXO03-198	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/7/2022	NA	UXO03-199	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/7/2022	NA	UXO03-200	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/7/2022	NA	UXO03-201	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/7/2022	NA	UXO03-202	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/11/2022	NA	UXO03-203	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-204	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-205	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-206	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-207	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-208	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-209	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-210	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-211	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-212	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-213	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-214	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-215	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-216	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-217	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-218	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-219	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-220	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-221	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 3	7/12/2022	NA	UXO03-222	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-223	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-224	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-225	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-226	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-227	1	--	MD, Projectile, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-228	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-229	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-230	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-231	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-232	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-233	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-234	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-235	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-236	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-237	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-238	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-239	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-240	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-241	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/12/2022	NA	UXO03-242	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-243	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-244	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-245	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-246	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-247	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-248	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-249	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-250	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-251	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-252	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-253	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-254	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-255	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-256	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-257	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-258	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-259	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-260	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-261	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-262	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-263	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-264	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-265	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-266	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-267	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-268	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-269	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-270	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 3	7/13/2022	NA	UXO03-271	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-272	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-273	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-274	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-275	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-276	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-277	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-278	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-279	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-280	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-281	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-282	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-283	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-284	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-285	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-286	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-287	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-288	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-289	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-290	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-291	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-292	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-293	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-294	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-295	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-296	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-297	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-298	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-299	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-300	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-301	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-302	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-303	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-304	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-305	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-306	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-307	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-308	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-309	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-310	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-311	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-312	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-313	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-314	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-315	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-316	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-317	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-318	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-319	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 3	7/13/2022	NA	UXO03-320	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-321	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-322	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-323	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-324	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/13/2022	NA	UXO03-325	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/14/2022	NA	UXO03-326	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/14/2022	NA	UXO03-327	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-328	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-329	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-330	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-331	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-332	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-333	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-334	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-335	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-336	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-337	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-338	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-339	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	NA	UXO03-340	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/19/2022	7/20/2022	0312	--	1	Booster, Bomb, Photoflash, AN-46	Tt transport to Keyport Annex magazine for storage until detonation	9gm black powder / 0.01	11/2/2022
UXO 3	7/25/2022	7/26/2022	0313	--	1	Booster, Bomb, Photoflash, AN-M46	Tt transport to Keyport Annex magazine for storage until detonation	9gm black powder / 0.01	11/2/2022
UXO 3	7/25/2022	NA	UXO03-341	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-342	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-343	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-344	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-345	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-346	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-347	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-348	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-349	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-350	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-351	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-352	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-353	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-354	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-355	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-356	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-357	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-358	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-359	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-360	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-361	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-362	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-363	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-364	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 3	7/25/2022	NA	UXO03-365	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-366	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-367	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-368	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-369	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-370	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-371	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-372	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-373	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-374	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-375	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-376	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-377	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-378	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-379	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-380	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-381	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-382	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-383	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-384	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-385	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-386	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-387	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/25/2022	NA	UXO03-388	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-389	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-390	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-391	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-392	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-393	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-394	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-395	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-396	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-397	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-398	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-399	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/26/2022	NA	UXO03-400	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/27/2022	NA	UXO03-401	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	7/27/2022	NA	UXO03-402	1	--	MD, Bomb, Photoflash, AN-M46	Placed in MDAS drum at laydown yard	NA	NA
UXO 3	8/17/2022	8/17/2022	0314	--	1	Bomb, Photoflash, AN-M46	EOD DIP (Eroded to Surface)	NA	11/2/2022
UXO 4 - Trigger Avenue Disposal (Site 9)									
UXO 4	5/8/2022	NA	UXO04-01	2	--	Fin Assembly, AN-M109A1	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	5/8/2022	NA	UXO04-02	15	--	Fin Assembly, AN-M103A1	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	5/8/2022	NA	UXO04-03	1	--	MD, Fuze/Fuze adapter, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	5/8/2022	NA	UXO04-04	1	--	MD, Fuze/Fuze adapter, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-05	1	--	Cartridge, 40mm, Dummy, M25	Placed in MDAS drum at laydown yard, demil needed	0 (Inert)	11/2/2022
UXO 4	6/5/2022	NA	UXO04-06	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-07	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-08	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 4	6/5/2022	NA	UXO04-09	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-10	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-11	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-12	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-13	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-14	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-15	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-16	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-17	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-18	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-19	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-20	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-21	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-22	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-23	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-24	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-25	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-26	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-27	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-28	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-29	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-30	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-31	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-32	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-33	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-34	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-35	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-36	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-37	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-38	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-39	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-40	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-41	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 4	6/5/2022	NA	UXO04-42	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-43	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-44	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/5/2022	NA	UXO04-45	1	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/12/2022	NA	UXO04-46	1	--	Fin Assembly, AN-M103A1	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/12/2022	NA	UXO04-47	34	--	Fin Assembly, AN-M109A1/AN-M103A1	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/12/2022	NA	UXO04-48	1	--	MD, Fuze/Fuze Adapter, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/12/2022	NA	UXO04-49	1	--	MD, Fuze/Fuze Adapter, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/12/2022	NA	UXO04-50	1	--	MD, Fuze/Fuze Adapter, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/12/2022	NA	UXO04-51	1	--	MD, Fuze/Fuze Adapter, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/12/2022	NA	UXO04-52	1	--	Fin Assembly, AN-M103A1	Placed in MDAS drum at laydown yard	NA	NA
UXO 4	6/12/2022	NA	UXO04-53	1	--	Fin Assembly, AN-M103A1	Placed in MDAS drum at laydown yard	NA	NA
UXO 6 - Debris Area 2 (Site 22)									
UXO 6	10/10/2022	10/11/2022	0601	--	1	Primer, Percussion, Mk 22	Tt transport to Keyport Annex magazine for storage until detonation	64gm black powder / 0.06	11/2/2022
UXO 6	10/10/2022	10/11/2022	0602	--	1	Primer, Percussion, Mk 22	Tt transport to Keyport Annex magazine for storage until detonation	64gm black powder / 0.06	11/2/2022
UXO 6	10/10/2022	10/11/2022	0603	--	1	Primer, Percussion, Mk 22	Tt transport to Keyport Annex magazine for storage until detonation	64gm black powder / 0.06	11/2/2022
UXO 6	10/10/2022	10/11/2022	0604	--	1	Primer, Percussion, Mk 22	Tt transport to Keyport Annex magazine for storage until detonation	64gm black powder / 0.06	11/2/2022
UXO 6	10/10/2022	10/11/2022	0605	--	1	Primer, Percussion, Mk 22	Tt transport to Keyport Annex magazine for storage until detonation	64gm black powder / 0.06	11/2/2022
UXO 6	10/10/2022	10/11/2022	0606	--	1	Primer, Mk 2 Mod 1	Tt transport to Keyport Annex magazine for storage until detonation	< .25lbs black powder / 0.11	11/2/2022
UXO 6	10/10/2022	NA	UXO06-01	10	--	MD, Unknown (various)	Placed in MDAS drum at laydown yard	NA	NA
UXO 7 - Debris Area 1 (Site 23)									
UXO 7	3/13/2022	03/14/2022 - 03/15/2022	0701	--	1	M69 incomplete incendiary bomb with residue	Addressed as MEC by transport to Keyport Annex magazine	< 1 lb unknown filler / 1	11/2/2022
UXO 7	3/13/2022	NA	UXO07-01	1	--	Broken up remains of a M48 series fuse	Placed in MDAS drum at laydown yard	NA	NA
UXO 7	3/13/2022	NA	UXO07-02	1	--	L-60 40mm cartridge case	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B - Site A Debris Area (OU1 Site A)									
UXO 7B	7/6/2022	NA	UXO07B-01	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/6/2022	NA	UXO07B-02	1	--	MD, Fuze, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/6/2022	NA	UXO07B-03	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/6/2022	NA	UXO07B-04	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/6/2022	NA	UXO07B-05	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/6/2022	NA	UXO07B-06	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/6/2022	NA	UXO07B-07	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/6/2022	NA	UXO07B-08	1	--	Case, Cartridge, Mk 2	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/6/2022	NA	UXO07B-09	1	--	MD, Fuze, Tail, Mk 376	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-10	1	--	MD, Fuze, M48 Series	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-11	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-12	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-13	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-14	1	--	MD, Cartridge, 75mm, Unknown model	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-15	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 7B	7/10/2022	NA	UXO07B-16	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-17	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-18	1	--	MD, Exploder Mechanism, Mk 19 Mod 1	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-19	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-20	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-21	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-22	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/10/2022	NA	UXO07B-23	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/17/2022	7/18/2022	07B01	--	1	Projectile, 40mm, Unknown Model	Tt transport to Keyport Annex magazine for storage until detonation	< .15lbs TNT / 0.15	11/2/2022
UXO 7B	7/17/2022	7/18/2022	07B02	--	1	Projectile, 40mm, HE, HE-I, Mk 2	Tt transport to Keyport Annex magazine for storage until detonation	.15lbs TNT / 0.15	11/2/2022
UXO 7B	7/18/2022	NA	UXO07B-24	1	--	MD, Bomb, Unknown Model	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/20/2022	7/21/2022	07B03	--	1	Marker, Location, Marine, Mk 25 Mod 1-3	EOD addressed MEC item during training	NA	7/21/2022
UXO 7B	7/20/2022	NA	UXO07B-25	1	--	MD, Marker, Location, Marine, Mk 25 Mod 1-3	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/20/2022	NA	UXO07B-26	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/20/2022	NA	UXO07B-27	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-28	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-29	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-30	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-31	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-32	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-33	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-34	1	--	MD, Projectile, 75mm, Unknown model	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-35	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-36	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-37	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/21/2022	NA	UXO07B-38	1	--	MD, Unknown Item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/24/2022	7/25/2022	07B04	--	1	Projectile, 75mm, HE, Unknown model	Tt transport to Keyport Annex magazine for storage until detonation	< 1lbs TNT / 1	11/2/2022
UXO 7B	7/24/2022	NA	UXO07B-39	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/24/2022	NA	UXO07B-40	1	--	MD, Unknown item	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	7/24/2022	NA	UXO07B-41	1	--	MD, Projectile, 37mm, APC-T, M51	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	9/21/2022	NA	UXO07B-42	1	--	Case, Cartridge, Model Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 7B	9/21/2022	NA	UXO07B-43	1	--	Case, Cartridge, Model Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 9 - Cattail Lake/Marsh (Site OO)									
UXO 9	8/15/2022	8/15/2022	0901	--	1	Grenade, Hand, Smoke, M18	EOD removed item for disposition (not safe to move); EOD disposed of item same day	NA	NA
UXO 11 - Luoto Road Disposal (Site 14)									
UXO 11	5/12/2022	NA	UXO11-01	1	--	Case, Cartridge, 40mm, Mk 2	Placed in MDAS drum at laydown yard	NA	NA
UXO 11B - Ammunition Can/Tank Disposal Site (Site 8)									
UXO 11B	5/26/2022	NA	UXO11B-01	1	--	Case, Cartridge, Mk 2	Placed in MDAS drum at laydown yard	NA	NA

Table 5-1: Summary of MEC and MDAS Results

Site	Date	MEC Management Dates	Item ID	Findings		Item Description	Transport/ Disposition	Filler / NEW	Date of Final Disposition
				# MDAS	# MEC				
UXO 17 - Classification Yard (Site 2)									
UXO 17	5/9/2022	NA	UXO17-01	1	--	Case, Cartridge, Mk 2	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	5/9/2022	NA	UXO17-02	1	--	Case, Cartridge, Mk 3	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	5/10/2022	5/11/2022	1701	--	1	Projectile, 5 in., Special Common, Mk 38 Mod 3	Tt transport to Keyport Annex magazine for storage until detonation	2.04 lbs Explosive D / 1.73	11/2/2022
UXO 17	5/25/2022	NA	UXO17-03	1	--	Case, Cartridge, Mk 2	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	5/25/2022	NA	UXO17-04	1	--	Case, Cartridge, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	5/25/2022	NA	UXO17-05	2	--	Case, Cartridge, Mk 2	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	6/13/2022	NA	UXO17-06	1	--	Case, Cartridge, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	6/13/2022	NA	UXO17-07	1	--	Case, Cartridge, 40mm, Mk 2	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	6/13/2022	NA	UXO17-08	1	--	Case, Cartridge, 40mm, Mk 2	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	6/13/2022	NA	UXO17-09	1	--	Warhead, 5 in., Practice, Mk 6 Mod 7	Placed in MDAS drum at laydown yard, demil needed	0 (Inert)	11/2/2022
UXO 17	6/13/2022	6/14/2022	1702	--	1	Warhead, 5 in., Mk 6 Unknown Mod	Tt transport to Keyport Annex magazine for storage until detonation	7.5 lbs TNT / 7.5	11/2/2022
UXO 17	6/13/2022	6/14/2022	1703	--	1	Projectile, 5 in., Special Common, Mk 46 Mod 2	Tt transport to Keyport Annex magazine for storage until detonation	2.04 lbs Explosive D / 1.73	11/2/2022
UXO 17	6/13/2022	6/14/2022	1704	--	1	Projectile, 5 in., Special Common, Mk 46 Mod 2	Tt transport to Keyport Annex magazine for storage until detonation	2.04 lbs Explosive D / 1.73	11/2/2022
UXO 17	6/13/2022	6/14/2022	1705	--	1	Projectile, 5 in., Special Common, Mk 46 Mod 2	Tt transport to Keyport Annex magazine for storage until detonation	2.04 lbs Explosive D / 1.73	11/2/2022
UXO 17	6/14/2022	NA	UXO17-10	1	--	Case, Cartridge, 40mm, Mk 3	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	6/14/2022	NA	UXO17-11	1	--	Case, Cartridge, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	6/14/2022	NA	UXO17-12	1	--	Case, Cartridge, 40mm, Mk 3	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	6/15/2022	NA	UXO17-13	1	--	Case, Cartridge, Unknown	Placed in MDAS drum at laydown yard	NA	NA
UXO 17	9/27/2022	NA	UXO 17-14	1	--	Case, Cartridge, 3in, Mk 7 Mod 1	Placed in MDAS drum at laydown yard	NA	NA
UXO 17B - Western Side Car Barricade (Site 1)									
UXO 17B	4/25/2022	NA	UXO17B-NR-01	1	--	Case, Ctg., Practice, M212	Placed in MDAS drum at laydown yard	NA	NA

Notes:
- 10/24/2022, metal debris, drums, and ammo cans were found scattered down the UXO 6 slope. Among the various debris, were scattered MDAS and MEC items. Per Navy direction with NSWC IHD approval, all items were left as is down the slope at UXO 6 due to safety concerns to retrieve the items by rope repelling downslope. No items identified on the UXO 6 slope are included in this table.
- 11/04/2022, MDAS from detonation operations were placed into the secured containers at laydown area and disposed as MDAS.

Grey shaded cells indicate the item found was MEC.

DIP: Detonation in Place
EOD: Explosives Ordnance Disposal
gm: grams
HE: High Explosive
lb: pound
in: inch
MD: Munitions Debris
MDAS: Material Documented as Safe
MEC: Materials and explosives of Concern
mm: millimeters
NA: Not Available
NEW: Net Explosive Weight
NSWC IHD: Naval Surface Warfare Center Indian Head Division
TNT: Trinitrotoluene
Tt: Tetra Tech
UXO: Unexploded Ordnance

Table 5-2: Summary of Geophysics Results

Site Name		Location	Site Size (acres)	Results for Type of Geophysical Survey Coverage									
				EM61-MK2 HP				TEM-8g				GPR	
				Transects (acres)	Full Coverage (acres)	Number of Targets	Number/ Acres of SRAs	Transects (feet)	Full Coverage (acres)	Number of Targets	Number/ Acres of SRAs	Transects (linear feet)	Qualitative Results
UXO 03	Escolar Road OB/OD (Site D)	Lower Base	37	0.69	0.042	3954	3/ 9.19	---	0.32	426	3/ 0.06	---	---
UXO 04	Trigger Ave Disposal (Site 9)	Upper Base/ Lower Base	6	0.12	0.149	400	10/ 1.76	389	0.37	70	3/ 0.37	1,255.55	- Widespread manmade metal or metallic-mineral rich stone (e.g., railroad ballast) in the shallow subsurface - Increase in clay mineral content in the shallow subsurface likely due to fill material
UXO 07	Debris Area 1 (Site 23)	North Lower Base	1	0.11	---	58	1/ 0.07	---	0.67	374	4/ 0.2	353.96	- Suspected buried appears to be within the upper 5 feet of the subsurface. - For data collected across the mounds in the eastern portion of the site, results indicate an approximate 2- to 2.5-feet thick soil cover atop buried debris. Buried debris appears to extend to depths of between 7.5 feet and 10 feet bgs beneath the mounds.
UXO 11	Luoto Road Disposal (Site 14)	Lower Base	2	0.21	---	65	1/ 0.09	---	---	---		---	---
UXO 11B	Ammunition Can/Tank Disposal Site (Site 8)	Lower Base	2	0.67	---	233	3/ 0.34	---	---	---		---	---
UXO 13	Site 4 Carlson Spit Disposal (Site 4 Carlson Spit)	Lower Base	4.1	0.22	---	326	4/ 0.17	---	---	---		---	---
UXO 17	Classification Yard (Site 2)	Upper Base	9.3	---	1.94	1455	4/ 1.01	---	6.13	2503	8/ 4	1,120.59	GPR surveys were focused in the central and northern portions of the MRP site: - The top of buried debris along the western side of the site, near the base of the current western slope, suggests a thicker layer of cover soil, with the top of debris at around 5 feet bgs. - Elsewhere within the site, the GPR data suggest the top of the buried debris is relatively shallow at approximately 2 to 2.5 feet bgs. - The GPR data and observations during field work indicate the site was subjected to earthwork activities, with materials likely pushed towards the north and eastern portion of the MRP site during re-development since its prior use as a disposal area. - The base of the suspected debris at Site UXO 17 cannot be reliably imaged in the GPR data. The data indicate likely undisturbed soils range from approximately 5 to 10 feet below ground surface, although it is possible that the water table is within this depth interval and is consistent with existing site-specific hydrogeologic information of a perched water table at Site UXO 17.
UXO 17B	Western Side Car Barricade (Site 1)	Upper Base	67	---	9.15	4092	18/ 8.26	---	8.16	2676	20/ 6.4	1,370.47	- The GPR data for this site appear to depict changes in subsurface geology and hydrogeology throughout the site and less evidence of widespread disposal of buried debris. - In the northern section of the site, in the former rail car sidings, evidence likely of the remaining track and ballast. - Moving southward through the site, wetter, softer ground occurs, demonstrating potential impacts from shallow groundwater table and wet soils at the surface. - Spreading of metallic objects (manmade or geologic) within the shallow subsurface has likely occurred at UXO 17B.

bgs	below ground surface	OB/OD	Open Burn/Open Detonation
EM61-HP	EM61-MK2-High Power	SRA	Saturated Response Area
GPR	Ground Penetrating Radar	TEM	Time-domain electromagnetic
MRP	Munitions Response Program	UXO	Unexploded Ordnance

Table 5-3: MC Soil and Post-Detonation Sample Results

ASSOCIATED UXO SITE SAMPLE ID SAMPLE DATE SAMPLE DEPTH (INCHES) DUP OF SDG	CAS No.	Human Health PSL[1]	Ecological PSL[2]	UXO 3 X3-SS-C01-0006 11/01/2022 0-6 280-168718-1	UXO 3 FD-11012201 11/01/2022 0-6 X3-SS-C01-0006 280-168718-1	UXO 3 X3-SS-C02-0006 11/01/2022 0-6 280-168718-1	UXO 3 X3-SS-C04-0006 11/01/2022 0-6 280-168718-1	UXO 3 X3-SS-C05-0006 11/02/2022 0-6 280-168718-1	UXO 3 FD-11022201 11/02/2022 0-6 X3-SS-C05-0006 280-168718-1	UXO 3 X3-SS-CO6-0006 11/02/2022 0-6 280-168718-1	UXO 3 X3-SS-C07-0006 11/03/2022 0-6 280-168718-1
EXPLOSIVES (UG/KG)											
NITROGUANIDINE	556-88-7	480	NC	25 UJ	25 UJ	25 UJ	25 UJ	25 UJ	25 UJ	25 UJ	25 U
1,3,5-TRINITROBENZENE	99-35-4	2,100	300	39 U	38 U	40 U	39 U	39 U	39 U	39 U	39 U
1,3-DINITROBENZENE	99-65-0	1.8	34	39 U	38 U	40 U	39 U	39 U	39 U	39 U	39 U
2,4,6-TRINITROTOLUENE (TNT)	118-96-7	57	7,500	68 U	67 U	70 U	69 U	**510 J**	**240 J**	69 U	**160**
2,4-DINITROTOLUENE	121-14-2	0.32	6,000	39 U	38 U	40 U	39 U	**110**	**43 J**	39 U	39 U
2,6-DINITROTOLUENE	606-20-2	0.067	4,000	39 U	38 U	40 U	39 U	39 U	39 U	39 U	39 U
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	1.5	14,000	68 U	67 U	70 U	69 U	**180**	**210**	69 U	68 U
2-NITROTOLUENE	88-72-2	0.3	190	97 U	96 U	100 U	99 U	97 U	97 U	99 U	96 U
3,5-DINITROANILINE	618-87-1	4.1	NC	19 U	19 U	20 U	20 U	**87 J**	**98**	20 U	19 U
3-NITROTOLUENE	99-08-1	1.6	130	150 U	140 U	150 U	150 U	150 U	150 U	150 U	140 U
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	1.5	12,000	68 U	67 U	70 U	69 U	**190**	**200**	69 U	68 U
4-NITROTOLUENE	99-99-0	4	140	97 U	96 U	100 U	99 U	97 U	97 U	99 U	96 U
HMX	2691-41-0	1,300	16,000	68 U	67 U	70 U	69 U	68 U	68 U	69 U	68 U
NITROBENZENE	98-95-3	0.092	4,800	190 U	190 U	200 U	200 U	190 U	190 U	200 U	190 U
NITROGLYCERIN	55-63-0	0.85	13,000	680 U	670 U	700 U	690 U	680 U	680 U	690 U	680 U
PETN (PENTAERYTHRITOL)	78-11-5	260	2,200	970 U	960 U	1000 U	990 U	970 U	970 U	990 U	960 U
PICRIC ACID (2,4,6-TRINITROPHENOL)	88-89-1	190	NC	97 U	96 U	100 U	99 U	97 U	97 U	99 UJ	96 U
RDX	121-82-4	0.37	2,300	97 U	96 U	100 U	99 U	97 U	97 U	99 U	96 U
TETRYL	479-45-8	370	18	97 U	96 U	100 U	99 U	97 U	97 U	99 U	96 U
2,4-DINITROPHENOL	51-28-5	44	61	26000 UJ	25000 UJ	25000 UJ	28000 UJ	23000 UJ	23000 UJ	23000 U	23000 UJ
DIPHENYLAMINE	122-39-4	2,300	1,010	4300 U	4100 U	4200 U	4600 U	3800 U	3800 U	3800 U	3800 UJ
N-NITROSODIPHENYLAMINE	86-30-6	67	545	1700 U	1700 U	1700 U	1900 U	1500 U	1500 U	1500 U	1500 UJ
NITROCELLULOSE (MG/KG)											
NITROCELLULOSE	9004-70-0	13,000	NC	**12 J**	**12 J**	**31 J**	**8.7 J**	**120 J**	**13 J**	**14 J**	**19 J**

Table 5-3: MC Soil and Post-Detonation Sample Results

ASSOCIATED UXO SITE SAMPLE ID SAMPLE DATE SAMPLE DEPTH (INCHES) DUP OF SDG	CAS No.	Human Health PSL[1]	Ecological PSL[2]	UXO 3 X3-SS-C08-0006 11/03/2022 0-6 280-168718-1	UXO 7 X7-SS-C01-0006 11/02/2022 0-6 280-168718-1	UXO 7B X7B-SS-C01-0006 11/02/2022 0-6 280-168718-1	UXO 7[3] X7-TP-C01-5460 11/02/2022 54-60 280-168718-1	UXO 7[3] X7-TP-C02-3648 11/02/2022 36-48 280-168718-1	UXO 7[3] X7-TP-C03-4248 11/02/2022 42-48 280-168718-1	UXO 7[3] X7-TP-C04-4248 11/03/2022 42-48 280-168718-1
EXPLOSIVES (UG/KG)										
NITROGUANIDINE	556-88-7	480	NC	25 U	25 UJ	25 UJ	25 UJ	25 UJ	25 UJ	25 U
1,3,5-TRINITROBENZENE	99-35-4	2,100	300	**130**	39 U	39 U	37 U	39 U	39 U	38 U
1,3-DINITROBENZENE	99-65-0	1.8	34	39 U	39 U	39 U	37 U	39 U	39 U	38 U
2,4,6-TRINITROTOLUENE (TNT)	118-96-7	57	7,500	***17000***	68 U	68 U	64 U	69 U	68 U	67 U
2,4-DINITROTOLUENE	121-14-2	0.32	6,000	***8300***	39 U	39 U	37 U	39 U	39 U	38 U
2,6-DINITROTOLUENE	606-20-2	0.067	4,000	**430**	39 U	39 U	37 U	39 U	39 U	38 U
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	1.5	14,000	**400**	68 U	68 U	64 U	69 U	68 U	67 U
2-NITROTOLUENE	88-72-2	0.3	190	98 U	98 U	97 U	92 U	98 U	97 U	95 U
3,5-DINITROANILINE	618-87-1	4.1	NC	**81 J**	20 U	19 U	18 U	20 U	19 U	19 U
3-NITROTOLUENE	99-08-1	1.6	130	150 U	150 U	150 U	140 U	150 U	150 U	140 U
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	1.5	12,000	68 U	68 U	68 U	64 U	69 U	68 U	67 U
4-NITROTOLUENE	99-99-0	4	140	98 U	98 U	97 U	92 U	98 U	97 U	95 U
HMX	2691-41-0	1,300	16,000	68 U	68 U	68 U	**1600**	**4200**	**170**	**280**
NITROBENZENE	98-95-3	0.092	4,800	200 U	200 U	190 U	180 U	200 U	190 U	190 U
NITROGLYCERIN	55-63-0	0.85	13,000	680 U	680 U	680 U	640 U	690 U	680 U	670 U
PETN (PENTAERYTHRITOL)	78-11-5	260	2,200	980 U	980 U	970 U	920 U	980 U	970 U	950 U
PICRIC ACID (2,4,6-TRINITROPHENOL)	88-89-1	190	NC	98 U	98 U	97 U	92 U	98 U	97 U	95 U
RDX	121-82-4	0.37	2,300	98 U	98 U	97 U	***38000***	***65000***	***4800***	***6200***
TETRYL	479-45-8	370	18	98 U	98 U	97 U	92 U	98 U	97 U	95 U
2,4-DINITROPHENOL	51-28-5	44	61	22000 U	23000 U	22000 U	23000 U	22000 U	23000 U	22000 U
DIPHENYLAMINE	122-39-4	2,300	1,010	3700 U	3900 U	3700 U	3900 U	3700 U	3800 U	3600 U
N-NITROSODIPHENYLAMINE	86-30-6	67	545	***590 J***	1600 U	1500 U	1500 U	1500 U	1500 U	1500 U
NITROCELLULOSE (MG/KG)										
NITROCELLULOSE	9004-70-0	13,000	NC	**17 J**	**32 J**	**4.9 J**	**16 J**	**92 J**	**9.2 J**	**4.6 J**

All results are in ug/kg except for Nitrocellulose, which is in mg/kg.

Bolded results indicate a detection.

Black shading indicates an exceedances of the Human Health PSL.

Italicized and black shading indicates an exceedances of the Human Health and Ecological PSL.

[1] USEPA Regional Screening Levels risk-based soil screening levels for protection of groundwater.

[2] Ecological screening value selected from the following sources listed in order of preference: Washington State Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals (Table 749-3), Draft Ecological Soil Screening Levels (SERDP, 2012), Draft Ecological Soil Screening Levels (Checkai et al., 2012), Los Alamos National Laboratory (2022), and Region 4 - USEPA Region 4 Soil Screening Levels (March 2018).

[3] Sample collected from test pits from detonation effort, which was conducted at UXO 7.

NC: No Criteria

U: Non-detect

J: Result is an estimated quantity

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Table 5-4: Quality Control Sample Results

SAMPLE ID	RB-11012201
SAMPLE DATE	11/01/2022
QC TYPE	Rinsate Blank
SDG	280-168718-1
EXPLOSIVES (UG/L)	
NITROGUANIDINE	10 UX[(1)]
1,3,5-TRINITROBENZENE	0.2 U
1,3-DINITROBENZENE	0.1 U
2,4,6-TRINITROTOLUENE	0.1 U
2,4-DIAMINO-6-NITROTOLUENE	0.9 U
2,4-DINITROTOLUENE	0.08 U
2,6-DIAMINO-4-NITROTOLUENE	0.9 U
2,6-DINITROTOLUENE	0.08 U
2-AMINO-4,6-DINITROTOLUENE	0.1 U
2-NITROTOLUENE	0.2 U
3,5-DINITROANILINE	0.3 U
3-NITROTOLUENE	0.4 U
4-AMINO-2,6-DINITROTOLUENE	0.12 U
4-NITROTOLUENE	0.4 U
HMX	0.2 U
NITROBENZENE	0.2 U
NITROGLYCERIN	2 U
PETN	1 U
PICRIC ACID	0.12 U
RDX	0.2 U
TETRYL	0.1 U
2,4-DINITROPHENOL	60 U
DIPHENYLAMINE	14 U
N-NITROSODIPHENYLAMINE	16 U

[(1)] For the Rinsate Blank for nitroguanidine, the UX qualification was applied because the extraction holding time was exceeded (greater than 2 times the required time in the MC QAPP). It is recommended to use the data for the following reasons: (1) the sample was a rinse blank there was no expectation of a detection for nitroguanidine, and (2) the compound was not detected in associated soil samples.

U: Non-detect

X: The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and meet published method and project quality control criteria.

ug/L: micrograms per liter

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Table 6-1: Updated CSM for 21 Sites

MRS	Site Boundary (total acres)	Investigation Boundary (acres)[1]	Former Land Use and Site History	Current/Future Land Use	Historical Munitions-Related Findings	2022 SI MEC Findings (Surface Results)	2022 SI Geophysics/ Subsurface Anomalies Evaluation	MDAS/ Munitions Scrap/ Fragments (Surface Results)	Associated MC
UXO 02 Keyport Annex Rail Line (Site CC)	19	4.54	• Rail line operational as early as 1946 • Identified as surface disposal area	• Located within Lower Base-Keyport Annex (extremely high security with Navy escort needed) • Accessible to installation personnel, site workers, and visitors (limited due to high security) • Active rail line 1946 to present (operation by Keyport Annex EOD installation personnel) Future land use same as current land use	• EOD responded to MPPEH observed at the surface (February 2015) • MPPEH observed include 40mm and .50 caliber casings, ammunition containers labelled explosive D, RDX, smokeless powder, and TNT, as well as potential smoke pot • EOD team did not identify explosives or explosive residue within items inspected	• None Identified	• NA (Geophysics not conducted - Only surface concerns were identified for UXO 2 CSM)	• MDAS: MK 2/3 40 mm Cartridge Case (582), Unknown model 20mm Cartridge Case (78) • Various ammo cans and shipping containers • Disposal site identified	• NA (MC Sampling Not Warranted)
UXO 03 Escolar Road OB/OD (Site D)	37	20	• Identified as a surface/subsurface ordnance disposal area and primary area OB/OD activity between 1946 and 1965 • Former small arms incinerator, trench, and smaller burn areas present • Explosive D sludge disposal occurred between 1944 and 1957 • Other items disposed of may have included smokeless powder, black powder, rocket propellant, white phosphorous shells, compound B (TNT and RDX), Amatol (ammonia nitrate and trinitrotoluene), ordnance wastes containing TNT and RDX, propulsion missile grains and reportedly 600 obsolete rocket motors • Per interviewee knowledge, thousands of photoflash bombs were recalled to be detonated in trenches with ammonium nitrate blocks.	• Located within Lower Base (high security) • Accessible to installation personnel, site workers, site visitors (limited due to high security), installation traffic from road intersecting site Future land use same as current land use	• During PA a masonry block structure was observed that appears to have been the small arms ammunition incinerator • Adjacent to this structure was an accumulation of .30-caliber and 20mm munitions-related materials, soil staining and minimal vegetation	• MEC: AN-M46 Photoflash Bomb/AN-M46 Photoflash Bomb Booster Cup (13)	• Geophysics was conducted at the site during the SI. UXO 3 EM61-HP and TEM-8g data exhibit the presence of widespread metallic debris across the majority of the site, consistent with historic disposal activities.	• MDAS: AN-M46 100 lb. Photoflash Bomb MD (400), 8 lbs. suspect MDAS (1), Unknown Projectile MD (1)	7 samples collected - 4 samples: TNT HH (4) and ecological (1) - 3 samples: 2,4-DNT HH (3) and ecological (1) - 1 sample: 2, 6-DNT HH - 3 samples: 2-amino-2,6-DNT HH - 3 samples: 3,5-DNT HH - 2 samples: 4-amino-2,6-DNT HH - 1 sample: N-nitrosodiphenylamine HH and ecological
UXO 04 Trigger Avenue Disposal (Site 9)	6	3.3	• Operational from 1951 to 1977 • Identified as surface/subsurface disposal area for inert ordnance-related items, scrap metal, and railroad ties	• Located within Lower Base (northern portion of site, high security) and within Upper Base (southern portion of site, general public access) • Lower Base Accessible to installation personnel, site workers, site visitors (limited due to high security), installation traffic from road intersecting site • Upper Base Accessible to installation personnel, site workers, site visitors (limited due to wooded	• One 40mm projectile was found on the surface	• None Identified	• Geophysics was conducted during the SI. UXO 4 EM61-HP and TEM-8g data exhibit widespread metallic debris across much of the site. Although likely associated with non-munitions metallic debris disposed from rail cars or with metallic, mineral-rich ballast rock associated with the rail spur extending along the western edge of the site. Based on historic images of the site	• MDAS: AN-M109A1/AN-M103AI Fin Assembly (54), Unknown Fuze/Fuze adapter MD (6), M25 Dummy 40mm Cartridge (1), and Unknown (various) MD (40)	• NA (MC Sampling Not Warranted)

Table 6-1: Updated CSM for 21 Sites

MRS	Site Boundary (total acres)	Investigation Boundary (acres)[1]	Former Land Use and Site History	Current/Future Land Use	Historical Munitions-Related Findings	2022 SI MEC Findings (Surface Results)	2022 SI Geophysics/ Subsurface Anomalies Evaluation	MDAS/ Munitions Scrap/ Fragments (Surface Results)	Associated MC
				area with no reason to visit), general public Future land use same as current land use			that depict a clearing, the area has undergone significant disturbance associated with the construction of Trigger Avenue. These conditions limited efficacy of GPR surveying at the site, where the GPR signal attenuation was too high in the shallow subsurface (e.g., upper 1 foot) to provide meaningful interpretation at depth.	• Various Trash Piles and Shipping Containers identified	
UXO 06 Debris Area 2 (Site 22)	1	1.65	• Surface disposal area 1965 to 1973 (over bank) • Paint cans, drums, ammunition and boxes and other metal debris.	• Located within Lower Base (high security and additional level of security since in EOD training range area). • Accessible to installation personnel, site workers, site visitors (limited due to high security with no reason to visit), Marines training • Steep hillside portion of site largely inaccessible to all receptors Future land use same as current land use. As wetlands site, would not be developed.	• During PA metallic debris and MPPEH observed including ammunition cans, 40mm cartridge casings, and various other unopened ordnance storage containers	• MEC: Mk 22 Percussion Primer (5), Mk 2 Mod 1 Primer (1) • Cascading swath of material scattered down the slope including MEC	• NA (Geophysics not conducted - Only surface concerns were identified for UXO 6 CSM)	• MDAS: Unknown (various) MD (10) • Cascading swath of metal debris, drums, ammo cans and MDAS scattered down the slope	• NA (MC Sampling Not Warranted)
UXO 07 Debris Area 1 (Site 23)	1	1	• Surface/subsurface disposal area 1965 to 1973 • Inert ordnance-related items including ammunition cans reportedly buried onsite • Buried munitions-related items may contain RDX/TNT, PETN, black powder, smokeless powder and explosive D	• Located within Lower Base (high security and additional level of security since in EOD training range area.) • Accessible to installation personnel, site workers, site visitors (limited due to high security with no reason to visit), marines training Future land use same as current land use	• Unspecified possible MPPEH has been observed on the surface at northern end of site, surface MPPEH not expected as the subsurface is of most concern	• MEC: M69 incomplete incendiary bomb with residue (1)	• Geophysics was conducted at the site during the SI. Consistent with historical disposal activities at UXO 7 EM61-HP and TEM-8g data depict widespread metallic debris across the majority of the site. GPR data indicate suspected buried debris to be up to 5 feet bgs. Buried debris appears to extend to depths of between 7.5 feet and 10 feet bgs beneath the mounds located in the eastern portion of the site. The cover soil over the mounds is approximately 2 to 2.5 feet thick.	• MDAS: M48 Series Fuse Remains (1), L-60 40mm cartridge case (1)	• No exceedances of project screening levels in surface soil samples

Table 6-1: Updated CSM for 21 Sites

MRS	Site Boundary (total acres)	Investigation Boundary (acres)[1]	Former Land Use and Site History	Current/Future Land Use	Historical Munitions-Related Findings	2022 SI MEC Findings (Surface Results)	2022 SI Geophysics/ Subsurface Anomalies Evaluation	MDAS/ Munitions Scrap/ Fragments (Surface Results)	Associated MC
UXO 07B Site A Debris Area (OU 1 Site A)	37	9.91	• Surface/subsurface disposal area included OB/OD area, stormwater discharge area, facilities for personnel, fire suppression vehicles and equipment, incinerator for small arms ammunition, and blast pit for ordnance detonation • Buildings demolished and burned in 1977 • June 1983: several hundred truckloads of soil inadvertently transported from vicinity of Burn Area to a SUBASE building site along Hood Canal. • May 1984: soil in question was excavated from Hood Canal site and returned to Burn Area creating hummocky nature of area. • MPPEH may be present and can contain RDX/TNT, PETN, black powder, smokeless powder and explosive D	• Located within Lower Base (high security and additional level of security since in EOD training range area). • Accessible to installation personnel, site workers, site visitors (limited due to high security and that the majority of the site is bounded by a chain link fence restricting access), marines training, WWTP operation and maintenance. • EOD training area since 1973 • Historically, a ROD was completed in December 1991 for OU 1 and then modified through three Explanations of Significant Differences (Battelle, 2017). Currently, institutional controls are in place for OU 1. Future land use same as current land use although possible new monitoring wells could be installed.	• None previously reported	• MEC: Unknown Model 40mm Projectile (1), Mk 2 HE-I HE 40 mm Projectile, Unknown model HE 75mm Projectile (1), Mk 25 Mod 1-3 Marine Location Maker (1)	• NA (Geophysics not conducted - Only surface concerns were investigated for UXO 7B due to institutional controls)	• MDAS: Unknown Item MD (31), Various Fuzes (Unknown Fuze MD, Mk 376 Tail Fuze MD, M48 Series Fuze MD) (3), Cartridge Cases (Mk 2 Cartridge Case, Unknown Model 75mm Cartridge MD, Model Unknown Cartridge Case) (4), Mk 19 Mod 1 Exploder MD (1), Unknown Model Bomb MD (1), Mk 25 Mod 1-3 Marine Location Marker MD (1), Unknown model 75 mm Projectile MD (1), M51 APC-T 37mm Projectile MD (2) • Debris pile identified	• No exceedances of project screening levels in surface soil samples
UXO 08 Flier/Tang Road Disposal (Site NN)	9	*Pending SI Investigation (anticipated Spring 2023)*	• Operational 1951 to 1973 • Surface/subsurface disposal area	• Located within restricted access area (SWFPAC) of Lower Base (extremely high security with Navy escort needed) • Accessible to installation personnel, site workers, site visitors (limited due high security) • Recent construction of buildings and parking lot completed onsite • Recently constructed secure perimeter fence extends through site Future land use same as current land use	• Documented EOD response to ammunition can finds, small arms and M115 Artillery Simulators	*Pending SI Investigation (anticipated Spring 2023)*			

Table 6-1: Updated CSM for 21 Sites

MRS	Site Boundary (total acres)	Investigation Boundary (acres)[1]	Former Land Use and Site History	Current/Future Land Use	Historical Munitions-Related Findings	2022 SI MEC Findings (Surface Results)	2022 SI Geophysics/ Subsurface Anomalies Evaluation	MDAS/ Munitions Scrap/ Fragments (Surface Results)	Associated MC
UXO 09 Cattail Lake/ Marsh (Site OO)	7	6.07	• Manmade Lake created in the 1950s when a road was constructed along the installation waterfront of Hood Canal. Restored to Cattail Marsh in 2012 with bridge installation. • Site 7 (disposal site for old paint cans and drums) was also documented as being associated with Cattail Lake with cleanup conducted in 1981	• Located within Lower Base (high security) • Accessible to installation personnel, site workers, site visitors (limited due to high security), installation traffic on adjacent roads, marines training, ecological management by USACE (e.g., seeding, tree planting), recreational walking trail on west side of site Future land use same as current land use plus potential harvesting by tribe. As wetlands site, would not be developed.	• Documented Navy EOD response to a signal flare in its original container (L312) and a smoke grenade in the marsh area during its construction • Old ammunition observed "popping off" during a controlled burn	• MEC: M18 Smoke Hand Grenade (1)	• NA (Geophysics not conducted - Only surface concerns were investigated at UXO 9 due to presence of wetlands)	• Drums identified	• NA (MC Sampling Not Warranted)
UXO 09B Floral Point (OU 7 Site B)	6	NA (SI Desktop Study)	• Operated from 1950 to the 1960's as a pyrotechnic test range • Open burn 1966 to 1967 of RDX/TNT residuals • Black powder also was reportedly burned onsite • Used for pit disposal, landfilling, and trash burning 1950 to 1968 • Subsurface disposal area for detonators and primers, star signals, smoke cans (aluminum types), smoke pots, and hand grenades • Solid waste from Keyport was brought to this location and landfilled from 1967 to 1972	• Located within Lower Base (high security) • Accessible to installation personnel, site workers, site visitors (limited due to LUCs over entire site and extremely high security) • Beach south of Floral Point currently used by base personnel for shellfish harvesting and fishing • Site has a signed ROD with a cap and erosion controls; the cap covers the site in its entirety and so is subject to land use controls Future land use same as current land use	• Two Polaris missile motors reportedly entombed in retaining wall • No MPPEH reportedly recovered onsite	Based on the desktop investigation of UXO 9B evaluation of historical aerial photographs and mapping during QAPP preparation, investigation of this site has been eliminated from the SI field investigation. A remedy was implemented at this site (i.e., cap and erosion controls) in 1997 per the ROD; therefore, the UXO 9B site was not included in the SI field work effort.			
UXO 10 Dunnage Canyon (Site 12)	7	*Pending SI Investigation (anticipated Spring 2023)*	• Operational 1950 to 1970 • Surface/subsurface disposal of ordnance dunnage, scrap metal, and potentially ammonium picrate	• Located within restricted access area (SWFPAC) of Lower Base (extremely high security with Navy escort needed) • Accessible to installation personnel, site workers, site visitors (limited due to high security) Future land use same as currently land use	• MEC/MPPEH identified at the site include ammonium picrate, MK22 fuzes, 3" projectiles, MK1 and MK2 40mm projectiles.	*Pending SI Investigation (anticipated Spring 2023)*			
UXO 11 Luoto Road Disposal (Site 14)	2	1.19	• Operational 1946 to 1973 • Surface/subsurface disposal area drums and for inert ordnance-related items including ammunition cans and boxes	• Located within Lower Base (high security) • Accessible to installation personnel, site workers, site visitors (limited due to high security and wooded area with no reason to visit) Future land use same as current land use	• Single ammunition can observed during PA • Metal drum fragments observed during September 2019 site visit	• None Identified	• Geophysics was conducted during the SI. UXO 11 EM61-HP data depict SRAs coincident with non-munitions related surface obstructions (i.e., burn barrels and cultural features).	• MDAS: Mk 2 40mm Cartridge Case (1) • Drums identified	• NA (MC Sampling Not Warranted)

Table 6-1: Updated CSM for 21 Sites

MRS	Site Boundary (total acres)	Investigation Boundary (acres)[1]	Former Land Use and Site History	Current/Future Land Use	Historical Munitions-Related Findings	2022 SI MEC Findings (Surface Results)	2022 SI Geophysics/ Subsurface Anomalies Evaluation	MDAS/ Munitions Scrap/ Fragments (Surface Results)	Associated MC
UXO 11B Ammunition Can/Tank Disposal Site (Site 8)	2	2	• Operational 1946 to 1973 • Surface/subsurface disposal area for inert ordnance-related items including ammunition cans and tanks	• Located within Lower Base (high security) • Accessible to installation personnel, site workers, site visitors (limited due to high security and wooded area with no reason to visit) Future land use same as current land use	• Ammunition box was observed at the surface during PA.	• None Identified	• Geophysics was conducted during the SI. UXO 11B EM61-HP data depict SRAs coincident with non-munitions related surface obstructions (i.e., burn barrels and cultural features).	• MDAS: Mk 2 Cartridge Case (1) • Ammo cans and shipping containers identified	• NA (MC Sampling Not Warranted)
UXO 12 Barricade Siding P-1 (Site HH)	0.72	0.27	• Operational 1946 to 1973 • Used as rail car siding; rail cars potentially temporarily stored munitions items • Surface disposal area	• Located within Lower Base (high security) • Accessible to installation personnel, site workers, site visitors (limited due to high security and wooded area with no reason to visit) Future land use same as current land use	• None previously reported	• None identified	• NA (Geophysics not conducted - Only surface concerns were identified for UXO 12 CSM)	• None identified	• NA (MC Sampling Not Warranted)
UXO 13 Site 4 Carlson Spit Disposal (Site 4 Carlson Spit)	4.1	1.7	• Operational 1946 to 1973 • Former OB/OD and surface/subsurface disposal area for fuzes and other unspecified objects	• Located within Lower Base (high security) • Accessible to installation personnel, site workers, site visitors (limited due to high security) • Area used for worker laydown area and as a boat slip Future land use same as current land use	• None previously reported	• None identified	• Geophysics was conducted during the SI. UXO 13 EM-61-HP survey transects data did not demonstrate any SRAs or other features consistent with a disposal site. Discrete geophysical anomalies were identified along the survey transects. Localized steep slopes within the project area limit the ability to collect 100 percent digital DGM data across the entire site.	• None identified	• NA (MC Sampling Not Warranted)
UXO 14 Barricade Siding P-2 (Site JJ)	0.5	0.33	• Operational 1946 to 1973 • Used as rail car siding; rail cars potentially temporarily stored munitions items • Surface disposal area	• Located within restricted access area of Lower Base (extremely high security since inside SWFPAC area) • Accessible to installation personnel, site workers, site visitors (extremely limited due to high security restricted area [SWFPAC] and wooded area with no reason to visit) • Siding used for emergency use Future land use same as current land use	• None previously reported	• None Identified	• NA (Geophysics not conducted - Only surface concerns were identified for UXO 14 CSM)	• None identified	• NA (MC Sampling Not Warranted)
UXO 15 Tinian Road Dunnage (Site KK)	12	*Pending SI Investigation (anticipated Spring 2023)*	• Operational 1951 to 1977 • Site identified as surface/subsurface disposal area and dunnage yard	• Located within restricted access area (SWFPAC) of Lower Base (extremely high security with Navy escort needed) • East side of site accessible to installation personnel, site workers, site visitors (limited due to high security)	• MEC/MPPEH found at site include MK22 dummy fuzes, 3” projectiles, MK1 40mm dummy projectiles, MK2 40mm projectiles, and various other 40mm projectiles • EOD response actions to retrieve MPPEH were reported at nearby building	*Pending SI Investigation (anticipated Spring 2023)*			

Table 6-1: Updated CSM for 21 Sites

MRS	Site Boundary (total acres)	Investigation Boundary (acres)[1]	Former Land Use and Site History	Current/Future Land Use	Historical Munitions-Related Findings	2022 SI MEC Findings (Surface Results)	2022 SI Geophysics/ Subsurface Anomalies Evaluation	MDAS/ Munitions Scrap/ Fragments (Surface Results)	Associated MC
				• Central portion used as storage area and parking area for site workers • Site bisected by secure area perimeter fence • Restricted access in western portion of site inside secure perimeter Future land use same as current land use					
UXO 16 Boundary Road Burn Site (Site LL)	10	*Pending SI Investigation (anticipated Spring 2023)*	• Operational 1951 to 1977 • OB area and possible ordnance-related surface/subsurface disposal	• Located within restricted access area (SWFPAC) of Lower Base (extremely high security with Navy escort needed) • Accessible to installation personnel, site workers, site visitors (extremely limited due to high security restricted area) Future land use same as current land use	• MEC/MPPEH found at the site includes: MK22 dummy fuzes, 3" projectiles, MK1 40mm dummy projectiles, MK2 40mm projectiles, and various other 40mm projectiles	*Pending SI Investigation (anticipated Spring 2023)*			
UXO 17 Classification Yard (Site 2)	9.3	9.3	• Used as classification yard and storage area from 1964 to 1973 • Also used for surface/subsurface disposal of steel scrap, empty drums, ordnance dunnage, and waste oils and paints • Cleanup of surface debris at Site 2A completed 1986 – 1987 • Removal action for debris and drums from site 2B completed in 1993; soils excavated during this action placed in containment cells.	• Located within Upper Base (general public access) • Area accessible to installation personnel (including crane testing and dog training), site visitors, site workers, general public/recreational (Trident Lake Upper Ballfields, walking trails) • Polychlorinated biphenyls were detected in stockpiled site soils result in estimated cancer risk of 1 in 100,000 for assumed future residents of site • Site soils (in-place) and groundwater pose no unacceptable risk under unrestricted site use Future land use same as current land use	• MPPEH found on surface included 40mm, 57mm anti-tank rounds, M168 bomb fuzes, 5" shells and 3" shells, small arms • Small arms and a single 40mm cartridge observed during PA	• MEC: Mk 6 Unknown Mod 5 inch Warhead (1), Mk 38 Mod 3 Special Common 5 inch projectile and Mk 46 Mod 2 Special Common 5 inch projectile (4)	• Geophysics was conducted during the SI. UXO 17 EM61-HP and TEM-8g data depict large areas of elevated DGM response, consistent with a former disposal site, and suggest debris was disposed in pits or trenches or was subjected to spreading due to earthwork activities. Metallic debris was observed protruding from the ground in the northern portion of the site. Delineated SRAs indicate a high-response area in the DGM data extending laterally from the current site boundary. GPR surveys were focused in the central and northern portions of the MRP site. GPR data show in the northwest portion of the site collected closest to the northwest site boundary, debris at the top of the slope is approximately 5 feet bgs. For all other GPR survey locations collected within the site, the GPR data suggest the top of the buried debris is relatively shallow at approximately 2 to 2.5 feet bgs. The GPR data and observations indicate disposal area materials were likely pushed to the north and east portions of UXO 17 during earthwork activities.	• MDAS: Types of Cartridge Cases (Mk 2, Mk3, Unknown, Mk 2 40 mm, Mk 3 40mm, Mk 7 Mod 1 3 inch) (14), Mk 6 Mod 7 Practice 5 inch Warhead (1) • Trash pile and rebar pit identified	• NA (MC Sampling Not Warranted)

Table 6-1: Updated CSM for 21 Sites

MRS	Site Boundary (total acres)	Investigation Boundary (acres)[1]	Former Land Use and Site History	Current/Future Land Use	Historical Munitions-Related Findings	2022 SI MEC Findings (Surface Results)	2022 SI Geophysics/ Subsurface Anomalies Evaluation	MDAS/ Munitions Scrap/ Fragments (Surface Results)	Associated MC
							• Total depth of debris at UXO 17 cannot be reliably imaged in the GPR data. The data indicate undisturbed soils may range from approximately 5 to 10 feet bgs. • Geophysical survey results depict linear feature bisecting southern portion of the site near the ball field. These features are consistent with underground pipes (e.g., sewer, stormwater drainage culvert). Person portable geophysical mapping completed along eastern edge of site boundary (where towed array system could not access) show additional underground pipes, likely associated with stormwater drain culverts. The depth of the pipe or culvert is not known.		
UXO 17B Western Side Car Barricade (Site 1)	67	13.3	• Area operated 1946 to 1973 • Used as rail car siding; rail cars potentially temporarily stored munitions items • Polaris missile motors were reportedly subsurface disposed of at the site • Additional activity reportedly included disposal of building rubble and metal scrap, including debris from a former offsite metallurgy facility (1973). Mercury ordnance shell coatings were tested at the metallurgy facility; IAS reported an estimated 100 pounds of mercury may have been present in the facility debris, which were disposed in an abandoned local barricade siding identified as Site 5. Brass shell casings were testing in the building by heating casings with mercury nitrate; however, there is no evidence of ordnance disposal at siding.	• Located within Upper Base (general public access) • Accessible to installation personnel, site workers, site visitors (general public) • Sidings currently contain fill material up to depths of approximately 15 meet Future land use same as current land use	• None previously reported	• None Identified	• Geophysics was conducted at the site during the SI. UXO 17B data indicate presence of metallic debris across the majority of the site, with a large number of discrete targets and mapped SRAs and suggest one or more of the following: (1) evidence of debris or scrap offloaded and dumped from rail cars, (2) more recent earthwork activities spread metal within the shallow subsurface, and (3) the responses are predominately associated with demolition and removal of the former rail line and ballast rock. GPR data depict changes in subsurface geology and hydrogeology throughout the site and less evidence of widespread disposal of buried debris. In the southern portion of the site, shallow groundwater and saturated surface soils may limit the efficacy of GRP.	• MDAS: M212 Practice Cartridge Case (1)	• NA (MC Sampling Not Warranted)
UXO 17C Eastern Side Car Barricade (Site BB)	71	13.7	• Operational 1946 to 1973 • Used as rail car siding; rail cars potentially temporarily stored munitions items • Possible surface disposal area	• Located within Upper Base (general public access) • Accessible to installation personnel, site workers, site visitors (general public)	• None previously reported	• None Identified	• NA (Geophysics not conducted - Only surface concerns were identified for UXO 17C CSM)	• None Identified	• NA (MC Sampling Not Warranted)

Table 6-1: Updated CSM for 21 Sites

MRS	Site Boundary (total acres)	Investigation Boundary (acres)[1]	Former Land Use and Site History	Current/Future Land Use	Historical Munitions-Related Findings	2022 SI MEC Findings (Surface Results)	2022 SI Geophysics/ Subsurface Anomalies Evaluation	MDAS/ Munitions Scrap/ Fragments (Surface Results)	Associated MC
Note: Two currently used sidings on south side of site were eliminated from SI				• Two sidings available for current use. Remaining sidings (all but one) currently contain fill material/ vegetation Future land use same as current land use					
UXO 17D Brass Yard (Site 13)	90.6	NA (SI Desktop Study)	• Operational 1946 to 1973 • Storage area for brass and other metals • Area may have been decontaminated prior to 1979 and start of site development • Adjustments to site boundary made to encompass entire former storage yard	• Located within Upper Base (general public access) • Accessible to installation personnel, site workers, site visitors (general public) • Highly developed area including commercial buildings, roads, parking lots, and landscaping Future land use same as current land use	• None previously reported	Based on the desktop investigation of UXO 17D evaluation of historical aerial photographs and mapping during QAPP preparation, investigation of this site was eliminated from the SI field investigation since the area of concern is in a highly developed area, and any potential munitions onsite would have been identified during development of the area.			

[1] Investigation boundary is based on the area where the UXO detector-aided surface survey was conducted.

CSM: Conceptual site model
EOD: Emergency ordnance disposal
lbs: pounds
MC: Munitions constituents
MD: Munitions debris
MDAS: Material documented as safe
MEC: Munitions and explosives of concern
mm: millimeter
MPPEH: Material potentially presenting an explosive hazard
MRS: Munitions response site
NA: Not Applicable
NBK: Naval Base Kitsap
OB/OD: Open burn/open detonation
OU: Operable unit
PA: Preliminary Assessment
PETN: Pentaerythritol tetranitrate
QAPP: Quality assurance project plan
RDX: 1,3,5-trinitro-1,3,5-triazine
ROD: Record of decision
RSL: Regional screening level
SI: Site inspection
SRA: Saturated Response Area
SWFPAC: Strategic Weapons Facility Pacific
SUBASE: Submarine base
TNT: Trinitrotoluene
UXO: Unexploded ordnance

Table 6-2: Summary of Preliminary MEC Hazard Assessment

Site Name		MEC HA Score[1,2]	MEC HA Hazard Level[1,2]	Comments
UXO 02	Keyport Annex Rail Line (Site CC)	---	---	---
UXO 03	Escolar Road OB/OD (Site D)	750	2	Qualitative MEC HA evaluation is consistent with weight of evidence results from the SI: - MEC was encountered during SI and extent was not determined. - Because shallow subsurface anomalies are suspected to potentially be MEC, erosion/uplifting could result in MEC migrating to the ground surface. - Accessibility is limited by site location in Lower Base but otherwise is not restricted. Moreover, Escolar Road cuts through the site.
UXO 04	Trigger Ave Disposal (Site 9)	---	---	---
UXO 06	Debris Area 2 (Site 22)	560	3	Qualitative MEC HA evaluation overestimates hazards considering the weight of evidence results from the SI: - Although MEC/MPPEH remains in place down the steep hillside, the area has been delineated and is only accessible via rope access. Moreover, UXO danger signs with point of contact information have been installed at the top of the hillside in the location. - Accessibility is limited by site location in Lower Base plus a gate is utilized to prevent access to the nearby EOD training range when in use.
UXO 07	Debris Area 1 (Site 23)	560	3	Qualitative MEC HA evaluation overestimates hazards considering the weight of evidence results from the SI: - Although MEC was encountered at the ground surface, it is uncertain if UXO 7 (or UXO 7B) or the nearby EOD training range is the source. UXO 7 was largely expected to be a subsurface disposal area. Future recontamination by EOD training range operations is possible. - Accessibility is limited by site location in Lower Base plus a gate is utilized to prevent access to the nearby EOD training range when in use.
UXO 07B	Site A Debris Area (OU1 Site A)	780	2	Qualitative MEC HA evaluation is consistent with weight of evidence results from the SI: - MEC was encountered at the ground surface, including MEC just below the ground surface (it is uncertain if UXO 7B or the nearby EOD training range is the source). MEC/MPPEH extent has was not determined during the SI. Surface MEC was not expected at UXO 7B, which was largely expected to be a subsurface disposal concern. Future recontamination by EOD training range operations is possible. - Accessibility is limited by site location in Lower Base plus a gate is utilized to prevent access to the nearby EOD training range when in use. Although accessibility is limited, authorized workers and military personnel do access the sites for various tasks within UXO 7B that include groundwater monitoring, land use control inspections, WWTP operation and maintenance. EOD personnel also traverse the overlapping UXO 7B training range area.
UXO 09	Cattail Lake/Marsh (Site OO)	515	4	Qualitative MEC HA evaluation overestimates hazards considering the weight of evidence results from the SI: - UXO 9 was subject to a surface clearance of the accessible portions of the SI investigation area; only one MEC was encountered during the SI, and may or may not have been site related considering near the bridge. - Accessibility is limited by site location in Lower Base but otherwise is not restricted.
UXO 11	Luoto Road Disposal (Site 14)	N/A	N/A	There were no explosive hazards identified in the MRS.
UXO 11B	Ammunition Can/Tank Disposal Site (Site 8)	N/A	N/A	There were no explosive hazards identified in the MRS.
UXO 12	Barricade Siding P-1 (Site HH)	N/A	N/A	There were no explosive hazards identified in the MRS.
UXO 13	Site 4 Carlson Spit Disposal (Site 4 Carlson Spit)	N/A	N/A	There were no explosive hazards identified in the MRS.
UXO 14	Barricade Siding P-2 (Site JJ)	N/A	N/A	There were no explosive hazards identified in the MRS.
UXO 17	Classification Yard (Site 2)	600	3	Qualitative MEC HA evaluation is consistent with the weight of evidence results from the SI: - MEC was encountered during SI and extent was not determined. - Site location is in Upper Base with public accessibility; however, the primary areas of public accessibility (e.g., walking trails) were cleared of MEC on the ground surface during the SI. - Because shallow subsurface anomalies are suspected to potentially be MEC, erosion/uplifting could result in MEC migrating to the ground surface.
UXO 17B	Western Side Car Barricade (Site 1)	N/A	N/A	There were no explosive hazards identified in the MRS.
UXO 17C	Eastern Side Car Barricade (Site BB)	N/A	N/A	There were no explosive hazards identified in the MRS.

[1] The MEC HA results are qualitative references only and do not represent quantitative measures of explosive hazard at any of the NBK Bangor MRSs. The MEC HA results are considered preliminary because they will require updating when the MEC impacts are further characterized during future investigations, where recommended.

[2] For the sites with no MEC HA results, MEC has not been encountered at the site to date and additional data is needed to evaluate the explosive hazards, if any, within the MRS.

MDAS	Material Documented as Safe
MEC	Munitions and Explosives of Concern
MEC HA	MEC Hazard Assessment
MPPEH	Material Presenting an Explosive Hazard
MRS	Munitions Response Site
N/A	Not Applicable
UXO	Unexploded Ordnance

Table 7-1: Summary of SI Results and Recommendations

Site		Item Type / Number of Items	Number of Item(s) / Item Description	Geophysical Survey Results	MC Sampling PSL Exceedances	MEC HA Score/ MEC HA Hazard Level	Preliminary Data Gaps Identified	Recommendations
UXO 2	Keyport Annex Rail Line (Site CC)	MDAS (660 Items)	(582) MK 2/3 40mm Cartridge Case (78) Unknown model 20-mm Cartridge Case	N/A (Geophysics not conducted – Only surface concerns were identified for UXO 2 CSM)	N/A	MEC HA was not prepared. Additional data needed to evaluate explosive hazard.	- Surface extent of MEC/MPPEH, if any, to the south of the site current boundary -Surface extent of MEC/MPPEH, if any, on the ground surface beneath the shipping containers	Recommendation for RI will be reevaluated based on the results of the 2023 field work and will be presented in an addendum to this report.
UXO 3	Escolar Road OB/OD (Site D)	MDAS (402 Items)	(400) 100lb Photoflash Bomb AN-M46 MD (1) 8lbs suspect MDAS (1) Unknown Projectile MD	UXO 3 EM61-HP and TEM-8g data exhibit the presence of widespread subsurface metallic debris across the majority of the site (unknown if MEC), consistent with historic disposal activities.	7 samples collected - 4 samples: TNT HH (4) and ecological (1) - 3 samples: 2,4-DNT HH (3) and ecological (1) - 1 sample: 2, 6-DNT HH - 3 samples: 2-amino-2,6-DNT HH - 3 samples: 3,5-DNT HH - 2 samples: 4-amino-2,6-DNT HH - 1 sample: N-nitrosodiphenylamine HH and ecological	750/ Level 2 Qualitative MEC HA evaluation is consistent with weight of evidence results from the SI.	- Surface extent MEC/MPPEH in all directions laterally from the SI investigation area, including east over Escolar Road - Subsurface MEC/MPPEH presence and extent - Determination if SI MC PSL exceedances pose unacceptable risk - Reassessment of OU 6 institutional controls in place for OU 6 (under wetlands regulations but determined to provide sufficient protection for OU 6 as per the OU 6 ROD)	Recommendation for RI will be reevaluated based on the results of the 2023 field work and will be presented in an addendum to this report.
		MEC (14 Items)	(13) AN-M46 Photoflash Bomb Booster Cup/ AN-M46 Photoflash Bomb (1) Mk 19 Base Detonating Fuze					
UXO 4	Trigger Ave Disposal (Site 9)	MDAS (101 Items)	(54) AN-M109A1/AN-M103A1 Fin Assembly (6) Unknown Fuze/Fuze adapter MD (1) M25 Dummy 40-mm Cartridge (40) Unknown (various) MD	UXO 4 EM61-HP and TEM-8g data exhibit widespread subsurface metallic debris across much of the site. Although likely associated with non-munitions metallic debris disposed from rail cars or with metallic, mineral-rich ballast rock associated with the rail spur extending along the western edge of the site it is possible that subsurface MEC is present. Based on historic images of the site that depict a clearing, the area has undergone significant disturbance associated with the construction of Trigger Avenue. These conditions limited efficacy of GPR surveying at the site, where the GPR signal attenuation was too high in the shallow subsurface (e.g., upper 1 Foot) to provide meaningful interpretation at depth.	N/A	MEC HA was not prepared. Additional data needed to evaluate explosive hazard.	- Surface extent of MEC/MPPEH, if any, particularly to the south and west of the SI investigation area -Surface extent of MEC/MPPEH, if any, on the ground surface beneath shipping containers and ammo cans - Subsurface MEC/MPPEH, if any, presence and extent	RI
UXO 6	Debris Area 2 (Site 22)	MDAS (10 Items)	(10) Unknown (various) MD	N/A (Geophysics not conducted – Only surface concerns were identified for UXO 6 CSM)	N/A	560/ Level 3 Qualitative MEC HA evaluation overestimates explosive hazard considering the weight of evidence results from the SI	- None	- Additional Phase of Site Inspection to remove MEC/MPPEH. Recommendations will be reevaluated based on the results of the 2023 field work and will be presented in an addendum to this report.
		MEC (6 Items)	(5) Mk 22 Percussion Primer (1) Mk 2 Mod 1 Primer					
UXO 7	Debris Area 1 (Site 23)	MDAS (2 Items)	(1) Broken up remains of a M48 series fuse (1) L-60 40-mm cartridge case	Consistent with historical disposal activities at UXO 7 EM61-HP and TEM-8g data depict widespread subsurface metallic debris across the majority of the site. GPR data indicate suspected	1 sample collected There were no human health or ecological PSL exceedances. Four samples collected from the	560/ Level 3 Qualitative MEC HA evaluation overestimates explosive hazard	- Surface extent of MEC/MPPEH in all directions laterally from the SI investigation area -Subsurface MEC/MPPEH presence and extent	RI

Table 7-1: Summary of SI Results and Recommendations

Site		Item Type / Number of Items	Number of Item(s) / Item Description	Geophysical Survey Results	MC Sampling PSL Exceedances	MEC HA Score/ MEC HA Hazard Level	Preliminary Data Gaps Identified	Recommendations
		MEC (1 Item)	(1) M69 incomplete incendiary bomb with residue	buried debris to be up to 5 feet bgs. Buried debris appears to extend to depths of between 7.5 feet and 10 feet bgs beneath the mounds located in the eastern portion of the site. The cover soil over the mounds is approximately 2 to 2.5 feet thick.	detonation pits showed RDX PSL exceedances and two samples showed HMX PSL exceedances. Nitrocellulose was detected in all four samples but at concentrations below the PSL and all other parameters were nondetect. The PSL exceedances are associated with donor explosives used to conduct the detonations and do not present exposure/risk to receptors as OU 1 institutional controls are in place at UXO 7.	considering the weight of evidence results from the SI	- Evaluation of OU1 institutional controls which overlap the footprint of UXO 7, and evaluation on need for subsurface investigation and/or need for modification of controls - Determination if donor explosive MC PSL exceedances pose unacceptable risk	
UXO 7B	Site A Debris Area (OU1 Site A)	MDAS (43 Items)	(31) Unknown item MD (3) Various Fuzes MD: Fuze Unknown MD, Mk 376 Tail Fuze MD, and M48 Series Fuze MD (4) Various Cartridge Cases: Mk 2 Cartridge Case, Unknown model 75-mm Cartridge MD, and Model Unknown Cartridge Case (1) Mk 19 Mod 1 Exploder Mechanism MD (1) Unknown Model Bomb MD (1) Mk 25 Mod 1-3 Marine Location Marker MD (2) Various Projectiles MD: Unknown model 75-mm Projectile MD and M51 APC-T 37-mm Projectile MD	N/A (Geophysics not conducted – Only surface concerns were investigated for UXO 7B due to institutional controls)	1 sample collected There were no human health or ecological PSL exceedances.	780/ Level 2 Qualitative MEC HA evaluation is consistent with weight of evidence results from the SI	- Surface extent of MEC/MPPEH in all directions laterally from the SI investigation area -Subsurface MEC/MPPEH presence and extent - Reassessment of OU 1 institutional controls/land use restrictions in relation to the UXO 7B footprint.	RI
		MEC (4 Items)	(3) Types of Projectiles: Unknown Model 40-mm Projectile, Mk 2 HE-I HE 40-mm Projectile, and Unknown model HE 75-mm Projectile (1) Mk 25 Mod 1-3 Marine Location Marker					
UXO 9	Cattail Lake/Marsh(Site OO)	MEC(1 Item)	(1) M18 Smoke Hand Grenade	N/A (Geophysics not conducted – Only surface concerns were investigated at UXO 9 due to presence of wetlands)	N/A	515/ Level 4 Qualitative MEC HA evaluation overestimates explosive hazard considering the weight of evidence results from the SI	- None	- The institutional controls for OU 1 Site A institutional controls extend over a portion of UXO 9. Further recommendation for UXO 9 is pending Navy internal discussions and will be presented in the SI addendum.

Table 7-1: Summary of SI Results and Recommendations

Site		Item Type / Number of Items	Number of Item(s) / Item Description	Geophysical Survey Results	MC Sampling PSL Exceedances	MEC HA Score/ MEC HA Hazard Level	Preliminary Data Gaps Identified	Recommendations
UXO 9B	Floral Point (OU7 Site B)	Desktop Study; SI Field Investigation Not Warranted				MEC HA was not prepared. No unacceptable explosive hazard is present due to remedy implemented under ROD.	- None	NFA Eliminated from SI Investigation; ROD and remedy (cap) already in place as part of OU 7 that encompasses UXO 9B. Adequately addressed internally by Navy in current ICMP without need for revision.
UXO 11	Luoto Road Disposal (Site 14)	MDAS (1 Item)	(1) Mk 2 40-mm Cartridge Case	UXO 11 EM61-HP data depict SRAs coincident with non-munitions related surface obstructions (i.e., burn barrels and cultural features).	N/A	MEC HA was not prepared. No explosive hazards identified.	- None	NFA
UXO 11B	Ammunition Can/Tank Disposal Site (Site 8)	MDAS (1 Item)	(1) Mk 2 Cartridge Case	UXO 11B EM61-HP data depict SRAs coincident with non-munitions related surface obstructions (i.e., burn barrels and cultural features).	N/A	MEC HA was not prepared. No explosive hazards identified.	- Observed but inaccessible MPPEH remaining in underground pit (confined space), also listed as a cultural site.	Interim Action for removal of remaining items safely accessible in underground pit.
UXO 12	Barricade Siding P-1 (Site HH)	N/A	N/A	N/A (Geophysics not conducted – Only surface concerns were identified for UXO 12 CSM)	N/A	MEC HA was not prepared. No explosive hazards identified.	- None	NFA
UXO 13	Site 4 Carlson Spit Disposal(Site 4 Carlson Spit)	N/A	N/A	UXO 13 EM-61-HP survey transects data did not demonstrate any SRAs or other features consistent with a disposal site. Discrete geophysical anomalies were identified along the survey transects. Localized steep slopes within the project area limit the ability to collect 100 percent digital DGM data across the entire site	N/A	MEC HA was not prepared. No explosive hazards identified.	- None	NFA
UXO 14	Barricade Siding P-2 (Site JJ)	N/A	N/A	N/A (Geophysics not conducted – Only surface concerns were identified for UXO 14 CSM)	N/A	MEC HA was not prepared No explosive hazards identified..	-None	NFA
UXO 17	Classification Yard (Site 2)	MDAS (15 Items) MEC (5 Items)	(14) Various Cartridge Cases: Mk 2 Cartridge Case, Mk 3 Cartridge Case, Unknown Cartridge Case, Mk 2 40-mm Cartridge Case, Mk 3 40-mm Cartridge Case, and Mk 7 Mod 1 3 in. Cartridge Case (1) Mk 6 Mod 7 Practice 5 in. Warhead (1) Mk 6 Unknown Mod 5 in. Warhead (4) Projectiles: Mk 38 Mod 3 Special Common 5 in. Projectile and Mk 46 Mod 2 Special Common 5 in. Projectile	UXO 17 EM61-HP and TEM-8g data depict large areas of elevated DGM response, consistent with a former disposal site, and suggests that debris was disposed in pits or trenches or was subjected to spreading due to earthwork activities. Metallic debris was observed protruding from the ground in the northern portion of the site. Delineated SRAs indicate a high-response area in the DGM data extending laterally from the current SI investigation area. GPR surveys were focused in the central and northern portions of the MRP site. GPR data show in the northwest portion of the site, debris at the top of the slope is approximately 5 feet bgs. In the central portion of the site, the GPR data suggest the top of the buried debris is relatively shallow at approximately 2 to 2.5 feet bgs. The GPR data and observations indicate disposal area	N/A	600/ Level 3 Qualitative MEC HA evaluation is consistent with the weight of evidence results from the SI.	-Surface MEC/MPPEH extent, particularly in the northern portion of UXO 17 SI investigation area to the north and east -Subsurface MEC/MPPEH to determine the presence and extent	RI

Table 7-1: Summary of SI Results and Recommendations

Site		Item Type / Number of Items	Number of Item(s) / Item Description	Geophysical Survey Results	MC Sampling PSL Exceedances	MEC HA Score/ MEC HA Hazard Level	Preliminary Data Gaps Identified	Recommendations
				materials were likely pushed to the north and east portions of UXO 17 during earthwork activities. Total depth of debris at UXO 17 cannot be reliably imaged in the GPR data. The data indicate undisturbed soils may range from approximately 5 to 10 feet bgs.				
UXO 17B	Western Barricade Railroad Sidings (Site 1)	MDAS (1 Item)	(1) M212 Practice Ctg. Case	UXO 17B data indicate presence of subsurface metallic debris across the majority of the site, with a large number of discrete targets and mapped SRAs and suggest one or more of the following: (1) evidence of debris or scrap offloaded and dumped from rail cars, (2) more recent earthwork activities spread metal within the shallow subsurface, and (3) the responses are predominately associated with demolition and removal of the former rail line and ballast rock. GPR data depict changes in subsurface geology and hydrogeology throughout the site and less evidence of widespread disposal of buried debris. In the southern portion of the site, shallow groundwater and saturated surface soils may limit the efficacy of GRP.	N/A	MEC HA was not prepared. No explosive hazards identified.	- None	NFA
UXO 17C	Eastern Side Car Barricade (Site BB)	N/A	N/A	N/A (Geophysics not conducted – Only surface concerns were identified for UXO 17C CSM)	N/A	MEC HA was not prepared. No explosive hazards identified.	- None	NFA
UXO 17D	Brass Yard (Site 13)	Desktop Study; SI Field Investigation Not Warranted				MEC HA was not prepared. No explosive hazards identified.	- None	NFA

DGM	Digital geophysical mapping
DNT	Dinitrotoluene
EM61-HP	EM61-MK2-High Power
EOD	Explosive Ordnance Disposal
FS	Feasibility Study
GPR	Ground Penetrating Radar
HMX	cyclotetramethylene tetranitramine
ICMP	Institutional Controls Management Plan
LUC	Land Use Control
MC	Munitions constituents
MD	Munitions Debris
MDAS	Material documented as safe
MEC	Munitions and explosives of concern
MEC HA	MEC Hazard Assessment
MPPEH	Material potentially presenting an explosive hazard
N/A	Not Applicable
NFA	No Further Action
OU	Operable Unit
PSL	Project Screening Level
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	Record of Decision
SI	Site Inspection
SRA	Saturated Response Area
TEM	Time-domain electromagnetic
TNT	2,4,6-trinitrotoluene
UXO	Unexploded ordnance

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FIGURES

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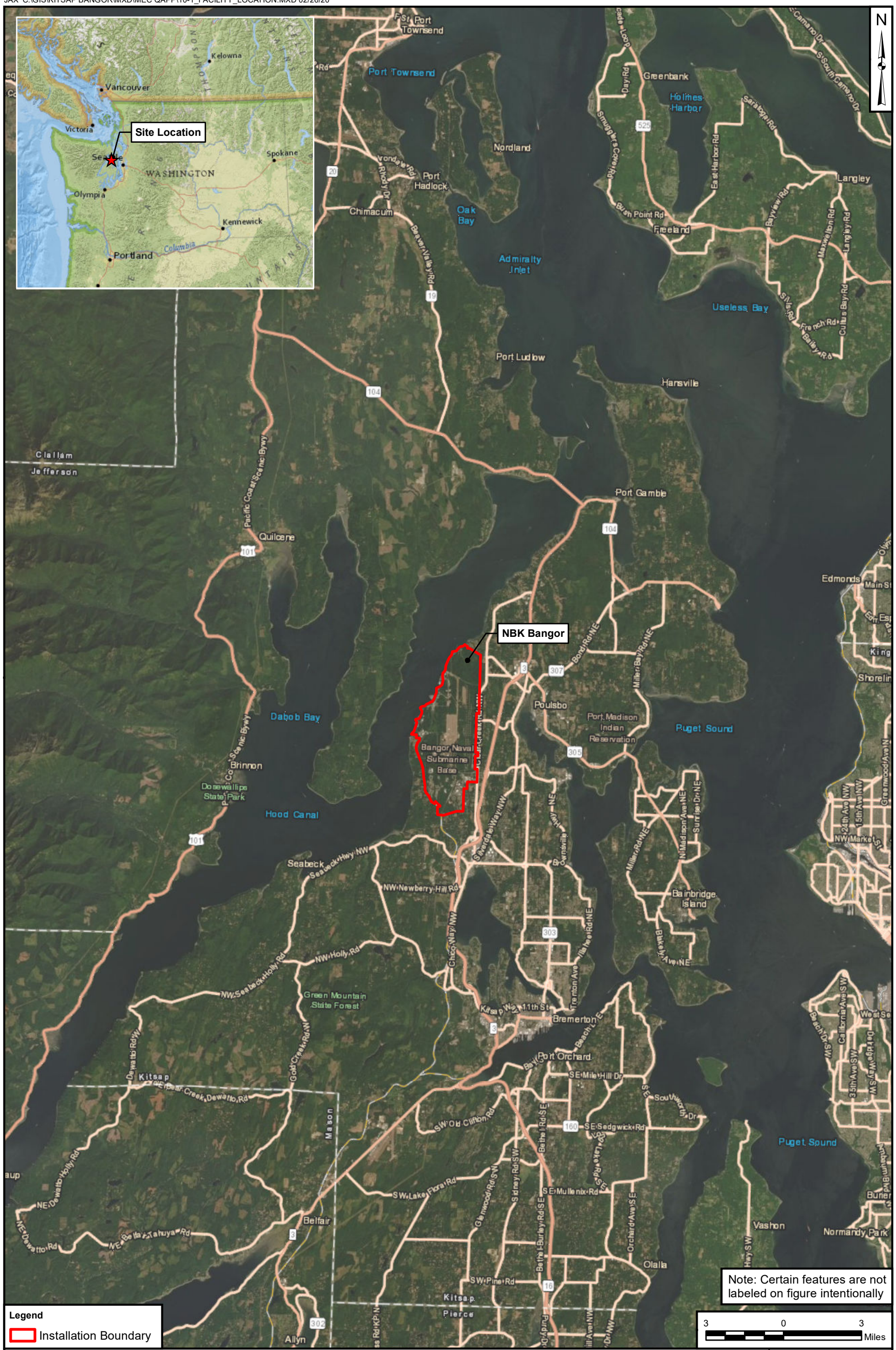

FACILITY LOCATION MAP
KITSAP BANGOR
BANGOR, WASHINGTON

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J.MADDEN	02/26/20
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H.NOLF	02/26/20
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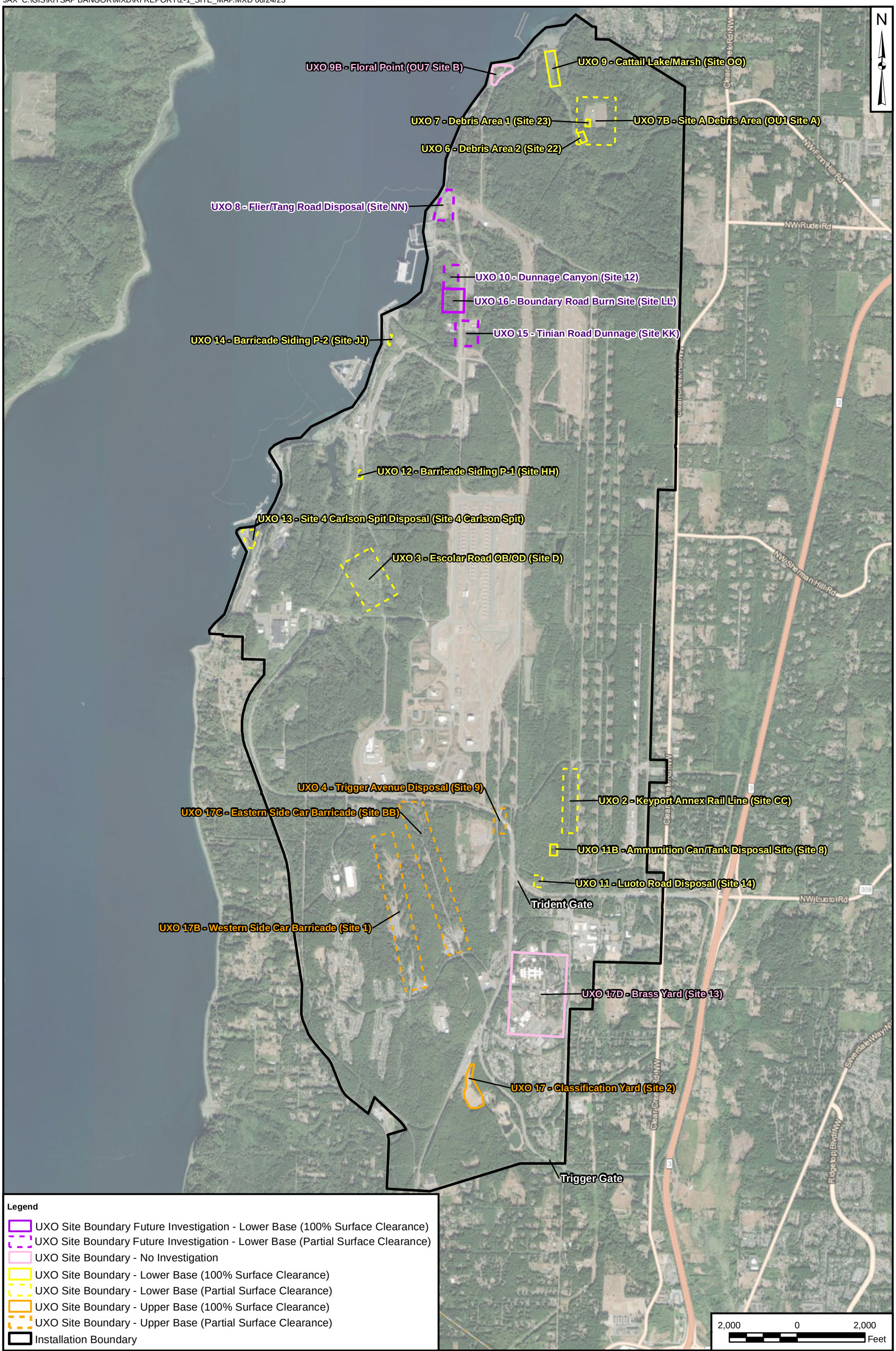

Legend

- UXO Site Boundary Future Investigation - Lower Base (100% Surface Clearance)
- UXO Site Boundary Future Investigation - Lower Base (Partial Surface Clearance)
- UXO Site Boundary - No Investigation
- UXO Site Boundary - Lower Base (100% Surface Clearance)
- UXO Site Boundary - Lower Base (Partial Surface Clearance)
- UXO Site Boundary - Upper Base (100% Surface Clearance)
- UXO Site Boundary - Upper Base (Partial Surface Clearance)
- Installation Boundary

SITE MAP
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

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J.MADDEN	06/24/23	N4425519F4112
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H.HOOK	06/24/23	2-1

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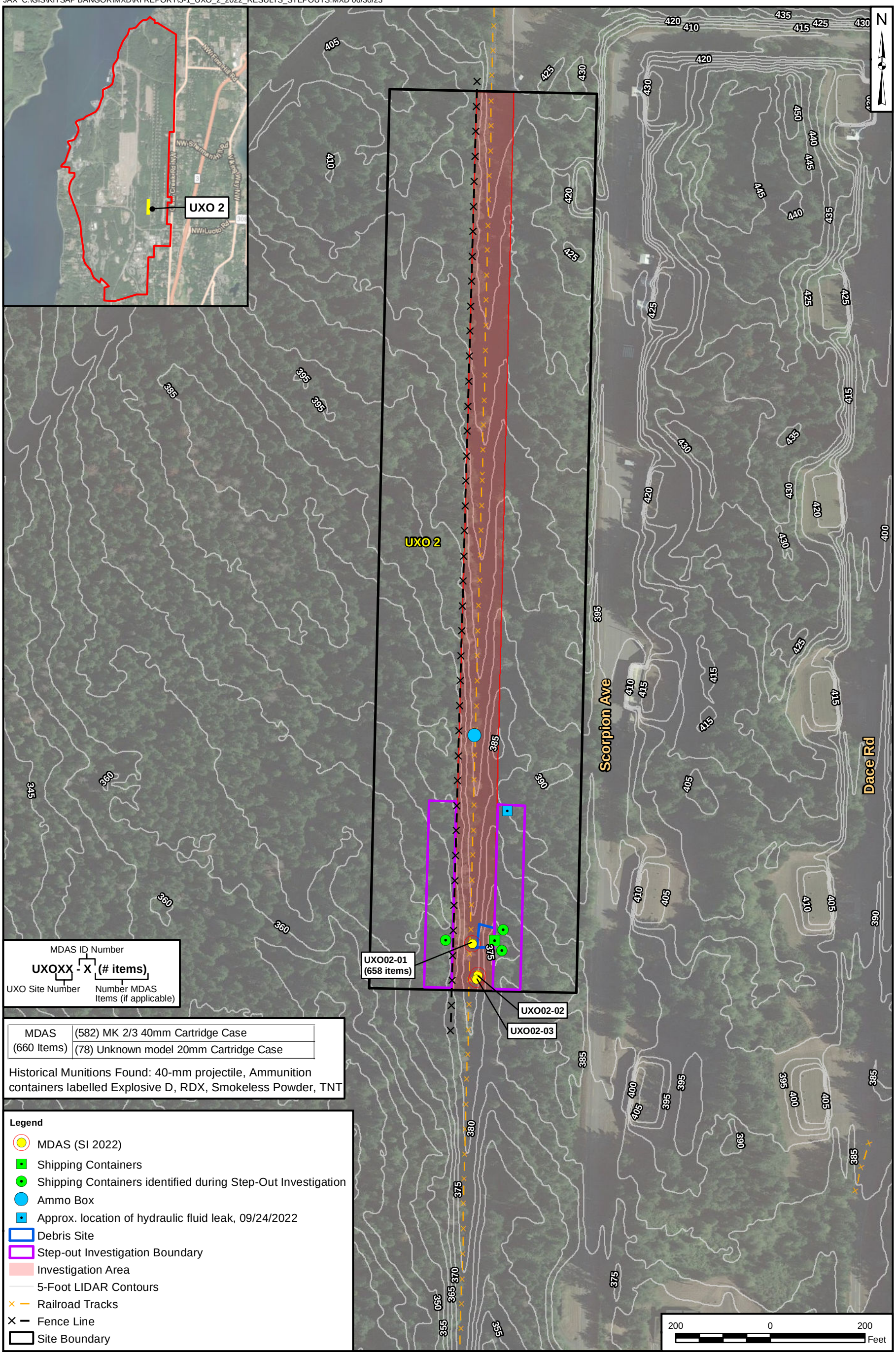
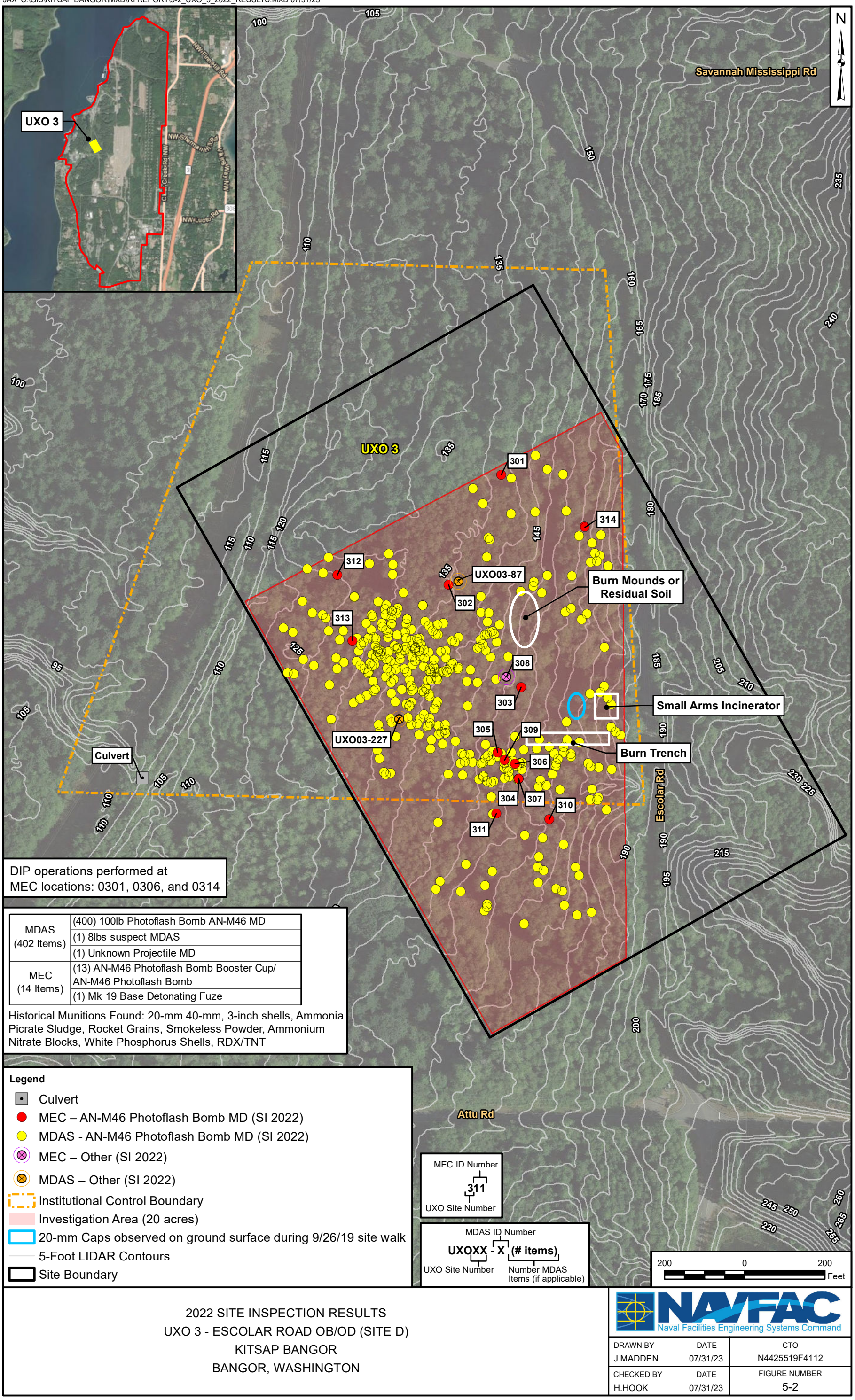


2022 SITE INSPECTION AND STEP-OUT INVESTIGATION RESULTS
UXO 2 - KEYPORT ANNEX RAIL LINE (SITE CC)
KITSAP BANGOR
BANGOR, WASHINGTON

Naval Facilities Engineering Systems Command

DRAWN BY	DATE	CTO
J.MADDEN	06/30/23	N4425519F4112
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	06/30/23	5-1

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-2_UXO_3_2022_RESULTS.MXD 07/31/23

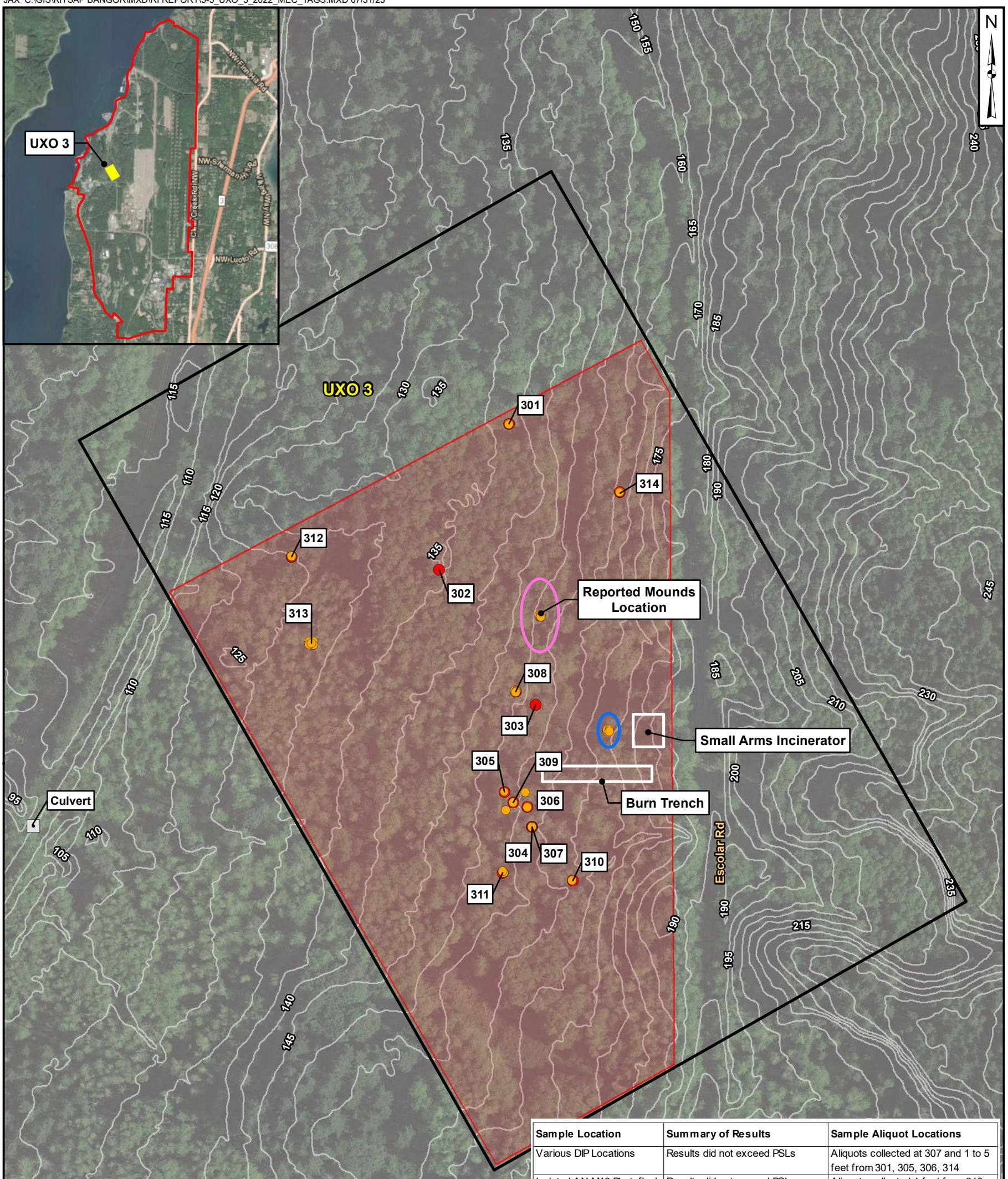


2022 SITE INSPECTION RESULTS
UXO 3 - ESCOLAR ROAD OB/OD (SITE D)
KITSAP BANGOR
BANGOR, WASHINGTON

Naval Facilities Engineering Systems Command

DRAWN BY	DATE	CTO
J.MADDEN	07/31/23	N4425519F4112
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	07/31/23	5-2

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-3_UXO_3_2022_MEC_TAGS.MXD 07/31/23



Sample Location	Summary of Results	Sample Aliquot Locations
Various DIP Locations	Results did not exceed PSLs	Aliquots collected at 307 and 1 to 5 feet from 301, 305, 306, 314
Isolated AN-M46 Photoflash Bomb Booster Findings	Results did not exceed PSLs	Aliquots collected 1 foot from 310, 311, and 312
MEC and high density MDAS area: AN-M46 Photoflash Bomb	Results did not exceed PSLs	Aliquots collected at 313 and 5 feet from MEC/MDAS item
Incinerator Area	Exceedances of TNT, 2,4-Dinitrotoluene, 2-Amino-4,6-Dinitrotoluene, 3,5-Dinitroaniline, and 4-Amino-2,6-Dinitrotoluene	Aliquots collected near incinerator opening and encircling 5 feet from first aliquot
Burn Mounds	Results did not exceed PSLs	Aliquots collected w ithin burn mounds area and encircling 5 feet from first aliquot
MEC 304/309 locations and associated potential drainage/pooling areas	Exceedance of TNT	Aliquots collected at 304/309 and 5 to 20 feet from 304 and 309
MEC: MK19 Base Detonating Fuze (308)	Exceedances of TNT, 2,4-Dinitrotoluene, 2,6 Dinitrotoluene, 2-Amino-4,6-Dinitrotoluene, 3,5-Dinitroaniline, and N-Nitrosodiphynylamine	Aliquots collected at 308 and encircling 5 feet from MEC item

MEC ID Number
311
UXO Site Number

Five aliquots collected at 0 to 6 inch deep, using UXO avoidance.

Legend

- Culvert
- MC Soil Sample location
- MEC – AN-M46 Photoflash Bomb MD (SI 2022)
- Reported Mounds Area
- Investigation Area (20 acres)
- 20-mm Caps observed on ground surface during 9/26/19 site walk
- 5-Foot LIDAR Contours
- Site Boundary

2022 MC SAMPLING SITE INSPECTION RESULTS
UXO 3 - ESCOLAR ROAD OB/OD (SITE D)
KITSAP BANGOR
BANGOR, WASHINGTON

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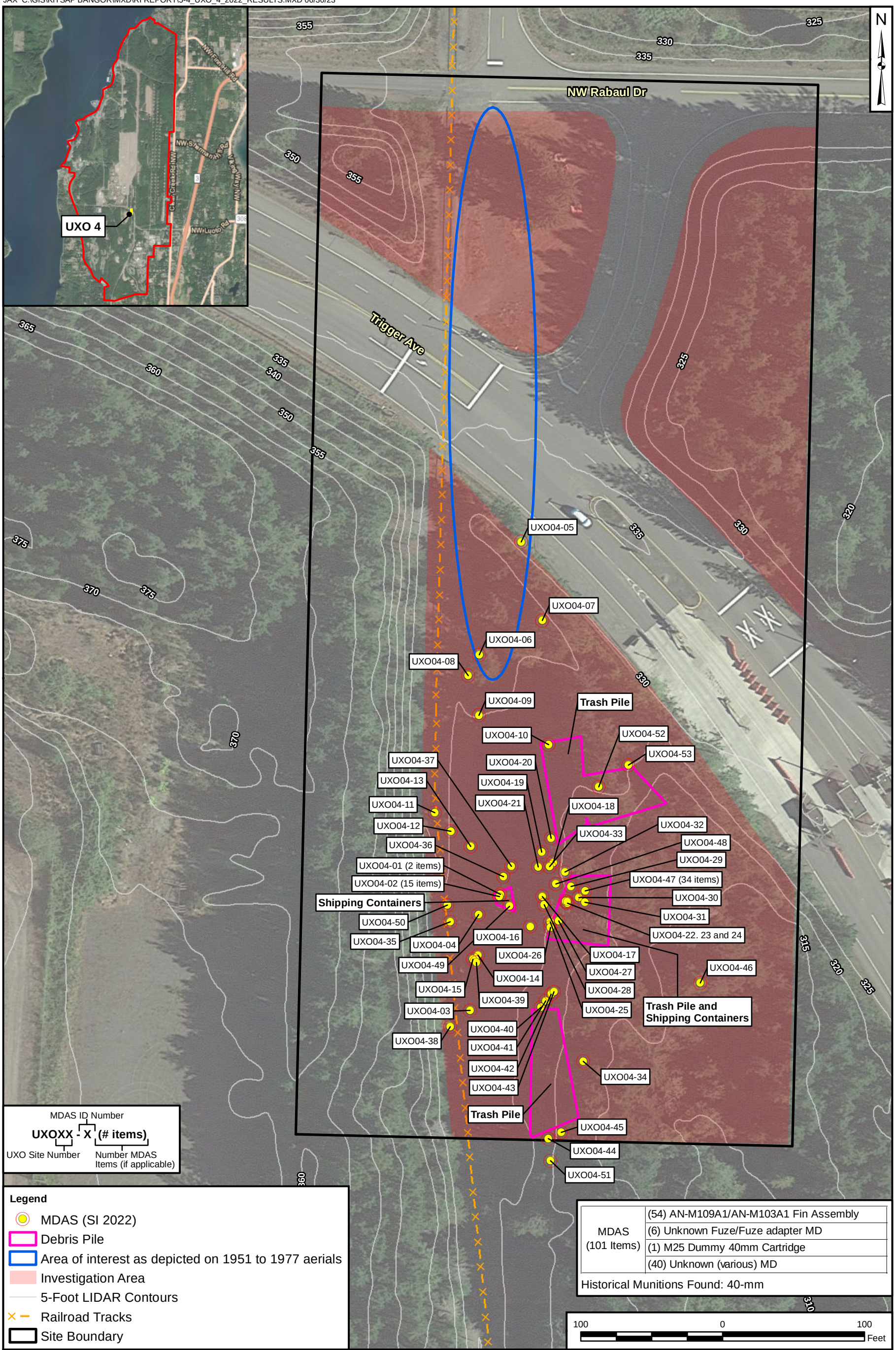
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	07/31/23	5-3

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-4_UXO_4_2022_RESULTS.MXD 06/30/23



2022 SITE INSPECTION RESULTS
UXO 4 - TRIGGER AVENUE DISPOSAL (SITE 9)
KITSAP BANGOR
BANGOR, WASHINGTON

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J.MADDEN	06/30/23	N4425519F4112
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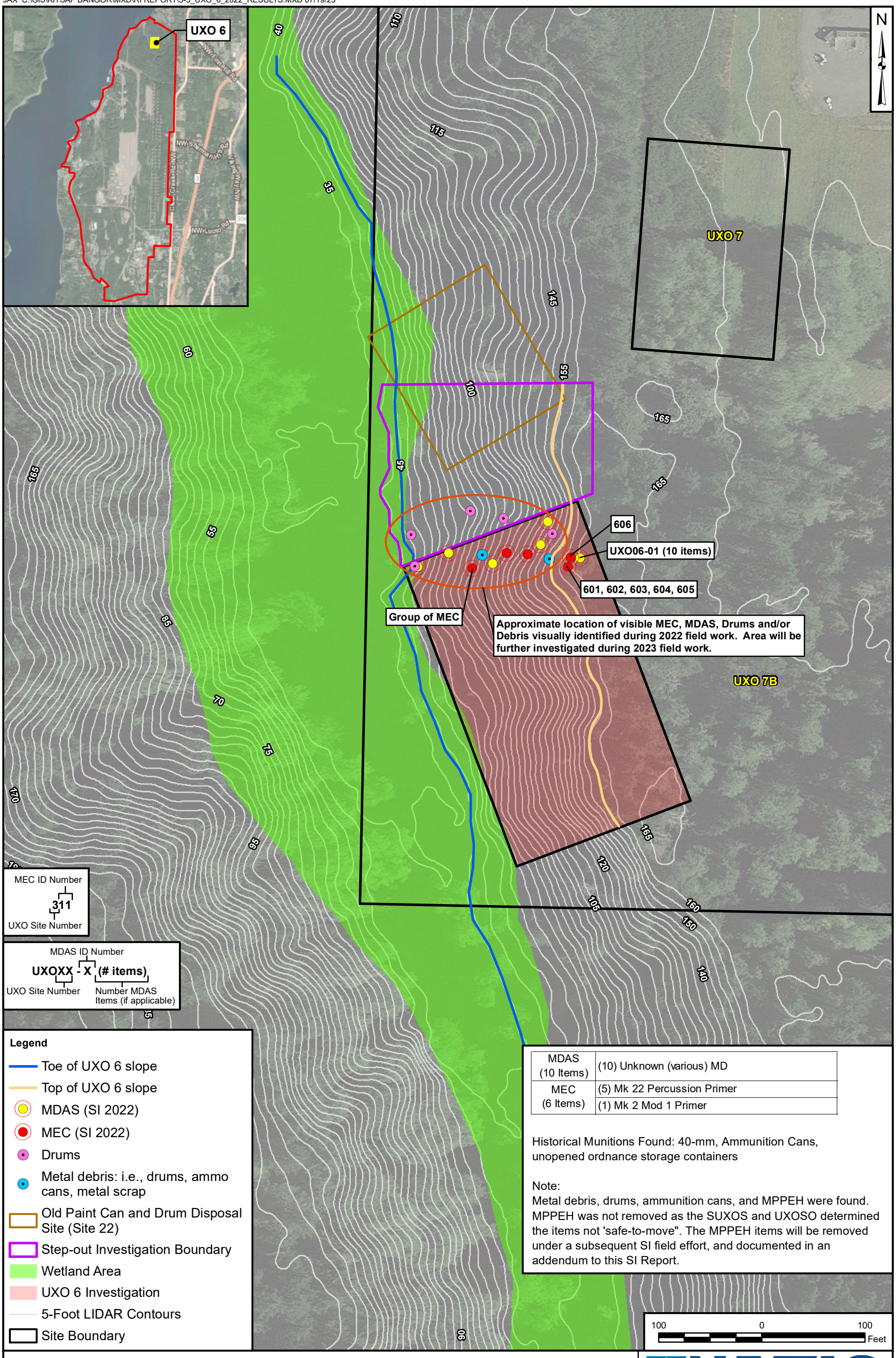
H.HOOK	06/30/23	5-4

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-5_UXO_6_2022_RESULTS.MXD 07/19/23

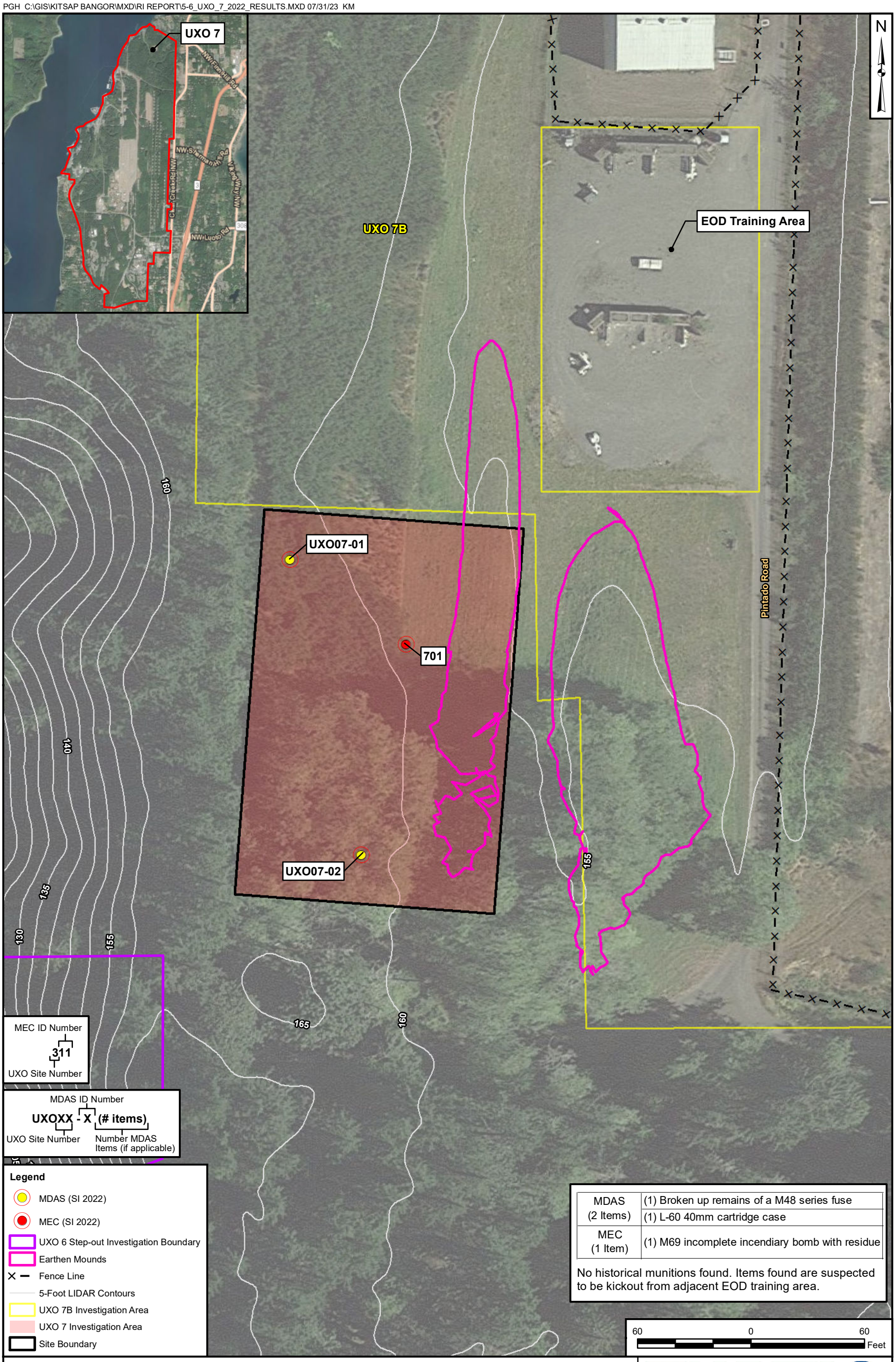


2022 SITE INSPECTION AND STEP-OUT INVESTIGATION RESULTS
UXO 6 - DEBRIS AREA 2 (SITE 22)
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

DRAWN BY	DATE	CTO
J.MADDEN	07/19/23	N4425519F4112
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	07/19/23	5-5

PGH C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-6_UXO_7_2022_RESULTS.MXD 07/31/23 KM



MDAS (2 Items)	(1) Broken up remains of a M48 series fuse
	(1) L-60 40mm cartridge case
MEC (1 Item)	(1) M69 incomplete incendiary bomb with residue

No historical munitions found. Items found are suspected to be kickout from adjacent EOD training area.

2022 SITE INSPECTION RESULTS
UXO 7 - DEBRIS AREA 1 (SITE 23)
KITSAP BANGOR
BANGOR, WASHINGTON

Naval Facilities Engineering Systems Command

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J.MADDEN	07/31/23	N4425519F4112
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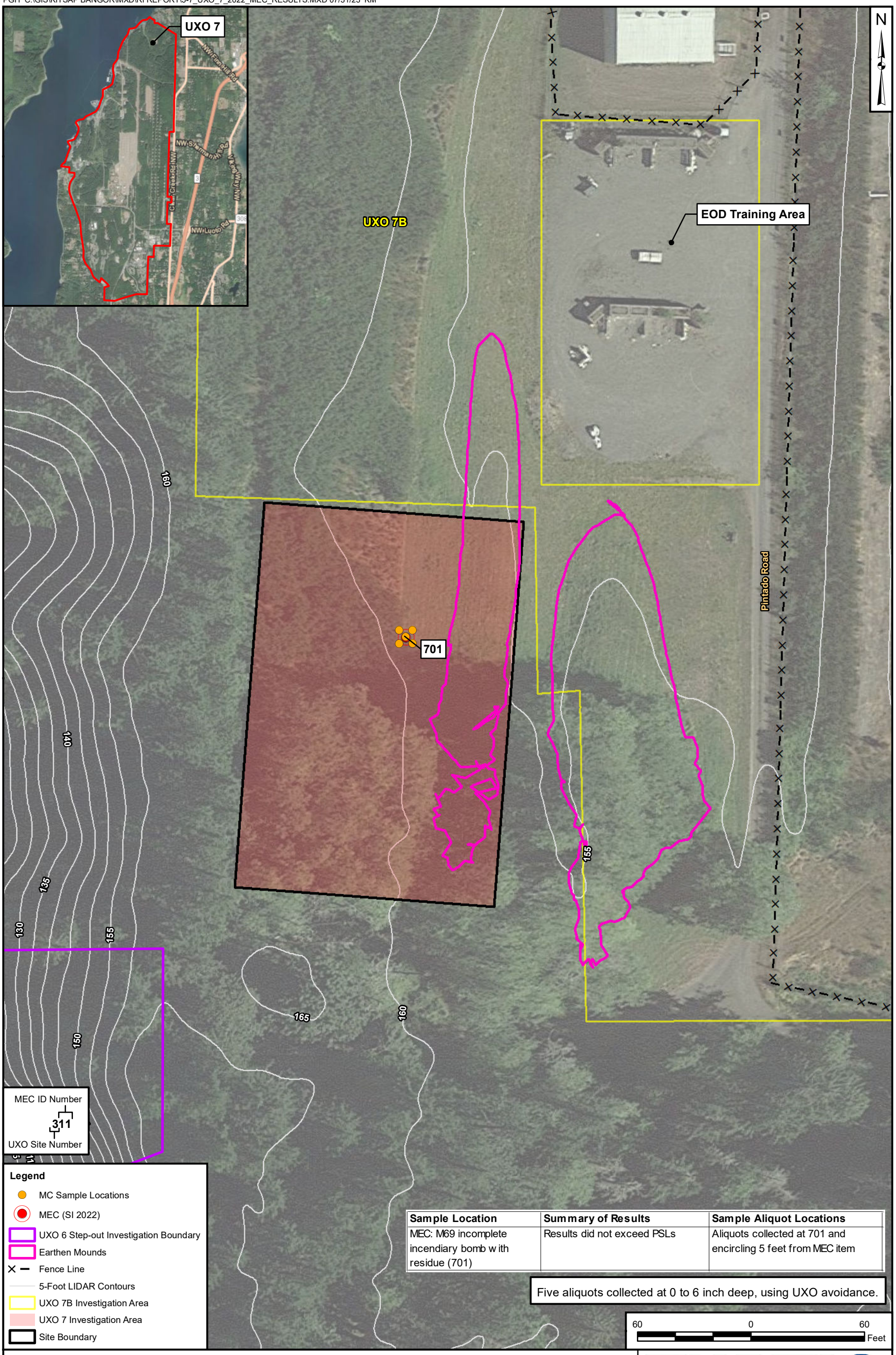
H.HOOK	07/31/23	5-6

PGH C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-7_UXO_7_2022_MEC_RESULTS.MXD 07/31/23 KM



Sample Location	Summary of Results	Sample Aliquot Locations
MEC: M69 incomplete incendiary bomb w ith residue (701)	Results did not exceed PSLs	Aliquots collected at 701 and encircling 5 feet from MEC item

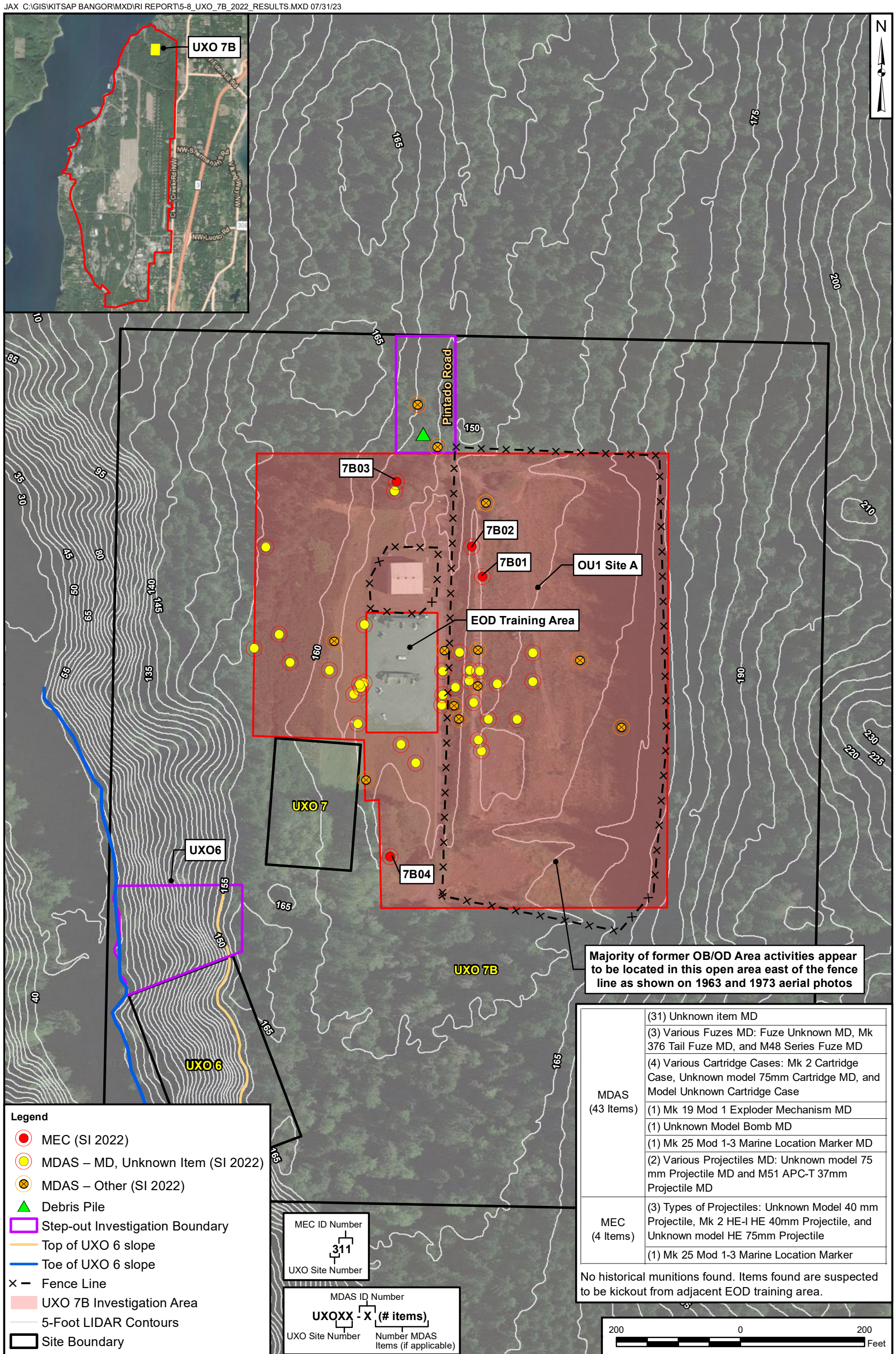
Five aliquots collected at 0 to 6 inch deep, using UXO avoidance.

2022 MC SAMPLING SITE INSPECTION RESULTS
UXO 7 - DEBRIS AREA 1 (SITE 23)
KITSAP BANGOR
BANGOR, WASHINGTON

Naval Facilities Engineering Systems Command

DRAWN BY	DATE	CTO
J.MADDEN	07/31/23	N4425519F4112
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	07/31/23	5-7

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-8_UXO_7B_2022_RESULTS.MXD 07/31/23

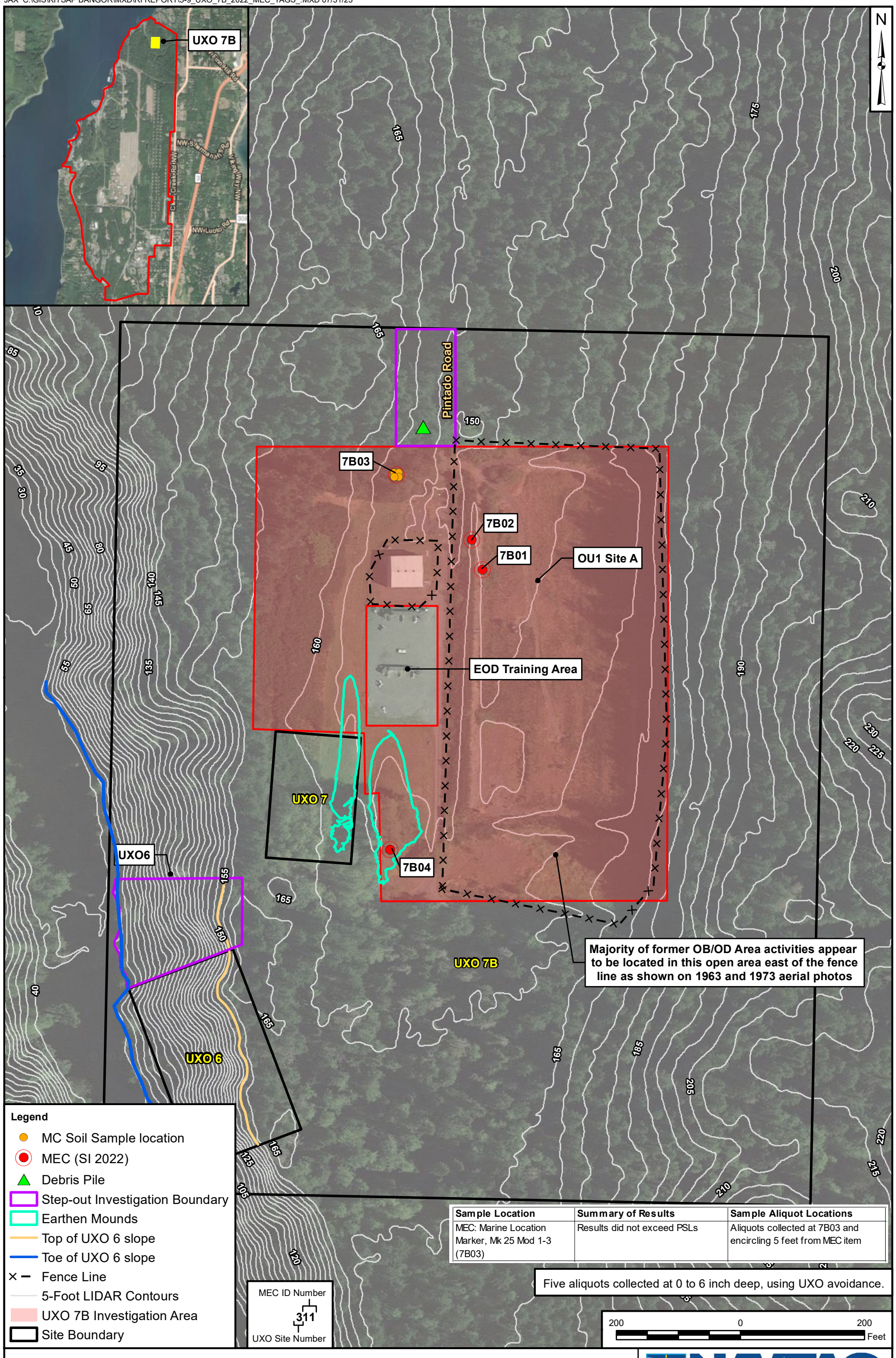


2022 SITE INSPECTION AND STEP-OUT INVESTIGATION RESULTS
UXO 7B - SITE A DEBRIS AREA (OU1 SITE A)
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

DRAWN BY	DATE	CTO
J.MADDEN	07/31/23	N4425519F4112
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	07/31/23	5-8

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-9_UXO_7B_2022_MEC_TAGS_.MXD 07/31/23



Sample Location	Summary of Results	Sample Aliquot Locations
MEC: Marine Location Marker, Mk 25 Mod 1-3 (7B03)	Results did not exceed PSLs	Aliquots collected at 7B03 and encircling 5 feet from MEC item

2022 MC SAMPLING SITE INSPECTION RESULTS
UXO 7B - SITE A DEBRIS AREA (OU1 SITE A)
KITSAP BANGOR
BANGOR, WASHINGTON

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J.MADDEN	07/31/23	N4425519F4112
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	07/31/23	5-9

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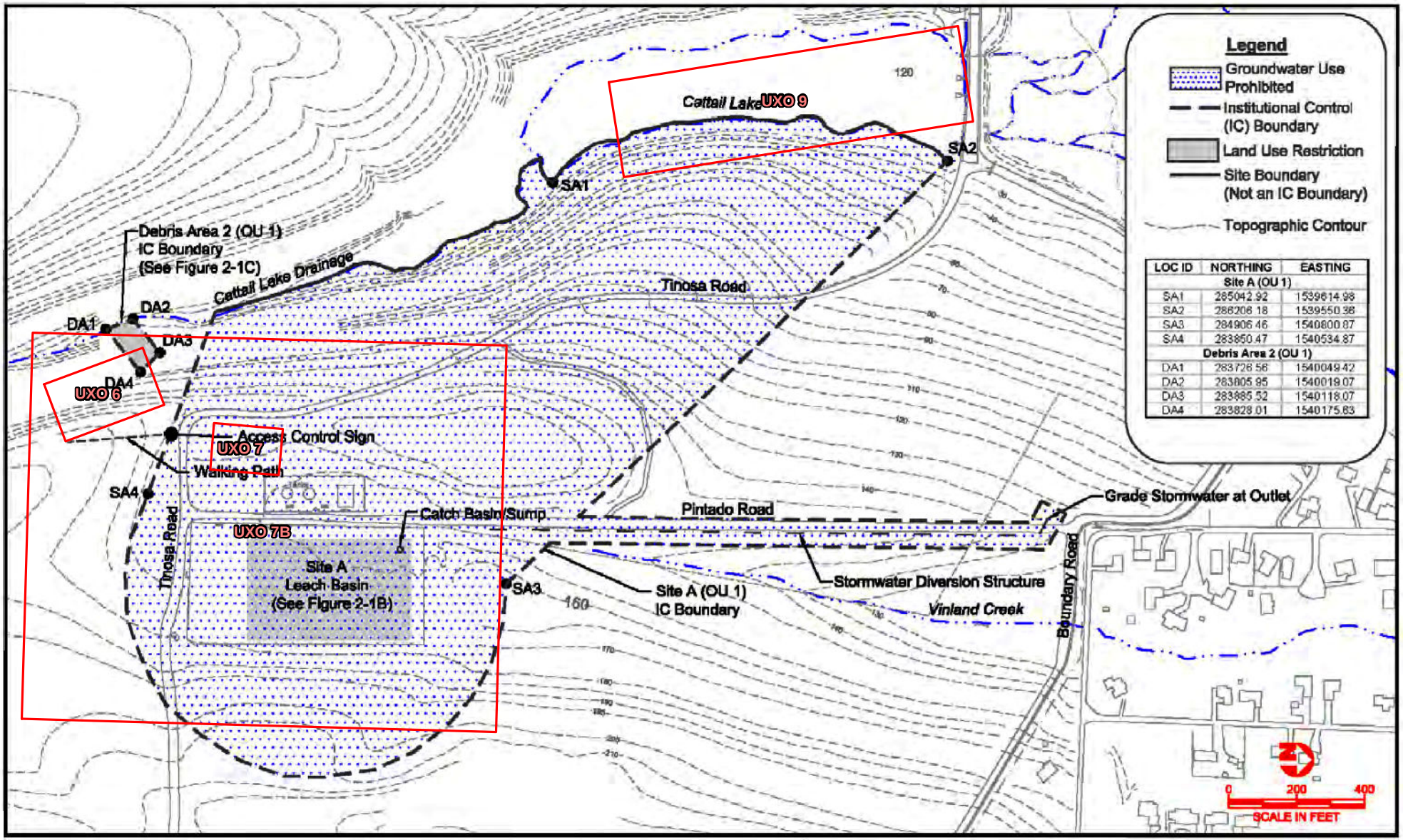

UXO AND OU 1 SITE A BOUNDARIES
KITSAP BANGOR
BANGOR, WASHINGTON

Source: Sealaska Environmental, 2011. Final 2010 Institutional Controls Inspection Letter Report for Compliance Institutional Controls (IC) Inspections (LUC) and Long Term Monitoring Operable Unit 8 Sites A and F Naval Base Kitsap Bangor WA. March 24.

NAVFAC
Naval Facilities Engineering Systems Command

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H.HOOK	06/30/23	5-10

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SITE MAP FOR FUTURE MEC INVESTIGATION
UXO 8 - FLIER/TANG ROAD DISPOSAL (SITE NN)
KITSAP BANGOR
BANGOR, WASHINGTON

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J.MADDEN	06/25/23	N4425519F4112
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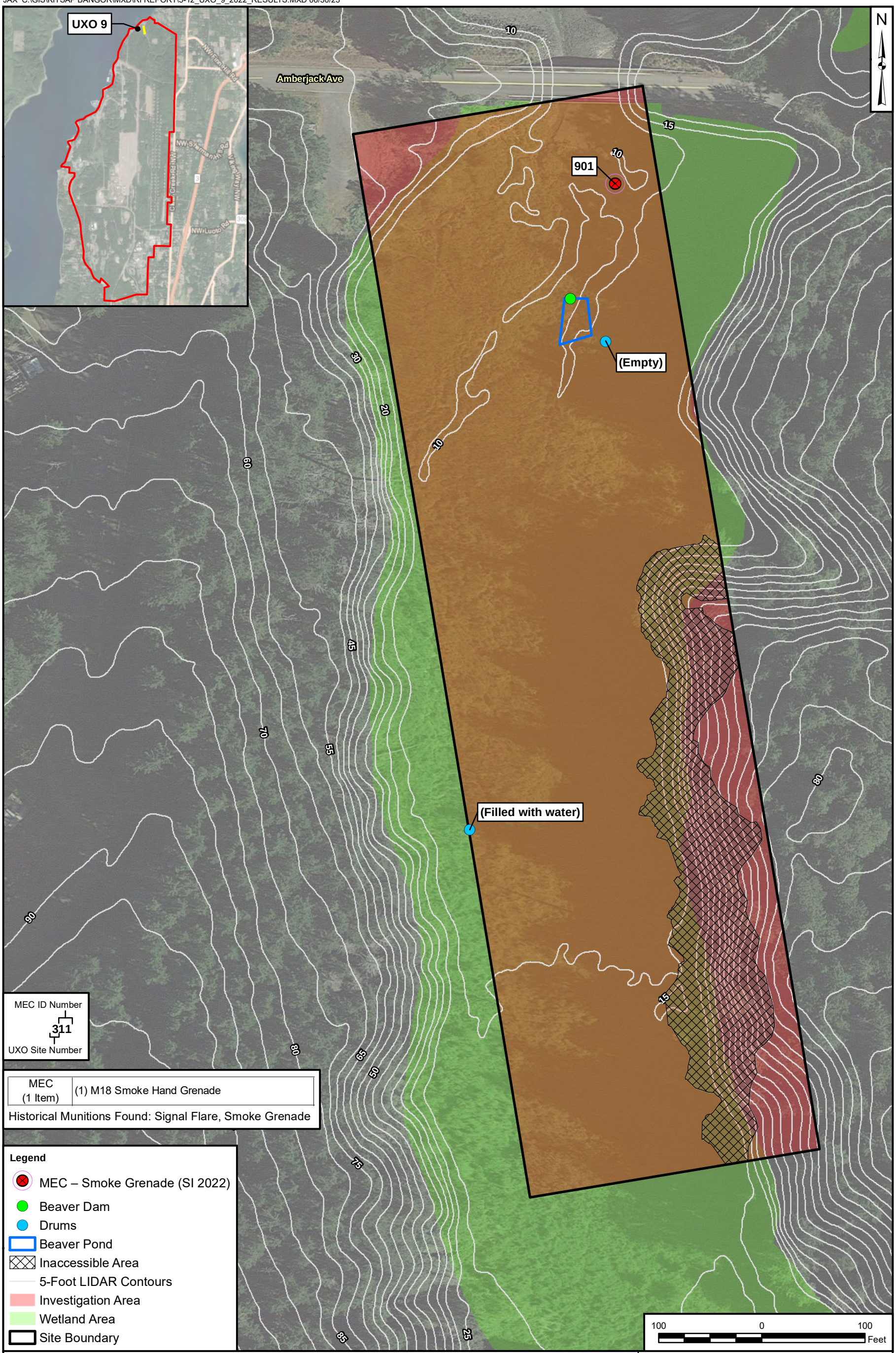
H.HOOK	06/25/23	5-11

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-12_UXO_9_2022_RESULTS.MXD 06/30/23



2022 SITE INSPECTION RESULTS
UXO 9 - CATTAIL LAKE/MARSH (SITE OO)
KITSAP BANGOR
BANGOR, WASHINGTON

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J.MADDEN	06/30/23	N4425519F4112
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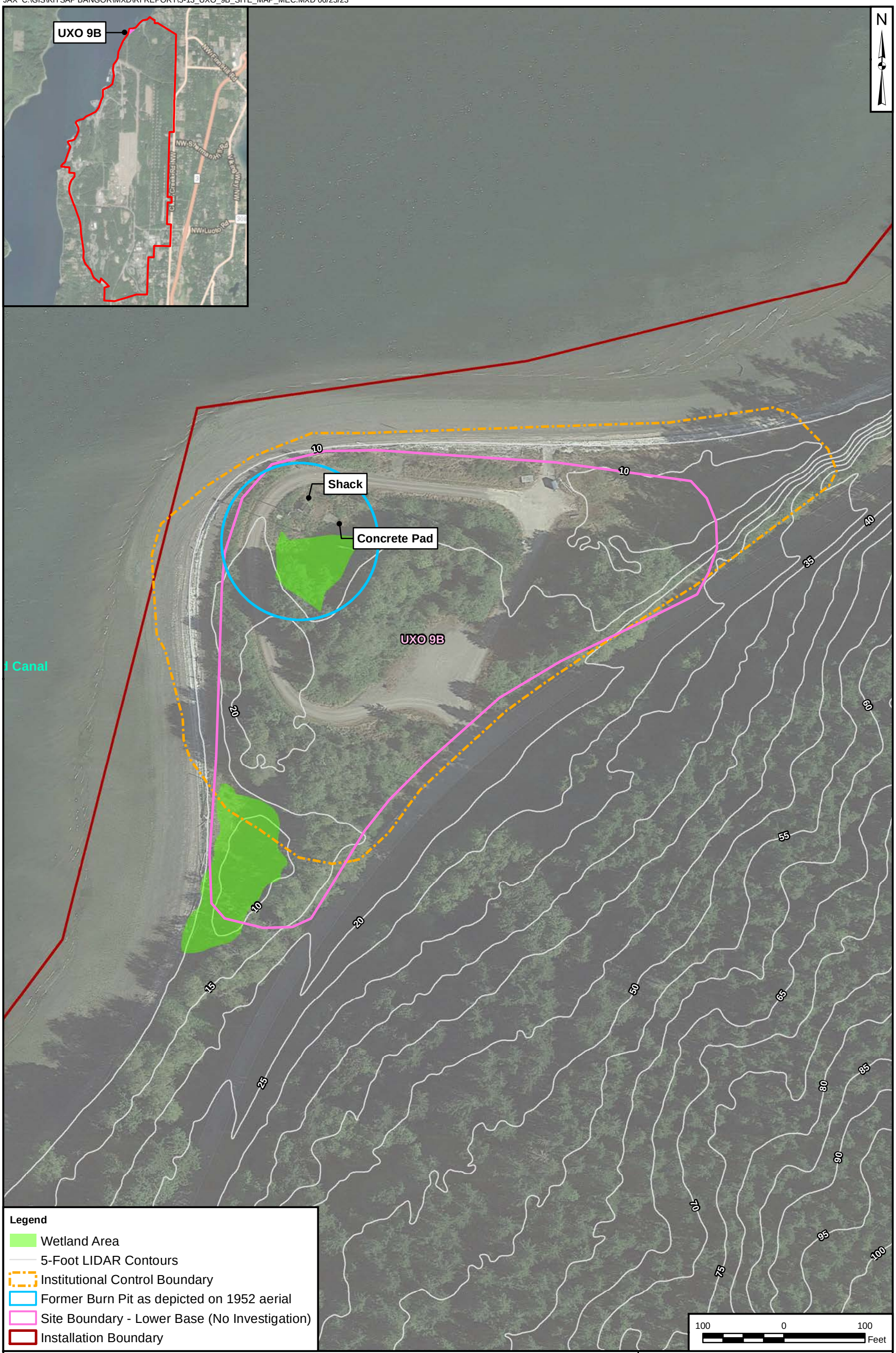
H.HOOK	06/30/23	5-12

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-13_UXO_9B_SITE_MAP_MEC.MXD 06/25/23



Legend

- Wetland Area
- 5-Foot LIDAR Contours
- Institutional Control Boundary
- Former Burn Pit as depicted on 1952 aerial
- Site Boundary - Lower Base (No Investigation)
- Installation Boundary

SITE MAP/NO INVESTIGATION
UXO 9B - FLORAL POINT (OU7 SITE B)
KITSAP BANGOR
BANGOR, WASHINGTON

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J.MADDEN	06/25/23	N4425519F4112
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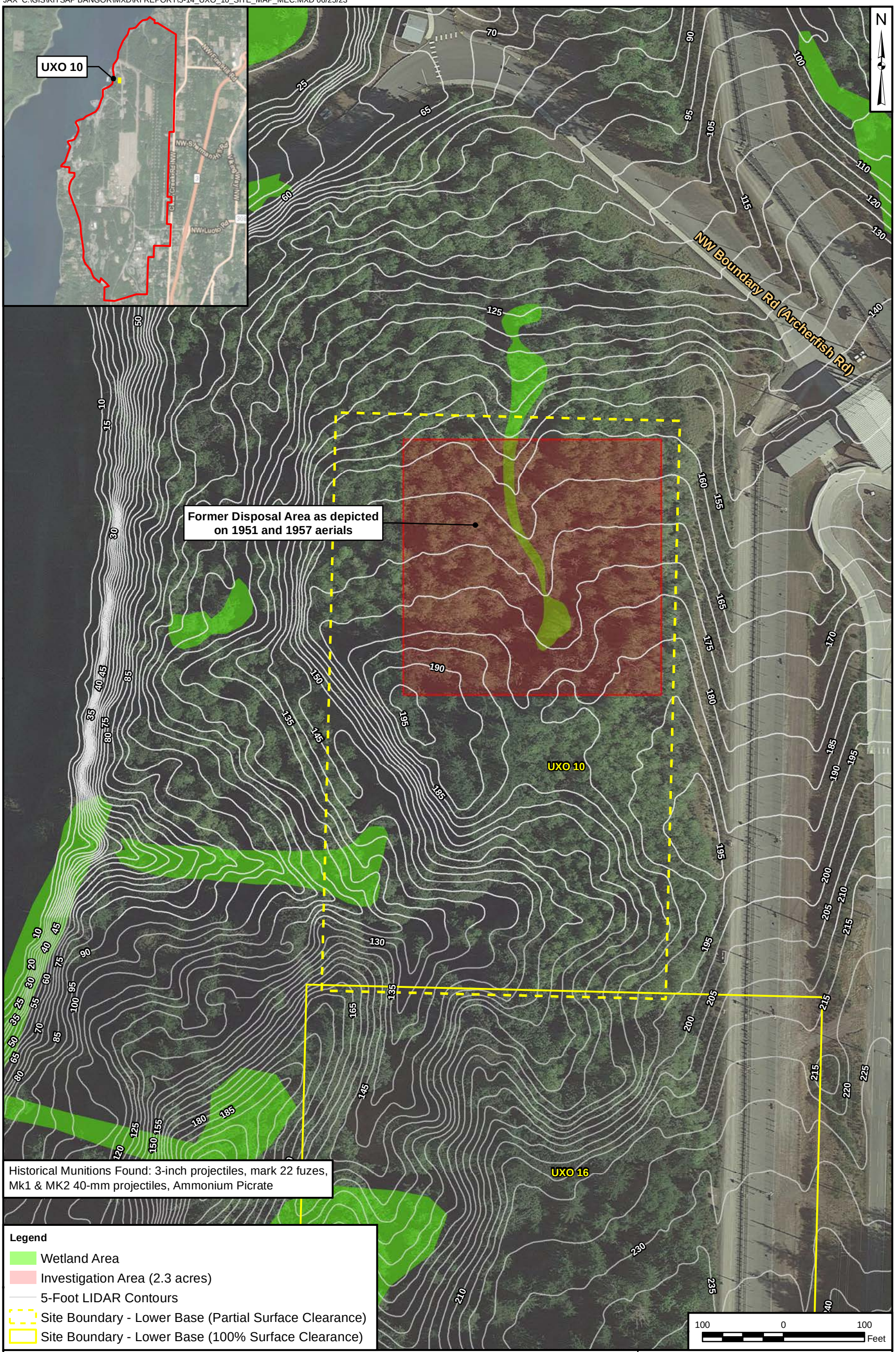
H.HOOK	06/25/23	5-13

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-14_UXO_10_SITE_MAP_MEC.MXD 06/25/23



SITE MAP FOR FUTURE MEC INVESTIGATION
UXO 10 - DUNNAGE CANYON (SITE 12)
KITSAP BANGOR
BANGOR, WASHINGTON

Naval Facilities Engineering Systems Command

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J.MADDEN	06/25/23	N4425519F4112
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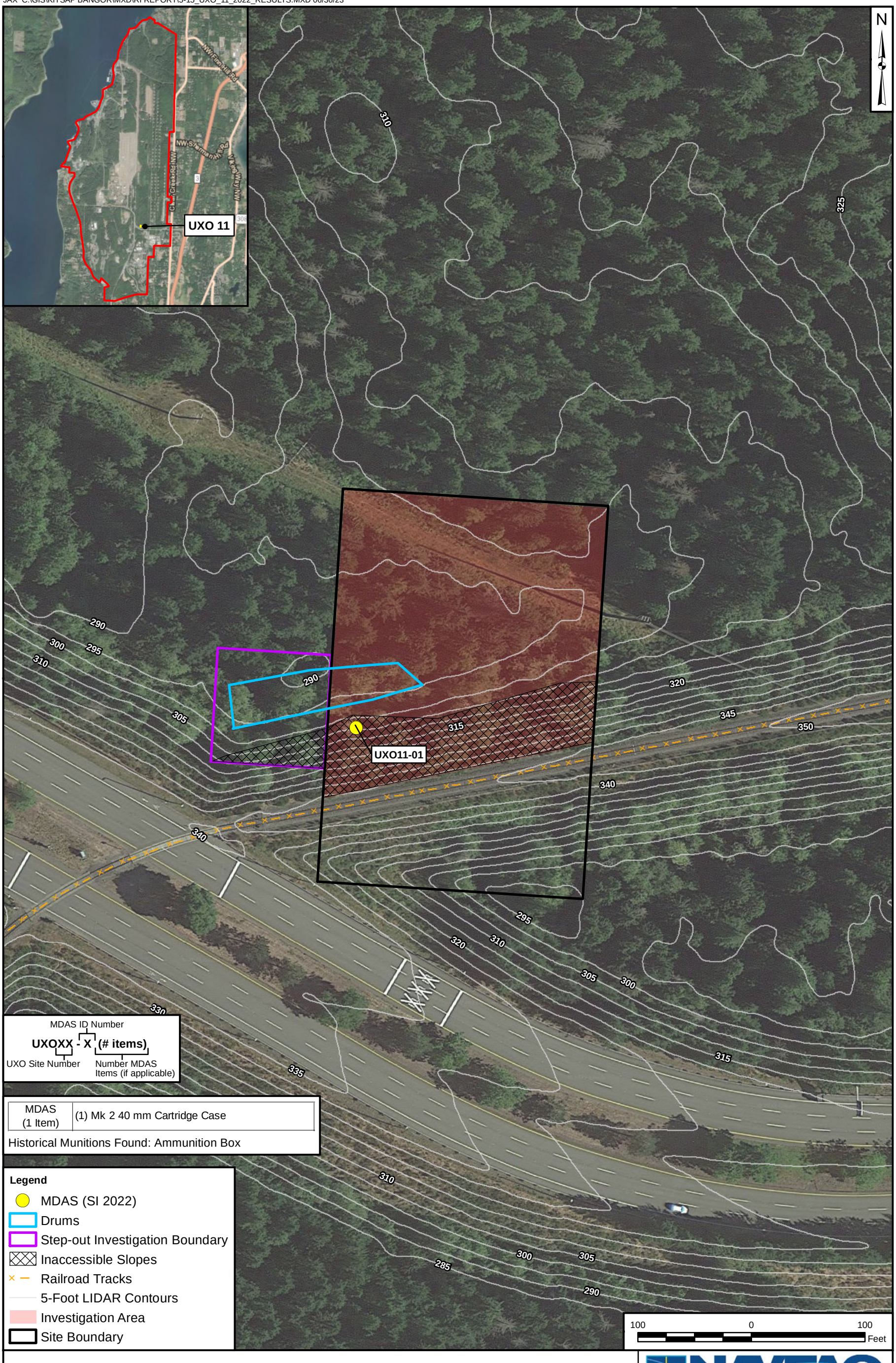
H.HOOK	06/25/23	5-14

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-15_UXO_11_2022_RESULTS.MXD 06/30/23



2022 SITE INSPECTION AND STEP-OUT INVESTIGATION RESULTS
UXO 11 - LUOTO ROAD DISPOSAL (SITE 14)
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

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J.MADDEN	06/30/23	N4425519F4112
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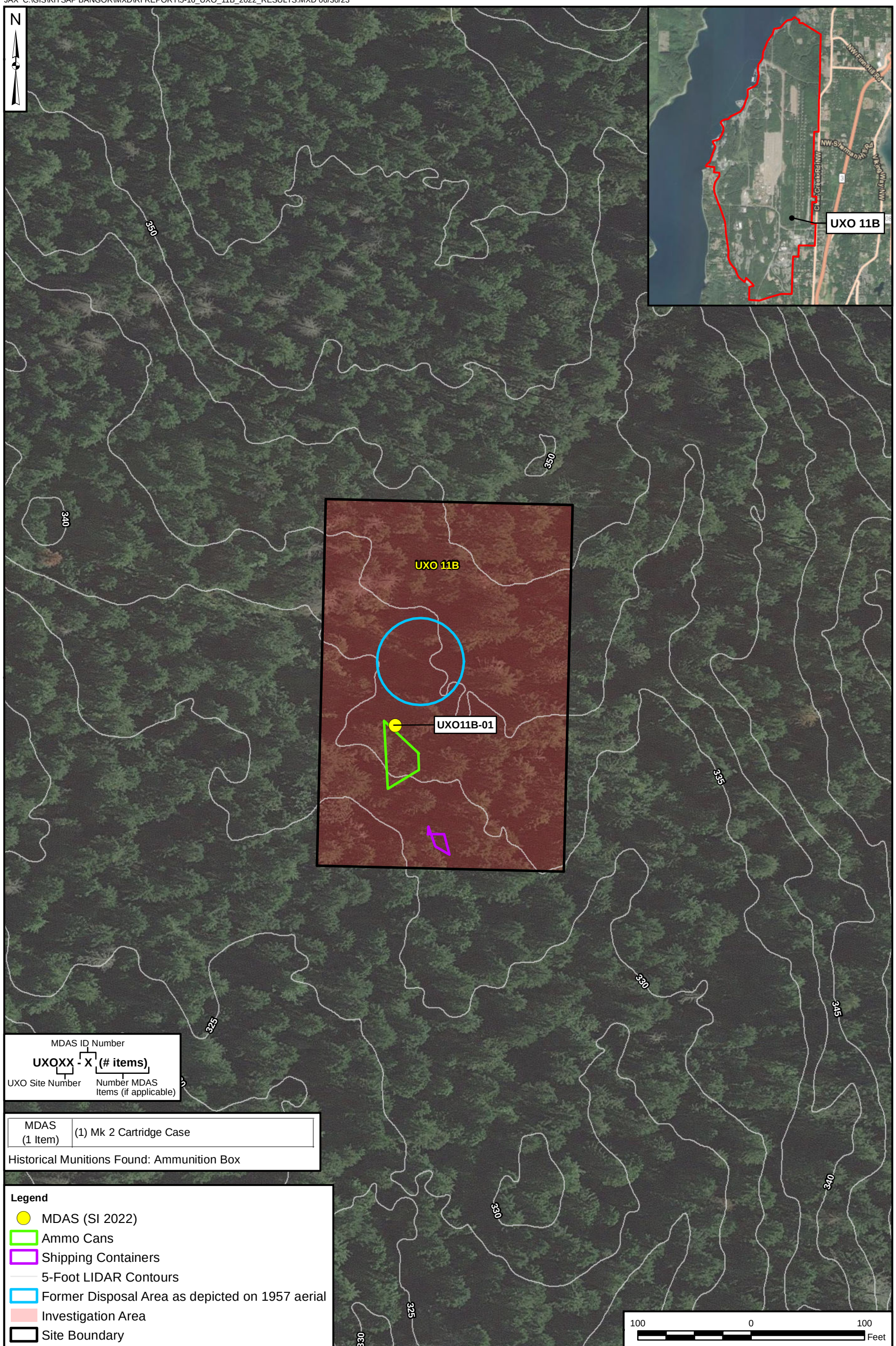
H.HOOK	06/30/23	5-15

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-16_UXO_11B_2022_RESULTS.MXD 06/30/23



2022 SITE INSPECTION RESULTS
UXO 11B - SITE 8 AMMUNITION CAN DISPOSAL AREA
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

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J.MADDEN	06/30/23	N4425519F4112
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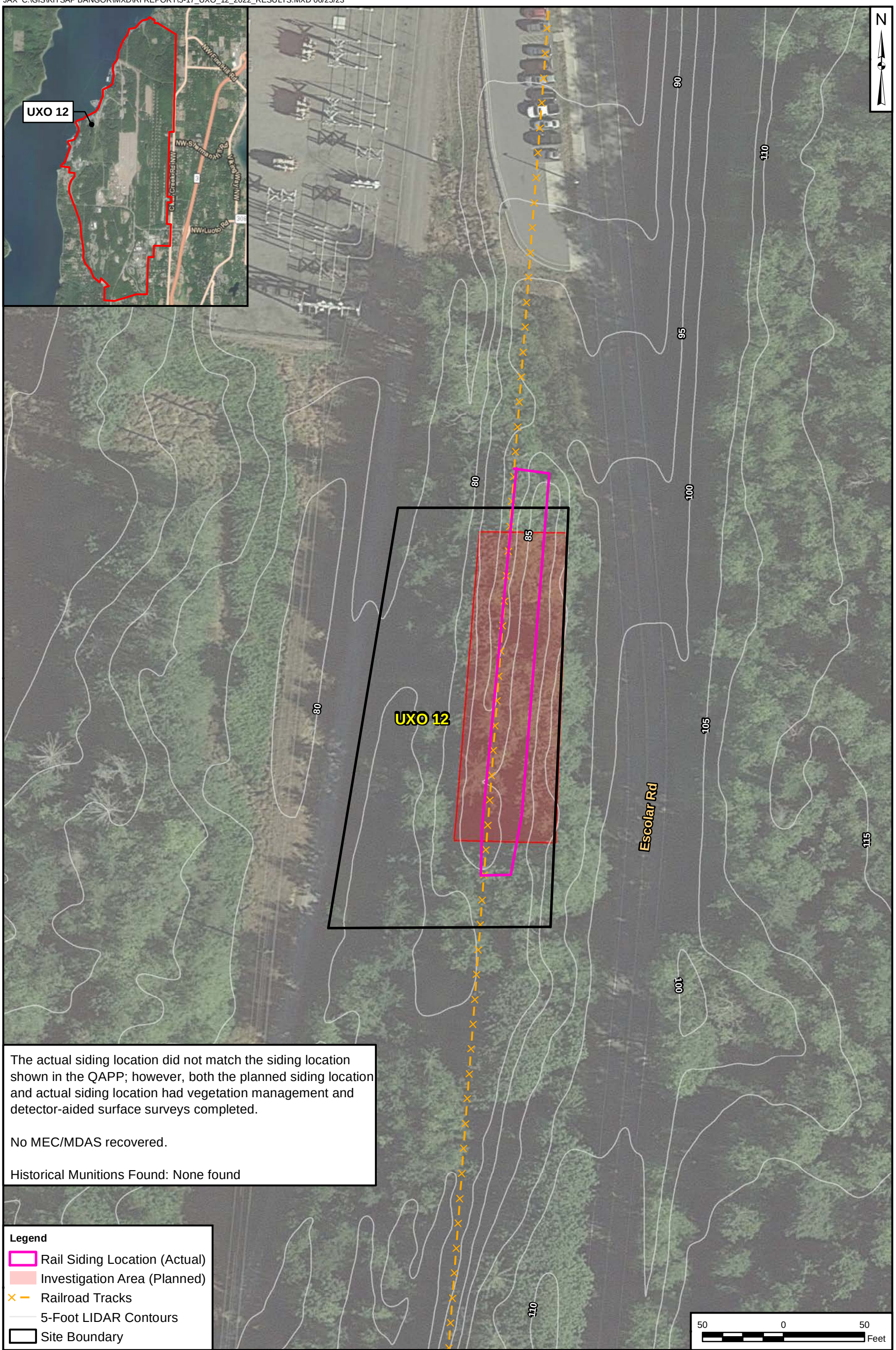
H.HOOK	06/30/23	5-16

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-17_UXO_12_2022_RESULTS.MXD 06/25/23



2022 SITE INSPECTION RESULTS
UXO 12 - BARRICADE SIDING P-1 (SITE HH)
KITSAP BANGOR
BANGOR, WASHINGTON

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J.MADDEN	06/25/23	N4425519F4112
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H.HOOK	06/25/23	5-17

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-18_UXO_13_2022_RESULTS.MXD 06/25/23

2022 SITE INSPECTION RESULTS
UXO 13 - SITE 4 CARLSON SPIT DISPOSAL (SITE 4 CARLSON SPIT)
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

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J.MADDEN	06/25/23	N4425519F4112
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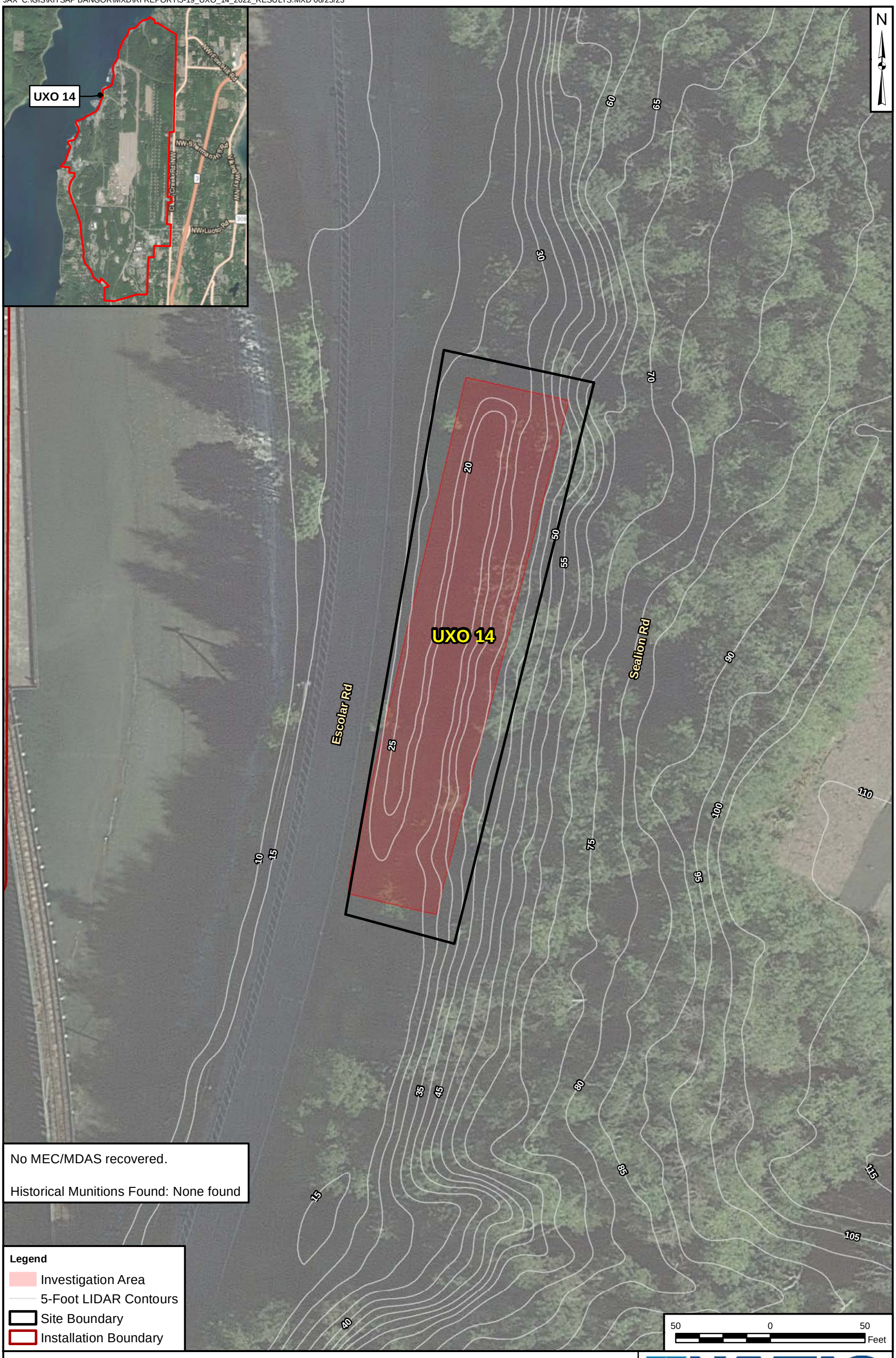
H.HOOK	06/25/23	5-18

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-19_UXO_14_2022_RESULTS.MXD 06/25/23



2022 SITE INSPECTION RESULTS
UXO 14 - BARRICADE SIDING P-2 (SITE JJ)
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

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J.MADDEN	06/25/23	N4425519F4112
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H.HOOK	06/25/23	5-19

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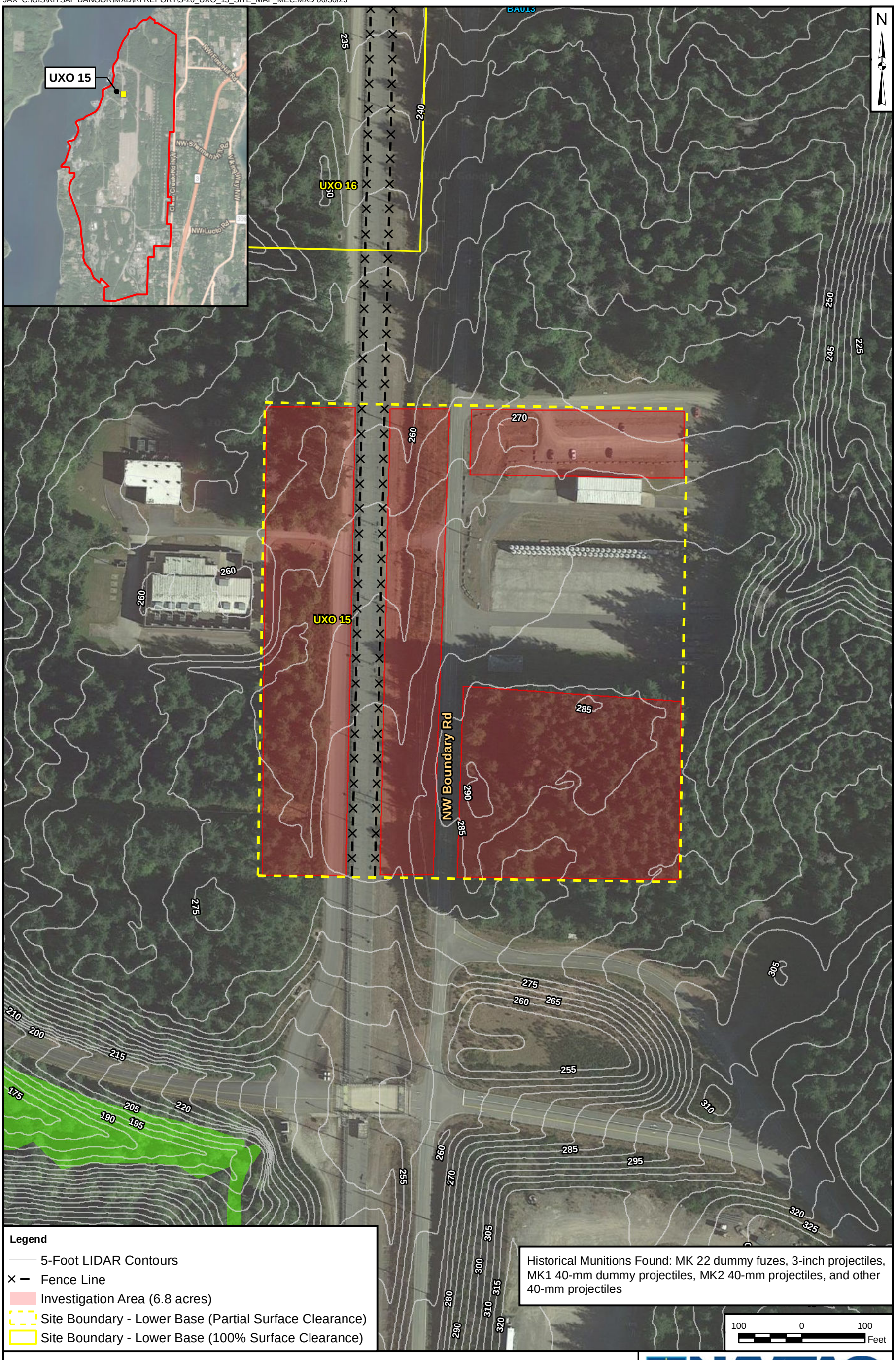

SITE MAP FOR FUTURE MEC INVESTIGATION
UXO 15 - TINIAN RD DUNNAGE (SITE KK)
KITSAP BANGOR
BANGOR, WASHINGTON

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Naval Facilities Engineering Systems Command

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J.MADDEN	06/30/23	N4425519F4112
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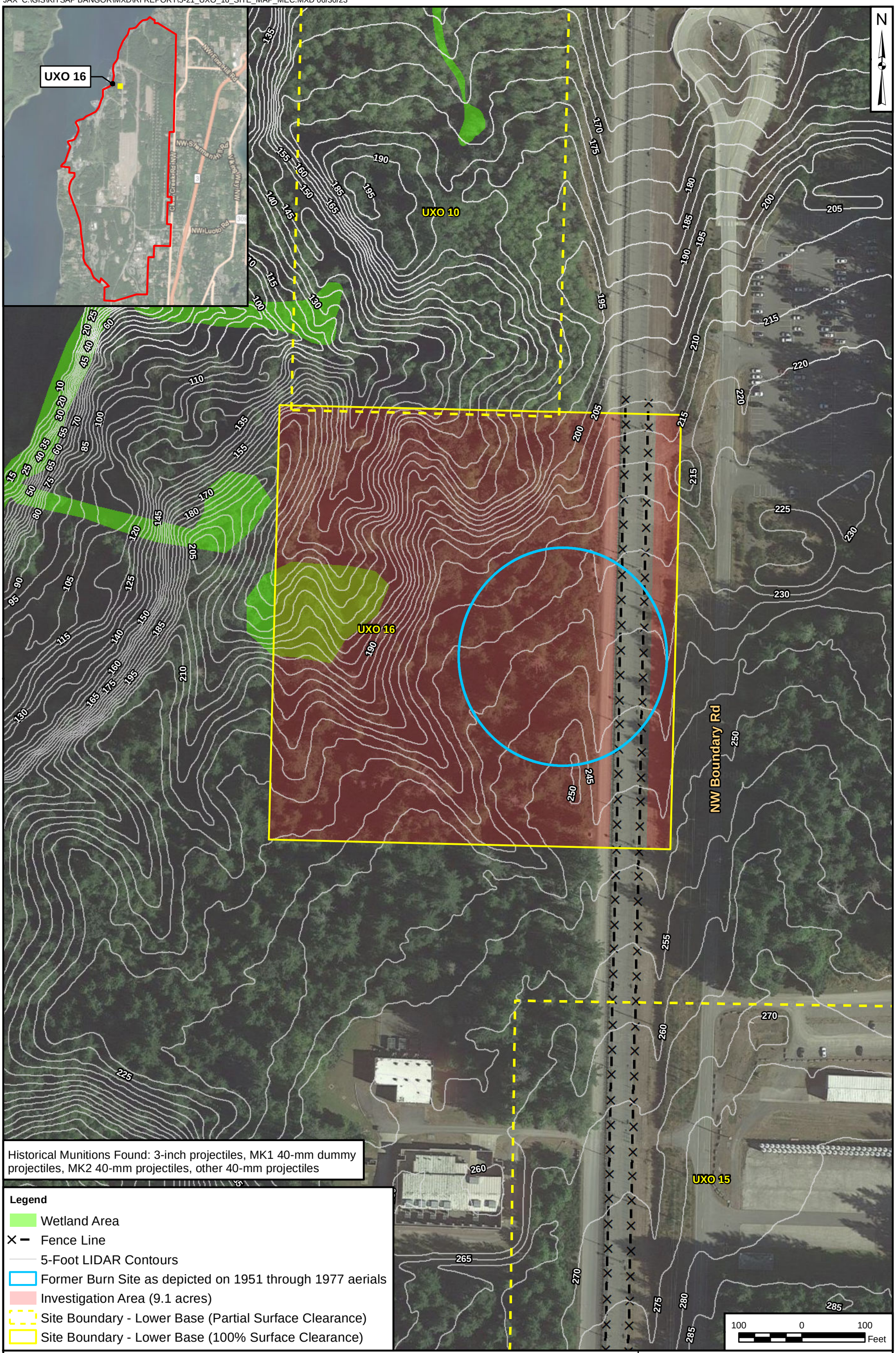
H.HOOK	06/30/23	5-20

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-21_UXO_16_SITE_MAP_MEC.MXD 06/30/23



Historical Munitions Found: 3-inch projectiles, MK1 40-mm dummy projectiles, MK2 40-mm projectiles, other 40-mm projectiles

Legend

- Wetland Area
- Fence Line
- 5-Foot LIDAR Contours
- Former Burn Site as depicted on 1951 through 1977 aerials
- Investigation Area (9.1 acres)
- Site Boundary - Lower Base (Partial Surface Clearance)
- Site Boundary - Lower Base (100% Surface Clearance)

SITE MAP FOR MEC INVESTIGATION
UXO 16 - BOUNDARY RD BURN SITE (SITE LL)
KITSAP BANGOR
BANGOR, WASHINGTON

Naval Facilities Engineering Systems Command

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J.MADDEN	06/30/23	N4425519F4112
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H.HOOK	06/30/23	5-21

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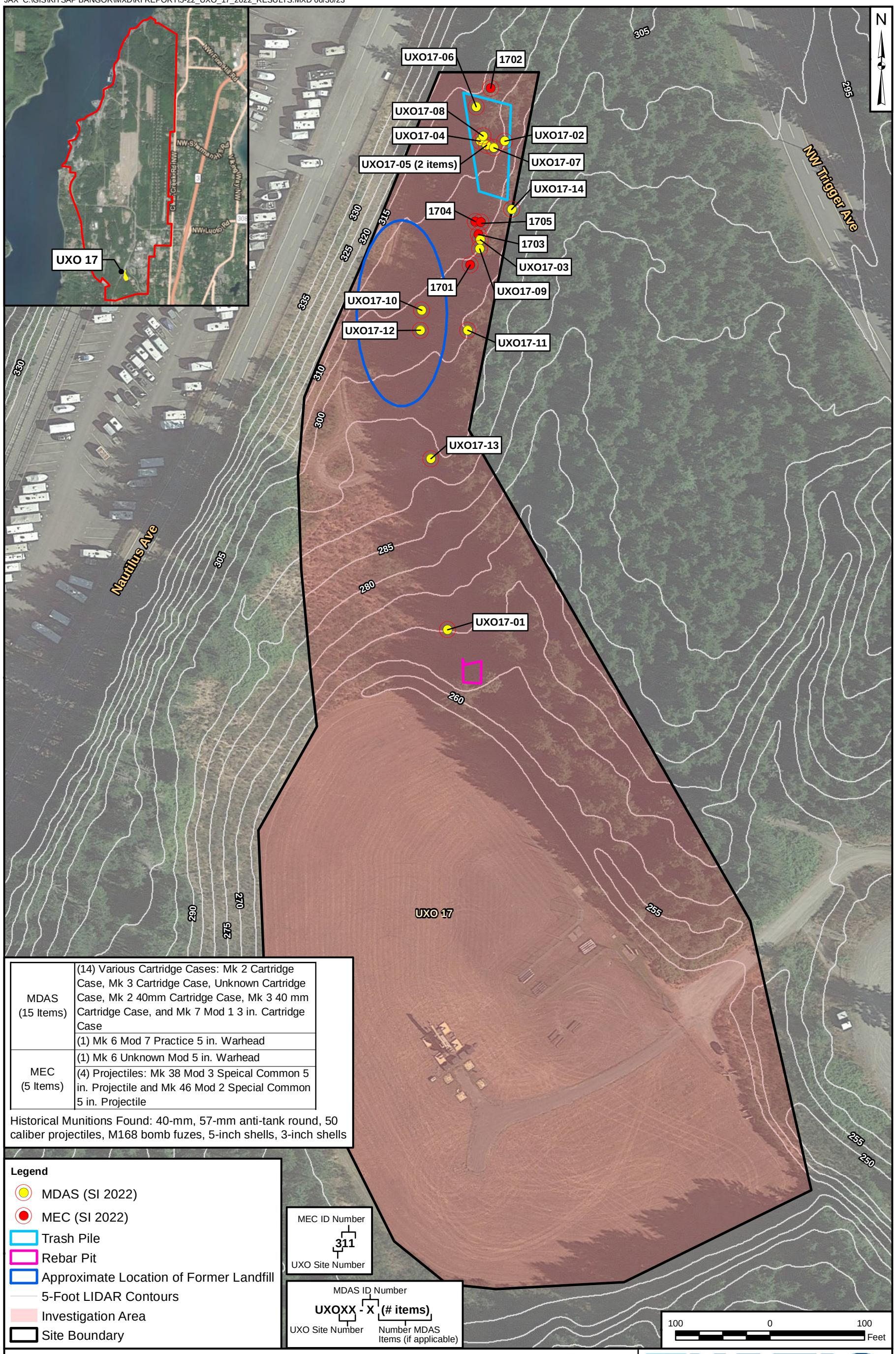

2022 SITE INSPECTION RESULTS
UXO 17 - CLASSIFICATION YARD (SITE 2)
KITSAP BANGOR
BANGOR, WASHINGTON

Naval Facilities Engineering Systems Command

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J.MADDEN	06/30/23	N4425519F4112
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H.HOOK	06/30/23	5-22

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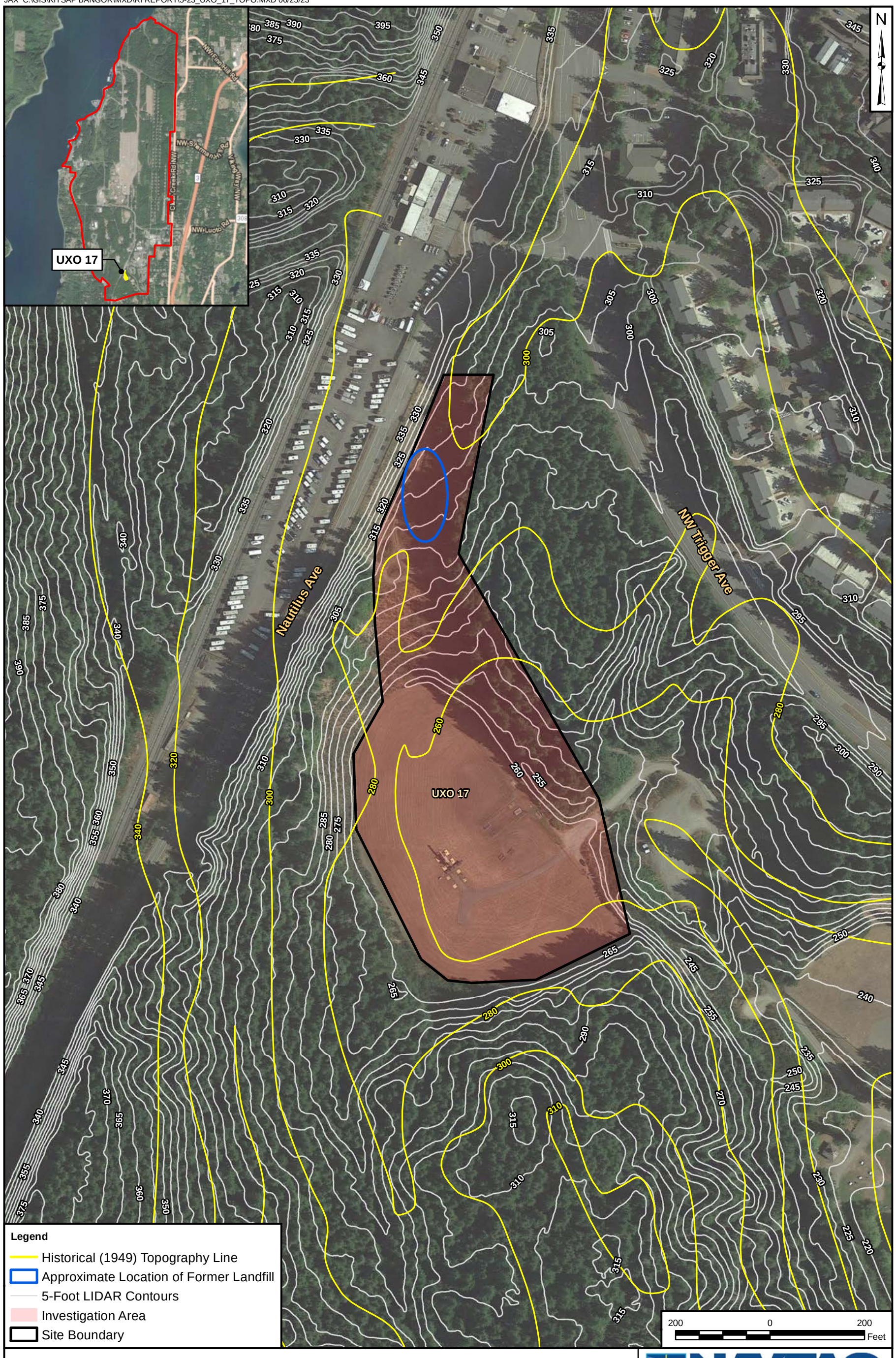

CURRENT AND HISTORICAL (1949) TOPOGRAPHY
UXO 17 - CLASSIFICATION YARD (SITE 2) KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

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J.MADDEN	06/25/23	N4425519F4112
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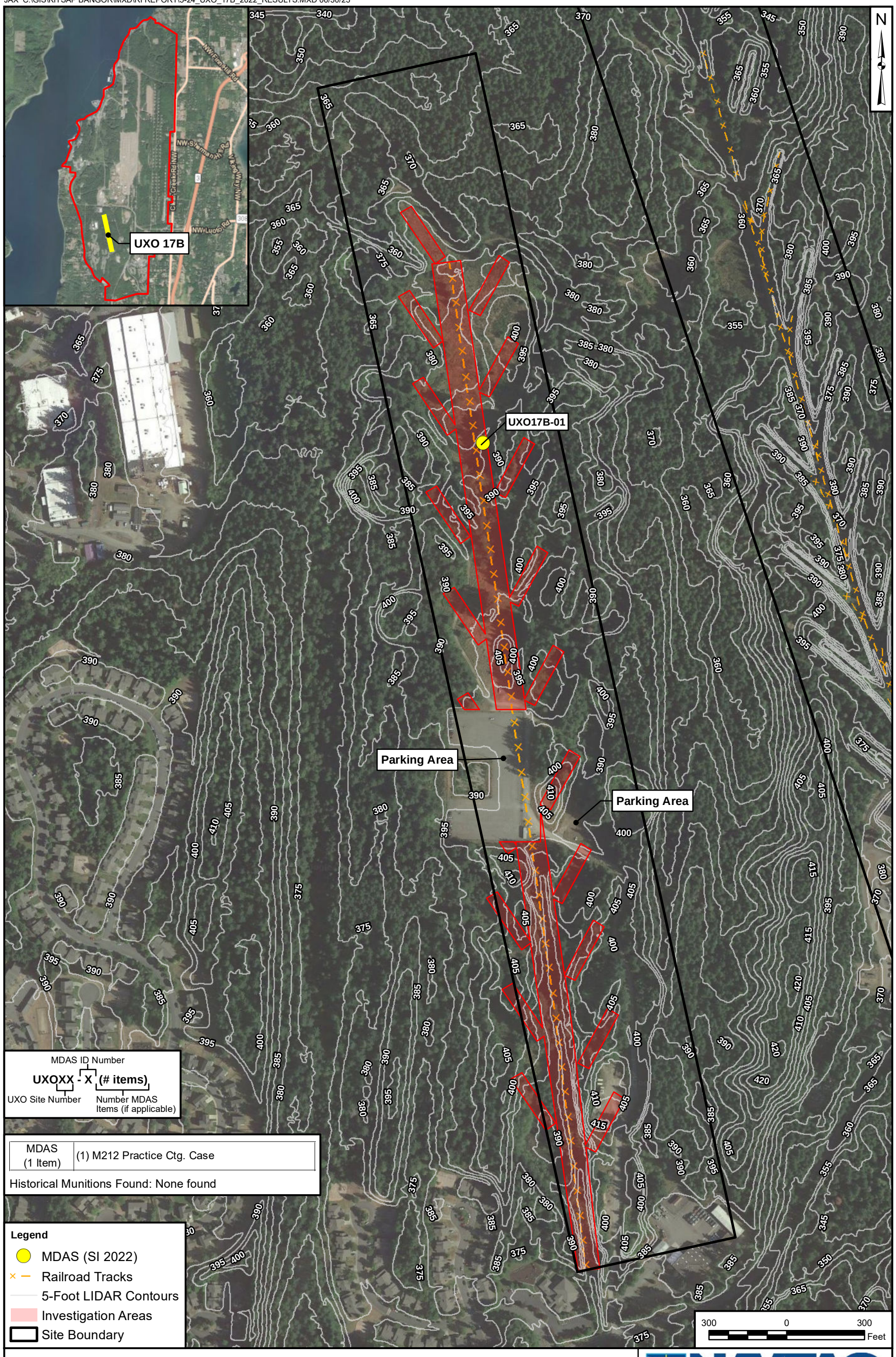
H.HOOK	06/25/23	5-23

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-24_UXO_17B_2022_RESULTS.MXD 06/30/23



2022 SITE INVESTIGATION RESULTS
UXO 17B – WESTERN SIDE CAR BARRICADE (SITE 1)
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

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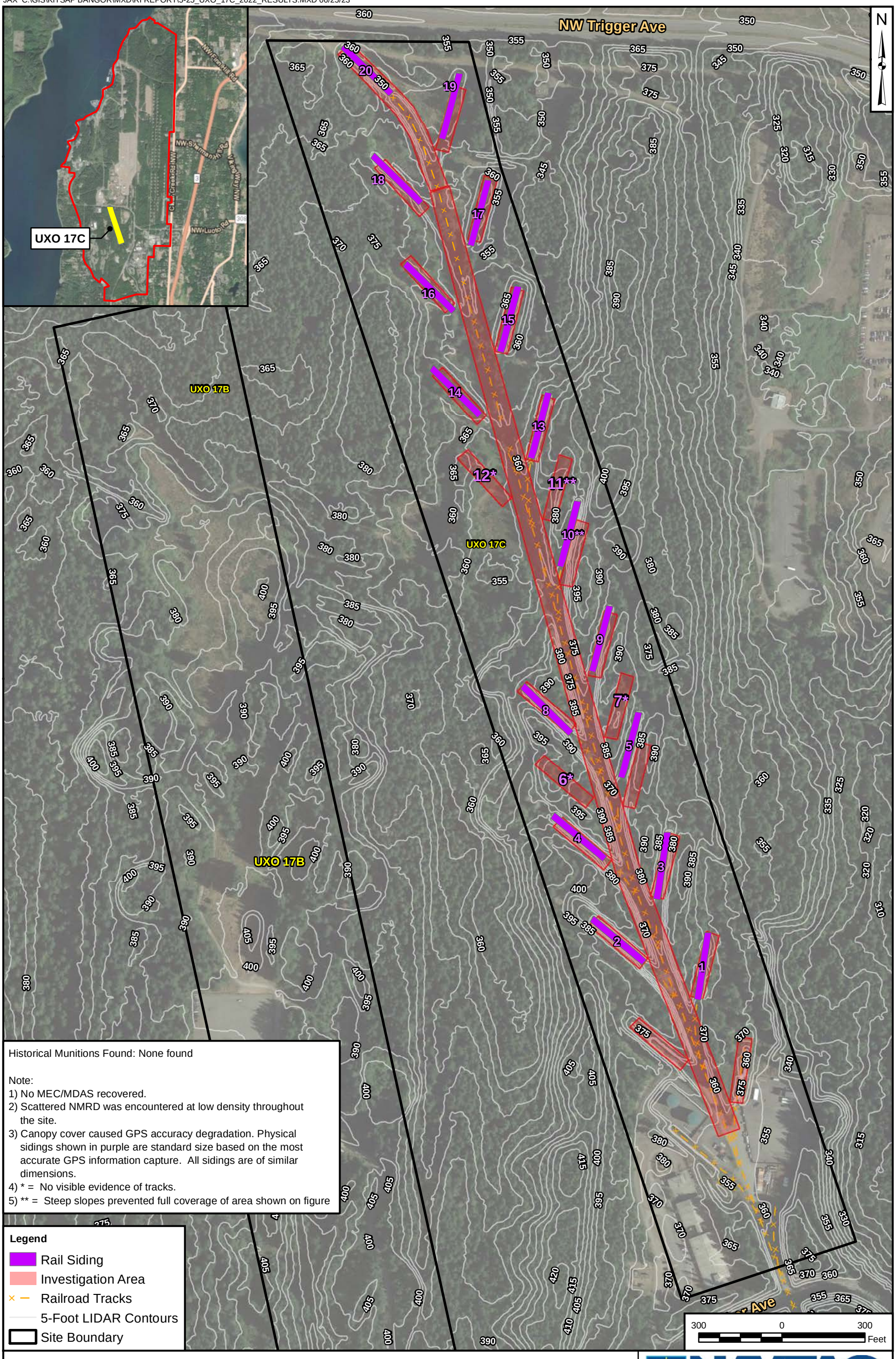
J.MADDEN	06/30/23	N4425519F4112
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	06/30/23	5-24

JAX C:\GIS\KITSAP BANGOR\MXD\RI REPORT\5-25_UXO_17C_2022_RESULTS.MXD 06/25/23



2022 SITE INSPECTION RESULTS
UXO 17C - EASTERN SIDE CAR BARRICADE (SITE BB)
KITSAP BANGOR
BANGOR, WASHINGTON

NAVFAC Naval Facilities Engineering Systems Command

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J.MADDEN	06/25/23	N4425519F4112
CHECKED BY	DATE	FIGURE NUMBER
H.HOOK	06/25/23	5-25

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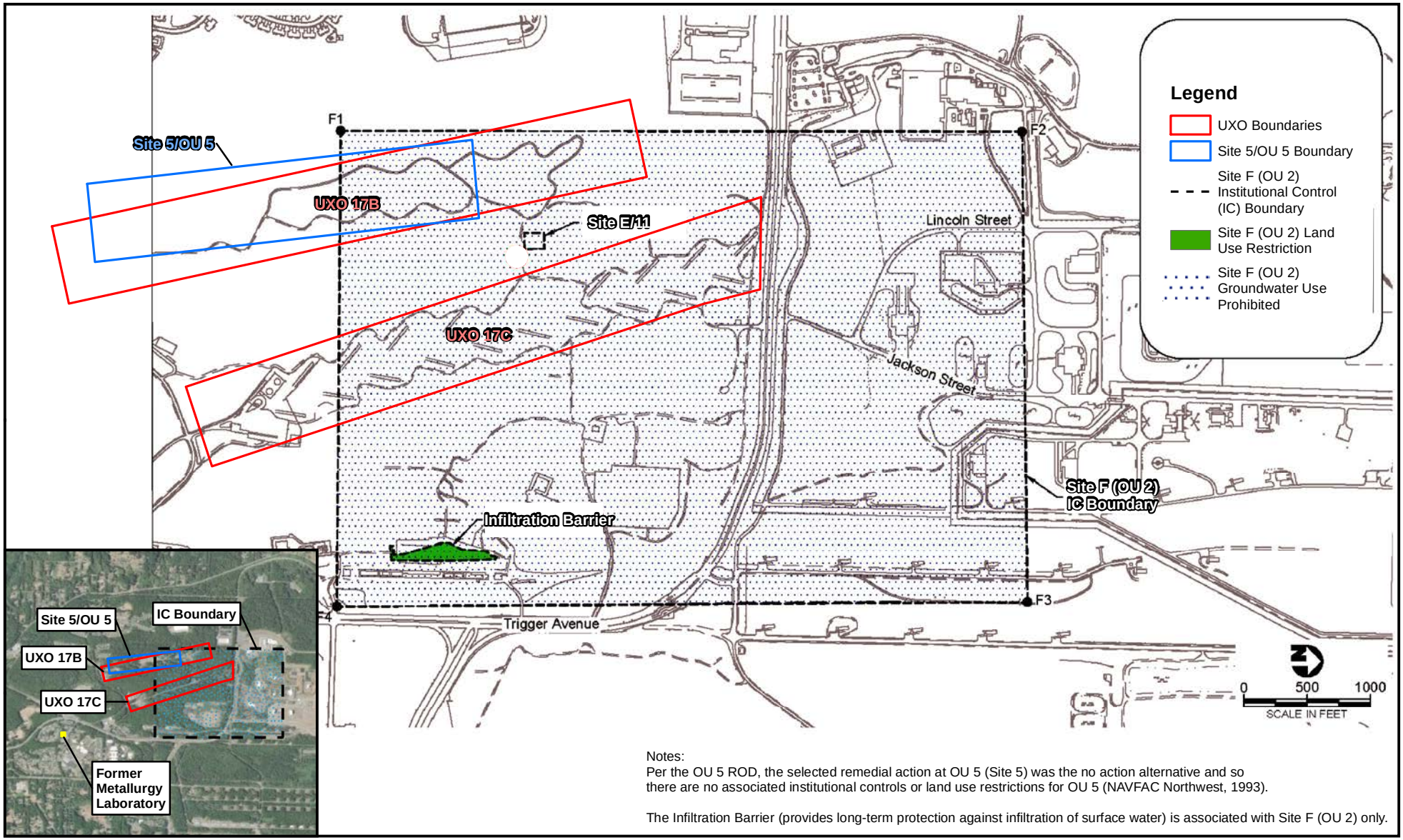

Notes:
Per the OU 5 ROD, the selected remedial action at OU 5 (Site 5) was the no action alternative and so there are no associated institutional controls or land use restrictions for OU 5 (NAVFAC Northwest, 1993).

The Infiltration Barrier (provides long-term protection against infiltration of surface water) is associated with Site F (OU 2) only.

UXO 17B/UXO 17C SUPPORTING INFORMATION
KITSAP BANGOR
BANGOR, WASHINGTON

Source: Sealaska Environmental, 2011. Final 2010 Institutional Controls Inspection Letter Report for Compliance Institutional Controls (IC) Inspections (LUC) and Long Term Monitoring Operable Unit 8 Sites A and F Naval Base Kitsap Bangor WA. March 24.

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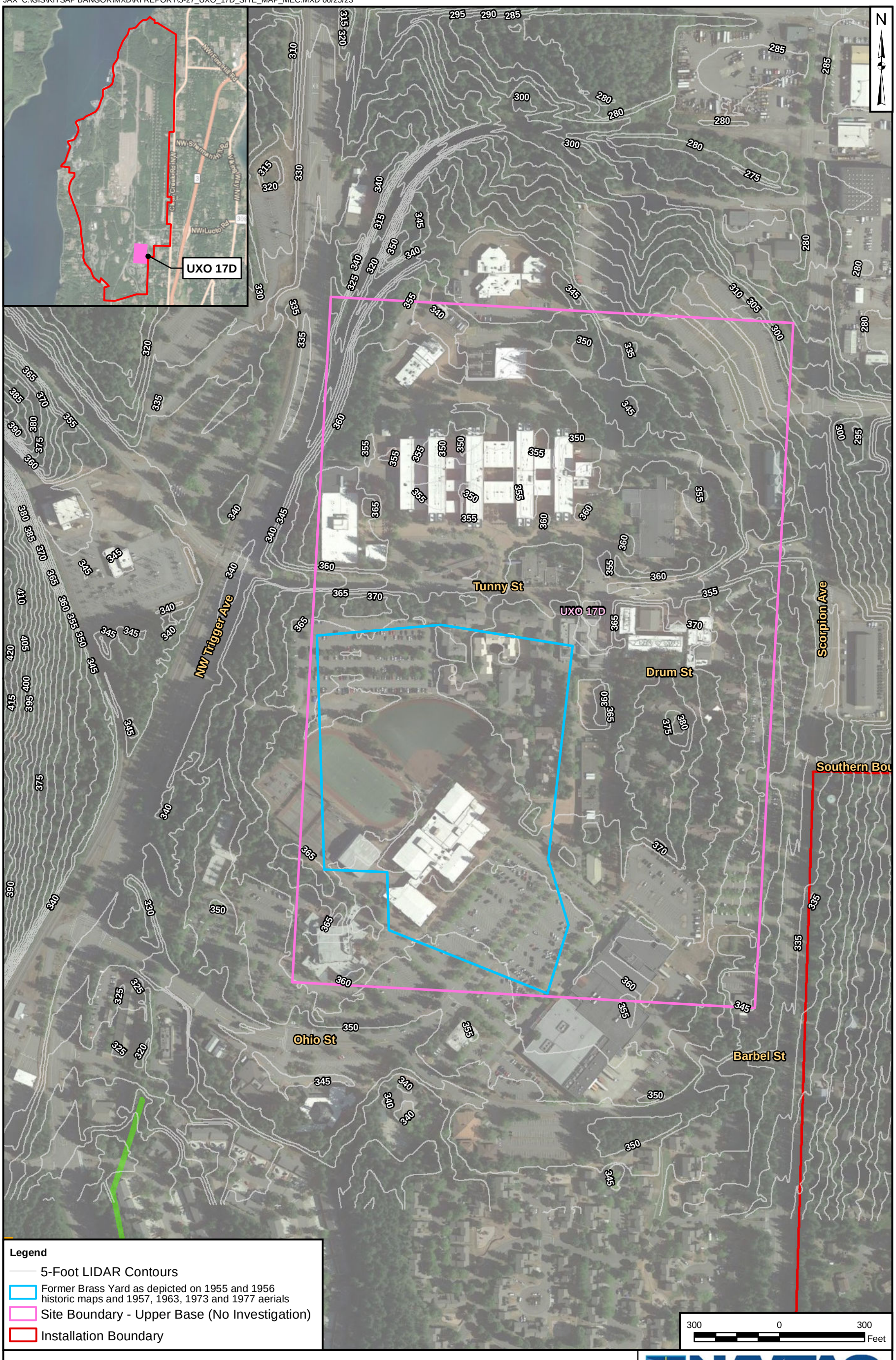

SITE MAP/NO INVESTIGATION
UXO 17D - BRASS YARD (SITE 13)
KITSAP BANGOR
BANGOR, WASHINGTON

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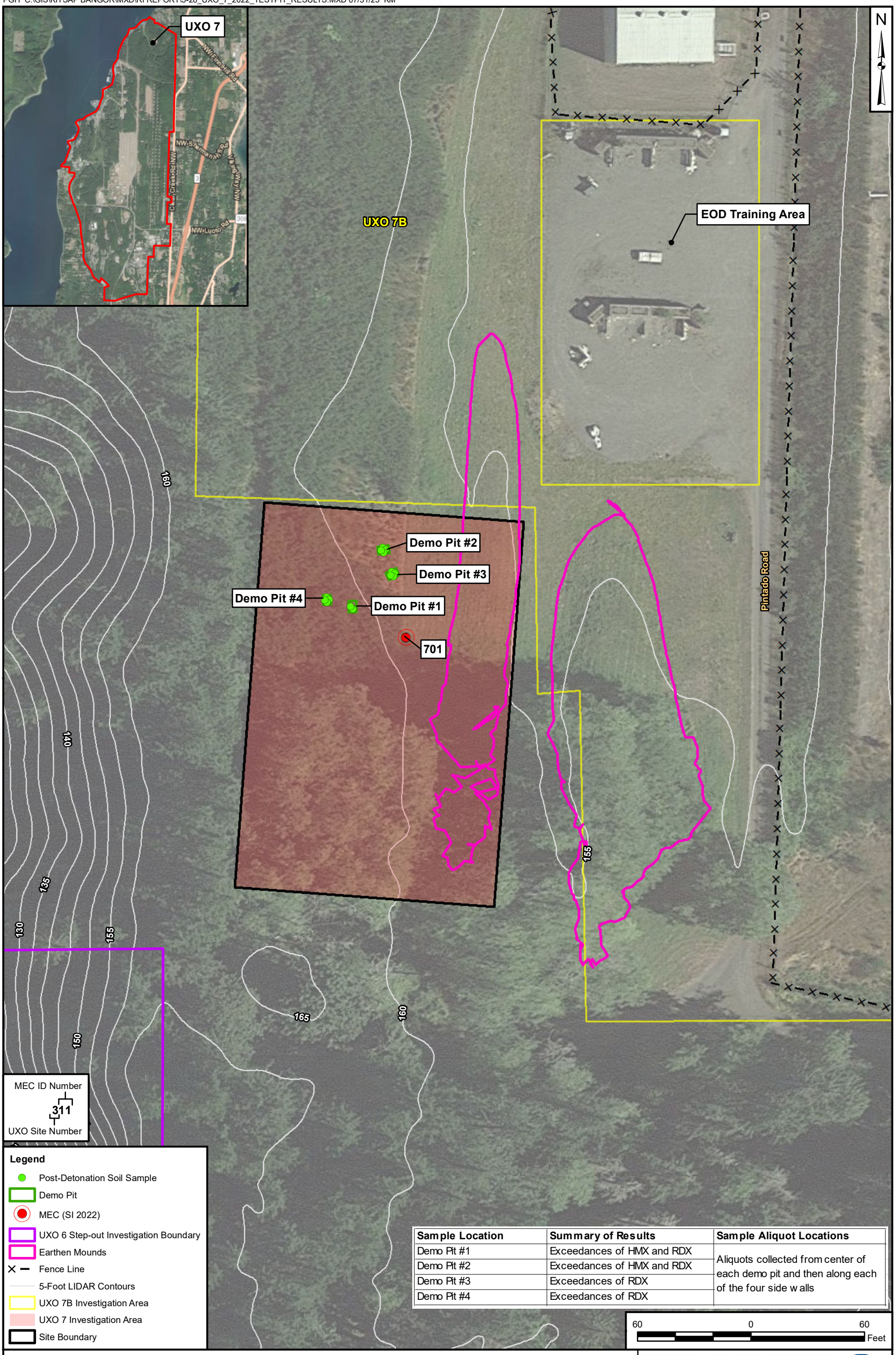

Sample Location	Summary of Results	Sample Aliquot Locations
Demo Pit #1	Exceedances of HMX and RDX	Aliquots collected from center of each demo pit and then along each of the four side w alls
Demo Pit #2	Exceedances of HMX and RDX	
Demo Pit #3	Exceedances of RDX	
Demo Pit #4	Exceedances of RDX	

2022 POST-DETONATION SOIL SAMPLING RESULTS
UXO 7 - DEBRIS AREA 1 (SITE 23)
KITSAP BANGOR
BANGOR, WASHINGTON

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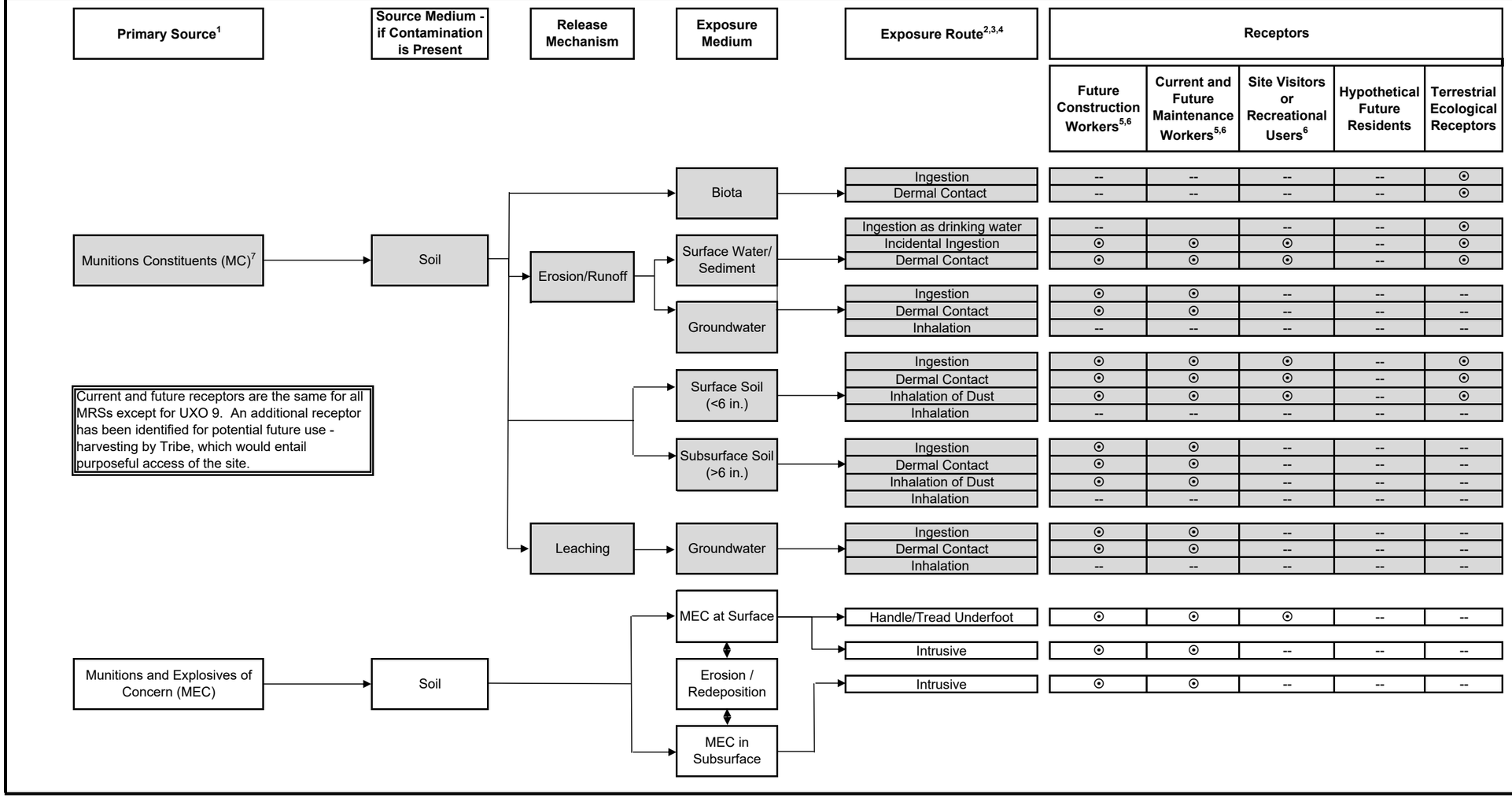
FIGURE 6-1
CONCEPTUAL SITE MODEL FOR POTENTIAL EXPOSURE TO MUNITIONS CONSTITUENTS AND MUNITIONS AND EXPLOSIVES OF CONCERN FROM MEC/MPPEH RELEASE



LEGEND

⊙ = Potentially complete/complete exposure pathway (pathway is considered completed if MEC was identified and considered potentially complete if MDAS is present as MDAS suggests that MEC may be present)

-- = Incomplete pathway

in. = inches

[1] Sites where source (MEC) was not present or are no longer suspected, as per historical information and/or SI results, include UXO 9, UXO 11, UXO 12, UXO 13, UXO 14, UXO 17B, UXO 17C, and UXO 17D.

[2] Sites where source (MEC) may be present or remain suspect, as per historical information and/or SI results, but existing land use restrictions are effective in limiting exposure routes include UXO 3 (over most of the site), UXO 7, UXO 7B, and UXO 9B.

[3] Sites where source (MEC) may be present or remain suspect, as per historical information and/or SI results, but exposures are limited based on high security areas include UXO 2, UXO 3 (remaining portions), UXO 4 (northern portion), UXO 6, UXO 7, UXO 7B, and UXO 11B.

[4] Sites where source (MEC) may be present or remain suspect, as per historical information and/or SI results, and located on low security areas include UXO 4 (southern portion) and UXO 17.

[5] Subsurface MEC: Sites with underground utilities and/or where construction activities are possible coupled with unknown MEC subsurface concerns include UXO 3, UXO 4, and UXO 17.

[6] Sites with MEC that is known or suspected to remain at the ground surface (e.g., although munitions items were removed during the SI but extent not yet determined and so remains suspect) include UXO 6. Moreover, the future RI may show evidence of MEC at the ground surface in the future during site boundary expansion (e.g., UXO 2, UXO 3, UXO 4, and UXO 17).

[7] MC is only considered a potential pathway if breached MEC was identified during the SI field work, as these areas (UXO 3, UXO7, and UXO 7B) were indicative of potential MC contamination. Of these 3 UXO sites, only UXO 3 had site-related PSL exceedances, although MC samples from SI detonations at end of field work in demolition pits at UXO 7 had PSL exceedances associated with donor explosives used for the detonations and, therefore, should be now included as part of UXO 7.

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