

FINAL
MMRP REMEDIAL INVESTIGATION
ADDENDUM #3 REPORT

RI Addendum and Document Updates
Fort Hancock Formerly Used Defense Site
Monmouth County, New Jersey

FUDS Project No.: C02NJ000403

Prepared for:

U.S. Army Corps of Engineers
Baltimore District

Contract: W912QR-12-D-0011, DA02



US Army Corps
of Engineers®
BUILDING STRONG®

Prepared by:

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Laurel, Maryland 20707

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November 2018

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COMPLETION OF SENIOR TECHNICAL REVIEW

This document has been produced within the framework of the ERT, Inc. (ERT) quality management system. As such, a senior technical review has been conducted. This included review of all elements addressed within the document, proposed or utilized technologies and alternatives and their applications with respect to project objectives and framework of U.S. Army Corps of Engineers regulatory constraints under the current project, within which this work has been completed.



02/19/18

Mike Dorman, PMP
Senior Technical Reviewer

Date

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

This document has been produced within the framework of ERT's quality management system. As such, an independent technical review, appropriate to the level of risk and complexity inherent in the project, has been conducted. This included a review of assumptions; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the project objectives. Comments and concerns resulting from review of the document have been addressed and corrected as necessary.


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02/20/18

Michelle Chesnut
Independent Technical Reviewer

Date

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ASR	Archive Search Report
BIP	blow-in-place
CENAB	U.S. Army Corps of Engineers, Baltimore District
CENAN	U.S. Army Corps of Engineers, New York District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMUA	Concentrated Munitions Use Area
CSM	conceptual site model
CWM	Chemical Warfare Materiel
DA	Department of the Army
DD	Decision Document
DERP	Defense Environmental Restoration Program
DGM	digital geophysical mapping
DMM	discarded military munitions
DoD	Department of Defense
DQO	data quality objective
ECRPP	Environmental and Cultural Resources Protection Plan
EE/CA	Engineering Evaluation/Cost Analysis
EHE	Explosive Hazard Evaluation
ERT	ERT, Inc.
ESTCP	Environmental Security Technology Certification Program
FS	Feasibility Study
ft	feet
FUDS	Formerly Used Defense Site
FUDSMIS	FUDS Management Information System
GIS	Geographic Information System
GPS	Global Positioning System
GSV	Geophysical System Verification
HHE	Health Hazard Evaluation
INPR	Inventory Project Report
ITS	Instrument Test Strip
MC	munitions constituents
MD	munitions debris
MDAS	material documented as safe
MEC	munitions and explosives of concern
mm	millimeters
MMRP	Military Munitions Response Program

MPPEH	material potentially presenting an explosive hazard
MRA	Munitions Response Area
MRS	Munitions Response Site
MRSP	Munitions Response Site Prioritization Protocol
NCP	National Contingency Plan
NGVD	National Geodetic Vertical Datum
NKSH	No Known or Suspected Hazard
NMRD	Non-munitions related debris
NPS	National Park Service
PP	Proposed Plan
QA	quality assurance
QC	quality control
RI	Remedial Investigation
RTK GPS	Real Time Kinematic Global Positioning System
SI	Site Inspection
SUXOS	Senior UXO Supervisor
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UXOQCS	UXO Quality Control Specialist
UXO	unexploded ordnance
VSP	Visual Sample Plan

GLOSSARY OF TERMS

Concentrated Munitions Use Area –CMUAs are MRSs or areas within MRSs where there is a high likelihood of finding UXO or DMM and that have a high amount of MD within them as a result of historical munitions use and fragmentation. CMUAs are most commonly target areas on ranges; however, they also include explosion sites, OB/OD areas, and potentially even disposal sites where munitions have been disposed of over a relatively large area (i.e., not small, isolated burial pits). The initial boundary of a CMUA is the line that differentiates between the elevated anomaly density area and the background anomaly density area.

Defense Site – All locations that are or were owned by, leased to, or otherwise possessed or used by the DoD. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used or was permitted for the treatment or disposal of military munitions.

Discarded Military Munitions (DMM) – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations. (10 United States Code [USC] 2710(e)(2)).

Explosive Hazard – A condition where danger exists because explosives are present that may react (e.g., detonate, deflagrate) in a mishap with potential unacceptable effects (e.g., death, injury, damage) to people, property, operational capability, or the environment.

Explosives Safety – A condition where operational capability and readiness, people, property, and the environment are protected from the unacceptable effects or risks of potential mishaps involving military munitions.

Material Potentially Presenting an Explosive Hazard (MPPEH) – Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris (MD) remaining after munitions use, demilitarization, or disposal; range-related debris); or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

Military Munitions – Military munitions means all ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the DoD, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges; and devices and components thereof. The term does not include wholly inert items; improvised explosive devices; and nuclear weapons, nuclear devices, and nuclear components, other than

nonnuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101(e)(4)(A) through (C)).

Munitions and Explosives of Concern (MEC) – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means (A) UXO, as defined in 10 U.S.C. 101(e)(5); (B) DMM, as defined in 10 U.S.C. 2710(e)(2); or (C) MC (e.g., Trinitrotoluene [TNT], Cyclotrimethylenetrinitramine [RDX]), as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC) – Any materials originating from UXO, DMM, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710(e)(3)).

Munitions Debris (MD) – Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions Response – Response actions, including investigation, removal actions and remedial actions to address the explosives safety, human health, or environmental risks presented by UXO, DMM, or MC, or to support a determination that no removal or remedial action is required.

Munitions Response Area (MRA) – Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. An MRA is composed of one or more MRSs.

Munitions Response Site (MRS) – A discrete location within an MRA that is known to require a munitions response.

Unexploded Ordnance (UXO) – Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (C) remain unexploded whether by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5)(A) through (C))

Unexploded Ordnance (UXO)-Qualified Personnel – Personnel who have performed successfully in military EOD positions or are qualified to perform in the following Department of Labor, Service Contract Act, Directory of Occupations, contractor positions: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, or Senior UXO Supervisor.

Unexploded Ordnance (UXO) Technicians – Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III.

EXECUTIVE SUMMARY

Introduction

The Fort Hancock Formerly Used Defense Site (FUDS) is located on the Sandy Hook peninsula in Monmouth County, New Jersey. The peninsula encompasses approximately 1,700 acres and is known as the Sandy Hook Unit of the Gateway National Recreation Area. It is currently managed by the National Park Service (NPS) and the U.S. Coast Guard, and is used for a variety of recreational purposes year-round. From 1874 to 1918, the property was used by the U.S. military for operation of a proving ground to test weapons and ordnance of all types manufactured in the U.S. The firing of weapons took place on the eastern side of the peninsula, from north to south, with six impact areas ranging in distance from 1,000 yards to 3.75-miles.

ERT, Inc. (ERT) has performed a Remedial Investigation (RI) for the United States Army Corps of Engineers (USACE) at the Fort Hancock FUDS, pursuant to the Defense Environmental Restoration Program (DERP) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The bulk of the RI activities are documented in the *Final Remedial Investigation Report, Fort Hancock Formerly Used Defense Site, January 2014* (USACE, 2014).

Based upon the conclusions and recommendations of the 2014 RI Report, ERT performed additional RI field activities in two follow-on RI addenda phases. Addendum #1 activities were conducted in July 2014 and the results are documented in the RI Addendum #1 Report (Final, September 2016). Addendum #2 activities were conducted in December 2015 and the results are documented in the RI Addendum #2 Report (Final, June 2017).

In 2017, ERT conducted a third RI phase to address MRS 08, an area that had previously been excluded from investigation by NPS, based on its concerns about potential impacts to plant communities from vegetation clearance/cutting required to conduct geophysical surveys. This document, RI Addendum #3 to the 2014 RI Report, presents the MRS 08 investigation findings.

This work was contracted under Environmental and Restoration Services Contract W912QR-12-D-0011, DA02. Performed under the DERP/FUDS Military Munitions Response Program (MMRP), the work involved munitions and explosives of concern (MEC) and munitions constituents (MC) that may be present at Fort Hancock. USACE Baltimore District (CENAB) administers this work and provides technical oversight, and the USACE New York District (CENAN) is the overall life cycle manager for the project

MRS Background

The 2014 RI included investigation of eight Munitions Response Sites (MRSs), seven land-based MRSs and one marine-based MRS. The 2014 RI revealed detailed information about the locations and potential locations of MEC and MC, and the eight MRS boundaries were adjusted accordingly, resulting in the six current Fort Hancock FUDS MRSs.

Based on NPS-identified "excluded areas", or environmentally sensitive locations, USACE was limited in terms of field work activities that could be conducted during the 2014 RI effort. Ultimately, NPS granted access to some of these areas, allowing RI Addendum #2 (MRS 06) and this current RI Addendum #3 (MRS 08, NPS Excluded Area) to be completed. For MRS 08, a

modified, species-protective investigation approach was planned; all activities for RI Addendum #3 were completed in accordance with the *Final Remedial Investigation/Feasibility Study Work Plan, Fort Hancock Formerly Used Defense Site, December 2010* (USACE, 2010) and the *Final MMRP Remedial Investigation Work Plan, Addendum #3, Fort Hancock Formerly Used Defense Site, November 2017* (USACE, 2017).

Purpose and Scope

The purpose of RI Addendum #3 is to adequately characterize the nature and extent of potential explosive hazards (some that may be defined as MEC) or MC contamination at MRS 08 resulting from the past U.S. military use of Fort Hancock. A secondary purpose of the Addendum is to describe adjustments to MRS configurations and acreages, including those resulting from MRS 08 footprint reduction recommendations, and development of the new MRS 10, Eastern Shoreline. These adjustments will be formalized by USACE in a Revised Inventory Project Report (INPR).

The scope of the MRS 08 investigation included “mag & dig” geophysical surveys, a technique performed along transects using hand-held analog magnetometers (metal detectors) to sweep the ground surface to detect anomalies, which are then excavated by hand to identify potentially explosive items. While this represented a change to the previous Fort Hancock FUDS RI field procedures, wherein digital geophysical mapping (DGM) was conducted, it requires less vegetation cutting and accommodated NPS concerns about potential damage to the rare and sensitive plant communities. In addition, unpaved hiking trails outside MRS 08, but within existing MRSs, were also intrusively investigated.

Finally, as a means of standardizing MEC risk evaluations across the multiple RI efforts, this Addendum also serves to update MEC risk evaluations for all previously existing Fort Hancock MRSs using the December 2016 USACE risk management methodology to assess risk posed by explosive hazards (USACE, 2017c).

Investigation Activities

MEC/MD

“Mag & dig” was conducted along transects cut through vegetated areas by the unexploded ordnance (UXO) dig team, as well as along existing, unpaved hiking trails (within and outside of MRS 08).

Field work on the hiking trails began on 24 October and was complete on 6 November 2017. Next, transects were cut through the vegetated areas of MRS 08. The UXO team was escorted by NPS biologists to ensure that no sensitive plants were damaged. Therefore, relative to planned transects, the actual transects generally meandered around vegetation that was not allowed to be cut. Additionally, some planned transects ended up in areas of standing water where excavations of anomalies was not possible. Transect cutting began 6 November and was complete on 16 November 2017. The last phase of field work involved the “mag & dig” of all cut transects by the UXO team, during which metallic anomalies were identified and subsequently investigated via digging by hand. The locations of all digs were captured by Real Time Kinematic Global

Positioning System GPS (RTK GPS). Investigation of anomalies began on 16 November and was completed on 6 December 2017.

In this manner, for the RI Addendum #3 effort, approximately 1,300 anomalies were excavated over approximately 77,000 linear feet of transects in MRS 08 and on the outlying hiking trails.

MC

Soil samples were planned for collection where there was visible evidence of energetic material, or in areas of significant munitions debris (MD), where at least 50% of the munition could be identified by UXO Technicians (in accordance with the approved RI Addendum #3 Work Plan Data Quality Objective). No evidence of energetics or significantly breached munitions was found during the investigation, and therefore no soil samples were collected. However, previous MC characterization of MRS 08 and areas adjacent to MRS 08 from earlier investigations were used as a basis for conclusions about the nature and extent of MC at MRS 08.

Investigation Findings

MEC/MD

During the investigation, a total of eight items classified as material potentially presenting an explosive hazard (MPPEH) were found in the subsurface of MRS 08 and along the hiking trails outside the MRS. Five of the MPPEH items were ultimately classified as MEC, and three were considered MD following processing. A total of 88 MD items were found on the surface and in the subsurface of MRS 08 and the hiking trails. Table ES-1 summarizes the investigation findings.

Table ES-1: Investigation Findings		
Area	MD	MEC
Transects in MRS 08	70	4
Trails in MRS 08	1	1
Total MRS 08	71	5
Trails outside MRS 08	17	0
Project Total	88	5

The spatial distribution of MEC and MD within MRS 08 was analyzed and areas of high MEC+MD density (>10/acre) were delineated. Four high-density areas were identified as MRS 08A, 08B, 08C, and 08D, with each constituting a Concentrated Munitions Use Area (CMUA).

These CMUAs align with buffer zones of the historical proving ground target impact areas and may represent shots that missed targets to the west.

The Munitions Response Site Prioritization Protocol (MRSP) is the methodology for prioritizing sites known or suspected to contain MEC or MC for response actions, assigning a relative priority to an MRS based on various safety and environmental factors. The MRSP was completed for MRS 08 and the overall MRS priority ranking is 3, with an Explosive Hazard Evaluation (EHE) module rating of B, based primarily on confirmed MEC in the subsurface of the MRS. The overall MRS priority ranking for the newly defined MRS 10, Eastern Shoreline (described below) is 3, with an Explosive Hazard Evaluation (EHE) module rating of B, based primarily on historical MEC finds resulting from munitions washing onto the shore following storm events (EOD, 2015).

For MRS 08, MEC risk was evaluated for each of the four CMUAs using the December 2016 USACE risk management methodology to assess risk posed by explosive hazards (USACE, 2017c). The method involves the use of four matrices to define acceptable and unacceptable risk from MEC hazards based on the likelihood of an encounter, the severity of incident, and the sensitivity of interaction based on expected land use activities. MRS 08A (CMUA-1) and MRS 08B (CMUA-2) were assessed to be areas that may pose an unacceptable MEC risk, while MRS 08C (CMUA-3) and MRS 08D (CMUA-4) were assessed to represent acceptable site conditions.

The RI Addendum #3 effort provided additional information about the locations and potential locations of MEC and MD within MRS 08, and based on the RI findings and the risk assessment conclusions, the footprint of MRS 08 was reduced. Areas outside of the four identified CMUAs contained no MEC or MD and therefore minimal explosive risk, while CMUA-3 and CMUA-4 were assessed to represent an acceptable level of risk. Consequently, the original 140 acre area of MRS 08 has been reduced to include only CMUA-1 and CMUA-2, areas that may pose an unacceptable explosive risk. The reduced footprint for the revised MRS 08 is 71 acres. The remaining acres were assigned to MRS 07, Remaining Land.

New MRS 10, Eastern Shoreline, defined to address munitions that have historically been found on the beaches after storm events, includes the beach and surf zone on the eastern side of the Sandy Hook peninsula. It was developed from dynamic shoreline acreage of MRS 07 as part of this RI Addendum #3, and encompasses portions of the former proving ground that have eroded into the ocean.

In addition to new MRS 10, MEC risk evaluations for the previously existing MRSs at Fort Hancock were updated using the current USACE risk management methodology. While MEC risk had previously been evaluated for those MRSs, as described in the relevant previous investigation document, updates were completed to standardize MEC risk for all MRSs using the current methodology.

MC

For the RI Addendum #3, soil samples were planned for collection where there was visible evidence of energetic material, or in areas of breached munitions (in accordance with the approved RI Addendum #3 Work Plan DQO), but no evidence of energetics or significantly breached munitions was found during the investigation, and therefore no soil samples were collected.

However, previous MC characterization of MRS 08 had been performed. Based on 2014 RI sediment, surface water, and groundwater samples within MRS 08, and soil samples in adjacent MRS 06, the human health and ecological risk assessments contained in the 2014 RI Report concluded that no unacceptable MC risk was posed by site media. Therefore, it is concluded that there is no unacceptable MC risk present at MRS 08.

Conclusions

The nature and extent of MEC and MC has been characterized for MRS 08. The original MRS 08 footprint has been reduced from 140 to 71 acres, based on those CMUAs that pose unacceptable explosive risk, as well as those areas that pose no unacceptable explosive risk. No unacceptable MC risk to human health or ecological receptors is present within MRS 08. Table ES-2 presents the conclusions summarizing areas of Unacceptable and Acceptable MEC risk at MRS 08.

Table ES-2: MRS 08 Conclusions					
MRS	Area	Acreage	CMUA	MEC Risk	Included in Revised MRS 08 Boundary
MRS 08, NPS Excluded Area	MRS 08A	11.8	CMUA-1	Unacceptable	Yes
	MRS 08B	59.2	CMUA-2	Unacceptable	Yes
	MRS 08C	14.6	CMUA-3	Acceptable	No
	MRS 08D	3.8	CMUA-4	Acceptable	No
	Areas Outside of CMUAs	NA	NA	Acceptable	No

Table ES-3 presents the updated MEC risk evaluations for previously existing Fort Hancock MRSs using the current methodology.

Table ES-3: MEC Risk Conclusions for all other MRSs				
MRS	Area	Acreage	CMUA	MEC Risk
MRS 03, Northern Portion Proving Ground	MRS 03	30.2	Yes	Unacceptable
MRS 05, Southern Portion Proving Ground	MRS 05A	1.5	No	Acceptable
	MRS 05C	0.9	No	Acceptable
	MRS 05D	1.0	No	Acceptable
	MRS 05F	3.9	No	Acceptable
	MRS 05B	39.0	Yes	Unacceptable
	MRS 05E	5.1	Yes	Unacceptable

Table ES-3: MEC Risk Conclusions for all other MRSs				
MRS	Area	Acreage	CMUA	MEC Risk
	MRS 05G	2.1	No	Unacceptable
MRS 06, Livens Discovery Area	MRS 06	5.0	Yes	Unacceptable
MRS 07, Remaining Land	MRS 07	862	No	Acceptable
MRS 10, Eastern Shoreline	MRS 10	179	No	Unacceptable

Unacceptable risk conditions typically require proceeding to the next phase of the CERCLA response process. Therefore, it is recommended that a Feasibility Study be conducted to address those MRSs determined to pose unacceptable explosive risks. Subsequently, one Proposed Plan (PP) and Decision Document (DD) will be prepared to address all MRSs, i.e., those MRSs posing unacceptable explosive risks, and noting those MRSs posing no unacceptable explosive risks, therefore requiring no action.

1.0 INTRODUCTION AND BACKGROUND

In 2014, ERT, Inc. (ERT) performed a Remedial Investigation (RI) for the United States Army Corps of Engineers (USACE), for the majority of the munitions response sites (MRS) identified at the Fort Hancock Formerly Used Defense Site (FUDS), located in Monmouth County, New Jersey. Those activities were documented in the *Final Remedial Investigation Report, Fort Hancock Formerly Used Defense Site, January 2014* (USACE, 2014), hereinafter referenced as the 2014 RI Report.

Based upon the conclusions and recommendations of the 2014 RI Report, ERT performed additional RI field activities in two follow-on RI addenda phases. Addendum #1 activities were conducted in July 2014 to further assess MC risk in one portion of MRS 03 and to describe revised MRS delineations based on the RI findings. The results are documented in the Final RI Addendum #1 Report (USACE, 2016). Addendum #2 activities were conducted in December 2015 to assess explosive hazards in MRS 06, where access had previously been restricted by the land manager, the National Park Service (NPS). The results are documented in the Final RI Addendum #2 Report (USACE, 2017a).

In 2017, a third RI phase was conducted to address MRS 08, an area that had previously been excluded from investigation by the NPS, based on concerns about potential impacts to plant communities (primarily Maritime Holly Forest) from vegetation clearance required for conducting geophysical surveys. This document, RI Addendum #3 to the 2014 RI Report, presents the findings from the investigation of MRS 08.

This work was contracted under Environmental and Restoration Services Contract W912QR-12-D-0011, DA02. This project involved munitions and explosives of concern (MEC) and munitions constituents (MC) and was performed under the Department of Defense (DoD) Military Munitions Response Program (MMRP), which was established under the Defense Environmental Restoration Program (DERP). ERT performed all work in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104 and the National Contingency Plan (NCP), Sections 300.120(d) and 300.400(e). Applicable provisions of Chapter 29 of the Code of Federal Regulations 1910.120 apply. All activities involving work in areas potentially containing MEC hazards was conducted in compliance with USACE, Department of the Army (DA), and DoD safety regulations.

USACE Baltimore District (CENAB) administers this work and provides technical oversight, and the USACE New York District (CENAN) is the overall life cycle manager for the project. The Project Team consisted of ERT, CENAB and CENAN, as well as other government and non-government agencies with specific expertise for implementation of specialized components of the field operations. For purposes of this RI Addendum Report, CENAB and CENAN are referred to jointly as “USACE”, unless specific district responsibilities are discussed.

1.1 Purpose and Scope

ERT performed the original RI (2014) for USACE at most of the Fort Hancock MRSs under the Multiple-Award Military Munitions Services Contract (W912DR-09-D-0012, Delivery Order 0002). The purpose of the RI was to adequately characterize the nature and extent of any potential MEC hazards or MC contamination resulting from the past U.S. military use of Fort Hancock.

The 2014 RI included investigation of eight Munitions Response Sites (MRSs), including seven

land-based and one marine-based MRS. Because of the globally-rare Maritime Holly Forest, significant portions (140 acres) of the land-based MRSs could not be investigated at the time, as a result of NPS cutting restrictions. Of those areas investigated, the original RI work revealed specific MEC locations and locations suspected of containing MEC, and multiple “MEC/MD Hazard Areas” were identified. As a result of the RI findings, the boundaries of the MRS were significantly adjusted, resulting in the six current MRSs shown in Figure 1 (all figures are presented in Appendix A). Figure 1 shows an evolved version of those six MRS boundaries that also encompasses the findings of RI Addenda #2 and #3. Access had been denied to the majority of MRS 06, the Livens Discovery Area, but was granted in 2016 for the conduct of the RI (addressed in the RI Addendum #2 Report). MRS 08 was identified as the “NPS Excluded Area,” as it appeared that access would be permanently denied.

For the 140-acre MRS 08 (NPS Excluded Area), a modified, species-protective investigation approach was planned; all activities for RI Addendum #3 were completed in accordance with the *Final MMRP Remedial Investigation Work Plan, Addendum #3, Fort Hancock Formerly Used Defense Site, November 2017* (USACE, 2017b).

The purpose of RI Addendum #3 is to adequately characterize the nature and extent of potential MEC hazards or MC contamination at MRS 08 resulting from the past U.S. military use of Fort Hancock.

The scope of the MRS 08 investigation included “mag & dig” geophysical surveys, a technique performed along transects using hand-held analog magnetometers (metal detectors) to sweep the ground surface to detect anomalies, which are then excavated by hand to identify potentially explosive items. While this represented a change to the previous Fort Hancock FUDS RI field procedures, wherein digital geophysical mapping (DGM) was conducted, it requires less vegetation cutting and accommodated NPS concerns about potential damage to the rare and sensitive plant communities.

A secondary purpose of the Addendum is to describe adjustments to MRS configurations and acreages, including those resulting from MRS 08 footprint reduction recommendations, and development of the new MRS 10, Eastern Shoreline. These adjustments will be formalized by USACE in a Revised Inventory Project Report (INPR) to be completed upon finalization of this RI Addendum.

Finally, as a means of standardizing MEC risk evaluations across the multiple RI efforts, this Addendum also serves to update MEC risk evaluations for all previously existing Fort Hancock MRSs using the December 2016 USACE risk management methodology to assess risk posed by explosive hazards (USACE, 2017c). The detail of the risk matrix analysis for those MRSs is presented separately in Appendix F.

1.2 Property Description and Problem Identification

Fort Hancock is located on the Sandy Hook peninsula in Monmouth County, New Jersey, in the Lower Bay of the Hudson River. The peninsula, which encompasses approximately 1,700 acres, is known as the Sandy Hook Unit of the Gateway National Recreation Area and is a National Historic Landmark. It is currently managed by the Department of the Interior (NPS) and the U.S. Coast Guard, and is used for a variety of recreational purposes year-round. An active U.S. Coast Guard Station is positioned on the northwest corner of the peninsula (approximately 68 acres).

Over its long history, the U.S. military occupied much of the 1,700 acres of the Sandy Hook Unit. From 1874 to 1918, the property was used for operation of a proving ground to test weapons and ordnance of all types manufactured in the U.S. The firing of weapons took place on the eastern side of the peninsula, from north to south, with six impact areas ranging in distance from 1,000 yards to 3.75-miles from the firing battery. Many military features still exist, including living quarters and administrative buildings (many of which are currently in use by NPS and other tenants), gun batteries, four NIKE missile silos, and a light house. In the early 1960s, the property was transferred from the U.S. Army to the State of New Jersey, which operated the Sandy Hook State Park. In 1973, the U.S. Department of Interior, NPS, took possession of the park and integrated it into the Gateway National Recreation Area.

Fort Hancock is situated on the New Jersey Coastal Plain, a seaward-dipping wedge of unconsolidated sediments. These sediments are clay, silt, sand, and gravel, and represent continental, coastal, or marine deposition. Sandy Hook is a coastal spit that projects northward, more than 5 miles into the bay. The spit is a continuation of a narrow offshore bar. Sandy Hook is an example of an active compound recurved spit (i.e., the end of the sand bar turns landward), which has lengthened about 1,000 feet (ft) in the past quarter century. Beach and dune sands make up all of the Sandy Hook Unit spit. The surficial soils at Fort Hancock consist mainly of beach and dune sands. A small area on the western side of the spit contains tidal marsh deposits.

MRS 08 as shown on Figure 1 encompasses 140 acres. The potential for MEC in MRS 08 was based on previous investigation findings and formed the basis of the RI Addendum #3 objectives. During the 1998 Engineering Evaluation/Cost Analysis (EE/CA) investigation (USACE, 1998), specific items found in MRS 08 included a fragment of a 4.7" Projectile base and other MD fragments. In addition, the following MEC items were found in surrounding areas during the 2014 RI: 75mm projectile; MK 1, 1-lb; 3.5-in projectile; 3-inch Stokes mortar; 75mm shrapnel round; 5-in armor piercing high explosives (APHE); and 4.5-in Mark V British APHE projectile (USACE, 2014).

1.3 Previous Investigations

Multiple investigations have taken place at Fort Hancock under the DERP/FUDS program, beginning in 1991 with an INPR and 1993 Archives Search Report (ASR), as well as a 1994 Interim Removal Action (IRA). The early investigations were based largely on the observations and accounts of munitions found by NPS personnel. The following is a brief summary of the primary investigations that shaped the conceptual site model (discussed in detail in the 2014 RI Report) and how the MRS delineations have evolved over time, as successive investigations have provided new characterization information. More detailed descriptions of these investigations and the evolution of the MRS delineations can be found in the 2014 Final RI Report (Sections 1.2 to 1.4) and the 2016 Final RI Addendum #1 Report (Section 6.0).

1.3.1 Engineering Evaluation/Cost Analysis

In 1998, USACE conducted an EE/CA to investigate a total of ten areas of concern either identified in the 1993 ASR or historical aerial photographs, or pointed out by NPS staff.

A total of 3,904 anomalies were identified during the geophysical investigations; of these, 1,710 were intrusively investigated. A total of five conventional MEC items found during the EE/CA were confirmed to contain explosive charges, including one 5-inch Shrapnel round and one 7-inch

projectile containing HE, one live Mark V fuze, and two 75mm projectiles (fuzed but no HE). MEC and MD also were found at the Livens Discovery Area, including one intact Livens projectile. Radiographic testing in the field indicated that the projectile did not contain a burster and that the filler was likely FM smoke. These tests were confirmed at a later point in time (USACE, 1999). An explosive risk assessment was conducted using the Ordnance and Explosives Cost-Effectiveness Risk Tool (OECert), and two areas were recommended for MEC clearance to depth. Note that this risk assessment would not be a true risk characterization as would be conducted today. Also note that neither of the two areas recommended for MEC clearance lie within MRS 08. Although the removal actions were never undertaken, NPS maintained a protocol for public education through information sheets/signage.

1.3.2 Site Inspection

In 2007, USACE completed a Site Inspection (SI) as part of a Department of Defense (DoD)-wide effort to evaluate inventoried military munitions training and testing ranges (later known as MRSs) for further action pursuant to CERCLA. The SI served to inspect each of the six MRSs, as they were then identified in the 1993 ASR. It is important to note that all six MRSs were based on interviews with and anecdotal information provided by NPS staff who had responded to munitions finds over the years and hypothesized about associated historical military operations (see Table 1-1 for additional details regarding the SI MRS designations). The SI was strictly scoped to identify (through site reconnaissance) possible MEC on the ground surface at those MRSs identified in the ASR, collect environmental samples to determine if there may have been a release of MC, to evaluate the MRSs using the Munitions Response Site Prioritization Protocol (MRSP), and make a determination of whether further, detailed investigation was warranted.

No MEC was observed on the surface in any of the areas inspected, but the SI report recommended a Remedial Investigation and Feasibility Study (RI/FS) for further evaluation of MEC on all land-based MRSs, based on historical information, and further evaluation of MC contamination for five of the MRSs, based on concentrations of metals above background and risk-based screening levels in soil (Section 7.4 of the SI, USACE, 2007), sediment, and surface water samples. It was also recommended that the off-shore portions of the range fans emanating from the firing batteries be assigned an MRSP rating of “evaluation pending,” based on pending changes in FUDS policy pertaining to off-shore areas (USACE, 2007).

1.3.3 Remedial Investigation

In 2008, for purposes of scoping the upcoming contract for the RI/FS, USACE researched the six SI MRSs and discovered, through discussions with NPS, that some of the MRS histories and locations had largely been surmised and approximated. The existence of two of the MRSs could not be verified, and one of the MRSs (created by off-shore dredging and beach replenishment) had completely eroded into the Atlantic Ocean. Further, USACE completed a probability assessment and determined that it is unlikely for chemical warfare material (CWM) to be encountered at Fort Hancock, resulting in another SI MRS being omitted from the RI. In the absence of a clear operational history of Fort Hancock, the RI/FS was awarded in 2009 with the understanding that the site history needed further research and the conceptual site model, with appropriate MRS designations, would be developed as part of the RI effort.

After award of the original RI/FS in 2009, ERT interviewed NPS staff and reviewed a three NPS-authored Historical Records Surveys as well as an undated overview of the artillery and ordnance

history of Fort Hancock. In this undated, 87-page report are lists and drawings of projectiles fired at the proving ground, as well as a map of the locations of six impact areas associated with the historic proving ground. This key document identifies the location of proof firing targets and indicates that guns were fired from north to south along the beach. From this, the conceptual site model was developed and seven new land-based MRSs were delineated, for purposes of conducting the RI. Six of the MRSs were associated with the impact areas, and buffer zones equal to the radius of the targets were added on all sides of the circular target areas. In addition, documentation of a 1927 storehouse fire was found in the area known as the Livens Discovery Area, and an MRS boundary was drawn around the expected kick-out area. An eighth, marine-based MRS was delineated off the eastern shore, paralleling the proving ground and target areas, to investigate the portions of the proving ground that have eroded into the Atlantic Ocean.

ERT completed the bulk of the RI in 2014 (USACE, 2014), characterizing the nature and extent of MEC, munitions debris (MD) and MC in the majority of the six newly-defined MRSs that encompass the impact areas and buffer zones, as well as the one marine-based MRS. In response to concerns from the New Jersey Department of the Environmental Protection (NJDEP) that more former batteries should be included in the RI, two Potential Areas of Interest (PAOIs), containing several former batteries, were also investigated. The land-based investigation excluded 140 acres of the buffer zones that contain Maritime Holly forest, on the western side, as well as most of the Livens Discovery Area. The scope of the original RI included DGM, intrusive investigations to identify location, density, and types of MEC and MD. The investigation also involved environmental sampling to determine concentrations and extent of MC metals and explosives in soil, sediment, surface water, and groundwater. Human health and ecological risk assessments were conducted to determine potential risk to human health or the environment, and no unacceptable risk from MC contamination was identified.

Seven MEC items and 65 MD items were found in the land-based MRSs, on both the ground surface and below ground surface. No MEC or MD were found in the marine-based MRS. The results of the DGM and intrusive investigations indicate that certain areas containing a concentration of metallic anomalies (clusters) within the MRSs have a higher likelihood of encountering MEC than others. In these clusters, eight “MEC/MD Hazard Areas” and one PAOI were identified within the MRSs. As defined, the MEC/MD Hazard Areas represent a “moderate to high” probability of encountering MEC, while the remainder of the MRS represents a “low” probability of encountering MEC. Using current terminology, these MEC/MD Hazard Areas would be considered Concentrated Munitions Use Areas (CMUA).

1.3.4 RI Addendum #1

In July 2014, ERT conducted additional RI soil sampling as a result of recommendations in the 2014 RI Report. The report had concluded that in a portion of the northern proving ground (the 1998 EE/CA grid B003), arsenic and lead in soil could potentially pose a threat to human health based on exceedances of background and calculated human health risk (Section 6.2.3 of the RI, USACE, 2014), and that antimony, arsenic, copper, lead, selenium, and thallium could pose a threat to ecological receptors. Additional soil samples were collected to further characterize this area, and the human health and ecological risk assessments were updated. The RI Addendum #1 Report concluded that the nature and extent of MC contamination had been determined and that no unacceptable risk to human health or the environment was posed by MC contamination in the B003 Area.

1.3.4.1 RI Addendum #1 MRS Delineations

In addition to the B003 soil sampling effort, the RI Addendum #1 Report (Section 6.0) documented revised MRS boundaries based on the findings of the RI up to that point, as well as the then-current status of NPS access restrictions. As presented in more detail in RI Addendum #1 report, MRS foot prints were reduced to encompass those areas where MEC was found or suspected. In the proving ground, two MRSs were developed to encompass the eight MEC/MD Hazard Areas and one PAOI as defined in the 2014 RI Report. Due to NPS access restrictions at the time, MRS 06, Livens Discovery Area, was retained for future investigation, and MRS 08, NPS Excluded Area, defined the 140 acres of the proving ground buffer areas to which access had been permanently restricted. NPS subsequently granted access to MRS 06, and the RI work was completed in the Livens Discovery Area as RI Addendum #2. Access to MRS 08 was also granted (the subsequent investigation is the subject of this document). MRS 07 was defined for all remaining land where no MEC is known or suspected. MRS 09 was defined for the off-shore water ranges emanating from the coastal firing batteries, where no MEC attributable to Fort Hancock operations is known or suspected. These post-RI adjustments resulted in the current MRSs shown in Figure 1. Figure 2 shows the proving ground impact areas and firing points, as well as the MRS designations as outlined in the 2010 RI Work Plan. The revised MRSs in Figure 1 correspond to newly-created FUDS project numbers, as established in a Revised INPR prepared by USACE in July 2014 (Projects 01, 02, and 04 correspond to other FUDS project types). The current MRSs are described below:

- MRS 03, Northern Portion Proving Ground: This MRS encompasses 30.2 acres and includes the MEC/MD Hazard Area 1A (29 acres) and PAOI 9-Gun Battery (1.2 acres). As shown on Figure 2, this MRS encompasses the old and new firing points of the former proving ground, a part of the 9-Gun Battery, and part of the buffer area of the 1,000-yard Impact Area. Three MEC and 26 MD items were found below the ground surface in 8 grids and in a meandering path in the PAOI during the original 2014 RI. The MEC items included a 75 mm projectile, a MK 1, 1.44-inch projectile, and a 3.5-inch armor piercing high explosive projectile. The MRS also includes the B003 Area where several MEC items were found during the 1998 EE/CA (10-inch, 4.7-inch, 5-inch, 3-inch, and 75 mm projectiles, and a Mark V fuze).
- MRS 05, Southern Portion Proving Ground: This MRS encompasses 51 acres and includes the following seven discontinuous MEC/MD Hazard Areas (as defined in the 2014 RI Report): 1B, 2A, 3A, 3B, 4A, 5A, and 5B. To minimize confusion and better align these areas with the current MRS number designation, these sub-areas have been renumbered as 05A, 05B, 05C, 05D, 05E, 05F, and 05G, respectively. This MRS encompasses portions of the buffer areas of the 2,000-yard, 2,500-yard, 3,000-yard, and 3-mile Impact Areas of the proving ground. Four MEC and 25 MD items were found in the MRS during the 2014 RI, including a 5-inch AP HE round, a 3-inch stokes mortar, a 75mm shrapnel round, and a 4.5-inch British HE round.
- MRS 06, Livens Discovery Area: This MRS encompasses 5 acres where the 1927 munitions storehouse fire occurred and Livens projectiles that were originally contained in the former storehouse (containing titanium tetrachloride (FM smoke)) were discovered in 1981. The original Livens Discovery Area footprint was a circular area covering 29 acres, with the location of the storehouse in the middle and a radius of 600 feet representing the

fragmentation distance for a Livens, plus a buffer area. NPS originally granted access to only 5 acres, which were investigated in the first phase of the 2014 RI; no MEC or MD was found in that area, so the 5 acres were included in MRS 07, Remaining Land (see below). NPS later granted access to the remaining 24 acres, and the RI was conducted as Addendum #2. MEC and MD were found in only 5 of the 24 acres, so the remaining 19 acres have been added to MRS 07.

- **MRS 07, Remaining Land:** At 862 acres, this MRS encompasses all remaining land on the former proving ground, where no MEC or MD was found during the RI. The MRS extends to the northernmost extent of the Sandy Hook peninsula and to the southernmost boundary of the recreation area and constitutes those portions of previous land-based MRSs investigated during the RI that would now be considered non-CMUAs. Although there is a potential that MEC remains in these areas from historical operations, the RI has determined that this potential is low. The MRS includes portions of the proving ground impact areas, buffer zones, and the Livens Discovery Area. *Note: MRS 07 was designated “Battery Complex & Other No Hazard Areas,” in the 2014 Revised INPR. The MRS was renamed “Remaining Land” in the 2016 RI Addendum #1 Report to separate the off-shore range fans from the shoreline and other on-land portions. This new name will be reflected in a second Revised INPR, to be prepared upon finalization of this RI Addendum.*
- **MRS 08, NPS Excluded Area:** MRS 08 was defined as 140 acres, but consequent to this investigation, its footprint has been reduced to 71 acres (see Figure 9). The MRS encompasses portions of the former proving ground to which NPS had excluded access for the RI DGM investigations. Right-of-entry refusal was based on concerns about potential impacts to plant communities (primarily Maritime Holly forest) due to vegetation clearance required for cutting transects and placing grids. As shown on Figure 2, this MRS (shaded green) contains western portions of buffer areas of the 2,000-yard, 2,500-yard, 3,000-yard, and 3.75-mile Impact Areas, as well as the western half of the 3-mile Impact Area. NPS ultimately granted access to the MRS, which was investigated through RI Addendum #3, the subject of this report. Revisions to this MRS based on the results of this investigation will be made in a second Revised INPR, to be compiled upon finalization of the RI. These pending revisions are discussed in Section 5.5.
- **MRS 09, Water Ranges:** This MRS is 129,611 acres and encompasses the off-shore portions of the coastal battery range fans. A large portion of the range fans overlaps those of Fort Tilden, another FUDS in New York, and have been excluded (the overlapping acres are accounted for in the Fort Tilden MMRP project). The MRS encompasses the in-water segment of the SI MRS called the Northern Battery Complex. It also encompasses the 154 acre area paralleling the eastern shore, which was identified in the 2014 RI Report as MRS 08. Investigation of the 154-acre area consisted of underwater geophysics to a water depth of 6 feet, and no MEC or MD was found. No distinct MEC source areas have been or can feasibly be identified in the off-shore areas, and deep water in portions of the 129,611 acres is considered a partial barrier to MEC, if any is present. As noted in Section 1.3.2, it recommended that the off-shore portions of the range fans emanating from the firing batteries be assigned an MRSPP rating of “evaluation pending,” based on pending changes in FUDS policy pertaining to off-shore areas.

- **MRS 10, Eastern Shoreline:** This new MRS, created from 179 acres of the dynamic shoreline of MRS 07 as part of RI Addendum #3, was developed to address munitions that have historically been found on the beaches after storm events. It is 179 acres encompassing the beach and surf zone on the eastern side of the Sandy Hook peninsula, where MEC washes onto the shore after large storm events in the Atlantic Ocean (Figure 10). In part, the MRS encompasses portions of the former proving ground that have eroded into the ocean. Although none were found during the RI, munitions historically found on the beaches have been investigated by Explosives Ordnance Disposal (EOD) units. Items that have washed up on the Atlantic beaches since 2010 include: 3.5-inch, 6-inch, and 8-inch projectiles, Marine flare, Mk-25 Marine Marker, and 5-inch AP projectile. These items were identified as live and blown in place by EOD units from Naval Weapons Station Earle. The MRS extends to the northernmost end of the Sandy Hook peninsula and to the southernmost boundary of the national recreation area.

1.3.5 RI Addendum #2

Upon receiving permission from the NPS to further investigate the Livens Discovery Area, MRS 06, ERT conducted additional RI field activities in November and December 2015 on the remaining 24 acres of the MRS. The MRS is centered on the location of the munitions storage magazine, which had been destroyed in a fire in 1927. Geophysical surveys were conducted along transects and within 9 grids, with subsequent investigation of anomalies. Geophysical and intrusive findings defined the extent of MEC contamination and the MRS was reduced from 24 acres to 5.0 acres (the 19 acres becoming part of MRS 07). Findings included two intact Livens projectiles, a partial Livens projectile, 5 Stokes Mortar MK1 fuzes, 4 Livens burster tubes, an MK1 detonator, an M-1 smoke canister, and a brass base fuze. MC had been characterized during the 2014 RI with no unacceptable MC risk identified, and additional sampling for explosives at the locations of intact Livens projectiles confirmed this. RI Addendum #2 was finalized in June 2017.

1.4 Current Investigation - RI Addendum #3

This document, RI Addendum #3, presents the results of the investigation of the approximately 140 acre MRS 08, NPS Excluded Area (Figure 1). The footprint of MRS 08 was developed as a function of acreage NPS excluded from previous investigations. As shown on Figure 2, the original MRS footprints investigated in the 2014 RI were derived from known firing points and target areas as documented by a historical map of previous military activity. Artillery was fired towards the six target areas at various distances up to 3.75 miles. Old MRS-1 through MRS-6 were based on the target areas, with range fan widths including buffer areas to the east and west of the target areas.

Following completion of the 2014 RI, and RI Addenda #1 and #2, USACE presented the “mag & dig” approach as an alternative way to conduct the geophysical investigation of MRS 08, in order to minimize impacts to sensitive plant species. NPS found the “mag & dig” approach acceptable and the investigation was performed, accordingly.

The potential for remaining MEC in MRS 08 was based on previous munitions related finds during the 1998 EE/CA investigation. The CSM for MRS 08 indicates that MEC, as UXO or from low order detonations, could exist on or under the ground surface from historical proving ground operations. MRS 08 comprises buffer areas of, and is adjacent to, several historical target impact

areas, and MEC or MD could be present as a result of shots missing the targets or due to shifting sands in the dynamic dunal environment. Therefore, RI Addendum #3 was conducted to adequately characterize the nature and extent of potential MEC hazards or MC contamination at MRS 08 resulting from the past U.S. military use of Fort Hancock.

1.5 MRS Designation Summary

To provide a complete understanding of the evolution of MRS terminology and footprints, Table 1-1 presents a crosswalk of how the original 2007 SI MRS designations evolved into the 2014 RI designations, while Table 1-2 presents a crosswalk between the 2014 RI MRSs and the RI Addenda revised MRS designations.

Table 1-1. Crosswalk of 2007 SI and 2014 RI MRS Designations		
2014 RI MRS	2007 SI MRS	Notes
MRS-1 1,000-Yard Impact Area (99 acres)	MRS 5 Northern Battery Complex (portion) – (total 356 acres)	<p>RI MRS-1 is the northern portion of the proving ground, covering both the “old” and “new” proof battery firing points, down to the 1,000-yard target (impact) area as well as estimated buffer areas. It encompasses the EE/CA Grid B003 Area as well as an area to the east where historical aerial photographs show ground disturbance (a potential sign of munitions impact craters). The park’s northern parking lot and beach plaza (shower house) are included in this area, as well as portions of North and Gunnison Beaches.</p> <p>SI MRS 5 partially overlaps RI MRS-1 and covers a small portion of the historic proving ground. The “Northern Battery Complex” mostly consists of the large, overlapping range fans emanating from 13 of the firing batteries to presumed off-shore target locations at the maximum distance the guns could fire. The majority of this acreage was excluded from the RI, as (1) limited firing of the guns is likely to have occurred, since they were installed between 1890 and 1933, during which time harbor defense was not necessary when the guns were in place, (2) no disposal operations are documented to have occurred near the batteries, (3) there are limited reports of munitions finds on the northern beaches, (4) much of the northern tip of the peninsula is sand that has accreted since firing operations ceased, likely burying any munitions that may have been in near-shore or on-shore areas, and (5) the off-shore targets would have been in deep water thousands of feet from shore.</p>
MRS-2 2,000-Yard Impact Area (151 acres)	MRS 5 Northern Battery Complex (portion) – (total 356 acres)	MRS-2 encompasses the second target area, moving from north to south from the proving ground firing area. A small portion of SI MRS 5 is covered by this area.
MRS-3 2,500-Yard Impact Area (89 acres)	MRS 5 Northern Battery Complex (portion) (total 356 acres)	MRS-3 encompasses the third target area, moving from north to south from the proving ground firing area. A small portion of SI MRS 5 is covered by this area.

Table 1-1. Crosswalk of 2007 SI and 2014 RI MRS Designations		
2014 RI MRS	2007 SI MRS	Notes
MRS-4 3,000-Yard Impact Area (73 acres)	NA	MRS-4 encompasses the fourth target area, moving from north to south from the proving ground firing area. The SI covered no portion of this MRS.
MRS-5 3-Mile Impact Area (205 acres)	NA	MRS-5 encompasses the fifth target area, moving from north to south from the proving ground firing area. The SI covered no portion of this MRS.
MRS-6 3.75-Mile Impact Area (90 acres)	MRS 1 Southern Dredging Disposal Area (31 acres)	MRS-6 encompasses the sixth target area, moving from north to south from the proving ground firing area. This MRS covers the SI MRS 1 in its entirety, the area where beach replenishment occurred, as well as the former small arms range.
MRS-7 Livens Discovery Area (29 acres)	MRS 2 Livens Projectile Disposal Area (24 acres)	MRS-7 covers the area where the 1927 storehouse explosion took place and spread Livens projectiles into an area not discovered until 1981. To draw the MRS boundary, a blast radius for the Livens projectiles, plus a buffer area, was measured from the storehouse location. The Livens found in 1981 contained FM smoke. In the SI report and Archive Search Report (ASR) Supplement, the location of the Livens area was incorrectly identified (too far to the north). Although this area was called an underground storage magazine in the 1998 EE/CA report, there is no documentation or visual evidence to date that the magazines in the ordnance depot were underground.
MRS-8 Water MRS (154 acres)	MRS 5 Northern Battery Complex (offshore portion) – (total 130,580 acres)	154 acres along the eastern shore of the property, parallel to the former proving ground and impact locations. The MRS extends eastward into the ocean approximately 100 yards, reflecting a 6-foot depth contour (at mean lower low water). Six feet was used to reflect a conservative maximum depth for human receptors to potentially encounter MEC through fishing, wading or swimming activities.

Table 1-1. Crosswalk of 2007 SI and 2014 RI MRS Designations		
2014 RI MRS	2007 SI MRS	Notes
NA	MRS 3 Northern Disposal Area (1 acre)	This was presumed to be the area off the north end of the peninsula, as described in an ASR interview, where fragmentation grenades were dumped. However, there is no map or description to document the dump or its location. The interview subsequently stated that items may possibly have washed up on-shore in this area, but the location of the dump is entirely unknown. The interviewee subsequently did not recall this area and stated that he may have been referring to items that washed up on shore in the general vicinity.
NA	MRS 4 CWM Research and Development Laboratory (0.06 acres)	No CWM is documented to have been used or developed at Fort Hancock, and the name of this building in the ASR is a misnomer. The correct name was "School/Chemical Laboratory." The building was used for chemistry tests associated with conventional ordnance fired at the proving ground.
NA	MRS 6 Plum Island/Hand Grenade Court (0 acres-unlocated)	The ASR provides no documentation of the location of a grenade court, only a statement by an NPS employee that grenade training took place. The interviewee subsequently explained that the presence of a training range was conjecture and is not thought to be accurate. The found item was thought to have washed up from an off-shore area. (Note that none of the anomalies found on the island during the EE/CA were MEC-related.)

Table 1-2. Crosswalk of 2014 RI and RI Addenda MRS Designations	
Addendum #1 through #3 Revised MRS Designation (Current Designation)	MRS Designation - 2014 RI Report
MRS 03, Northern Portion Proving Ground	MRS-1: MEC/MD Hazard Area 1A
MRS 05, Southern Portion Proving Ground (including sub-areas: 05A, 05B, 05C, 05D, 05E, 05F, and 05G)	MRS-1 through 5: MEC/MD Hazard Areas 1B , 2A , 3A/3B , 4A, and 5A/5B
MRS 06, Livens Discovery Area	MRS-7 where NPS excluded RI activities (24 acres)
MRS 07, Remaining Land	Remaining acreage of MRSs-1 through 7
MRS 08, NPS Excluded Area	Portions of MRSs-1 through 6 where NPS denied right of entry for RI activities
MRS 09, Water Ranges	MRS 08
MRS 10, Eastern Shoreline	Shoreline portion of MRS 07

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2.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

The following discussions, summarized from the more detailed 2014 RI Report, are provided for context.

2.1 Overall Site Description

2.1.1 Surface Features

Sandy Hook is a coastal spit, or peninsula, that projects northward, more than 5 miles into the Atlantic Ocean. Beach and dune sands make up all of the Sandy Hook spit. Most of the MRSs have similar surface features, with relatively flat beach areas on the eastern side and densely vegetated areas on the western side. MRS 08 is densely vegetated acreage with the very southern edge extending to the Sandy Hook Bay along the western side of the peninsula.

2.1.2 Meteorology

Monmouth County's climate generally is moderate, with warm summers, mild winters, and evenly distributed average monthly rainfall. February is usually the month with minimum precipitation (2.89 inches (in.) average at Sandy Hook) and June is normally the month of maximum rainfall (4.45 in. average). Summer temperatures are warm, but seldom extreme due to the effect of the Atlantic sea breezes. Highest monthly temperatures occur in July (74-75 degrees Fahrenheit (°F) average). The lowest monthly average temperature occurs in January (33-34 °F). With the ocean influence, winds may blow across Sandy Hook from any direction; however, wind data are not recorded on Sandy Hook.

2.1.3 Surface Water Hydrology

There are no significant surface streams on the peninsula, and only a few marshy areas noted on the topographic maps. Except during intense rainfall events, infiltration is high and surface runoff minimal due to the sandy soils. Mean tide ranges from approximately -1.6 feet to 3 feet National Geodetic Vertical Datum (NGVD), while spring tides range from -2.1 feet to 3.5 feet NGVD. Flooding occurs only as a result of storm surges or hurricanes.

Surface water does not supply drinking water on or around Fort Hancock given the proximity to the ocean; all surface water is non-potable. There are three ponds on Sandy Hook, with Nike Pond being with MRS 08. While recreational fishing occurs along the beaches at Sandy Hook, it does not occur at any of the ponds.

2.1.4 Geology

Fort Hancock is situated on the New Jersey Coastal Plain, a seaward-dipping wedge of unconsolidated sediments ranging in age from Cretaceous to Recent. These sediments are clay, silt, sand, and gravel, and represent continental, coastal, or marine deposition. The Coastal Plain deposits thicken seaward at the Fall Line to more than 6,500 ft at the southern tip of Cape May County (USACE, 1993). Sandy Hook is an example of an active compound recurved spit (i.e., the end of the sand bar turns landward), which has lengthened about 1,000 ft in the past quarter century. Dunal topography is present on parts of the spit. Some of the recent growth of the spit is at the expense of the spit elsewhere. A large seawall along the barrier bar and southern part of the spit has been constructed to curtail the loss of sand from the open ocean side of Sandy Hook.

2.1.5 Soils

Beach and dune sands make up all of the Sandy Hook Unit spit. The beach sand is composed principally of quartz from underlying and nearby formations. Grain size ranges from clay to small pebbles, but the sand is mainly medium to coarse. The sand is fairly clean and loose and shifts about readily. The dunes are partly stabilized and fairly well covered by bushes and grass. A small area on the western side of the spit contains tidal marsh deposits.

2.1.6 Hydrogeology

Two major aquifer systems are associated with Fort Hancock and the surrounding peninsula. Groundwater is primarily found in the Northern Atlantic Coastal Plain aquifer system, with a typical yield of 250 to 300 gallons per minute of groundwater in high-capacity wells. Groundwater beneath the northern portion of the peninsula is associated with the Englishtown aquifer. These features, and the coastal topography of the site, will affect the general flow of groundwater. Drinking water for the entire Sandy Hook peninsula is supplied by one well approximately 880 feet deep, completed in a confined aquifer. Surrounding boroughs receive drinking water from other public community supply wells.

One groundwater monitoring well (GW2E) is within MRS 08; it and a few other groundwater monitoring wells were sampled as part of the 2014 RI.

2.1.7 Demography and Land Use

The Sandy Hook peninsula currently is part of the Gateway National Recreation Area and is used for a variety of purposes year-round. Public attractions include access to a 5-mile multi-use pathway, the Sandy Hook Visitor Center, the Fort Hancock Museum, the Sandy Hook Light House, and the Sandy Hook Bird Observatory. Recreational activities include hiking, wind surfing, swimming, and beach fishing. There are full-time and seasonal residents on Sandy Hook as well as an office of the National Oceanographic and Atmospheric Administration, the Marine Academy of Science and Technology, field offices of other non-profit environmental advocacy groups and a child care center. Many of the former Fort Hancock military buildings still exist, including housing, batteries, and silos. The U.S. Coast Guard Station is in use on Sandy Hook on the north end of the site with a functioning, on-line weather station. Many of the Coast Guard family members reside in homes on the 68 acre Coast Guard property (totaling approximately 200 residents). The NPS employs 55 permanent staff and 94 temporary (summer) employees (NPS, 2006). NPS has stated that Sandy Hook will remain part of the Gateway National Recreation Area in the future and that no changes to the current land use are projected.

2.1.8 Ecology

The Sandy Hook peninsula is characterized by a wide variety of habitats including forest, wetland, dune shrubland, dune grassland, beach, and adjacent benthic habitats (NPS, 2008a). The peninsula serves as a valuable migratory flyway, stopover site, breeding site, and wintering site for many bird species of concern. Threatened, endangered, and special concern species within or near Fort Hancock are primarily associated with beach and dune habitats.

Within MRS 08, wetlands are present in the central portion of the MRS, to the north of the Fishing Beach access road, and in the southern portion, located around and adjacent to the Nike missile pond. These were not significantly impacted during the investigation.

Sensitive ecological communities at Fort Hancock include a globally-rare 231-acre Maritime Holly forest, which is not open to the public (NPS, 2008a). Because of the sensitive ecological communities, NPS imposed vegetation removal or cutting restrictions on specific ‘excluded areas’. The Maritime Holly forest and other sensitive plants of concern in the MRSs were not cut to minimize disturbance, including Beach Wormwood (*Artemisia campestris caudata*), American Holly (*Ilex opaca*), Eastern Red Cedar (*Juniperus virginiana*), Northern Bayberry (*Myrica pensylvanica*), Beach Plum (*Prunus maritima*), Common Hackberry (*Celtis occidentalis*), Serviceberry (*Amelanchier arborea*), and experimental vegetation research plots consisting of Asiatic Sand Sedge (*Carex kobomugi*) and American Beachgrass (*Ammophila breviligulata*), the federally-threatened and state-endangered Seabeach Amaranth (*Amaranthus pumilis*), the Seabeach Knotweed (*Polygonum glaucum*), and Coast Flat Sedge (*Cyperus polystachyos*). While not all of these species are present with MRS 08, the MRS was the result of the remaining acreage that had initially been excluded from investigation by NPS, primarily due to the Maritime Holly forest.

Procedures for conducting the field activities for the Fort Hancock FUDS were documented in the Environmental and Cultural Resources Protection Plan (ECRPP) and addenda to the ECRPP (USACE, 2011, and the RI Addendum #2 Work Plan, USACE, 2015). Formal agency consultations and ongoing communication with stakeholders ensured that field activities did not jeopardize any federally-listed and/or state-listed species or critical habitats in the investigation area.

For MRS 08 specifically, the investigation approach was tailored to accommodate NPS concerns about potential damage to the rare and sensitive plant communities. The scope of the MRS 08 investigation included “mag & dig” geophysical surveys, a technique performed along transects using a hand-held analog metal detectors to sweep the ground surface to detect anomalies, which are then excavated. This compromise approach allowed for investigation with minimal cutting of vegetation.

Overall environmental impacts within MRS 08 were further minimized by limiting the geophysical transect width and spacing, limiting the extent of cut vegetation, and preserving undisturbed buffer zones. NPS biologists accompanied field teams to ensure that plant species of concern were properly identified and avoided. No restoration or replanting activities were required, as all excavation holes were properly backfilled and brush cut vegetation was allowed to re-establish naturally. Few wildlife species were encountered during RI Addendum #3 activities due to the investigation time frame (November-December). The ECRPP was included as an appendix to the RI Addendum #3 Work Plan (USACE, 2017).

Recovered archaeological artifacts deemed to be archaeologically significant were fully documented by USACE and NPS archaeological professionals, and were provided to NPS.

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3.0 REMEDIAL INVESTIGATION OBJECTIVES AND PRELIMINARY CONCEPTUAL SITE MODEL

3.1 RI Objectives and Conceptual Site Model

The objective of RI Addendum #3 is to adequately characterize the nature and extent of any MEC hazards or MC risk resulting from the past military use of MRS 08. In order to complete an RI that achieves these objectives, a preliminary CSM was developed in the original Final RI Work Plan (USACE, 2010). Defined as the buffer areas of the former MRS-1 through MRS-6, the CSM included the acreage that later became MRS 08. A CSM is used to communicate and describe the current state of knowledge and assumptions about risks at a project site. The CSM presents the exposure pathway analysis by integrating information on the MEC and MC source, receptors, and receptor/MEC interaction.

As MRS 08 comprises former buffer areas of original MRS-1 through MRS-6 (as described in the 2014 RI), adjacent to several target impact areas, the CSM elements are the same as those original MRSs. That is, MEC as UXO, or from low order detonations, could exist on or under the ground surface resulting from historical proving ground operations. MEC or MD could be present as a result of shots missing the targets or from shifting sands in the dynamic, dunal environment. While no target impact areas exist within MRS 08, during the 1998 EE/CA investigation, a fragment of a 4.7" Projectile base, and other fragments were found in investigated EE/CA grids.

Table 3-1 presents a detailed preliminary CSM for MRS 08, including facility and physical profiles (setting, layout, structures, terrain, vegetation, significant features, security), land use and exposure profiles (receptors), ecological (habitat, species) and munition release profiles (types, transport mechanisms, migration routes, pathway analysis). Impacts or revisions to this preliminary CSM, based on the RI Addendum #3 findings, are discussed in Section 5.4.

Table 3-1. Conceptual Site Model for MRS 08	
Profile Type	Site Characterization
Facility Profile	Location and Area: <ul style="list-style-type: none"> MRS 08 is approximately 140 acres and located in the center of the peninsula. Much of the MRS lies along or just east of Hartshorne Drive. The MRS comprises three discontinuous sections (northern, central, and southern).
	Structures: <ul style="list-style-type: none"> A single building, a former ranger station along Hartshorne Drive, exists within the MRS. Small parking lots are close to this structure. The Multi-Use Path passes through the south-central part of the MRS.
	Boundaries: <ul style="list-style-type: none"> North: The approximate boundary is a curved portion of Atlantic Drive. South: The southern edge of the historical 3.75 mile Target Area. West: The boundary lies west of Hartshorne Drive in the south, and between Hartshorne and Atlantic Drive in the north. It corresponds to the western edge of MRS 1 through 6 in the 2014 RI. East: The boundary was defined by NPS as the edge of the Maritime Holly Forest.
	Security: <ul style="list-style-type: none"> The MRS is partially covered by dense vegetation (woody and herbaceous), which naturally limits access to parts of the MRS.

Table 3-1. Conceptual Site Model for MRS 08	
Profile Type	Site Characterization
Physical Profile	Utilities: <ul style="list-style-type: none"> Buried electric lines and overhead power lines exist in the median between the northbound and southbound lanes of Hartshorne Drive.
	Topography: <ul style="list-style-type: none"> Elevation is 0-15 ft above mean sea level. Dunal topography is present.
	Vegetation: <ul style="list-style-type: none"> Beach and dune flora is predominantly characterized by grasses, forbs and stunted shrubs. Inland flora is predominantly characterized by evergreen and mixed maritime forests, with deciduous forests (both maritime and non-maritime).
	Wetlands: <ul style="list-style-type: none"> Two wetlands areas occur in the central portion of the MRS.
	Soil: <ul style="list-style-type: none"> Beach and dune sands make up all of the Sandy Hook Unit spit. The dune sand is chiefly medium grained and better sorted than the beach sand. The dunes are partly stabilized and fairly well covered by trees, bushes, and grass.
	Hydrology: <ul style="list-style-type: none"> Nike Pond is a small freshwater body in the south-central portion of the MRS. Except during intense rainfall events, groundwater infiltration is high and surface runoff minimal due to the sandy soils.
	Hydrogeology/Geology: <ul style="list-style-type: none"> Two major aquifer systems are associated with Fort Hancock: the North Atlantic Coastal Plain aquifer system and the Englishtown aquifer. Drinking water for the entire Sandy Hook peninsula is supplied by one well (more than 1,500 ft away from MRS 08) completed approximately 880 feet deep. Fort Hancock is situated on the New Jersey Coastal Plain, a wedge of unconsolidated clay, silt, sand, and gravel sediments, representing continental or marine deposition.
Land Use and Exposure Profile	Current Land Use: <ul style="list-style-type: none"> NPS and associated recreational uses. Hiking, fishing, treasure hunting, bird watching, swimming, picnicking, bike riding.
	Cultural, Archaeological and Historical Resources: <ul style="list-style-type: none"> Fort Hancock may include archaeological artifacts and features that are associated with the former military use. Former ammunition magazines may be encountered.
	Current Potential Human Receptors: <ul style="list-style-type: none"> Employees (NPS, Coast Guard), construction workers, and visitors. There are no residences currently within MRS 08.
	Potential Future Land Use: <ul style="list-style-type: none"> NPS has stated that Sandy Hook will remain part of the Gateway National Recreation Area in the future and that no changes to the current land use are projected.
	Potential Future Human Receptors: <ul style="list-style-type: none"> No changes are anticipated to the current potential human receptors.
Ecological Profile	Degree of Disturbance: <ul style="list-style-type: none"> Primarily undisturbed with low pedestrian traffic.
	Habitat Types: <ul style="list-style-type: none"> Rare Ecological Communities include: Maritime Holly Forest, Heathland, Primary

Table 3-1. Conceptual Site Model for MRS 08

Profile Type	Site Characterization
	<p>Dune System, Coastal Dune Woodland. Other types present are evergreen, mixed maritime, and deciduous forests; wetland, dune shrubland, and intertidal marine.</p> <p>Current Potential Ecological Receptors (See Table 6-1 of the RI for threatened and endangered species):</p> <ul style="list-style-type: none"> • Mammals: Red Fox, Raccoon, Virginia Opossum, Eastern Cottontail, Gray Squirrel, Whitetail Deer. • Birds: Over 340 species use the peninsula as foraging and resting habitat during spring and fall migration. The peninsula provides breeding habitat for sensitive species and coastal wintering habitat. • Reptiles/Amphibians: Species include Snapping Turtle, Painted Turtle, Spotted Turtle, Eastern Box Turtle, Eastern Hognose Snake, Northern Brown Snake. • Insects: Approximately 46 species of butterflies and at least 24 species of dragonflies may be present. • Plants: Beach and dune flora. Inland flora includes evergreen and mixed maritime forests; deciduous forests, and a Maritime Holly Forest.
<p>Munitions Release Profile</p>	<p>Munitions Types:</p> <ul style="list-style-type: none"> • Table 1-1 of the 2014 RI lists munitions historically used at Fort Hancock; it is possible that any of these could be present in the MRS. <p>Release Mechanisms:</p> <ul style="list-style-type: none"> • MEC, as UXO or from low order detonations could exist on or under the ground surface from historical proving ground or training operations. The MRS comprises former buffer areas adjacent to several target impact areas, and MEC or MD is likely present as a result of shots missing the targets or shifting sands. • Natural processes such as erosion, wave action or shifting of sand could expose MEC. MC could be present from the release of filler materials at low order detonations or from the corrosion of munitions projectiles (casings). <p>MEC Density:</p> <ul style="list-style-type: none"> • MEC density is expected to be low based on the few MEC/MD finds in adjacent areas to the east, investigated for the 2014 RI. • Munitions debris is expected to be scattered throughout these buffer areas. <p>Associated Munitions Constituents:</p> <ul style="list-style-type: none"> • Explosives, and selected metals (antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, thallium, titanium, vanadium, and zinc). <p>MEC/MD Transport Mechanisms/Migration Routes:</p> <ul style="list-style-type: none"> • Moving a potential item by a person. • Disturbance of MEC/MD through construction activities. • Natural processes such as wave action and beach erosion. <p>Pathway Analysis:</p> <ul style="list-style-type: none"> • MC may be present in the surface and subsurface soil above background concentrations and could have migrated to surface water, sediment, and groundwater. Receptors are present and these pathways are considered potentially complete. • MEC/MD may be present on the surface and in the subsurface; receptors are present and the pathway is considered potentially complete.

3.2 Data Needs and Data Quality Objectives

3.2.1 Data Needs

Data were needed to achieve the site characterization goal of assessing the nature and extent of MEC and MC contamination at MRS 08 and to recommend whether further CERCLA actions are warranted. Data obtained included intrusive investigations to identify location, density, and types of MEC. These data were used to define risk and determine acceptable and unacceptable risk from MEC hazards based on evaluation of site conditions.

3.2.2 Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality and level of data required to support the decision-making processes for a project. The *Data Quality Objectives Process for Hazardous Waste Site Investigations (QA/G-4HW)* (US Environmental Protection Agency, 2000a) provides general, non-mandatory guidance on developing DQOs for environmental data collection operations in support of hazardous waste site investigations. USACE's TPP process (USACE EM 200-1-2) closely mirrors USEPA's 7-step DQO process, and the DQOs for MRS 08 were refined through TPP meetings.

Table 3-2 presents the overall DQOs for the intrusive investigation, the primary means of identifying the nature and extent of MEC contamination. All DQOs were developed and presented during TPP meetings and any comments received from stakeholders were addressed; final versions of all DQOs were outlined in the RI Addendum #3 Work Plan (USACE, 2017b). Visual Sample Plan (VSP), a statistical software package developed by Pacific Northwest National Laboratories, was used to help design the investigation (see Appendix B-2).

All DQOs for MRS 08 were met unless specifically discussed in Section 5.0.

Table 3-2. Data Quality Objectives – Geophysical and Intrusive Investigation	
Data Quality Objective Element	Site-Specific DQO Statement
Project Objective(s) Satisfied	To determine if further actions are required to support the continued use of the site for recreational activities.
Data User Perspective(s)	To obtain data that satisfy compliance, risk, and if needed, remedy requirements. Evaluation of risk will be completed using the risk management methodology developed by USACE to define risk posed by MEC hazards and to provide a tool through which to evaluate remedial actions when an unacceptable risk is present; the method involves the use of four matrices to define acceptable and unacceptable risk from MEC hazards based on evaluation of site conditions.
Contaminant or Characteristic of Interest	To characterize the nature and extent of MEC.

Table 3-2. Data Quality Objectives – Geophysical and Intrusive Investigation	
Data Quality Objective Element	Site-Specific DQO Statement
Media of Interest	MEC
Required Sampling Locations or Areas and Depths	MRS 08, 140 acres, is the required sampling area. Locations should be random, but may include non-random areas (such as existing trails). Depth should include the surface and shallow subsurface to the limit of the approved detector.
Number of Samples Required	<p>Use VSP in Remedial Investigation Mode to design transect placement (random parallel transect sampling). The objective is to design transects with sufficient coverage over the 140 acre MRS 08 such that if no MEC is discovered, there will be a 95% confidence that the MEC density is less than 0.5 MEC/acre. VSP states that a coverage of 5.76 acres is required. A transect width of 3 feet and a spacing of 70 feet across the MRS (approximately 87,000 linear feet) meets the required coverage of 5.76 acres. The required number of samples is that all anomalies along these transects will be excavated.</p> <p>Note that this DQO is applicable to MRS 08 and the required coverage of 5.76 acres is based on a 140-acre site. Intrusive investigation of unpaved recreational trails outside MRS08 was also completed; as the goal was 100% clearance, no minimum coverage for the trails was necessary.</p>
Reference Concentration of Interest or Other Performance Criteria	<p>Performance criteria include documentation of quality control procedures including installation and use of an ITS, detection of blind seeds, and successful completion of repeat transects.</p> <p>Real Time Kinematic Global Positioning System (RTK GPS) will be used to record anomaly locations and transect locations, and the minimum GPS quality for under tree canopy conditions will be <i>autonomous</i>.* In open areas the minimum GPS quality will be <i>float</i>.* The positional accuracy of these states is sufficient to report the anomaly locations. A <i>fixed</i> state is not required because there is no need to return to any precise location.</p> <p>* GPS data quality falls into three categories: <i>autonomous</i>, with an error of approximately 5-10 feet; <i>float</i>, with an error of approximately 2-4 feet; and <i>fixed</i>, with an error of less than 0.5 feet.</p>
Sampling Method	VSP software tool for designing statistically based geophysical and intrusive investigations, followed by excavation of anomalies.
Analytical Method	Not Applicable

The DQOs for soil sampling activities are provided in the RI Addendum #3 Work Plan (USACE, 2017b). Soil sampling for this effort is addressed in Section 4.2.

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4.0 CHARACTERIZATION OF MUNITIONS AND EXPLOSIVES OF CONCERN AND MUNITIONS CONSTITUENTS

This section describes how the RI Addendum #3 field activities were performed. The results of these activities are presented in Section 5.0. All activities were performed in accordance with the RI Addendum #3 Work Plan (USACE, 2017b) or, where still applicable, the original RI Work Plan (USACE, 2010) and addenda to it.

4.1 Munitions and Explosives of Concern Characterization

4.1.1 Field Investigation Approach Overview

“Mag & dig”, the approach used to complete the investigation of MRS 08, is a technique performed using hand-held analog metal detectors to sweep the ground surface to detect anomalies, which are then excavated. This technique was conducted along transects cut through vegetated areas by the UXO dig team, as well as along existing, unpaved recreational trails (within and outside of MRS 08).

As presented in Table 3-2, VSP was used to determine that 5.76 acres of coverage over transects and trails (within MRS 08) was required. This was accomplished using a transect width of 3 feet and a spacing of 70 feet across the MRS, and a trail width of approximately 20 feet (10 feet on either side of the center of the trail). Intrusive investigation of unpaved recreational trails outside MRS08 was also completed, but as the goal was 100% clearance, no minimum coverage (acreage) for the trails was necessary.

UXO technicians used Schonstedt Magnetic Locators to sweep along the trails and transects, immediately digging any anomaly found (by hand, using shovels). Each anomaly was assigned a number by the UXO team leader, and a flag was placed following completion of the excavation. The team leader recorded the depth and type of item found on a dig sheet, and the field geophysicist then recorded the coordinates of each flag using an RTK GPS. In this manner, more than 6 acres were investigated along the transects and trails within MRS 08.

Figure 3 shows MRS 08 and the trails inside and outside of the MRS that were investigated. Note that while many of the trails are outside the MRS 08 boundary, all trails are within the boundaries of other existing and previously investigated MRSs.

4.1.2 General Approach

4.1.2.1 *Equipment*

Geophysical and navigational equipment used to identify locations for intrusive investigation are listed below.

- Schonstedt GA-52 Cx: The GA-52 Cx Magnetic Locator (Schonstedt) is a hand-held gradiometer that detects the magnetic field of a ferromagnetic object. It responds to the difference in the magnetic field between two sensors spaced 0.51 m apart. The instrument provides audio detection signals that peak in frequency when the locator’s tip is held directly over a ferrous object. The Schonstedt was used by qualified UXO personnel as the primary tool of the intrusive investigation and clearance.

- Topcon HiperGa RTK GPS: The Topcon HiperGa model of RTK GPS was used at the site, and controlled with an Allegro CX field computer running Carlson SurvCE software. The base station was set up on survey nails installed by licensed surveyors during previous investigations. The rover was used to capture anomaly locations (flags left in the field by the UXO team) and points along cut transects.
- Trimble GeoX7 Global Positioning System: The GeoX7 is a hand-held global positioning system of sub-meter accuracy. It was used by the UXO team to lay out the VSP-designed transects using waypoints.

4.1.2.2 Geophysical Investigation Process

The MRS 08 investigation was conducted in phases. As the trails did not require vegetation removal, all trails identified for clearance were investigated first, whether inside or outside of MRS 08. The “mag & dig” process was implemented such that four UXO technicians, supervised by a UXO Technician III, cleared 10 feet on both sides of the center of the trail, digging every anomaly detected by the Schonstedts. UXO teams completed all excavations using shovels. Depth to contact, contact type, and other notes were recorded on the dig sheet. Locations of digs were captured by RTK GPS. When material potentially presenting an explosive hazard (MPPEH) was discovered, the surrounding area within 10 feet of the item (whether on a trail or not) was also swept with Schonstedts. Trail clearance began on 24 October and was complete on 6 November 2017.

Due to several storms (notably Hurricane Sandy in 2012) and general beach erosion and deposition, the condition of some trails outside of MRS 08 were different than indicated on the Work Plan figures, which are derived from Geographic Information System data provided by NPS in 2010. That is, some trails were narrower, some wider, some were discovered to be paved, and some short spurs were overgrown and not found to be actual trails. The figures in this report show the locations and conditions of the trails that were actually cleared by ERT during the MRS 08 investigation. No unpaved trails that exist within current MRSs were left uninvestigated.

For the next phase, transects were cut through the vegetated areas and flagged by the UXO team. To install the planned transects, Trimble GeoX7 GPS units with waypoints every 35 feet (or less) along each transect were used by the UXO teams as a guide for transect placement in accordance with the Work Plan figures. However, the UXO team was escorted by NPS biologists to ensure that no sensitive plants were damaged, and therefore, the actual transects generally meandered around vegetation that was not allowed to be cut. Additionally, some planned transects ended up in areas of standing water where excavations of anomalies was not possible. Locations of cut transects were captured by RTK GPS. Transect cutting began 6 November and was complete on 16 November 2017. The actual cut transects are shown in Figure 4.

The next phase involved the “mag & dig” of all cut transects by the UXO team. The locations of all digs were captured by RTK GPS. Digging on transects began on 16 November and was completed on 6 December 2017. Section 5.1 describes the findings as well as resolution of potential data gaps caused by transects planned for areas that were actually locations of standing water.

Daily Quality Control Reports were completed by the UXO Quality Control Specialist (UXOQCS) and the project Senior UXO Supervisor (SUXOS) reviewed them; these are provided in Appendix C-1. Dig sheets are provided in Appendix C-2.

Table 4-1 summarizes the transect and trail dimensions and the total geophysical coverage for the investigation. Note that while the dimensions of the trails outside the MRS are included, this coverage was not necessary to satisfy the DQO developed for MRS 08 (5.76 acres of coverage).

Table 4-1: Transect and Trail Summary			
Transect/Trail	Length (ft)	Width (ft)	Geophysical Coverage (acres)
Northern Transects	6,771	3	0.47
Central Transects	33,692	3	2.32
Southern Transects	2,294	3	1.15
Trails within MRS 08	4,613	20	2.11
Total MRS 08	47,370		6.05
Trails outside MRS 08	29,588	20	13.58

4.1.3 Geophysical Quality Control

4.1.3.1 *Geophysical System Verification*

Quality control for the investigation of MRS 08 was based on *Geophysical System Verification (GSV): A Physics-Based Alternative to Geophysical Prove-Outs for Munitions Response* (Environmental Security Technology Certification Program [ESTCP], 2009). GSV is composed of daily surveys of an Instrument Test Strip (ITS) and the use of a blind seed program, where metallic pipes (“seeds”) are placed in the subsurface within the MRS at locations unknown to the data collectors (the UXO team). The objective of the ITS is to confirm the geophysical survey instrument selection, verify that the targets of interest will be detectable to the depth of interest, validate predetermined anomaly selection methods, and provide a daily verification of proper operation of the geophysical sensor.

The ITS was installed in the Nike Missile Radar Site (the same location as the ITS constructed for the RI Addendum #2 investigation) on 23 October 2017. The ITS installation was observed and approved by the CENAB representative on site. The initial ITS configuration is shown in Appendix B-1. The UXO team passed all Schonstedts instruments over the ITS daily to ensure proper functionality. The ITS was reconfigured on 31 October 2017, to demonstrate that the UXO team was not just memorizing the seed locations.

The blind seed program was implemented in the production survey areas. The seeds were used to verify that the DQOs concerning geolocation and sensor performance requirements were met. Per the Work Plan, the number of blind seeds installed was sufficient such that the UXO teams would

encounter at least one seed on average per day during mag & dig operations; this resulted in 17 seeds being installed. Small (1 inch diameter) or medium (2 inch diameter) industry standard objects were used as blind seeds. Seventeen blind seeds were installed (buried), as described in Appendix B-1. Figure B-1-1 of this appendix indicates the five lots for the blind seed program and how one seed per operator per lot criterion was met. With the exception of one blind seed, all seeds were detected and excavated by the dig teams. One seed could not be investigated because much of the transect was under water during high tide and a large amount of surficial debris had been deposited following burial.

4.1.3.2 Navigational Accuracy

RTK GPS was the primary means of navigation site wide. The base station was set up daily on one of several points including on survey monuments on top of Battery Gunnison, at the “90 degree turn” on Atlantic Drive, or in parking lot C. Another frequently used point was atop the 1938 magazine on Fishing Beach Road. The rover was always checked on a nearby point to ensure the coordinates were correct and that the signal was “fixed” at the highest level of accuracy. All points were installed or verified by a New Jersey licensed surveyor during previous investigations.

Fixed GPS data were not required at all times, as explained in the DQO section of the Work Plan. “Float” (2-4 ft error) and occasionally “autonomous” (5-10 ft error) GPS data were usable because there was no need to return to an anomaly after the GPS data were collected (i.e., all anomalies were excavated upon detection).

Handheld Geo X7 GPS units were used to navigate along transects. Because the exact position of the transects was determined more by existing vegetation that was prohibited from being removed than by evenly-spaced planned transects, the GPS quality did not need to be better than sub-meter accuracy.

4.1.4 Geophysical Data Analysis

The “mag & dig” approach uses an analog metal detector and does not digitally record data. For that reason, typically all anomalies are excavated under this approach and detailed analysis of individual anomalies is not warranted. However, locational analysis and derivation of anomaly densities is useful to characterize the site with regard to MEC and MD.

Excavation or dig locations as captured by RTK GPS were tracked throughout fieldwork and compiled onto a master dig sheet. As transects were cut, the locations of the transects were also captured by RTK GPS. This information was analyzed in VSP with the transect data and trail data being converted to “course over ground” files and imported to a VSP file containing the MRS 08 boundary. The following VSP analysis menu was used:

Sampling Goals > Analyze Spatial Anomaly Data (UXO) > Geostatistical mapping and delineation of anomaly densities

Transect data were set at 3 feet width and trail data were set at 20 feet width to allow calculation of coverage of the MRS. Importing of the locations of anomalies or MEC/MD locations allowed estimation of anomaly density or MEC/MD (MEC+MD) density within MRS 08. VSP was used to contour anomaly and MEC+MD density using a window size of 140 feet (twice the nominal transect spacing of 70 feet). Data results were exported and contours delineating areas of various MEC+MD densities were examined.

These results are discussed in Section 5.2.

4.1.5 Quality Control Process

The primary definable features of work (DFW) included transect layout/brush removal, trail/transect clearance, and processing of excavated items. Quality control was maintained at an acceptable level utilizing the preparatory, initial, and follow-up inspection process. In some cases the three phases may not have been formal inspections, depending on the DFW, but quality control was maintained throughout. In addition, it is critical to note that all requirements of the final approved Work Plan were met.

DFW 1 - Transect layout/brush removal

Preparatory phase included approved Work Plan, pre-operational briefings, and installation of ITS and blind seeds on the trails prior to clearance by the QC geophysicist and UXOSO-QC, training of the field geophysicist in the use of RTK GPS to capture anomaly locations, training of staff by the QC geophysicist on the use of hand-held GPS units and tolerance for deviations from proposed transects, and training by NPS personnel on cutting procedures that minimize damage to sensitive plant species in the area of investigation. The Topcon HiperGA RTK GPS was used to capture locations of seeds in the ITS and blind seeds throughout the site. The Trimble GeoX7 hand-held GPS was used to lay out transects in wooded areas. Initial phase included NPS personnel escorted UXO teams performing transect cutting until UXO teams became familiar with species that were not allowed to be damaged. The QC geophysicist refined procedures for capture of transect locations with RTK GPS. Follow-up phase included obtaining NPS verbal approval that they were compliant with desired procedures.

DFW 2: Trail/Transect Clearance

Preparatory phase included approved Work Plan, pre-operational briefings, and training of staff by the QC geophysicist on the width of clearance along cut transects, including installation of blind seeds on the trails prior to clearance by the field geophysicist and UXOSO-QC. Initial phase included notation on the dig sheets to ensure correct transect number and anomaly designation. Follow-up phase included ensuring that as trails were cleared by the dig teams, UXOSO-QC followed behind and checked trails for anomalies that might be missed by the dig teams.

DFW 3: Processing of Excavated Items

Preparatory phase included approved Work Plan, pre-operational briefings, training of staff in following Work Plan MEC SOPs. Initial phase included performing a 100% inspection of all recovered items to determine if free of explosives and ensuring that inspected MDAS is secured in a closed, labeled and sealed container. Follow-up phase included performing a 100% re-inspection of all recovered items to determine if free of explosives, and ensuring a Requisition and Turn-in Document, DD Form 1348-1A was completed for all MDAS prior to final disposition.

There were no nonconformances requiring a Non-Conformance Report.

4.2 Munitions Constituents Characterization

Breached or damaged munitions may leach MC and pose a risk, and while soil sampling was conducted as part of the 2014 RI, the MRS 08 area was excluded at that time (with the exception

of sediment and surface water sampling of Nike Pond) and potential areas of breached munitions could not be investigated. Therefore, in accordance with the soil sampling DQO contained in the RI Addendum #3 Work Plan, soil samples were planned for collection in areas where there was visible evidence of energetic material, or in areas of significant MD, where at least 50% of the munition could be identified by UXO Technicians.

However, during the RI Addendum #3 investigation, no evidence of energetics or significantly breached munitions was found, and therefore no soil samples were collected. Section 5.6 describes relevant results of MC findings of previous investigations within MRS 08, or for areas adjacent to MRS 08.

5.0 REMEDIAL INVESTIGATION RESULTS

Section 5.0 presents the results of the RI Addendum #3 field activities. Section 5.1 addresses the MEC/MD intrusive investigation findings and 5.2 provides analysis of those findings. Sections 5.3 and 5.4 discuss Munitions Response Site Prioritization Protocol (MRSP) and MEC risk ratings, respectively. Section 5.5 discusses MRS footprint reduction and Section 5.6 discusses MC characterization of the MRS. Updates to the CSM are discussed in Section 5.7 and a discussion of uncertainties associated with the findings is presented in Section 5.8.

5.1 Intrusive Investigation Findings

5.1.1 MRS 08

A total of 697 anomalies were intrusively investigated within MRS 08, along unpaved trails and along cut transects. All anomalies were discovered by the “mag & dig” process using Schonstedt magnetometers as described in Section 4.0. The intrusive investigation findings are summarized in Table 5-1, and include descriptions of all MEC and MD findings. Figures 5, 6, and 7 show the locations of all MEC and MD findings in the north, central, and south portions of the MRS, respectively. The field dig sheets showing specific findings at each anomaly, are provided in Appendix C-2.

Table 5-1: Summary of Findings				
Area	NMRD	MD	MEC	MEC Description
Transects in MRS 08	517	70	4	<ul style="list-style-type: none"> MEC: 57mm projectile, M303 HE with fuze (anomaly 112-01), BIP 11-30-17. MEC: 57mm projectile, M86 APHE (anomaly 117-14), BIP 11-30-17. MEC: 3-inch Mk 3 Model 7 projectile with tracer (anomaly 140-5), BIP 12-7-17. MEC: 4-inch MK10 APHE projectile, with base plug (anomaly 5-01), BIP 12-7-17.
Trails in MRS 08	104	1	1	<ul style="list-style-type: none"> MEC: 57mm Mk1 APHE projectile, fuzed and fired (anomaly 95), BIP 10-26-17.
Total MRS 08	621	71	5	
Trails outside MRS 08	543	17	0	<ul style="list-style-type: none"> None

Most of the anomalies were non-munitions related debris (NMRD). However, MD, primarily present as fragments of munitions, was somewhat common (71 MD items found) in MRS 08. The five MEC items described in Table 5-1 all had energetics and were blown in place (BIP). Note that the items were not breached and no energetics were visible prior to detonation, and thus no

soil samples were collected associated with these items. The three MPPEH items were explosively vented but contained no energetics and were considered to be MD. Additional MD items of interest included an expended Mk 2 practice grenade (anomaly 707), and a 37mm slug (anomaly 783) both found in transects within the southern portion of the MRS.

All anomalies were completely dug, clearing the hole to below the audible Schonstedt signal, and no excavations indicative of burial pits or discarded military munitions were encountered.

All MEC items and significant MD items, as well as miscellaneous field activities, are documented in the Appendix G photographic log.

Eight total items were initially considered MPPEH and were demilitarized in the field. Through this process it was determined that only five of the items were MEC (Table 5-1). These items were then secured as material documented as safe (MDAS). Some recovered archaeological artifacts, including MDAS items deemed to be archaeologically significant, were provided to NPS archaeological professionals under Form 1348 documentation. NMRD was either removed or left in place. Disposition documentation (1348 forms) is contained in Appendix C-3.

5.1.2 Trails Outside of MRS 08

For the unpaved trails outside of MRS 08, the goal was 100% clearance, and all detected anomalies (560) were excavated. This included 543 NMRD items and 17 MD items. No MEC was found outside of MRS 08. Two MD items initially considered MPPEH were found close to one another on the trail near parking Lot J, far north of the MRS 08 boundary (these items actually fall within the footprint of existing MRS 03). Another notable MD item was a 6-inch diameter cannonball (anomaly 651), found near the Sandy Hook Visitor Center. The locations of all findings are recorded on the dig sheets.

All anomalies investigated are shown in Appendix B-2 (Maps 1 through 6).

5.1.3 Potential Data Gaps

Transects planned for areas that were found to be locations of standing water could have resulted in data gaps, affecting the DQO required 5.76 acres of coverage (Table 3-1). A conference call between USACE and ERT took place on 1 December, 2017, to discuss the situation (see Appendix B-2, Memo for Record documentation). It was discovered that the original coverage calculation did not include the acreage of the much wider trails. When that acreage was properly factored in, ERT was able to estimate that approximately 5.5 to 6.0 acres of coverage would be obtained without having to cut transects through standing water areas or having to compensate by cutting additional transects elsewhere.

While the Table 3-1 DQO indicates 87,000 linear feet of transect would be required, and Table 4-1 indicates only 42,370 linear feet of transect was actually surveyed, the acreage of the much wider trails (20 feet vs 3 foot wide transects) more than compensated for transects not surveyed due to standing water conditions. At the completion of the investigation, a total of 6.05 acres of coverage had been obtained in MRS 08, as shown in Table 4-1, and thus the DQO was achieved.

Further, the finding of more than 60 MD items and 6 MPPEH items (at the time of the conference call) indicated that a higher than expected density of targets of interest would be reported even at that current level of coverage (acreage), and consequently it was not critical to investigate every planned transect shown in the work plan. That is, enough munitions related items had been found to effectively reduce the amount of acreage needed to satisfy the DQO and make RI-level

conclusions about the site. On the conference call, USACE agreed, and thus selected transects in logistically challenging areas (swampy standing water) were not completed. These areas are indicated as either “wetlands” or “swampy/standing water” on Figure 4.

5.2 Analysis of MEC Intrusive Investigation Findings

Table 4-1 shows that 6.05 acres were covered within MRS 08 (3.94 acres on transects and 2.11 acres on unpaved trails). Using this coverage and the number of MEC and MD items found throughout the MRS as shown in Table 5-1, the estimated average density and density at 95% confidence are shown in Table 5-2. The 95% confidence value provides an upper confidence bound on the MEC density estimate for the MRS.

Table 5-2: MEC/MD Densities for MRS 08			
Anomaly Type	Number of Items	Average density (Items/acre)	Density at 95% confidence (Items/acre)
MEC	5	0.82	1.72
MEC+MD	76	12.6	15.2

5.2.1 Development of Concentrated Munitions Use Areas

As described in Section 4.1.4, the spatial distribution of MEC and MD within MRS 08 was analyzed using VSP to contour MEC+MD density. Using 10 MEC+MD/acre as the site background, areas of high MEC+MD density (>10/acre) were contoured. This was a conservative (low) value that captured all the MEC+MD findings and was consistent with previous investigations for the site.

A figure showing the contoured results (>10 MEC+MD/acre) along with the MEC and MD locations is provided as Figure 1 of Appendix B-2. The contours show multiple small discontinuous areas which can be grouped geographically into four larger high-density areas. These four areas have been named MRS 08A, 08B, 08C, and 08D (from north to south), and are presented with more detail on Figure 8.

Each of these four areas constitutes a Concentrated Munitions Use Area (CMUA). CMUAs are areas within MRSs where there is a high likelihood of finding MEC and that have a high amount of MD within them as a result of historical munitions use and fragmentation (EM 200-1-15, 2015). CMUAs are most commonly target areas on ranges, and for MRS 08, these areas align with buffer zones of the historical target impact areas. The CMUAs are further numbered to be identified with the areas of the MRS such that MRS 08A is CMUA-1, MRS 08B is CMUA-2, MRS 08C is CMUA-3 and MRS 08D is CMUA-4 (Figure 8).

Note that the configuration of CMUA-2 involved inclusion of approximately 0.7 acres along a trail (northwest tip of CMUA-2) outside of any previous MRS boundary, and also includes a portion of trail outside MRS 08 (but within MRS 07) in the east-central portion where several MD items were present.

The CMUAs were used as the basis of MRS 08 footprint reduction, presented in Section 5.5.

5.3 Munitions Response Site Prioritization Protocol

DoD developed the MRSPP as the methodology for prioritizing sites known or suspected to contain MEC or MC for response actions. The MRSPP consists of three modules to evaluate the unique characteristics of each hazard type at an MRS:

- a. The Explosive Hazard Evaluation (EHE) Module addresses explosive hazards posed by MEC and MC in high enough concentrations to pose an explosive hazard;
- b. The Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE) Module addresses hazards associated with the effects of CWM; and
- c. The Health Hazard Evaluation (HHE) Module addresses chronic health and environmental hazards posed by MC and incidental non-munitions-related contaminants.

Each of the modules is assigned a rating from “G” (lowest) to “A” (highest), with alternative ratings of Evaluation Pending (insufficient information available), No Known or Suspected Hazard (NKSH), or No Longer Required (cleanup is complete). The highest of the three module ratings is used to assign an MRS priority ranking, ranging from 1 to 8, with Priority 1 having the highest relative priority and Priority 8 having the lowest.

The MRSPP evaluations for the reduced 71.0 acre MRS 08 (see Section 5.5) and the new MRS 10 are presented in Appendix D and summarized below.

- **MRS 08, NPS Excluded Area:** The overall MRS priority ranking is 3, based on an EHE module rating of B. The explosive hazard conditions are based on MEC finds including: 4-inch Mk10 APHE projectile, 57mm Mk1 APHE projectile, 57mm M86 and M303 rounds, and a 3-inch Mk3 projectile. Site accessibility is partial based on natural dense vegetation and population density is high based on several occupied buildings and land uses in the vicinity. The CHE module is NKSH, based on the lack of CWM, and the HHE module is also rated NKSH, based on human health or ecological risk assessments indicating no risk.
- **MRS 10, Eastern Shoreline:** The MRS priority is 3, based on an EHE module rating of B. The EHE rating is based primarily on historical MEC finds resulting from munitions washing onto the shore following storm events (EOD, 2015). The CHE and HHE modules are both NKSH, based on the lack of CWM and the lack of MC at concentrations posing an unacceptable risk to human and ecological receptors.

5.4 MEC Risk Assessment Matrices

MEC risk was evaluated using the current USACE risk assessment methodology to define risk posed by MEC hazards. The method, provided in the *Decision Logic to Assess Risks Associated with Explosive Hazards, and to Develop Remedial Action Objectives for Munitions Response Sites* (USACE, 2017c), involves the use of four matrices to define acceptable and unacceptable risk from MEC hazards based on the likelihood of an encounter, the severity of incident, and the sensitivity of interaction based on expected land use activities. This method is ultimately used to establish remedial action objectives and to help evaluate potential remedial action alternatives.

For MRS 08, each of the four CMUAs, as described in Section 5.2.1 and shown on Figure 8, were evaluated separately. The detail of the matrix analysis for existing or baseline conditions for the MRS 08 CMUAs is presented in Appendix E and summarized below.

- **Matrix 1 – Likelihood of Encounter.** This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site. In MRS 08A (CMUA-1), one MEC item (4 inch MK10 APHE projectile) and 14 MD items were found. In MRS 08B (CMUA-2), four MEC items (57mm Mk1 APHE projectile, 57mm round M303 HE, 57mm round M86 APHE, and 3 inch Mk 3 Model 7 projectile) and 45 MD items were found. Both areas are characterized by MEC detected in the subsurface. In MRS 08C (CMUA-3) and MRS 08D (CMUA-4), no MEC was discovered, but its presence is suspected based on historical munitions use in the area. All areas, other than the unpaved trails, are moderately inaccessible due to dense vegetation; the trails have been cleared of UXO. However, visitors (e.g., hikers) could access the MRS by venturing off the trails. Authorized personnel (e.g., NPS biologists, authorized contractors) can access any part of the MRS. The frequency of the site activities, in combination with the accessibility conditions, supports the selection of “Intermittent” for all four CMUAs. However, the amount of MEC results in a ‘likelihood of encounter’ rating of **“Occasional”** for CMUA-1 and CMUA-2, but **“Unlikely”** for CMUA-3 and CMUA-4.
- **Matrix 2 – Severity of Incident.** This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation. Based on the identification of various projectiles containing high explosives during the RI Addendum #3 effort, a “Catastrophic” rating is appropriate as the MEC item could result in one or more deaths or permanent disability. For an “Occasional” likelihood of encounter and a “Catastrophic” severity of incident, Matrix 2 results in a **“B”** rating for CMUA-1 and CMUA-2. However, no MEC was detected in CMUA-3 or CMUA-4, and a rating of “Improbable” is appropriate. Therefore, for an “unlikely” likelihood of encounter and a “Improbable” severity of incident, Matrix 2 results in a **“D”** rating for CMUA-3 and CMUA-4.
- **Matrix 3 – Likelihood of Detonation.** This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users. There is a “Modest” likelihood to impart energy onto an item for all CMUAs. This area is undeveloped and mostly forested. It is unlikely that this area will be developed in the future and intrusive activities would likely be limited to hand tools. Sensitivity is rated as “Moderate” for CMUA-1 and CMUA-2 based on the RI Addendum #3 findings of projectiles containing high explosives. The combination of these two categories results in a Matrix 3 rating of **“2”** for CMUA-1 and CMUA-2. Sensitivity is rated as “Not Sensitive” for CMUA-3 and CMUA-4 based on the finding of MD only (no MEC). The combination of these two categories results in a Matrix 3 rating of **“3”** for CMUA-3 and CMUA-4.
- **Matrix 4 – Acceptable and Unacceptable Site Conditions.** This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions. The combined ratings of “B” and “2” indicate **“Unacceptable”** for CMUA-1 and CMUA-2 for existing or baseline conditions. The combined ratings of “D” and “3” indicate **“Acceptable”** for CMUA-3 and CMUA-4 for existing or baseline conditions.

Unacceptable baseline site conditions typically proceed to the next phase of the CERCLA response process, where some type of remedial action for MEC is required, while Acceptable baseline conditions do not warrant further action with regard to MEC.

Table 5-3 summarizes the above discussion and the completed risk matrices for MRS 08 that are presented in Appendix E.

Table 5-3: Summary of Risk Assessment Matrix Analysis				
MRS 08 CMUA	Matrix 1: Likelihood of Encounter	Matrix 2: Severity of Incident	Matrix 3: Likelihood of Detonation	Matrix 4: Acceptable and Unacceptable Site Conditions
MRS 08A CMUA-1	Occasional (Confirmed MEC, Intermittent Access)	B (Catastrophic Severity, Occasional Likelihood)	2 (Moderate Sensitivity, Modest Likelihood)	Unacceptable
MRS 08B CMUA-2	Occasional (Confirmed MEC, Intermittent Access)	B (Catastrophic Severity, Occasional Likelihood)	2 (Moderate Sensitivity, Modest Likelihood)	Unacceptable
MRS 08C CMUA-3	Unlikely (Historical Evidence of MEC, Intermittent Access)	D (Improbable Severity, Unlikely Likelihood)	3 (Not Sensitive, Modest Likelihood)	Acceptable
MRS 08D CMUA-4	Unlikely (Historical Evidence of MEC, Intermittent Access)	D (Improbable Severity, Unlikely Likelihood)	3 (Not Sensitive, Modest Likelihood)	Acceptable

As a means of standardizing MEC risk evaluations across the multiple RI efforts, this Addendum also includes updated MEC risk evaluations for all previously existing Fort Hancock MRSs using the current risk management methodology (USACE, 2017c). The data for these previous RI efforts, while pre-dating the matrix methodology, were of sufficient quality to meet the respective DQOs and are appropriate to input into the matrices. The detail of the risk matrix analysis for these MRSs is presented separately in Appendix F. Note, Appendix F includes new MRS 10 as well as the previously existing MRSs.

5.5 MRS 08 Footprint Reduction

The RI Addendum #3 effort provided additional information about the locations and potential locations of MEC and MD within MRS 08, and areas known or suspected to contain MEC or MD are now identified as smaller CMUAs. Areas outside of the identified CMUAs contained no MEC or MD. Based on the conclusions of the MEC risk assessment matrices in Table 5-3 above, MRS 08C (CMUA-3) and MRS 08D (CMUA-4) represent acceptable site conditions. Consequently, the original 140 acre area of MRS 08 has been reduced to include only MRS 08A (CMUA-1) and MRS 08B (CMUA-2), areas that may pose an unacceptable MEC risk.

The new acreage for the revised MRS 08 is 71.0 acres. Figure 9 shows this acreage as cross hatched areas. In order to account for FUDS Management Information System (FUDSMIS) acreages properly, the 69 acres removed from MRS 08 will become part of MRS 07 (Remaining Land). However, the acreage of MRS 07 also changed because new MRS 10 was created from MRS 07 shoreline acreage. Consequently, MRS 07 is now 862 acres, and new MRS 10, Eastern

Shoreline, is 179 acres. Figure 10 presents all the Fort Hancock FUDS MRSs, showing the revised MRS 08 and MRS 07 footprints, the new MRS 10 footprint, and the acreage changes. These changes will be formalized in a second Revised INPR.

5.6 Munitions Constituents Findings

While soil sampling was conducted as part of the 2014 RI, the MRS 08 area was excluded from investigation at that time. Therefore, in accordance with the soil sampling DQO contained in the RI Addendum #3 Work Plan, soil samples were planned for collection in areas where there was visible evidence of energetic material, or in areas of significant MD, where at least 50% of the munition could be identified by UXO Technicians. However, during the RI Addendum #3 investigation, no evidence of energetics or significantly breached munitions was found, and therefore no soil samples were collected.

Although no soil sampling was conducted, previous MC sampling relevant to characterizing MRS 08 has been performed. The sediments and surface water of Nike Pond, the only permanent body of surface water within MRS 08, were previously sampled for the 2014 RI; no MC exceedances were found and the human health and ecological risk assessments determined that no unacceptable risk was posed by the surface water or sediment of Nike Pond (Section 6.2.5 of the 2014 RI Report).

One groundwater well (GW2E) is geographically within MRS 08, and it (and all other wells) was sampled for the 2014 RI (where all sampled wells were used to represent groundwater conditions across all MRSs). Arsenic concentrations in monitoring well GW2E were found at levels higher than the screening level, but the 2014 RI human health and ecological risk assessments concluded that the level of arsenic in GW2E was consistent with NJ background concentrations (Section 6.2.5 of the 2014 RI Report).

With regard to soil, MC sampling relevant to characterizing MRS 08 has also been conducted previously. For example, in MRS 06 (adjacent to and between the CMUA-2 and CMUA-3 areas of MRS 08), five surface soil samples were collected during the 2007 SI, and 21 surface soil samples were collected during the 2014 RI. No explosives were detected (with limits of detection less than the project screening limits, as indicated in the approved QAPP), and the human health and ecological risk assessments determined that all metals were consistent with background concentrations (Section 6.2.5 of the 2014 RI Report).

Based on these findings, it is concluded that there is no unacceptable MC risk present at MRS 08.

5.7 Updated Conceptual Site Model

Section 3.0 presented the initial preliminary CSM for MRS 08. The RI Addendum #3 investigation indicated areas of MRS 08 that pose ‘unacceptable’ risk due to MEC hazards, changing the preliminary CSM. The updated CSM includes the munition types actually found, and the MEC density estimated based on the findings, as presented in this Section 5.0. Based on this investigation, MEC depths ranged from 2 to 10 inches (all MEC was found in the subsurface). The depth of MD items ranged from the surface to 24 inches, with 64 of the 71 MD items at less than 12 inches in depth.

5.8 Uncertainty

There is some uncertainty in the detection of MEC or MD due to the limitations of the geophysical

detectors that were required for this effort. The Schonstedt GA-52-CX can detect ferrous objects to various depths depending on size. This instrument is analog rather than digital but its detection capability is similar to some digital meters such as the G-858 Gradiometer. For example, a 37 millimeter (mm) round can be detected by the G-858 at a depth of approximately 0.4 meters or less, or a 155mm round can be detected at a depth of approximately 1.7 meters or less, meaning that small items at depth are more likely to be left in the ground (this would be expected for Schonstedts as well as the G-858).

There is uncertainty in the detection capability due to the transect spacing design. The transects were designed to achieve an amount of coverage such that if no MEC were discovered, there would be a 95% confidence that the MEC density is less than 0.5 MEC/acre. Ultimately the coverage goal of 5.76 acres as shown in Table 3-1 was exceeded, but only 4.3% of the site was investigated, and MEC or MD is likely present between the transects.

There is uncertainty in the results of MEC or MD density as calculated with VSP software. The calculated average density and density at 95% confidence (upper bound) are inversely and exponentially related to the area investigated. Coverage was good and fairly uniform relative to other areas investigated during the 2014 RI, and so a higher confidence in results was obtained, but it is possible that the areas sampled are not representative of the level of MEC or MD contamination present at the site.

6.0 SUMMARY AND CONCLUSIONS

6.1 Summary

This section summarizes the key findings from Section 5.0.

6.1.1 Nature and Extent of Contamination

6.1.1.1 MEC/MD

For RI Addendum #3, a comprehensive, statistically based intrusive investigation of MRS 08 and unpaved trails outside of MRS 08 was conducted using “mag & dig” methodology to investigate approximately 77,000 linear feet of transects/trails and excavate approximately 1,300 anomalies.

A total of eight MPPEH items were found on the surface and in the subsurface of MRS 08 and the trails outside of MRS 08. Five of the MPPEH items were ultimately classified as MEC, and three were considered MD following processing. A total of 88 MD items were found on the surface and in the subsurface of MRS 08 and the hiking trails. Table 6-1 summarizes the investigation findings, which are graphically displayed on Figures 5, 6, and 7.

Table 6-1: Investigation Findings			
Area	NMRD	MD	MEC
Transects in MRS 08	517	70	4
Trails in MRS 08	104	1	1
Total MRS 08	621	71	5
Trails outside MRS 08	543	17	0
Project Total	1,164	88	5

The spatial distribution of MEC and MD within MRS 08 was analyzed and areas of high MEC+MD density (>10/acre) were contoured. Four high-density areas were defined (MRS 08A, 08B, 08C, and 08D), with each constituting a CMUA. These CMUAs align with buffer zones of the historical target impact areas (Figure 8).

The methodology for prioritizing sites known or suspected to contain MEC or MC for response actions, the MRSP, was completed for MRS 08. The overall MRS priority ranking is 3, with an EHE module rating of B, based primarily on confirmed MEC in the subsurface of the MRS. An MRSP was also completed for new MRS 10, Eastern Shoreline. The overall MRS priority ranking is 3, with an EHE module rating of B, based primarily on historical MEC finds resulting from munitions washing onto the shore following storm events (EOD, 2015).

MEC risk was evaluated for each of the four CMUAs using the current USACE risk assessment methodology (USACE, 2017c) to define risk posed by MEC hazards. The method involves the use of four matrices to define acceptable and unacceptable risk from MEC hazards based on the

likelihood of an encounter, the severity of incident, and the sensitivity of interaction based on expected land use activities. MRS 08A (CMUA-1) and MRS 08B (CMUA-2) were assessed to be areas that may pose an unacceptable MEC risk, while MRS 08C (CMUA-3) and MRS 08D (CMUA-4) were assessed to represent acceptable site conditions.

Footprint reduction of the MRS was conducted based on the MEC risk conclusions. Areas outside of the identified CMUAs contained no MEC or MD and present no MEC risk, and CMUA-3 and CMUA-4 were assessed to represent acceptable site conditions. Consequently, the original 140 acre area of MRS 08 has been reduced to include only CMUA-1 and CMUA-2, areas that may pose an unacceptable MEC risk. The new acreage for the revised MRS 08 is 71.0 acres.

The reduced MRS 08 acreage was added to MRS 07, which was subsequently reduced in acreage to create new MRS 10. Consequently, MRS 07 is now 862 acres, and new MRS 10, Eastern Shoreline, is 179 acres. Figure 10 presents all the Fort Hancock FUDS MRSs, showing the revised MRS 08 and MRS 07 footprints, the new MRS 10 footprint, and the acreage changes

In addition to MRS 08, MEC risk evaluations for previously existing Fort Hancock MRSs were standardized across the multiple RI efforts, using the current risk management methodology (USACE, 2017c). Table 6-3 summarizes this analysis showing areas of acceptable and unacceptable MEC risk. The detail of the risk matrix analysis for these MRSs is presented separately in Appendix F.

6.1.1.2 MC

Soil sampling within MRS 08 was excluded from investigation during the 2014 RI. Therefore, for RI Addendum #3, soil samples were planned for collection where there was visible evidence of energetic material, or in areas of significant MD, where at least 50% of the munition could be identified by UXO Technicians (in accordance with the approved RI Addendum #3 Work Plan DQO). No evidence of energetics or significantly breached munitions was found during the investigation, and therefore no soil samples were collected.

However, previous MC characterization of MRS 08 has been performed. The sediments and surface water of Nike Pond (within MRS 08) were previously sampled for the 2014 RI. Groundwater was also sampled for the 2014 RI (all sampled wells were used to represent groundwater conditions across all MRSs). MC soil sampling relevant to characterizing MRS 08 was conducted within MRS 06 (adjacent to and between the CMUA-2 and CMUA-3 areas of MRS 08), including five surface soil samples collected during the 2007 SI and 21 surface soil samples collected during the 2014 RI. The human health and ecological risk assessments, contained in the 2014 RI Report, concluded that no unacceptable MC risk was posed by site media. Therefore, it is concluded that there is no unacceptable MC risk present at MRS 08.

6.2 Conclusions

Nature and extent of MEC and MC has been characterized for MRS 08. The original MRS 08 footprint has been reduced from 140 to 71 acres based on identified CMUAs posing unacceptable MEC risk and areas posing no unacceptable MEC risk. No unacceptable MC risk to human health or ecological receptors is present within MRS 08. New MRS 10 has been developed to address munitions that have historically been found on the beaches after storm events.

Table 6-2 presents the conclusions summarizing areas of unacceptable and acceptable MEC risk at MRS 08, and Table 6-3 summarizes the MEC risk conclusions applying the current USACE risk

management methodology to the previously existing Fort Hancock MRSs. The risk matrices are presented in Appendices E and F, respectively.

Table 6-2: MRS 08 Conclusions					
MRS	Area	Acreage	CMUA	MEC Risk	Included in Revised MRS 08 Boundary
MRS 08, NPS Excluded Area	MRS 08A	11.8	CMUA-1	Unacceptable	Yes
	MRS 08B	59.2	CMUA-2	Unacceptable	Yes
	MRS 08C	14.6	CMUA-3	Acceptable	No
	MRS 08D	3.8	CMUA-4	Acceptable	No
	Areas Outside of CMUAs	NA	NA	Acceptable	No

Table 6-3: MEC Risk Conclusions for all other MRSs				
MRS	Area	Acreage	CMUA	MEC Risk
MRS 03, Northern Portion Proving Ground	MRS 03	30.2	Yes	Unacceptable
MRS 05, Southern Portion Proving Ground	MRS 05A	1.5	No	Acceptable
	MRS 05C	0.9	No	Acceptable
	MRS 05D	1.0	No	Acceptable
	MRS 05F	3.9	No	Acceptable
	MRS 05B	39.0	Yes	Unacceptable
	MRS 05E	5.1	Yes	Unacceptable
	MRS 05G	2.1	No	Unacceptable
MRS 06, Livens Discovery Area	MRS 06	5.0	Yes	Unacceptable
MRS 07, Remaining Land	MRS 07	862	No	Acceptable
MRS 10, Eastern Shoreline	MRS 10	179	No	Unacceptable

Unacceptable risk conditions typically require proceeding to the next phase of the CERCLA response process. Therefore, it is recommended that a Feasibility Study be conducted to address those MRSs determined to pose unacceptable explosive risks. Subsequently, one Proposed Plan (PP) and Decision Document (DD) will be prepared to address all MRSs, i.e., those MRSs posing unacceptable explosive risks, and noting those MRSs posing no unacceptable explosive risks, therefore requiring no action.

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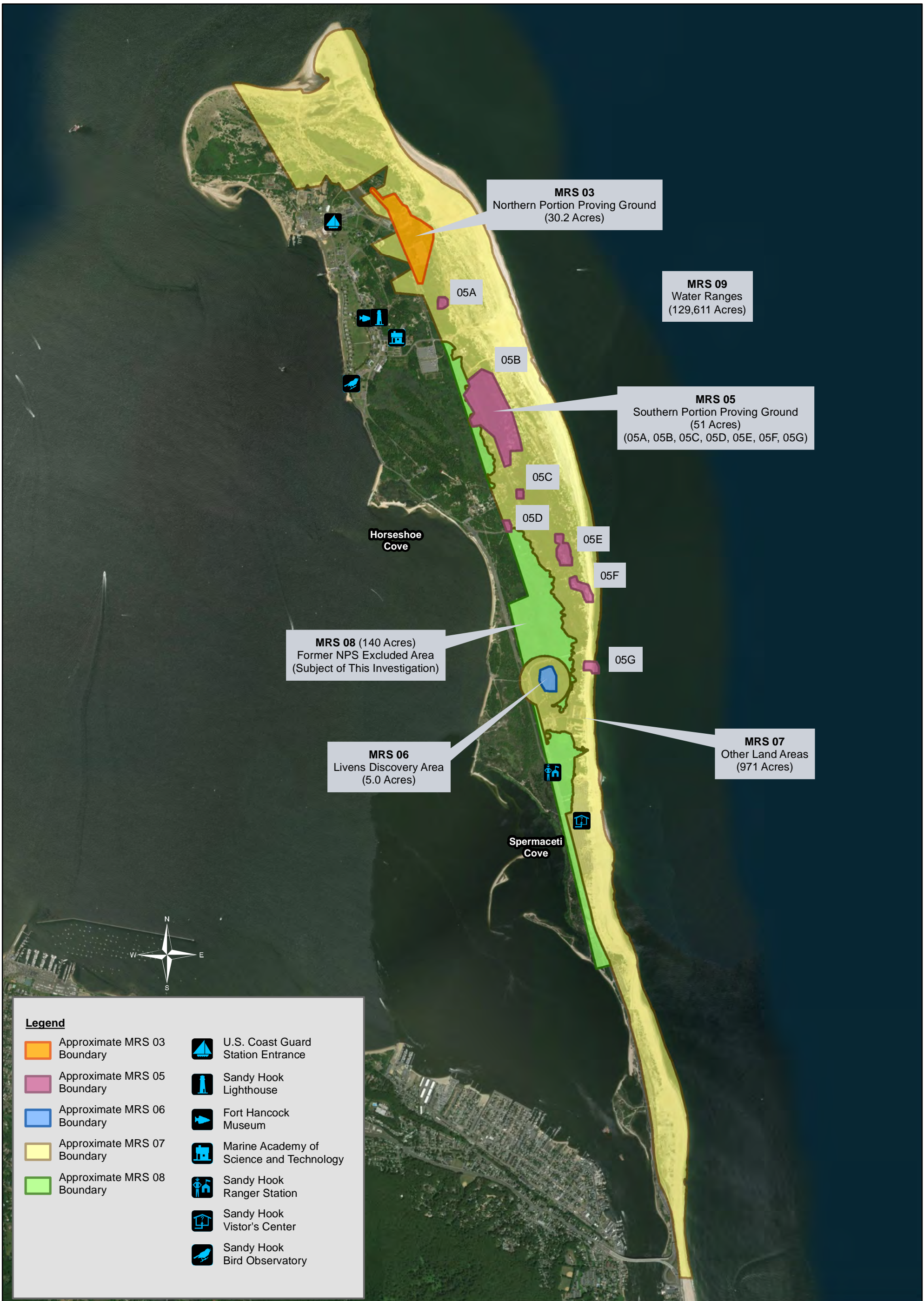
7.0 REFERENCES

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- USACE, 2017b. Final MMRP Remedial Investigation Addendum #3 Work Plan, Fort Hancock Formerly Used Defense Site, Monmouth County, New Jersey. November.
- USACE, 2017c. *Decision Logic to Assess Risks Associated with Explosive Hazards, and to Develop Remedial Action Objectives for Munitions Response Sites* (USACE 2017).

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Appendix A: Figures

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The green-shaded areas were designated by NPS as environmentally sensitive in 2010-2011, and were identified as "excluded areas." The excluded area includes parts of original MRS-1 through MRS-6 as shown. The excluded area was redesignated as MRS 08 in RI Addendum #1, and NPS allowed access to the area to USACE in 2016.



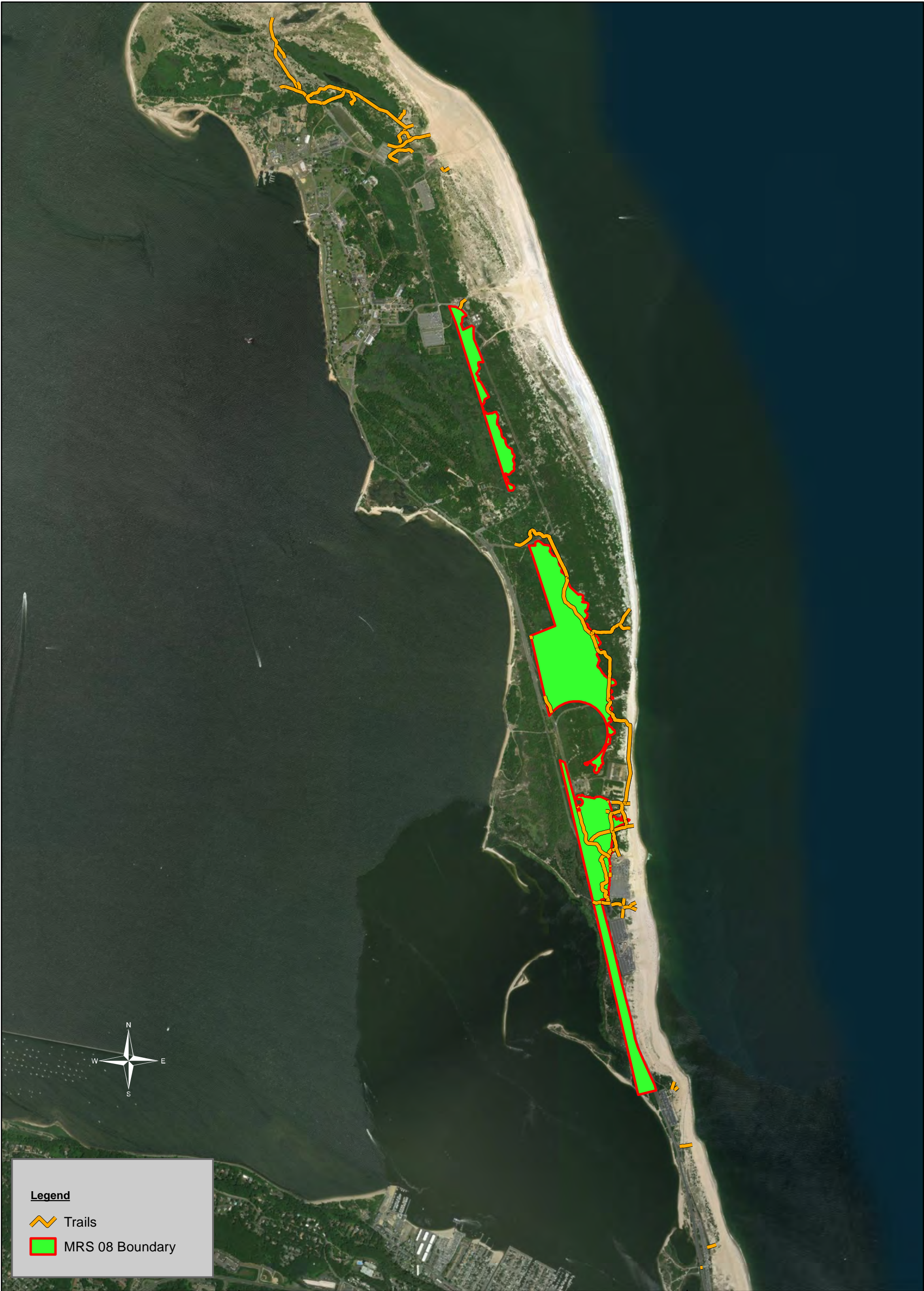
US Army Corps
of Engineers®
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Remedial Investigation
Fort Hancock Formerly Used Defense Site,
Monmouth County, New Jersey
Contract No.: W912QR-12-D-0011, DA02

Date: February 2018

Data Sources: ESRI Online, National Park Service



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Remedial Investigation
Fort Hancock Formerly Used Defense Site,
Monmouth County, New Jersey
Contract No.: W912QR-12-D-0011, DA02

Figure 3
MRS 08
and Unpaved
Recreational Trails

0 900 1,800
Feet

Date: February 2018

Data Sources: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





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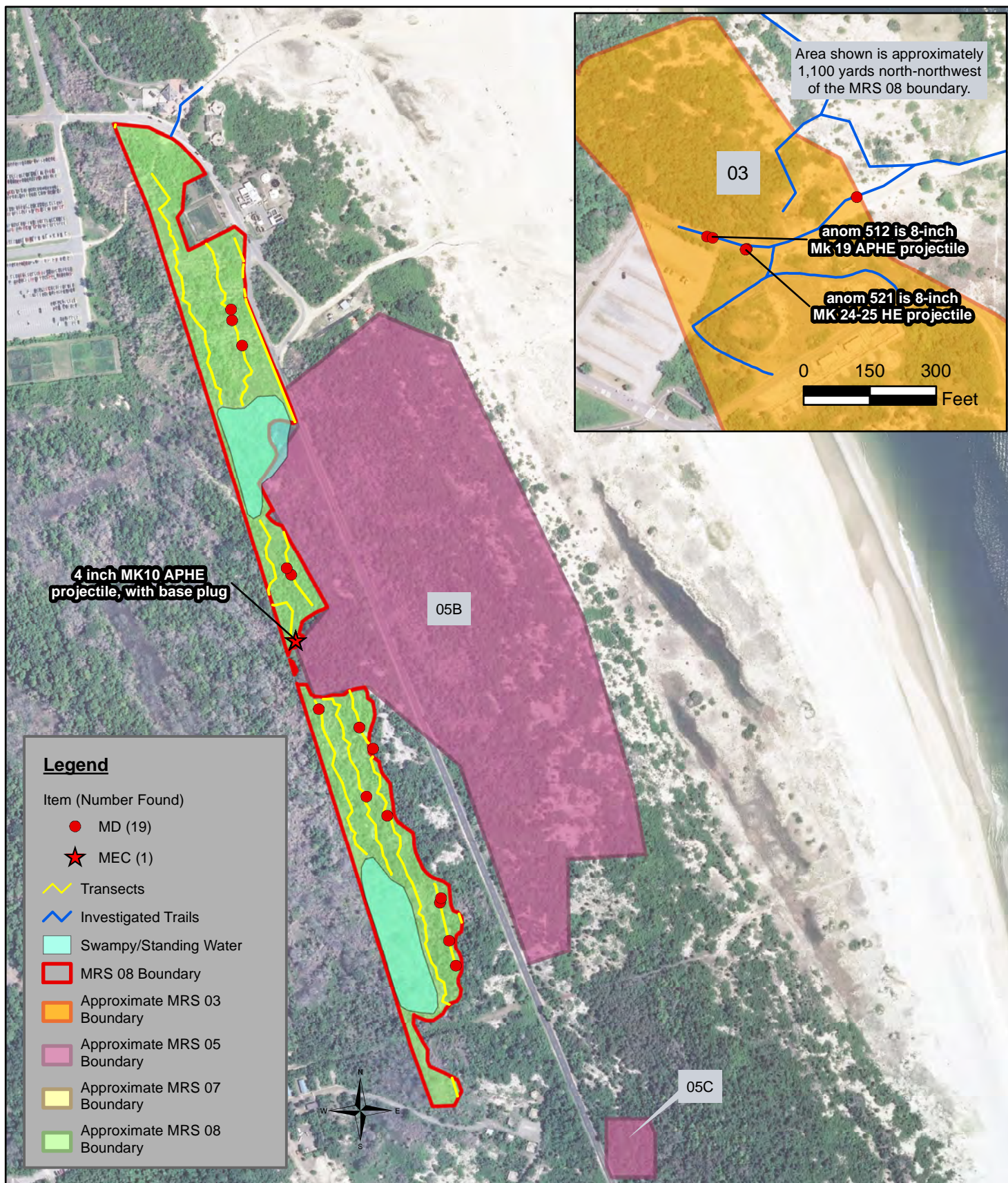
Date: February 2018

Remedial Investigation
Fort Hancock Formerly Used Defense Site,
Monmouth County, New Jersey
Contract No.: W912QR-12-D-0011, DA02

Data Sources: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4
MRS 08
Investigation Approach

0 550 1,100
Feet



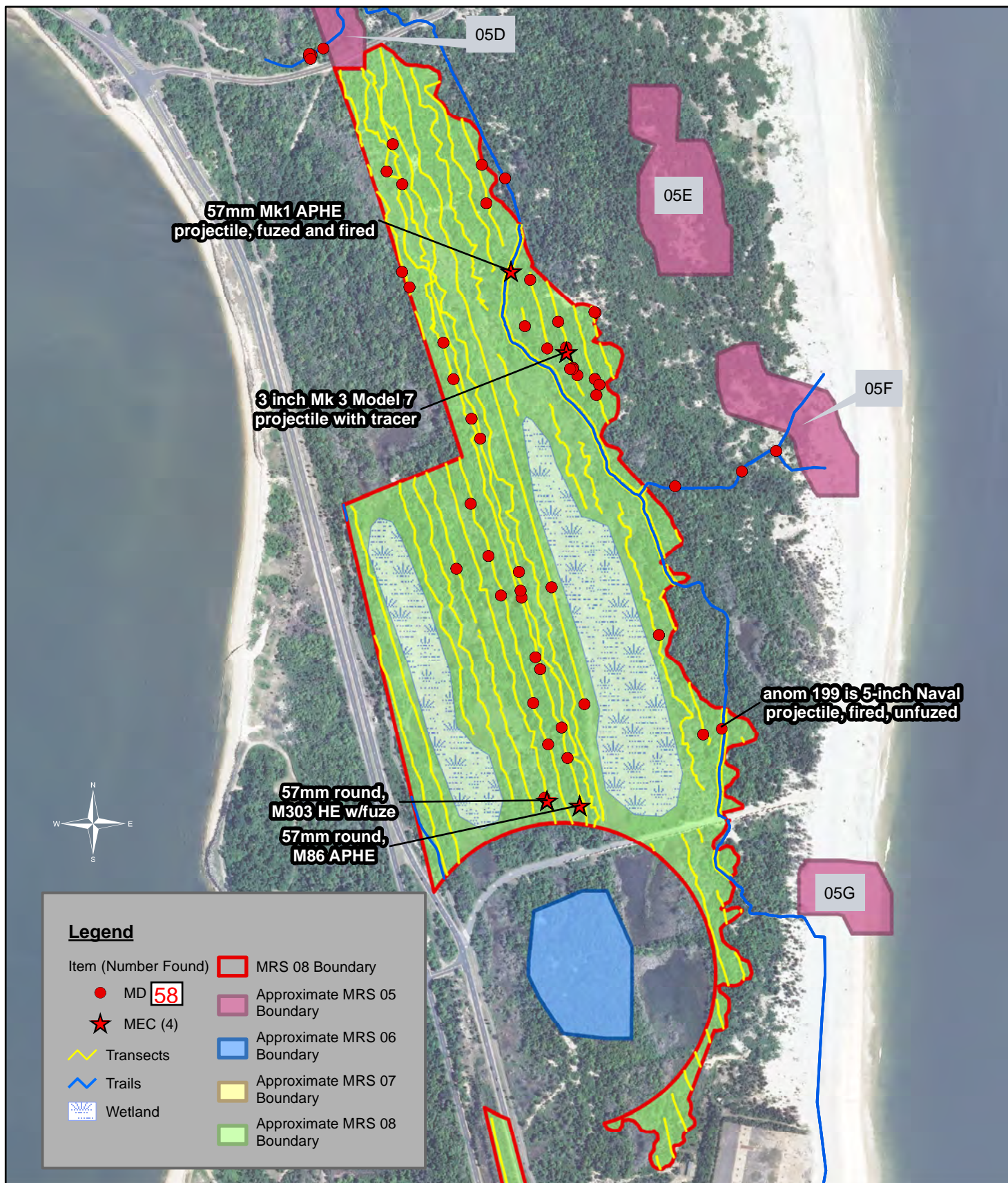
Remedial Investigation
Fort Hancock Formerly Used Defense Site,
Monmouth County, New Jersey
Contract No.: W912QR-12-D-0011, DA02

Figure 5
Munitions-Related
Finds Northern
MRS 08

Date: November 2018

Data Sources: 2014 Imagery Provided by NOAA

0 250 500
Feet



Remedial Investigation
Fort Hancock Formerly Used Defense Site,
Monmouth County, New Jersey
Contract No.: W912QR-12-D-0011, DA02

Figure 6
Munitions-Related
Finds Central
MRS 08

Date: November 2018

Data Sources: 2014 Imagery Provided by NOAA

0 275 550
Feet



Remedial Investigation
Fort Hancock Formerly Used Defense Site,
Monmouth County, New Jersey
Contract No.: W912QR-12-D-0011, DA02

Figure 7
Munitions-Related
Finds Southern
MRS 08

0 400 800
Feet


Date: February 2018


Data Sources: 2014 Imagery Provided by NOAA








Legend

 Proposed MRS 08 Boundary Revision

 Approximate MRS 05 Boundary

 Approximate MRS 06 Boundary

 Approximate MRS 07 Boundary

 Approximate Original MRS 08 Boundary



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Date: February 2018

Remedial Investigation

Fort Hancock Formerly Used Defense Site,
Monmouth County, New Jersey

Contract No.: W912QR-12-D-0011, DA02


Data Sources: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

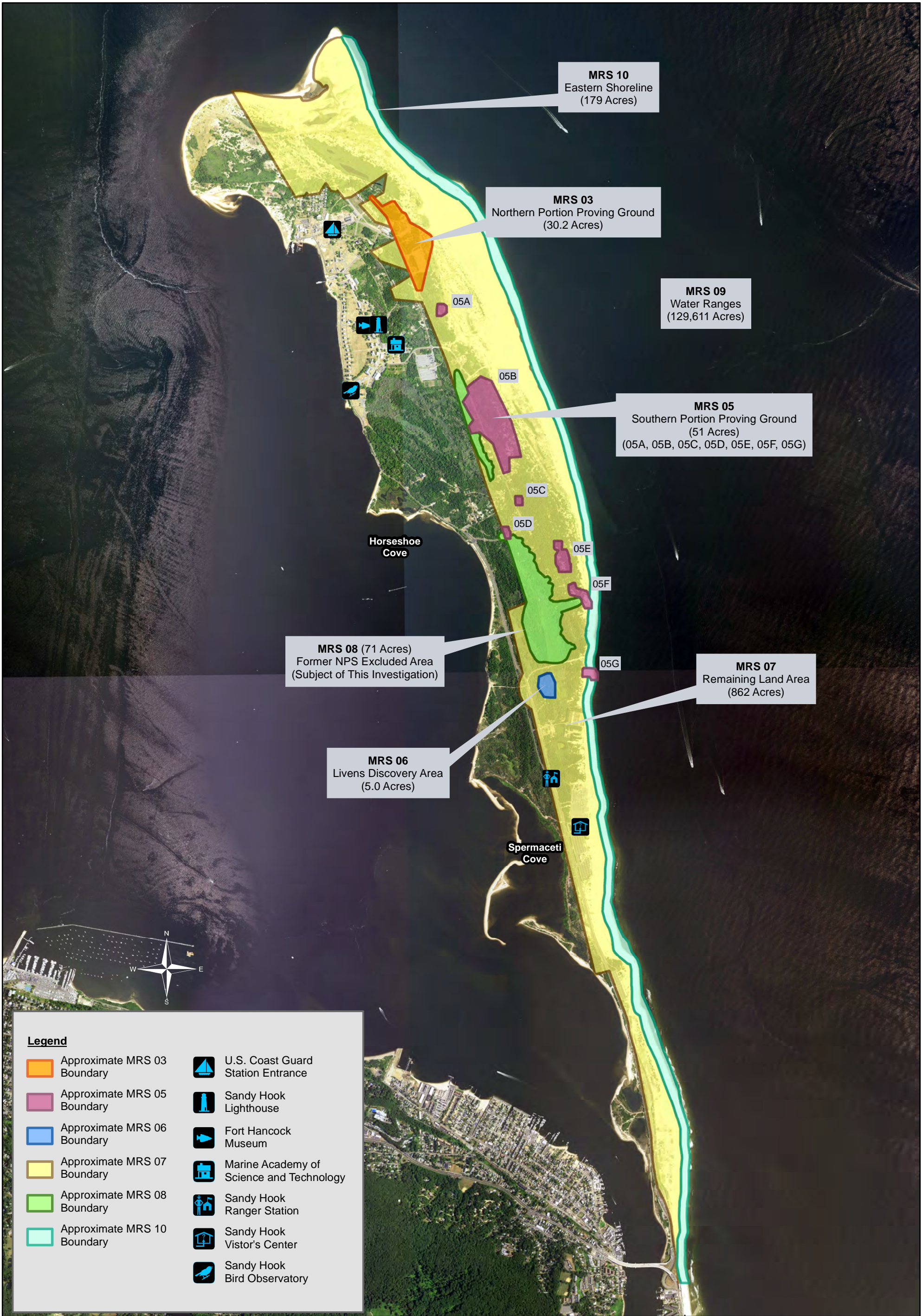
Figure 9

MRS 08

Footprint Reduction

05501,100

 Feet



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Date: June 2018

Remedial Investigation
Fort Hancock Formerly Used Defense Site,
Monmouth County, New Jersey
Contract No.: W912QR-12-D-0011, DA02

Data Sources: National Agriculture Imagery Program (NAIP), 2015

Figure 10
Revised Fort Hancock
MRS Footprints

0 1,125 2,250
Feet

Appendix B: Geophysical Data

Appendix B-1. ITS and Blind Seed Program

Appendix B-2. Geophysical Anomaly Maps and VSP Analysis Support

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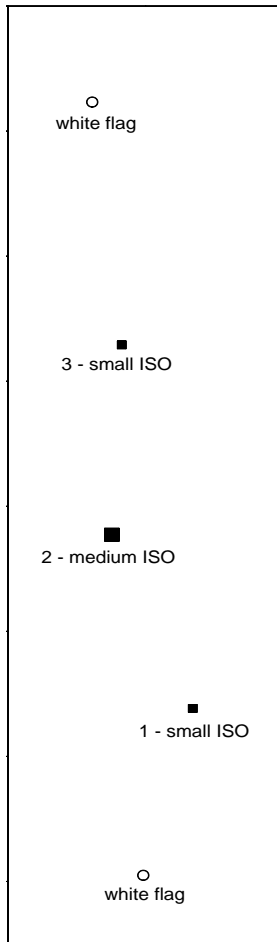
Appendix B-1. ITS and Blind Seed Program

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Instrument Test Strip

The instrument test strip (ITS) was installed on Oct. 23, 2017, by the SUXOS and QC geophysicist at the Nike Missile Radar Site (the same location as the ITS constructed during the 2015 RI of MRS 06). The ITS installation was observed and approved by a CENAB representative on site at the time (D. King).

The initial ITS configuration is shown below:



The UXO team passed all Schonstedts over the ITS daily to ensure proper functionality. The UXOSO/QC changed the configuration of the ITS on 31 October, 2017, to demonstrate that the UXO team was not just memorizing the seed locations.

Blind Seed Program

Ten blind seeds were installed on unpaved trails on Oct. 23 and 24, 2017, by the QC geophysicist, field geophysicist, and the UXOQC/SO. The UXOQC/SO followed anomaly avoidance procedures and excavated a shallow (less than 1 ft) hole to bury a seed in a clear area. The field geophysicist then captured the location and depth of the seed prior to backfilling the hole. A CENAB representative (D. King) oversaw installation of the seeds on Oct. 23. The locations of the seeds were captured with RTK GPS.

After the majority of transects were cut in MRS 08, seven more blind seeds were installed on the transects on Nov. 16, 2017, by the UXOQC/SO and the field geophysicist. The locations of the seeds were captured with RTK GPS.

Although the field geophysicist and UXOQC/SO knew the locations of blind seeds, the locations were not communicated to the SUXOS or any of the field team. The coordinates of the seeds were known only to the QC geophysicist.

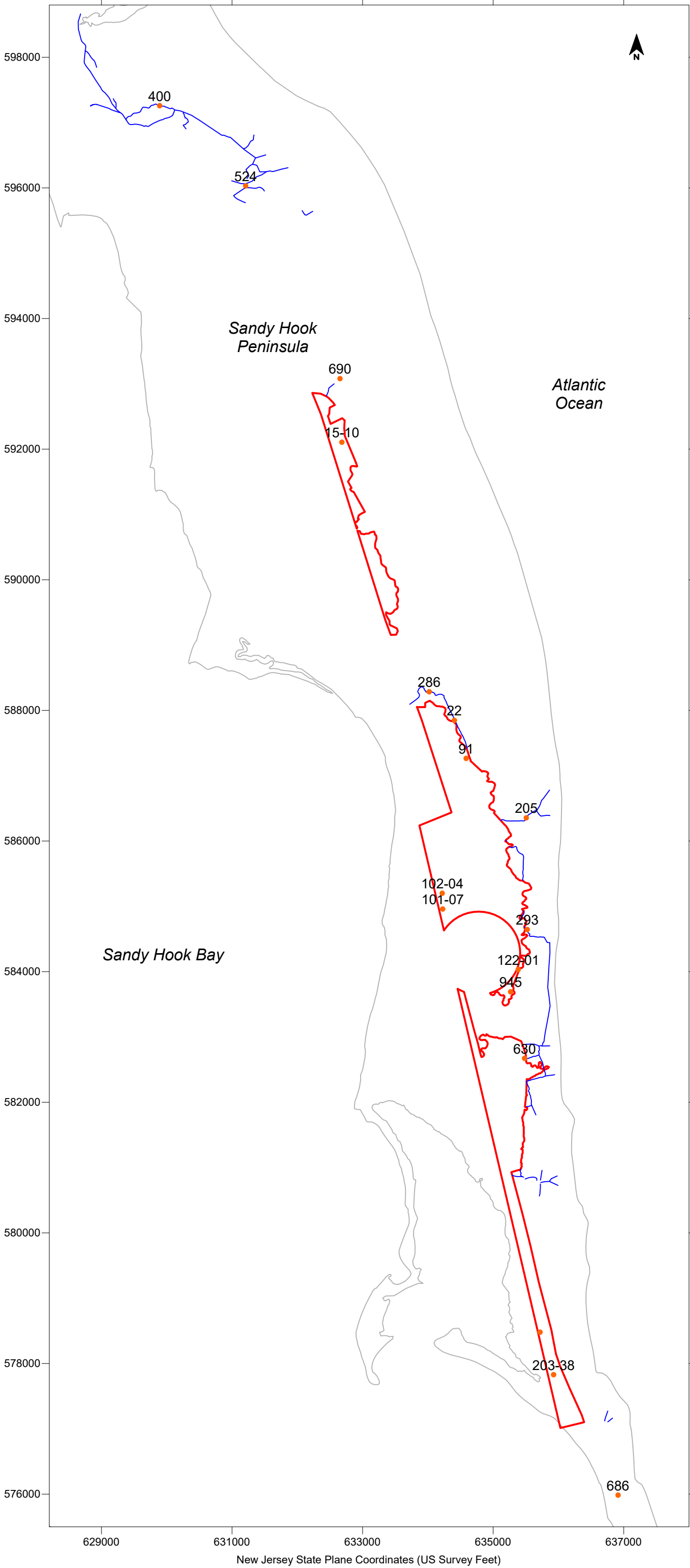
All blind seeds were detected and excavated by the dig teams, with the exception of seed 15, located on Transect 201, which was not investigated because much of the transect was under water during high tide and there was a large amount of surficial debris present. On a call between ERT and USACE on Dec. 1, 2017, the decision was made to not investigate Transect 201 and several other transects based on this situation.

Blind seed information is summarized in the following table.

Seed #	Easting	Northing	Type	Depth (inches)	Location	Anomaly ID
1	634406.71	587847.12	Small ISO, horizontal	6	Trail	22
2	634587.72	587264.41	Medium ISO, horizontal	12	Trail	91
3	634021.38	588284.05	Small ISO (stainless steel), horizontal	3	Trail	286
4	632654.70	593080.09	Small ISO, vertical	6	Trail	690
5	631210.15	596030.11	Medium ISO, horizontal	4	Trail	524
6	629891.92	597257.76	Small ISO, horizontal	6	Trail	400
7	635508.36	586354.41	Small ISO, horizontal	6	Trail	205
8	635523.88	584644.27	Small ISO, horizontal	6	Trail	293
9	635482.08	582672.45	Small ISO, vertical	3	Trail	630
10	636914.02	575984.86	Small ISO, horizontal	6	Trail	686
11	634227.76	584958.08	Small ISO, horizontal	6	Transect 101	101-07
12	634221.36	585199.69	Small ISO, horizontal	6	Transect 102	102-04
13	635268.71	583690.77	Small ISO, horizontal	6	Transect 116	945
14	635384.08	584030.75	Medium ISO, vertical	6	Transect 122	122-01
15	635719.52	578479.12	Small ISO, horizontal	6	Transect 201	*
16	632683.99	592105.91	Small ISO, vertical	6	Transect 15	15-10
17	635926.57	577828.37	Small ISO, horizontal	6	Transect 203	203-38

* Transect 201 was not dug

Figure B-1-1
Blind Seed Lots



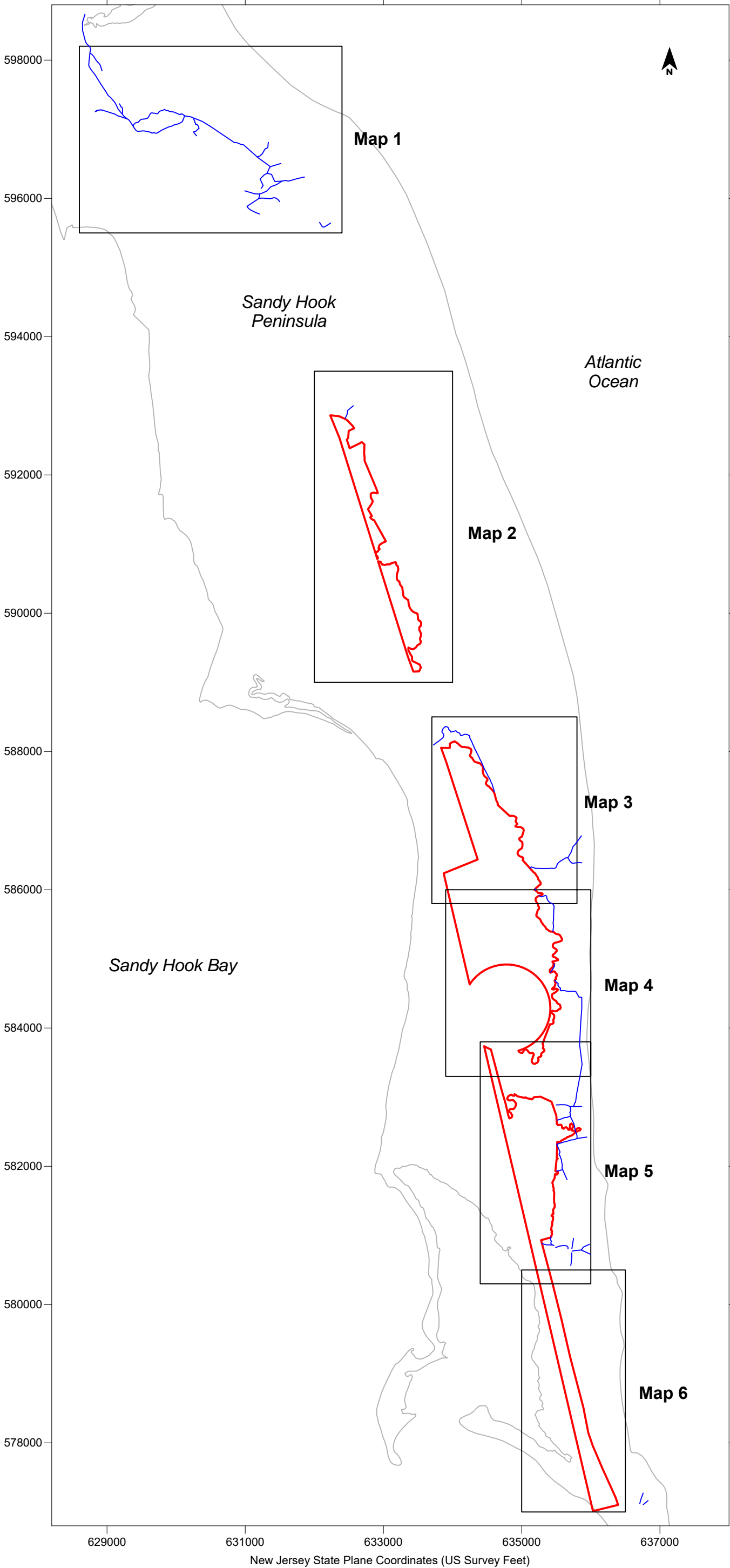
- Lot 1: northern trails - 2 seeds
- Lot 2: southern trails - 5 seeds
- Lot 3: southern MRS 08 - 2 seeds (+1 on transect not dug)
- Lot 4: central MRS 08 - 5 seeds (one on trail)
- Lot 5: northern MRS 08 plus short adjacent trail - 2 seeds

There were generally 2 schonstedt operators at any given time, so the standard is met.

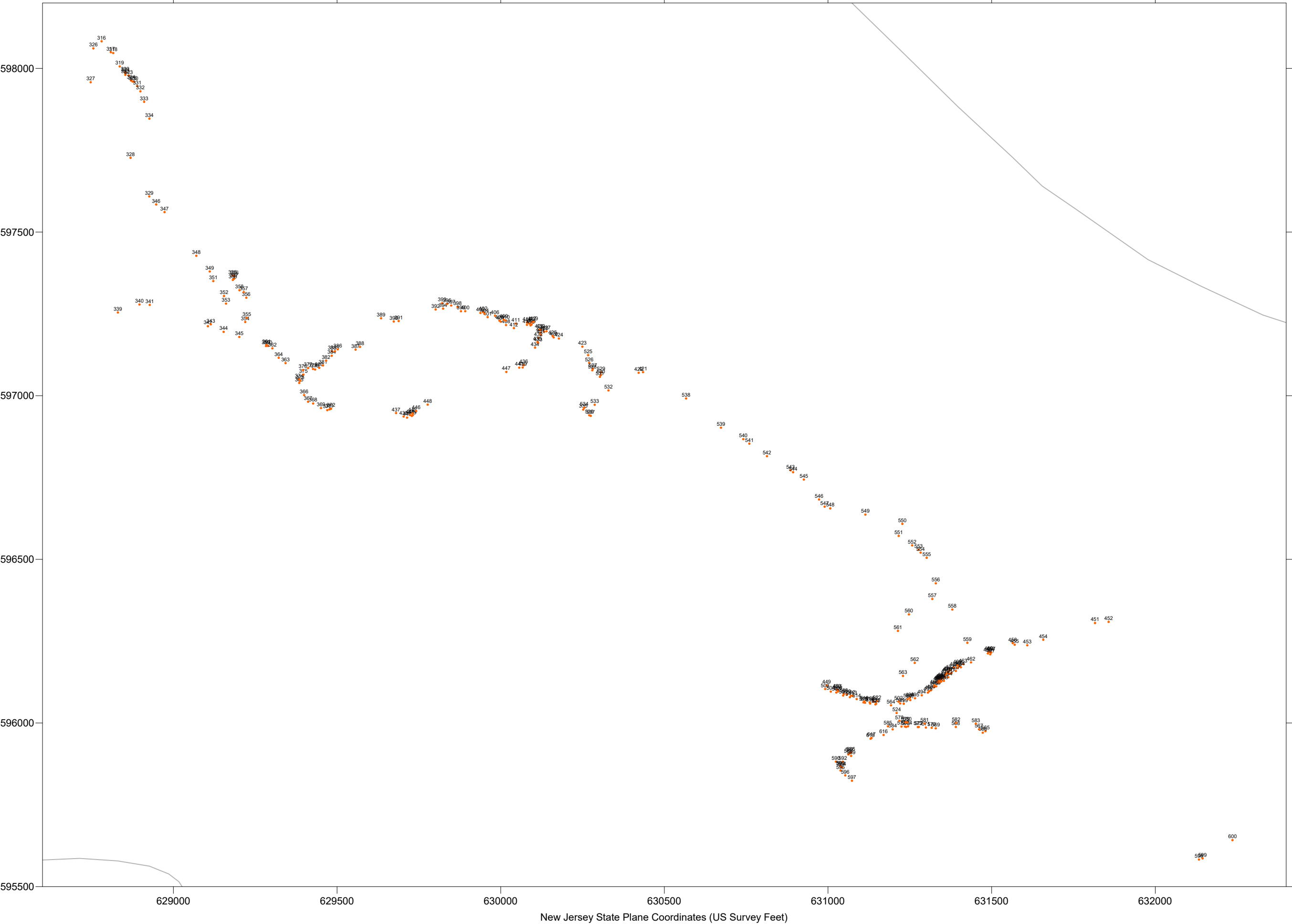
Appendix B-2. Geophysical Anomaly Maps and VSP Analysis Support

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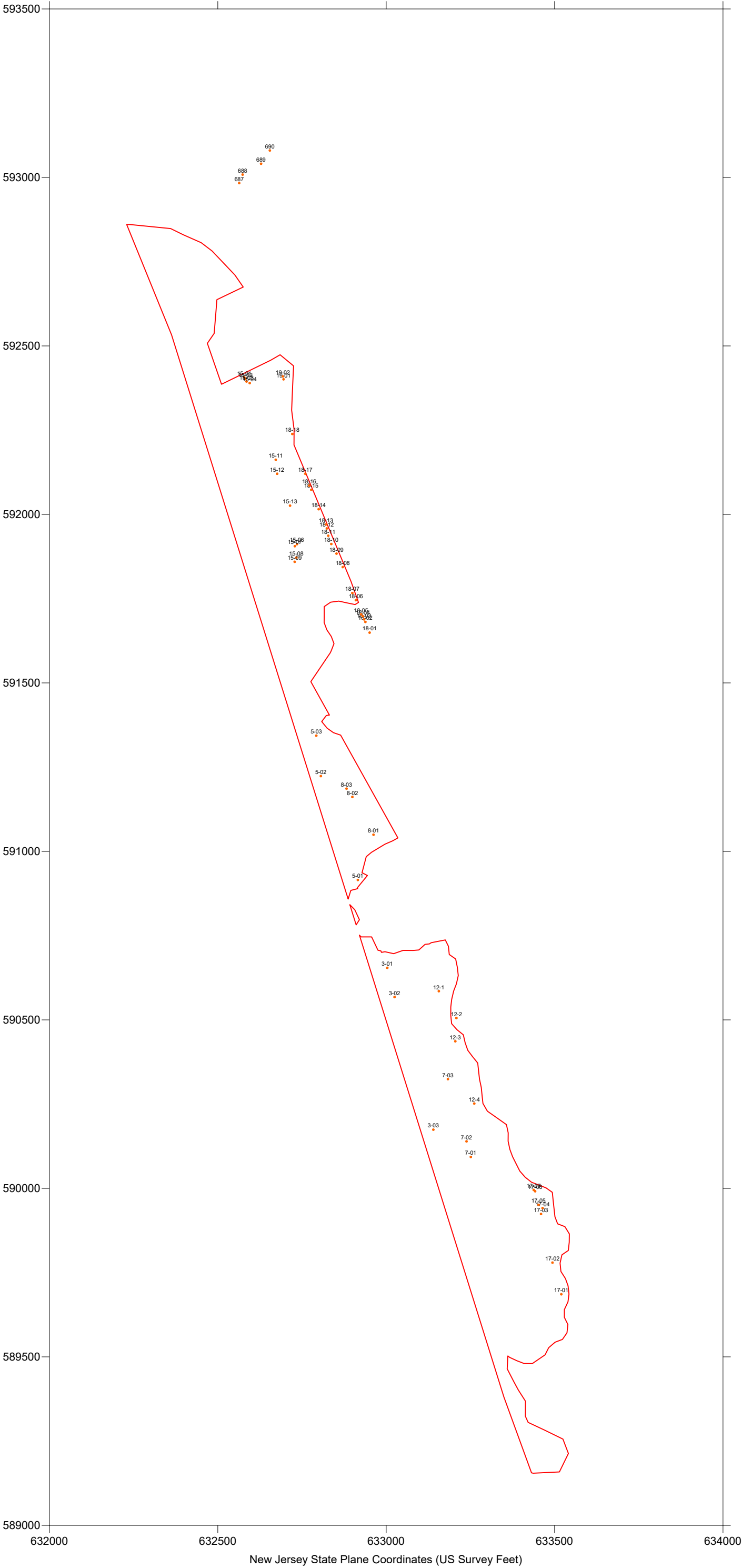
Index Map to Large Scale Anomaly Maps



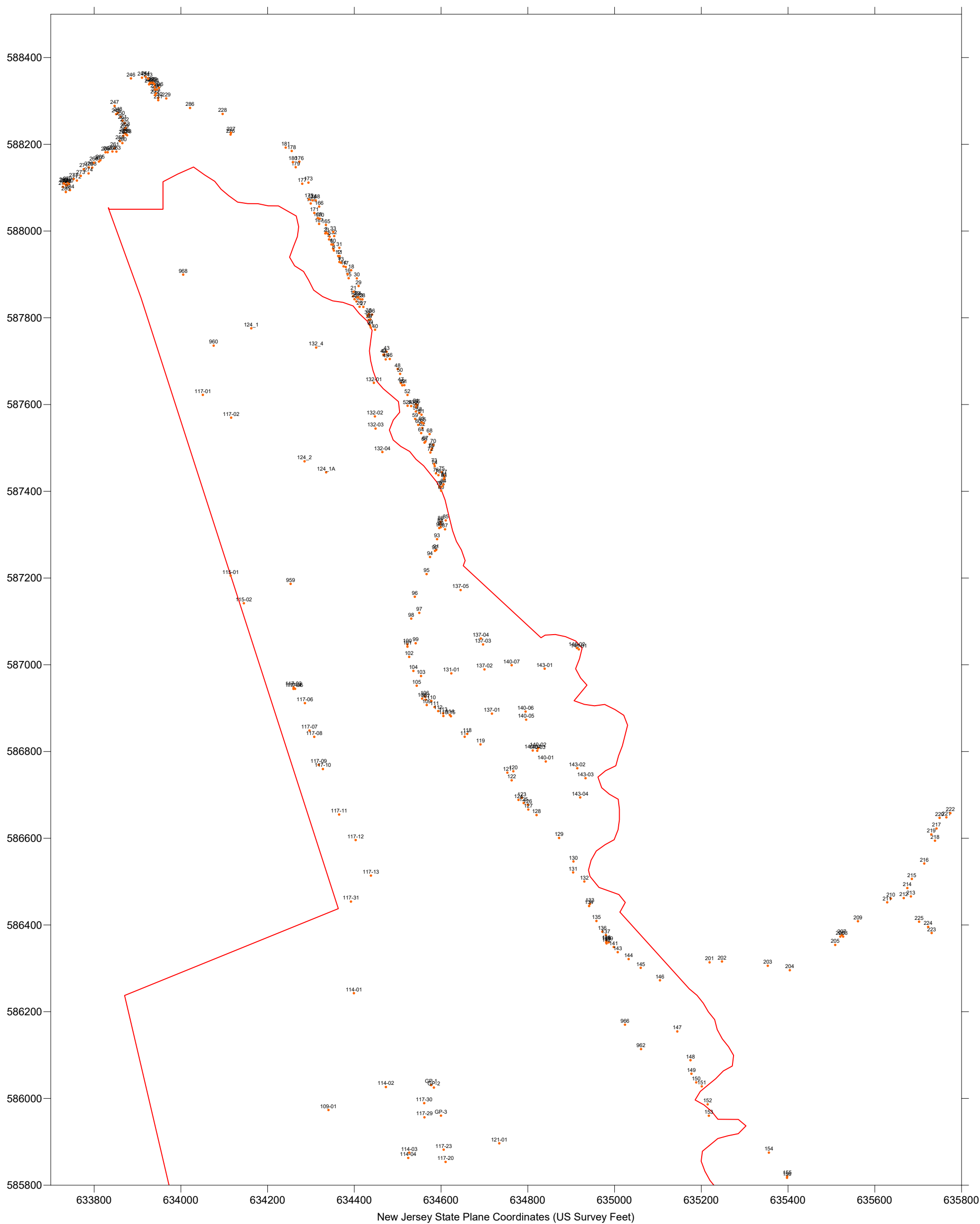
Map 1: Trails north of MRS 08



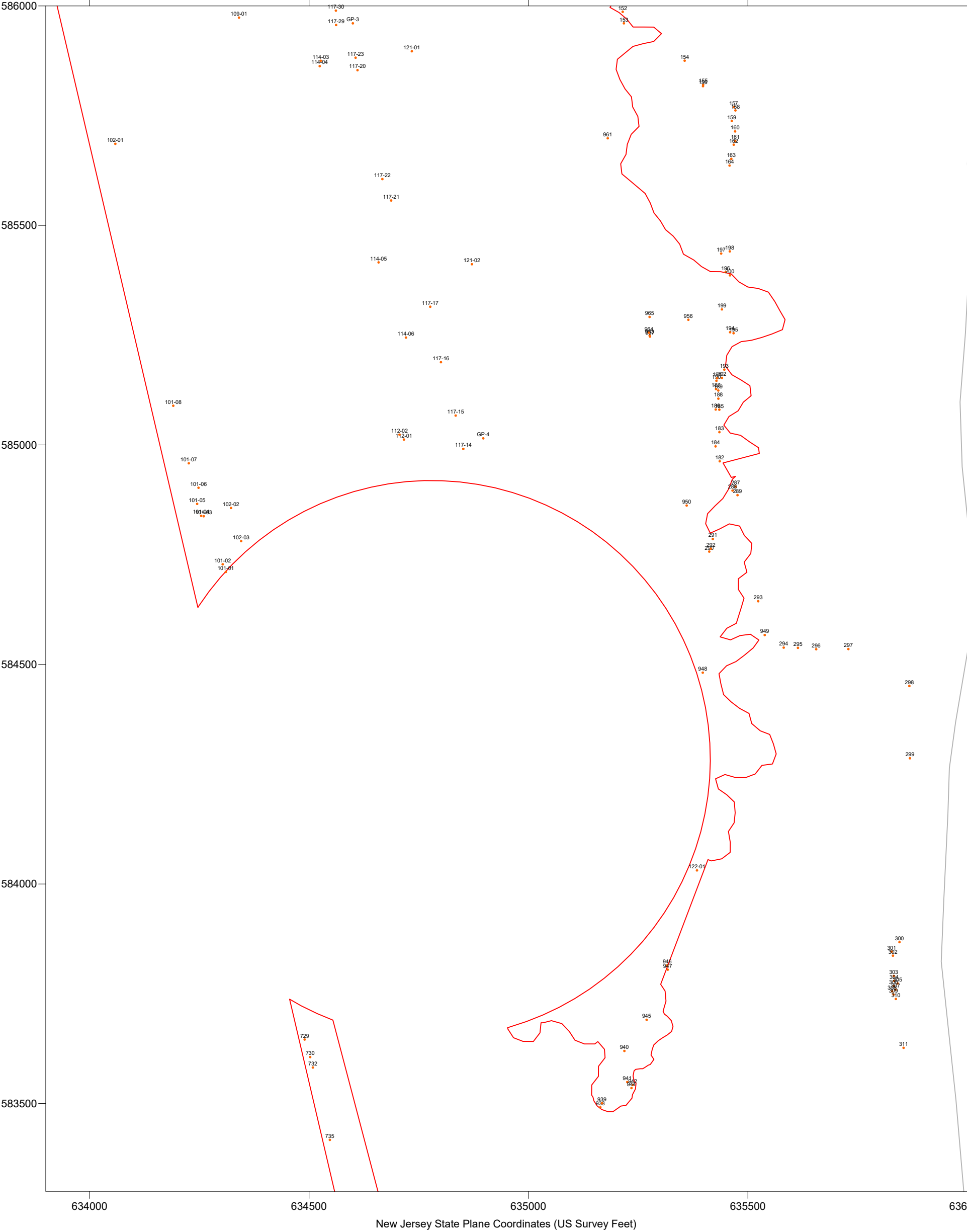
Map 2: Northern MRS 08



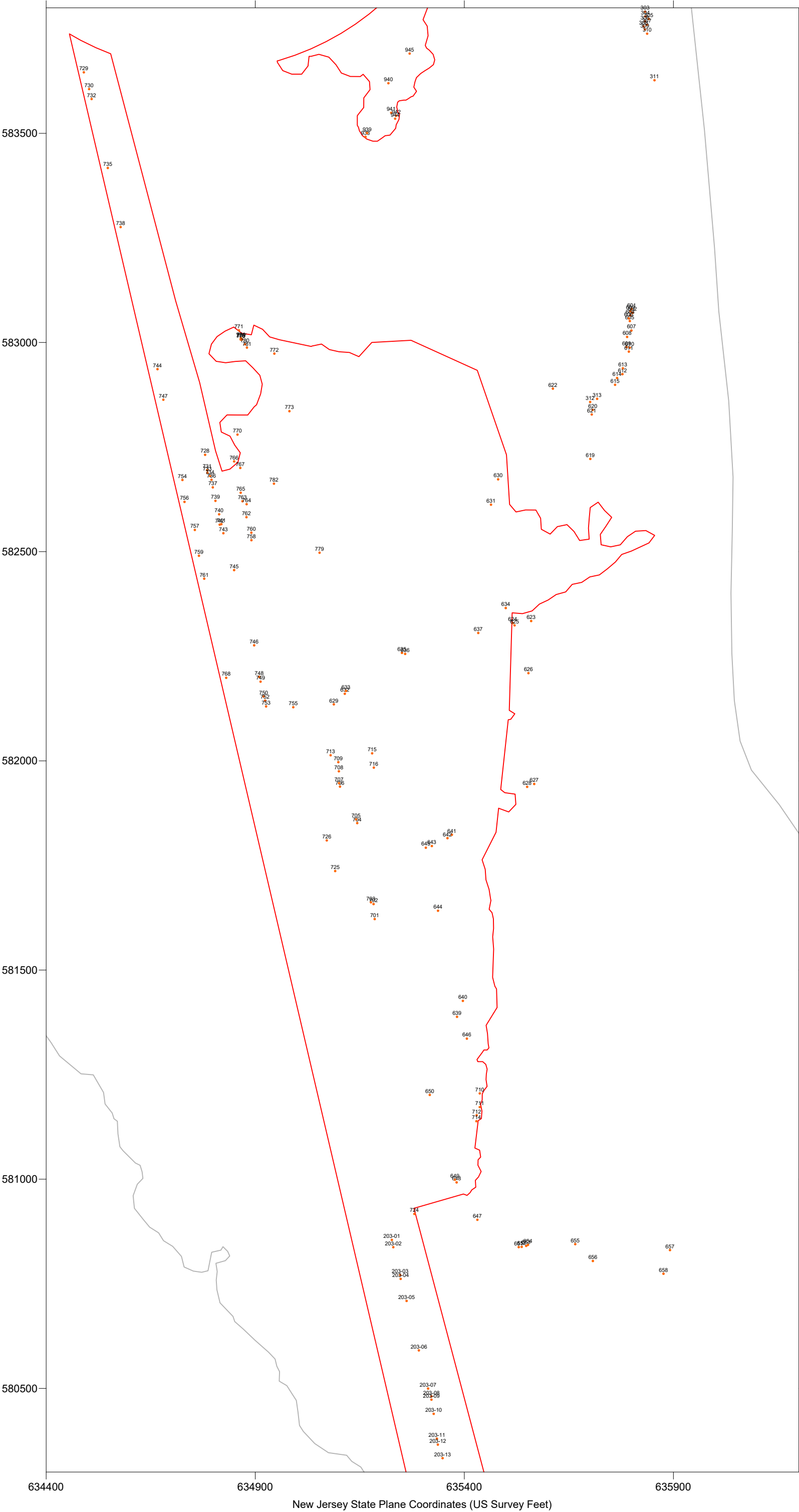
Map 3: North-central MRS 08



Map 4: South-central MRS 08



Map 5: Southern MRS 08



Map 6: Southern MRS 08

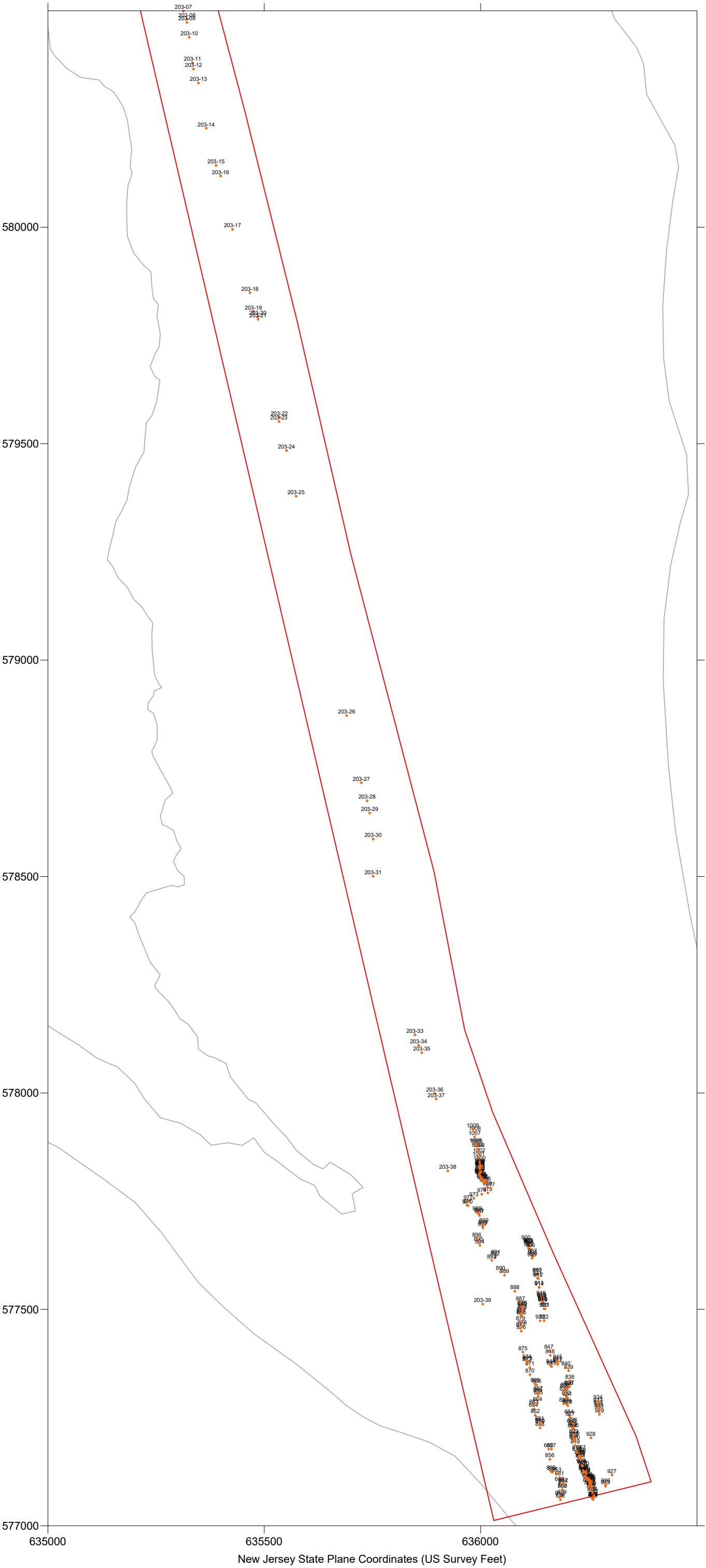
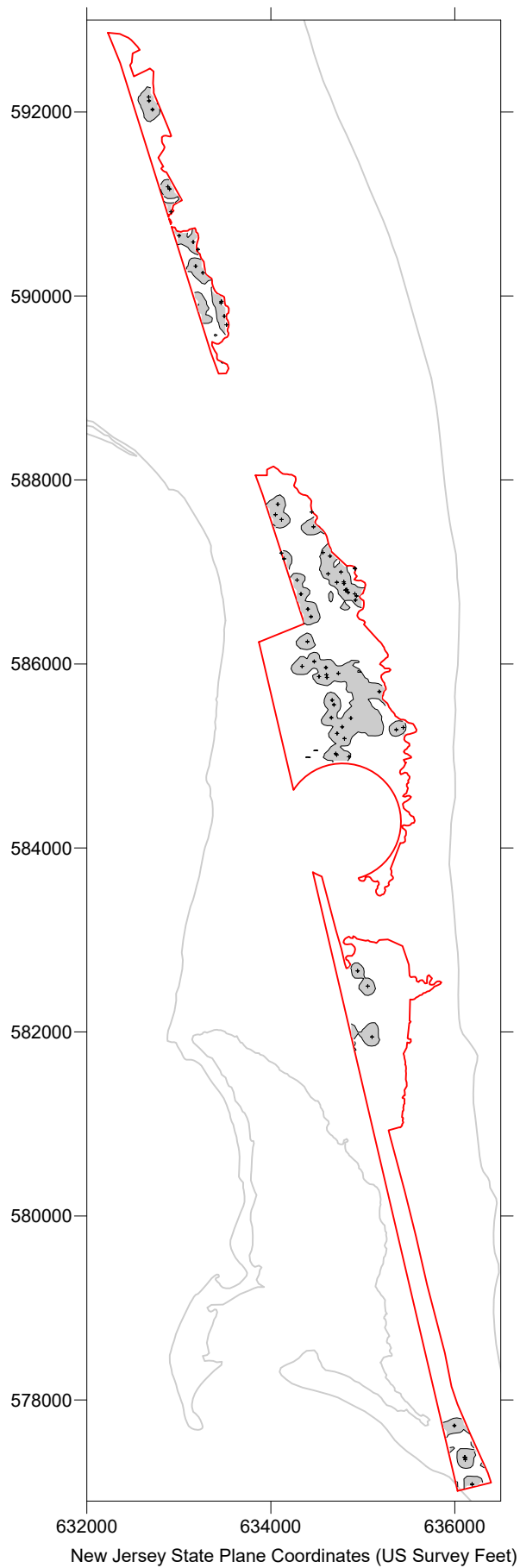


FIGURE 1, APPENDIX B-2



**MEC-MD Density Analysis of MRS 08
Using Visual Sample Plan (VSP)**

Red line is MRS 08 boundary

MEC+MD locations shown as small crosses

Gray shaded area shows density of
10 MEC+MD/acre or more

Geostatistical Estimation of Anomaly Density

The map shown in Appendix B-2, Figure 1, was generated by exporting the ASC (Action Script Communication) file from VSP. The following text and figures are automatically generated by VSP and provide statistical some inputs for the map. The analysis was performed on the locations of MEC and MD within MRS-08. The ASC file was contoured using Surfer 12.

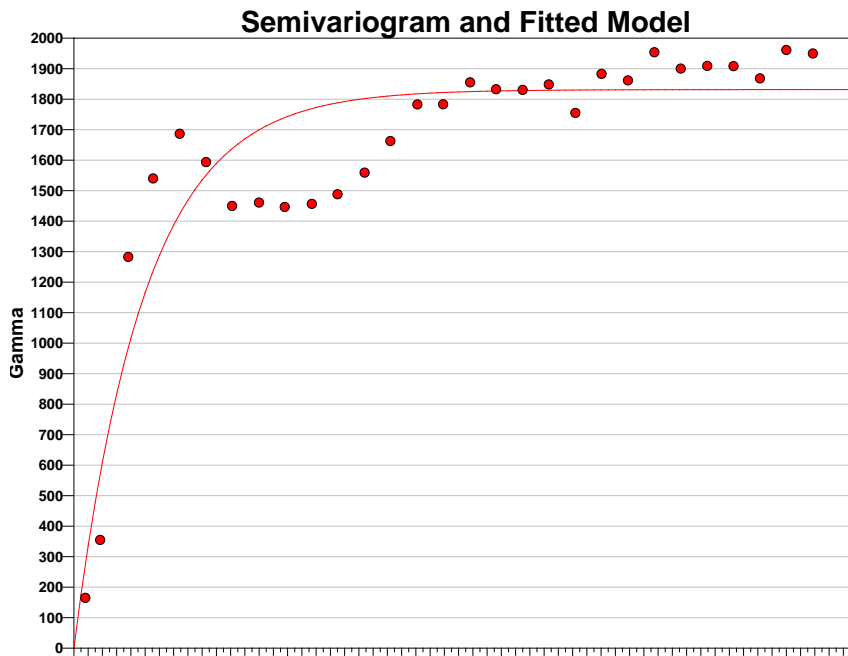
Summary

This report summarizes the parameters and processes used to generate kriging estimates of anomaly density from transect survey samples. The underlying variogram analyses for these results were performed using the GAM/GAMV codes¹. The graphical user interface for these codes, GAM/GAMV GUI was developed by Sandia National Laboratories.

Variogram

The following table and figure summarize the variogram analysis and model used in the kriging estimation.

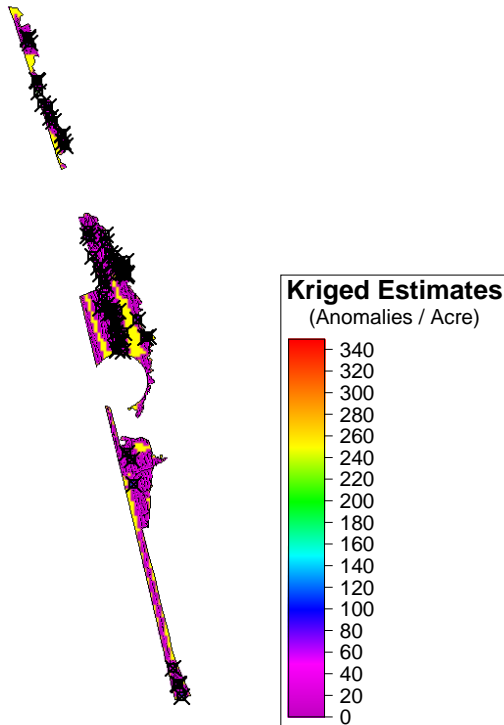
SUMMARY OF VARIOGRAM ANALYSIS	
Run Mode	Automatic
Variogram Data Field	Anomaly Density
Window Diameter	140 feet
Variogram Control Parameters	
Distance Between Lags	37.037 feet
Lag Tolerance Length	18.5185 feet
Number of Lags	30
Variogram Model	
Nugget	0
Model type 1	Exponential
Range 1	296.455 feet
Sill 1	1831.37



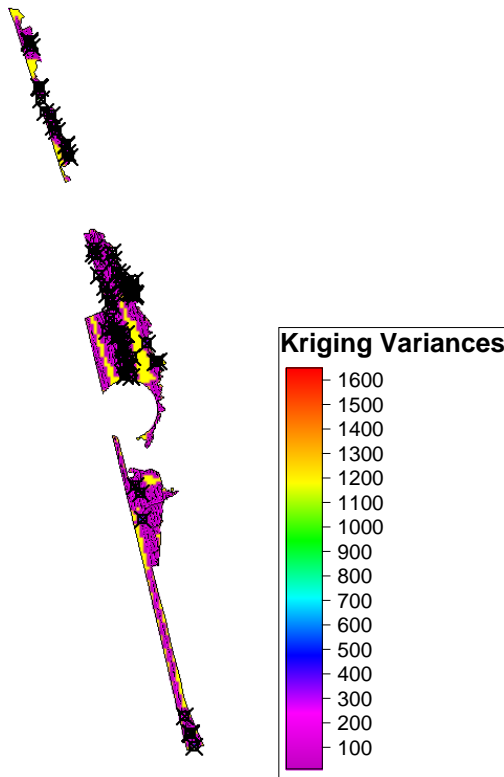
SUMMARY OF KRIGING ESTIMATION	
Run Mode	Automatic
Window Diameter	140 feet
Estimation Type	Anomaly Density
Grid	
Number of X Nodes	60
Number of Y Nodes	227
X Origin	632229.38
Y Origin	577012.32
X Block Size	70 feet
Y Block Size	70 feet
Search/Discretization	
Use Octant Search	True
Max Number of Neighbors	8
Kriging Minimum	2
Kriging Maximum	50
Max Search Radius	70 feet
Min Search Radius	70 feet
Reset Negative Values	True

Site Map With Kriging Results

The following figures show the results from the kriging estimation. The maps shown are from the active (most recently created) kriging estimation. The top figure shows the estimate values with the variance of the estimates shown in the lower figure. Areas within the sample area but without color-shading indicate areas where estimation was not possible due to lack of data within the search neighborhood.



Kriged Estimates



Estimation Variances

Primary Analysis Objective

The primary purpose of this analysis is to generate a continuous estimate of anomaly density for the entire sample site based on limited geophysical transect data

Analytical Approach

The kriging estimate is developed using observational data collected from field surveys along limited sampling transects. Prior to kriging, the observation data are transformed from location values to density values. This is done using a moving window which is translated along each sample transect. The total anomaly count and total transect sample area within the window area are used to compute a sample anomaly density value at a spacing of 1/6th the averaging window diameter along the transects. These sample anomaly density values are then used as conditioning data within the kriging estimator to estimate anomaly density values at un-sampled locations. The underlying spatial correlation of the sample anomaly density data is modeled with a variogram. The variogram model is then used within the Ordinary Kriging estimator to generate estimates with minimized variance. No estimate is generated for locations with insufficient sample data within the kriging search radius. Estimated anomaly density values are in the units of anomalies per acre.

References

¹Deutsch, C.V. and A.G. Journel. 1998. *GSLIB Geostatistical Software Library and User's Guide*, 2nd Edition, Applied Geostatistics Series, Oxford University Press, Inc. New York, NY.

This report was automatically produced* by Visual Sample Plan (VSP) software version 7.10.

This design was last modified 7/30/2018 9:43:22 AM.

Software and documentation available at <http://vsp.pnnl.gov>

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* - The report contents may have been modified or reformatted by end-user of software.



Memo for Record documenting client call and consensus that transects remaining in 'standing water' do not need to be completed as sufficient coverage has been obtained.

Ft Hancock Proposed Remaining Transects

1 message

Thomas Bachovchin <thomas.bachovchin@ertcorp.com>

Fri, Dec 1, 2017 at 1:27 PM

To: "Goepfert, Gregory J NAN02" <Gregory.J.Goepfert@usace.army.mil>, Julie.E.Kaiser@usace.army.mil, "King, David V NAB02" <David.V.King@usace.army.mil>, "Colozza, Thomas S NAB" <Thomas.S.Colozza@usace.army.mil>

Cc: Jim Stuby <Jim.Stuby@ertcorp.com>

All,

Per this morning's discussion, attached are the Work Plan site figures (north-central-south).

These are hand marked-up and scanned, so apologies for not being neater (also, when I printed them out internally, there were some issues, but they show up clearly on screen--maybe it was just my printer--beware if you are only looking at a printout that some info may not have printed, such as the legend box, etc.).

In short,

- Black lines represent transects completed (dug).
- Red lines represent proposed remaining transects to do to obtain sufficient coverage and show a relatively uniformly spread investigation (i.e., to avoid any perception of data gaps on a geographical level).
- Blue represents the ponded/swampy areas of the Central region that cannot practically be dug.
- Original Yellow lines that are not colored red or black would not be dug (NOTE--the exception is the Southern portion figure where **all transects have been completed**--I didn't make them black because it was getting too messy.)

When we finish the red lines, we propose that we are finished. This will result in approximately 5.5-6.0 acres of coverage, but based on 60+ MD items and 6 MEC items found so far, we have sufficient coverage (as discussed on the call) regardless of acreage.

A couple of other points to make: MEC/MD is relatively scattered and the locations would not call the current CSM into question. Also, the 20 ft wide unpaved trails within the MRS are not shown, but they are completed (dug) and that acreage is counted in the estimate)

Unless I hear back from you, I will assume this is our path forward so that I can let my team plan for what work remains.

Thanks.

Thomas Bachovchin, P.G.
Sr. Project Manager
ERT, Inc.

301-323-1442 (office)
703-389-3938 (cell)

14401 Sweitzer Lane, Suite 300
Laurel, Maryland 20707



Completed and Remaining Transects.pdf
550K

Appendix C: MPPEH-MEC Documentation

Appendix C-1. Daily QC Reports

Appendix C-2. Dig Sheets

Appendix C-3. Disposition Documentation

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Appendix C-1:
Daily QC Reports

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DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 10/23/2017 - Monday				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan “Lee” Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt on #4		
TODAY FIELD TIME: 21 hrs		CUMULATIVE MANHOURS THIS EFFORT: 39 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 62 – 73 F		
TRANSECT NAME	AMOUNT CUT/SURF CLEARED	AMOUNT M&D COMPLETED	TOTAL TARGETS	TRANSECT PERCENT COMPLETE	MPPEH ITEMS FOUND	DISPOSITION OF ITEMS
NA this day						
Comments: Today was a Mobilization / Set-Up. The IVS was set up by ERT Geophysicist with USACE Geophysicist and QC-SO oversight. Areas of the site were pre-inspected. Blind seeds were placed in advance of clearance. By 1800 hrs. All personnel had mobilized to the site. The northern trails were reconned to plan the approach in the coming days.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 10/23/2017

Problems: N/A

Corrective Actions: N/A

DGM Problems/Alternate Methods/Solutions:

Quality Control Activities:

IVS was set up by ERT Geophysicists (installed 2 small and one medium ISO in the IVS and surveyed them by RTK GPS).

Blind seeds were emplaced on the trails (6 installed in the central and northern trails).


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	8
Thompson	QC-SO	ERT	4
Watson	Tech 3	ERT	5
Hayes	Tech 2	ERT	5
McCarthy	Tech 2	ERT	
Jones	Tech 1	ERT	
Haynes	Tech 1	ERT	5
Stuby	Geophysicist	ERT	8
Lucas	Geophysicist	ERT	8
VISITORS			
David King	Geophysicist	USACE	



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 10/24/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 85.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 129 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 62 – 73 F, light rain		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH ITEMS FOUND	DISPOSITION OF ITEMS
Sand Beach Dune Trail	NA	Approx. 450'	58 Digs Completed	1 piece of Frag	0	Secured in drum in locked radar site
Comments: Transects were begun today on Sand Beach Dune Trail. Approx. 450' was inspected and cleared. The trail is highly contaminated, due to out buildings and underground utilities. Sections of terrain, farther South, look to be clear of these obstructions. Locations of all targets captured with RTK GPS. Target 56 was small piece of MD.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 10/24/2017

Problems: N/A

Corrective Actions: N/A

DGM Problems/Alternate Methods/Solutions:

Quality Control Activities:

UXOQC performed random inspections of area cleared. No negative issues found. 1 each Blind seed collected.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Watson	Tech 3	ERT	10
Hayes	Tech 2	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	10
Haynes	Tech 1	ERT	10
Stuby	Geophysicist	ERT	10
Lucas	Geophysicist	ERT	10
VISITORS			
David King	Geophysicist	USACE	



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 10/25/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 101.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 230.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 57 – 68 F		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
Sand Beach Dune Trail	NA	Approx. 500'	76 Digs Completed	0	1	57mm, HE-AP Mk I found, to be BIP'd 10-26-17. Location is recorded by RTK GPS.
				CUMULATIVE		
				MD	MEC	
				1	1	
Comments: Transects were continued today on Sand Beach Dune Trail. Approx. 500' was inspected and cleared. The trail is highly cluttered, likely due to out buildings and underground utilities. Sections of terrain, farther South, look to be clear of these obstructions. Locations of all targets captured with RTK GPS. Target #95 was identified at 3" deep as MPPEH, by the team leader. SUXOS and UXOSO/QC, identified the item as a 57mm High Explosive Armor Piercing (HE-AP) projectile. Notifications were made to the appropriate authorities. The MEC is being guarded by ERT personnel and will be disposed of the morning of the 10-26-17.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 10/25/2017

Problems: Blow-In-Place (BIP) item was secured and guarded overnight

Corrective Actions: N/A

Quality Control Activities:

UXOQC performed random inspections of area cleared. No negative issues found. 1 each Blind seed collected.

UXOQC concurred with the SUXOS on item identification. 57mm, Mk I

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Watson	Tech 3	ERT	10
Hayes	Tech 2	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	17
Haynes	Tech 1	ERT	17
Stuby	Geophysicist	ERT	7.5
Lucas	Geophysicist	ERT	10
VISITORS			
Greg Goepfert	CENAN PM	USACE	
Ralph Rodrigues	NJDEP PM	NJDEP	



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 10/26/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 74 hrs		CUMULATIVE MANHOURS THIS EFFORT: 304.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny / Rainy afternoon, lightning event				TEMP: 45-68 F, Rainy from 1210 hrs.		

TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
Sand Beach Dune Trail	NA	Approx. 900'	28 Digs Completed	0	0	N/A
				CUMULATIVE		
				MD	MEC	
				1	1	

Comments:
 Transects were continued today on Sand Beach Dune Trail.
 Approx. 500' was inspected and cleared. Locations of all targets captured with RTK GPS.

57mm MkI High Explosive Armor Piercing (HE-AP) projectile was destroyed successfully today at 1058 hrs. The area was declared All Clear at 1110 hrs.

Team worked thru steady rain from 1210 on.
 Lightning hold occurred, from 1250-1335 hrs.

SUXOS SIGNATURE:



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 10/26/2017

Problems: Lack of Radios for Demo Comms.

Corrective Actions: Radios being sent from ERT HQ.

Quality Control Activities:

UXOQC performed random inspections of area cleared. No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Watson	Tech 3	ERT	10
Hayes	Tech 2	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	7
Haynes	Tech 1	ERT	7
Lucas	Geophysicist	ERT	10
VISITORS			
Jeannie Heuser	NPS POC	NPS	



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 10/27/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan “Lee” Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 78 hrs		CUMULATIVE MANHOURS THIS EFFORT: 382.5 m/hrs		GOV’T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 54-74 F		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
Sand Beach Dune Trail	NA	Approx. 1100’	61 Digs Completed	3 Items 57 #’s	0	MD items are secured and awaiting MPPEH inspection.
		CUMULATIVE		CUMULATIVE		
		5,000 LF		MD	MEC	
				4	1	
Comments: Transects were continued today on Sand Beach Dune Trail. Approx. 1100’ LF was inspected and cleared for a total of ~ 5,000 LF of trails. Locations of all targets captured with RTK GPS. MD items are secured and awaiting inspection. Mostly a good day for distance, but still finding many contacts.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 10/27/2017

Problems: N/A

Corrective Actions: Radios arrived on-site

Quality Control Activities:

UXOQC performed inspections of the Sand Beach Dune Trail, between Atlantic Rd. and Fishing Beach Rd. No negative issues found. The dig team successfully found blind seed 7 (small ISO) on the trail and identified it as target 205.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Watson	Tech 3	ERT	10
Hayes	Tech 2	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	10
Haynes	Tech 1	ERT	10
Lucas	Geophysicist	ERT	8
VISITORS			



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 10/30/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan “Lee” Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 85.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 468 m/hrs		GOV’T. DELAY TIME: N/A		
WEATHER:				TEMP: 42- 57 F, Rain & Windy		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
Sand Beach Dune Trail – (North of Atlantic Rd)	NA	Approx. 400’	70 Digs Completed	6 Items: 8 lbs	0	MD items are secured and awaiting MPPEH inspection.
Sand Beach Dune Trail – (South of Fishing Beach Rd.)	N/A	Approx. 2500’	15 Digs Completed	0	0	
		CUMULATIVE		CUMULATIVE		
		7,500 LF		MD	MEC	
				7	1	
Comments: Transects were continued today on Sand Beach Dune Trail, North of Atlantic Rd. Approx. 400’ was inspected and cleared. Locations of all targets captured with RTK GPS. MD items are secured and awaiting inspection. 3 MD items found today, all were unfired and empty. Projectiles appear to be 2” diameter, 2 pounders.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 10/30/2017

Problems: N/A

Corrective Actions: Radios arrived on-site

Quality Control Activities:

UXOQC performed inspections of the Sand Beach Dune Trail, North of Atlantic Rd. The team successfully found blind seed 3 (small stainless steel ISO) on the trail and identified it as target 286, and found blind seed 8 (small ISO) and identified it as target 293.

South of Fishing Beach Rd. was inspected by QC, for the first 400'. No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	11
Haynes	Tech 1	ERT	11
Lucas	Geophysicist	ERT	8.5
VISITORS			
David Alfonse	Ranger	National Park Service	
Brian Malley	Ranger	NPS	



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 10/31/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan “Lee” Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 85.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 553.5 m/hrs		GOV’T. DELAY TIME: N/A		
WEATHER: Sunny, light wind				TEMP: 52- 67 F		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
Fisherman’ Trail – North End	NA	Approx. 3600’	121 Digs Completed	0	0	MD items are secured and awaiting MPPEH inspection.
		CUMULATIVE		CUMULATIVE		
		11,100 LF		MD	MEC	
				7	1	
Comments: Transects were continued today on Fisherman’s Trail, at the North end of the island (M) lot. Approx. 3600’ was inspected and cleared. Locations of all targets were captured with RTK GPS.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 10/31/2017

Problems: N/A

Corrective Actions: Radios arrived on-site

Quality Control Activities:

UXOQC performed inspections of the Fisherman's Trail
IVS was changed per Work Plan (to avoid memorizing seed locations).
Team successfully found blind seed 6 (small ISO) and identified it as target 400.
No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	11
Haynes	Tech 1	ERT	11
Lucas	Geophysicist	ERT	8.5
VISITORS			
David Alfonse	Ranger	National Park Service	
Brian Malley	Ranger	National Park Service	
Jean Heuser	Ranger	National Park Service	
Greg Goepfert	CENAN PM	USACE	



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/1/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 98.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 652 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny, light wind				TEMP: 52- 67 F		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
Fisherman' Trail – North End	NA	Approx.900'	26 Digs Completed	0	0	
"J" Lot Trails	N/A	Approx. 500'	61 digs completed	3	3	To be Demilitarized 11-2-17
		CUMULATIVE		CUMULATIVE		
		12,500 LF		MD	MEC	
				10	4	
<p>Comments: Transects were continued today on Fisherman's Trail, at the North end of the island (M) lot. Approx. 1400' was inspected and cleared. 2 ea. 8" projectiles were located and identified along the "J" Lot Trail, adjacent to the lot itself (21') & (63'), respectively: #1 - Mk 19 w/ BD fuze MK19 or 21. #2 - 8"/55 w/M53 fuze.</p> <p>Notifications with USACE, Dispatch and NPS were begun at approx. 1445 hrs. Preparations and Guard postings were completed by 1830 hrs. Note that an MPPEH item (5" Naval projectile), secured since 10-27-17, has also been determined to require a BIP and will be included with above activities (3 total MEC items).</p> <p>3 minor MD (frag) pieces were also found this day.</p>						
<p>SUXOS SIGNATURE:</p> 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/1/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC performed inspections of the Fisherman's Trail from the Observation Deck trail South.

UXOQC also performed random inspections of the "J" Lot South trail.

Dig team successfully found blind seed 5 on the trail and identified it as target 524.

No negative issues found.

Identification of the 2 BIP items was reviewed and agreed upon with SUXOS.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	17
Haynes	Tech 1	ERT	17
Lucas	Geophysicist	ERT	9.5
VISITORS			
Jean Heuser	NPS Liaison	National Park Service	2.5
Brian Malley	NPS	National Park Service	2.5



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/2/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 77 hrs		CUMULATIVE MANHOURS THIS EFFORT: 729 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny, light wind				TEMP: 52- 67 F		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
"J" Lot Trails	N/A	Approx. 700'	58 digs completed	3*		
		CUMULATIVE		CUMULATIVE		
		14,800 LF		MD	MEC	
				13	4	
Comments: Transects were continued today on "J" Lot Trails. 2 ea. 8" projectiles were BIP'd today along with an MPPEH item identified during an MDAS inspection performed by the SUXOS and UXOSO/QC. Items BIP'd and Demilitarized today; <u>FINAL ID:</u> * #1 – Mk19 Mods 1-3, 8" (AP)—anomaly #512 #2 - Mk 32 Mods 1-4, 5" (AP)—anomaly #199 #3 – Mk 24/25 Mod 1, 8" (AP)—anomaly #521 Support given to us by the NPS and base PD limiting access to civilians, was outstanding. *Final ID supersedes any previous attempts at Identification.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 11/2/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the “J” lot trails North and East of the lot.

No negative issues found. No blind seeds encountered.

Demo holes were inspected and cleared before being refilled.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	7
Haynes	Tech 1	ERT	7
Lucas	Geophysicist	ERT	8
VISITORS			
Jean Heuser	NPS Liaison	National Park Service	2.5
Brian Malley	NPS	National Park Service	2.5
Jim Varick	NJ Bomb Squad	NJPD – Blasters License	2.5
Jeff Lander	HE Delivery	Tripwire	2.5



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/3/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 48 hrs		CUMULATIVE MANHOURS THIS EFFORT: 700 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny, light wind				TEMP: 52- 67 F		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
"J" Lot Trails	N/A	Approx. 500'	28 digs completed	0	0	
"T" Lot trails	N/A	Approx. 350'	5 digs completed	0	0	
"NIKE" Trails	N/A	Approx. 1500'	12 digs completed	0	0	
		CUMULATIVE		CUMULATIVE		
		17,700 LF		MD	MEC	
				13	4	
Comments: Transects were continued today on "J""T" and the NIKE Trails. Approx. 2,900' was inspected and cleared. Trails went quick today very little anomalies as we moved South						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/3/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the “J” “T” and the NIKE trails

No blind seeds encountered. No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	6
Thompson	QC-SO	ERT	6
Watson	Tech 3	ERT	6
Hayes	Tech 2	ERT	6
McCarthy	Tech 2	ERT	6
Jones	Tech 1	ERT	6
Haynes	Tech 1	ERT	6
Lucas	Geophysicist	ERT	6
VISITORS			
Jean Heuser	NPS Liaison	National Park Service	2.5
Brian Malley	NPS	National Park Service	2.5
David Alfonse	NPS	National Park Service	2.5
D. Gambino	NPS	National Park Service	2.5



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/6/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 87 hrs		CUMULATIVE MANHOURS THIS EFFORT: 787 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Cloudy				TEMP: 57- 67 F		
TRANSECT NAME	AMOUNT CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
"E" Lot MRS 8 perimeter	N/A	Approx. 900'	22 digs completed	1	0	MD was a Chain Shot cannonball. It has been reported to NPS Archaeological personnel.
206,203,211, 213,216	Approx. 750'	Approx 100'	35 digs completed	0		
		CUMULATIVE		CUMULATIVE		
<i>Mistake—should have been 21,200 total →</i>		18,600 LF		MD	MEC	
				14	4	
Comments: Investigations were continued today on "E" Lot MRS 8 perimeter trails. Approx. 900' (<i>actual 3,500</i>) was inspected and cleared. <u>Transects were begun, including both cutting/brush removal under NPS oversight.</u> Approx.. 750' completed						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 11/6/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the “E” lot MRS trails and South to the end of Lot “C”.

No negative issues found.

4 blind seeds were recovered during today’s operations.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	11
Haynes	Tech 1	ERT	11
Lucas	Geophysicist	ERT	8
James	Stubby	ERT	2
VISITORS			
Jean Heuser	NPS Liaison	National Park Service	1.5
Brian Malley	NPS	National Park Service	10
David Alfonse	NPS	National park Service	10



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/7/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 77 hrs		CUMULATIVE MANHOURS THIS EFFORT: 864 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Cloudy, 90% chance of rain				TEMP: 38- 49 F		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
201,203	Approx. 6800' LF	N/A	N/A	0	0	
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	7,550 LF	21,200 LF		MD	MEC	
				14	4	
Comments: Transect cutting of MRS 08. Potential issue is transects under water that are not currently diggable. This is primarily the western transects along Spermacetti Cove. Working on options for this situation.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/7/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the MRS transects
No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	11
Haynes	Tech 1	ERT	11
VISITORS			
D. Gambino	NPS	National Park Service	10
Brian Malley	NPS	National Park Service	10



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/8/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 77 hrs		CUMULATIVE MANHOURS THIS EFFORT: 941 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Cloudy				TEMP: 38- 46 F		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See list in comments	Approx. 6,200 LF	N/A	N/A	0	0	
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	13,750 LF	21,200 LF		MD	MEC	
				14	4	
Comments:						
Transect cutting of MRS 08 continued all day.						
Transects completed include: #'s 203 , 206 , 207 , 211 ,212 , 215 , 216 , 217 , 219 , 220 , 222 , 223 , 224						
Estimate is approx. 6,200 LF completed today.						
A missed unpaved trail was completed at the end of the day. (Gunnison Beach)						
Any transects underwater will be reconned next week as high tide conditions are expected to abate.						
SUXOS SIGNATURE:						
						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/8/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the MRS transects.
No negative issues found. No deficiencies noted.
UXOQC also inspected Gunnison Beach Trail.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	11
Haynes	Tech 1	ERT	11
VISITORS			
D. Gambino	NPS	National Park Service	10
Brian Malley	NPS	National Park Service	10



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/9/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP. SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 77 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,018 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Cloudy				TEMP: 35- 56 F		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See list in comments	Approx. 5,800 LF	N/A	N/A	0	0	
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	19,550 LF	21,200 LF		MD	MEC	
				14	4	
Comments: Transect cutting of MRS 08 continued all day. All or portions of the following transects were cut today: #'s 204 , 208 , 209 , 210 , 213 , 214 , 218 , 221 , 225 , 226 , 227 , 228 , 229 , 230 , 231 232 , 233 , 234 , 235 , 236 , 237 , 238 , 239 , 240 , 241. Estimate is approx. 5,800 LF completed today. Significant areas of poison ivy encountered. Team still determining status of underwater transects caused by high tides. Tomorrow, Friday, is Veteran's Day—no work.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/9/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the MRS transects
No negative issues found.

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	11
Haynes	Tech 1	ERT	11
VISITORS			
D. Gambino	NPS	National Park Service	10
David Alfonse	NPS	National Park Service	10



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/13/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 77 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,095 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Rainy				TEMP: 42- 46 F		

TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See list in comments	Approx. 5,600 LF	N/A	N/A	0	0	
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	26,400* LF	21,200 LF		MD	MEC	
	* this number revised upward from estimate, per actual GPS location data			14	4	

Comments:
 Transect cutting of MRS 08 continued all day. All or portions of the following transects were cut today: #'s 101, 106, 108, 110, 131, 137, 140, 143, 144, 145, 146, 147, 148.

My estimate is approx. 5,600 LF today. A more formal estimate of all trail and transects completed, based on complete GPS data thru today, will be forthcoming

UXOQC-SO submitted the required paperwork for the individuals who had poison ivy issues.

SUXOS SIGNATURE:



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 11/13/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the MRS transects

No negative issues found.

Note: For completeness, please note that the dig team successfully found blind seed 4 (small ISO) and identified it as target 690 during Nov 8 mag & dig efforts (this was mistakenly left off the Nov 8 DQCR).


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Watson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	11
Haynes	Tech 1	ERT	11
VISITORS			
D. Gambino	NPS	National Park Service	10
David Alfonse	NPS	National Park Service	10



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/14/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 77 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,172 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Cloudy				TEMP: 42- 46 F		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See list in comments	Approx. 6,200 LF	N/A	N/A	0	0	
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	32,600 LF	21,200 LF		MD	MEC	
				14	4	
Comments:						
Transect cutting of MRS 8 trails.						
Transect cutting of MRS 08 all day. All or portions of the following transects were cut today: #'s 1, 4, 5, 7, 9, 12, 15, 17, 18, 19, 20, 121.						
Estimate is approx. 6,200 LF today.						
SUXOS SIGNATURE:						
						



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 11/14/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the MRS transects.

2 additional blind seeds were placed on the transects today.

No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	11
Thompson	QC-SO	ERT	11
Wilson	Tech 3	ERT	11
Hayes	Tech 2	ERT	11
McCarthy	Tech 2	ERT	11
Jones	Tech 1	ERT	11
Haynes	Tech 1	ERT	11
Lucas	Geophysicist	ERT	7
VISITORS			
D. Gambino	NPS	National Park Service	10
Brian Malley	NPS	National Park Service	10



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/15/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 77 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,172 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Cloudy				TEMP: 42- 46 F		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See list in comments	Approx. 10,000 LF	N/A	N/A	0	0	
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	42,600 LF	21,200 LF		MD	MEC	
				14	4	
Comments:						
Transect cutting of MRS 08 all day. All or portions of the following transects were cut today: #'s 102, 103, 104, 114, 115, 117.						
Estimate is approx. 10,000 LF today.						
The teams had to skirt some water inundated areas (since they cannot be dug), which increased the production.						
SUXOS SIGNATURE:						
						



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 11/15/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the MRS transects
4 blind seeds were placed on the transects.
No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10.5
Thompson	QC-SO	ERT	10.5
Wilson	Tech 3	ERT	10.5
Hayes	Tech 2	ERT	10.5
McCarthy	Tech 2	ERT	10.5
Jones	Tech 1	ERT	10.5
Haynes	Tech 1	ERT	10.5
Lucas	Geo	ERT	8
VISITORS			
D. Gambino	NPS	National Park Service	10
Brian Malley	NPS	National Park Service	10



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/16/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 82.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,254.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Cloudy				TEMP: 42- 46 F		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See list in comments	Approx. 12,500 LF	N/A	N/A	0	0	
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	21,200 LF		MD	MEC	
				14	4	
Comments: Transect cutting of MRS 08 all day. All or portions of the following transects were cut today: #'s 6, 105, 107, 109, 112, 119, 121, 124, 128, 129, 132, 139, 141, 142. Estimate is approx.12,500 LF today. Transects # 2 & 126 are almost entirely underwater (approx. 2,200'). ERT analyzing whether this linear footage will need to be made up with regard to achievement of DQO.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/16/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the MRS transects
Seeds were placed.
No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10.5
Thompson	QC-SO	ERT	10.5
Wilson	Tech 3	ERT	10.5
Hayes	Tech 2	ERT	10.5
McCarthy	Tech 2	ERT	10.5
Jones	Tech 1	ERT	10.5
Haynes	Tech 1	ERT	10.5
Lucas	Geo	ERT	8
VISITORS			
D. Gambino	NPS	National Park Service	10
Brian Malley	NPS	National Park Service	10
David Alfonse	NPS	National Park Service	10



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/17/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 61.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,316 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 42- 46 F Winds to 35 mph		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
6	N/A	100 LF	0	0	0	
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	21,300 LF		MD	MEC	
				14	4	
Comments: Some GPS issues allowed brush cutting team to get ahead of GPS Transect location marking. Therefore, one team assisted with GPS, while the other team began mag & dig operations on Transect #6. No significant finds.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/17/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the MRS transects
No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	8
Thompson	QC-SO	ERT	8
Wilson	Tech 3	ERT	8
Hayes	Tech 2	ERT	8
McCarthy	Tech 2	ERT	8
Jones	Tech 1	ERT	8
Haynes	Tech 1	ERT	8
Lucas	Geophysicist	ERT	5.5
VISITORS			
D. Gambino	NPS	National Park Service	
David Alfonse	NPS	National Park Service	



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/20/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 73.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,389.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 38- 46 F Winds to 25 mph		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	4,700 LF	82	4	0	MDAS Barrel
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	26,000 LF		MD	MEC	
				18	4	
Comments: Teams resumed full Mag & Dig Ops. Approx. 4,700 LF of mag & dig, including #s: 202, 204, 205, 207, 208 4 MD items found, including an Mk 2, training hand grenade. Geophysicists are doubling up to capturing transects.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/20/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:


UXOQC inspected the MRS transects
No negative issues found.

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10.5
Thompson	QC-SO	ERT	10.5
Wilson	Tech 3	ERT	10.5
Hayes	Tech 2	ERT	10.5
McCarthy	Tech 2	ERT	10.5
Jones	Tech 1	ERT	10.5
Haynes	Tech 1	ERT	10.5
Lucas	Geophysicist	ERT	10
Stuby	Geophysicist	ERT	10
VISITORS			
Brian Malley	NPS	National Park Service	2.5/ on call
David Alfonse	NPS	National Park Service	2.5/ on call



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

DATE: 11/21/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 73.5 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,389.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 38- 56 F Winds to 25 mph		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	1,400 LF	95 digs	1	0	Secured in the MDAS Barrel
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	27,400 LF		MD	MEC	
				19	4	
Comments: Teams performed Dynamic Repeatability testing today with geophysics team participated in the Dynamic Repeatability Transect mapping & Dig hole capturing. Transects investigated today included #s: 215, 211, 206. Linear ft of M&D was approx. 1,400. MD item encountered: a 37mm, complete nomenclature unknown due to base damage.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/21/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the M&D transects.

Team performed Dynamic Repeatability testing.

No negative issues found.

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10.5
Thompson	QC-SO	ERT	10.5
Wilson	Tech 3	ERT	10.5
Hayes	Tech 2	ERT	10.5
McCarthy	Tech 2	ERT	10.5
Jones	Tech 1	ERT	10.5
Haynes	Tech 1	ERT	10.5
Lucas	Geophysics	ERT	10
Stuby	Geophysics	ERT	10
VISITORS			
Brian Malley	NPS	National Park Service	on call
David Alfonse	NPS	National Park Service	on call



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/28/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 70 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,459.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 32- 56 F Winds to 9 mph		

TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	6,000 LF	82 digs	10	0	Secured in the MDAS Barrel
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	33,400 LF		MD	MEC	
				29	4	

Comments:
 Teams performed Mag&Dig ops throughout the Southern section of the MRS. Apart from transects 201 & 203 all transects in the Southern area are complete.

Transects investigated today included #s: 209, 210, 212, 213, 214, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241

Approx. linear footage completed today was 6,000 LF.

10 pieces of MD, mostly frag, were found today.

SUXOS SIGNATURE:



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 11/28/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the M&D transects.

Blind seeds were successfully located today and recorded by QC.

No negative issues found.

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Wilson	Tech 3	ERT	10
Hayes	Tech 2	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	10
Straub	Tech 1	ERT	10
Lucas	Geophysicist	ERT	7
VISITORS			
Brian Malley	NPS	National Park Service	on call
D. Gambino	NPS	National Park Service	on call



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/29/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan “Lee” Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 70 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,529.5 m/hrs		GOV’T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 39- 56 F Winds to 9 mph		

TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	9,000 LF	79 digs	23	0	Secured in the MDAS Barrel
		N/A	N/A	0	0	
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	42,400 LF		MD	MEC	
				52	4	

Comments:

Approx. linear footage completed today was 9,000 LF.

23 pieces of MD, mostly minor frag, were found today.

Transects completed today included #s: 106, 108, 110, 111, 113, 116, 118, 119, 120, 121, 122, 125, 133, 134, 135, 138, 139, 141, 142, 147, 148.

SUXOS SIGNATURE:



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 11/29/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the M&D transects.
No negative issues found.

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Wilson	Tech 3	ERT	10
Hayes	Tech 2	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	10
Straub	Tech 1	ERT	10
Lucas	Geophysicist	ERT	7.5
VISITORS			
Brian Malley	NPS	National Park Service	on call
D. Gambino	NPS	National Park Service	on call



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 11/30/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 70 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,599.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 43- 54 F Winds to 11 mph		

TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	6,500 LF	7 digs	11 Extra MD is from Demo hole	2	MEC/MPPEH items destroyed by detonation. MD secured in the secured barrel.
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	49,100 LF		MD	MEC	
				63	6	

Comments:

Teams located MEC and MPPEH items this morning that required Demo to be performed today: found a possible MEC item in Transect #112 (M303, HE, 57mm w/fuze M86). Also located an M86, APHE, 57mm (Transect #117). This item was unfuzed, but since we had explosives for the first BIP, we conservatively included it. Notifications made at 0710, and later revised to include the second item. Demo set-up was started at approx. 0945. All Clear was called by 1100 hrs. Results:

The transect 112 item (M303, HE, 57mm w/ fuze M86) was full-up HE.
The transect 117 item (M86, APHE, 57mm w/blank plug) was also explosively filled.

Otherwise, approx. 6,500 LF of transects completed, including #s 109, 112, 114, 115, 117, 20, 17

SUXOS SIGNATURE:



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

Date: 11/30/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the M&D transects.

Inspected Demo All Clear.

No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Wilson	Tech 3	ERT	10
Hayes	Tech 2	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	10
Straub	Tech 1	ERT	10
Lucas	Geophysicist	ERT	7.5
VISITORS			
David Alfonse	NPS	National Park Service	on call
D. Gambino	NPS	NPS	on call
Pete McCarthy	NPS	NPS	Site visit
Ralph Rodriguez	NJDEP	NJ Dept. Env. Protection	Site visit
Patrick DiGangi	NJDEP	NJDEP	Site visit
Greg Goepfelt	CENAN PM	USACE	Site visit



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 12/01/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 70 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,669.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 43- 54 F Winds to 11 mph		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	3,500 LF	38 digs	7	0	MD secured in the barrel.
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	52,600 LF		MD	MEC	
				70	6	
Comments: Approx linear ft of mag & dig completed was 3,500 LF. The worked continued primarily in the central portion. Transects completed included #s: 8, 18, 19, 128, 129, 132, 137.						
SUXOS SIGNATURE: 						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 12/01/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the M&D transects.
No negative issues found.

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Wilson	Tech 3	ERT	10
Hayes	Tech 2	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	10
Straub	Tech 1	ERT	10
Lucas	Geophysicist	ERT	7.5
VISITORS			
David Alfonse	NPS	National Park Service	on call
D. Gambino	NPS	National Park Service	on call



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 12/04/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 60 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,729.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 43- 54 F Winds to 11 mph		

TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	80%	98 digs	5	1	All MPPEH/MD secured in the barrel.
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	54,900 LF		MD	MEC	
				75	7	

Comments:

Teams located MPPEH item this morning on Transect 5 in the northern portion that today required a secure storage area for later disposition.

Approx linear ft of mag & dig completed was 2,300 LF, in the northern area. Encountered some water areas in thenorth (i.e., could not dig underwater)

NPS Archaeologist inspected non-munitions related debris of historical value to determine what objects they would like to keep for NPS.

Transects completed included #s: 3, 5, 8, 12.

SUXOS SIGNATURE:



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 12/01/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the M&D transects.
No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Wilson	Tech 3	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	10
Straub	Tech 1	ERT	10
Lucas	Geophysicist	ERT	7.5
VISITORS			
David Alfonse	NPS	National Park Service	on call
Brian Malley	NPS	NPS	on call
Greg Goepfelt	CENAN PM	USACE	
Mary Lou Ehler	Archaeologist	NPS	
Jeanie Heuser	NPS	NPS	



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 12/05/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 60 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,789.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 43- 54 F Winds to 11 mph		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	5,000 LF	72 digs	3	0	All MPPEH/MD secured in the barrel.
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	59,900 LF		MD	MEC	
				78	7	
Comments:						
Teams continued M&D ops. Approx linear ft of M&D completed was 5,000 LF, mostly in the central area.						
Continue to encounter water in northern and central portions. Meandering path on dry areas conducted to the extent practical.						
Transects completed include #s: 300 (make-up between 117 and 119), 203, 107, 102, 101, 15						
SUXOS SIGNATURE:						
						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 12/05/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the M&D transects.
2 blind seeds were located (transects 101 & 203)
No negative issues found.


Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Wilson	Tech 3	ERT	10
McCarthy	Tech 2	ERT	10
Jones	Tech 1	ERT	10
Straub	Tech 1	ERT	10
Lucas	Geophysicist	ERT	6
VISITORS			
D. Gambino	NPS	National Park Service	on call
Brian Malley	NPS	National Park Service	on call



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 12/06/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 40 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,829.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 43- 54 F Winds to 11 mph		
TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	100%	72 digs		1	All MPPEH/MD secured in the barrel.
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	62,400 LF		MD	MPPEH MEC	
				78	8	
Comments:						
Teams continued M&D ops on remaining transects, completing meandering path in water areas of the northern portion.						
MPPEH found on transect #140 was an Mk3Mod&, 3-in, APHE w/Tracer. It was secured for scheduled demo tomorrow.						
Approx. linear footage of mag&dig completed was 2,500 LF.						
SUXOS SIGNATURE:						
						



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 12/06/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

UXOQC inspected the M&D transects.

Initially missed blind seed in transect #102, re-worked transect and found it.

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Wilson	Tech 3	ERT	10
Straub	Tech 2	ERT	10
Lucas	Geophysicist	ERT	6
VISITORS			
D. Gambino	NPS	National Park Service	on call
Brian Malley	NPS	National Park Service	on call



DAILY QUALITY CONTROL REPORT

FORT HANCOCK FUDS – MRS 08

DATE: 12/07/2017				PROJECT: Ft. Hancock FUDS RI – MRS 08		
SUXOS: David Sykes				QC-SO: Nolan "Lee" Thompson		
CLIENT: USACE				CONTRACT: W912QR-12-D-0011, DA02		
MAG. EQUIP. TYPE: Schoenstedt GA-52-CX				EQUIP.SETTING: Schoenstedt set on #4		
TODAY FIELD TIME: 40 hrs		CUMULATIVE MANHOURS THIS EFFORT: 1,869.5 m/hrs		GOV'T. DELAY TIME: N/A		
WEATHER: Sunny				TEMP: 43- 54 F Winds to 11 mph		

TRANSECT NAME	TRANSECTS CUT	AMOUNT M&D COMPLETED	TOTAL TARGETS	MD FOUND	MPPEH / MEC ITEMS FOUND	DISPOSITION OF ITEMS
See transects below	N/A	0	0			
	CUMULATIVE	CUMULATIVE		CUMULATIVE		
	55,100 LF	62,400 LF		MD	MPPEH MEC	
				78	8	

Comments:

Teams performed final DEMO of 2 MPPEH items. Both items were HE filled and destroyed by detonation.

Equipment was loaded and transported back to ERT HQ.

Conex has been reported empty and is awaiting removal.

Roll-off of non-munitions debris has been taken away by Red Bank Recycling.

Work Complete. Remaining personnel will DEMOB on Dec 8, 2017.

SUXOS SIGNATURE:



DAILY QUALITY CONTROL REPORT
FORT HANCOCK FUDS – MRS 08

Date: 12/07/2017

Problems: N/A

Corrective Actions: N/A

Quality Control Activities:

Demo performed, No deficiencies noted.

Government Instructions: N/A

Onsite Personnel	Name/Title	Organization	Daily Hours
Sykes	SUXOS	ERT	10
Thompson	QC-SO	ERT	10
Wilson	Tech 3	ERT	10
Straub	Tech 2	ERT	10
Lucas	Geophysicist	ERT	6
VISITORS			
D. Gambino	NPS	National Park Service	Demo Security
Brian Malley	NPS	National Park Service	Demo Security
David Alfonse	NPS	National Park Service	Demo Security
Greg Goepfelt	CENAN PM	USACE Client	
Jim Varick	NJ Blasters License	NJ State Police Officer	
Jeff from Tripwire	Explosive Delivery	Tripwire Inc.	

Appendix C-2:

Dig Sheets

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DIG SHEET
Ft. Hancock RI, MRS 08 Transects

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
660	636210.31	577233.77	1	6	NMRD	cable	11/6/2017	211
661	636131.51	577581.14	1	6	NMRD	fence post (LIP)	11/6/2017	211
662	636140.78	577524.94	1	2	NMRD	fence post (LIP)	11/6/2017	211
663	636143.85	577514.04	1	18	NMRD	fence post (LIP)	11/6/2017	211
664	636204.95	577254.54	1	4	NMRD	scrap	11/6/2017	211
665	636216.16	577223.67	1	6	NMRD	railroad spike	11/6/2017	211
666	636218.29	577205.79	1	6	NMRD	bolt	11/6/2017	211
667	636232.71	577172.43	1	10	NMRD	scrap	11/6/2017	211
668	636233.06	577165.67	1	4	NMRD	bolt	11/6/2017	211
669	636232.14	577142.01	1	4	NMRD	railroad spike	11/6/2017	211
670	636240.39	577134.62	1	4	NMRD	scrap	11/6/2017	211
671	636238.80	577129.29	1	6	NMRD	bolts	11/6/2017	211
672	636242.55	577119.56	1	6	NMRD	bolts	11/6/2017	211
673	636254.56	577101.95	1	4	NMRD	heavy equipment tracks (LIP)	11/6/2017	211
674	636247.53	577096.52	1	6	NMRD	bolts and railroad spike	11/6/2017	211
675	636254.91	577089.06	1	2	NMRD	steel plate	11/6/2017	211
676	636257.45	577076.64	1	2	NMRD	railroad spike	11/6/2017	211
677	636260.84	577064.22	1	6	NMRD	bolt	11/6/2017	211
678	636259.69	577060.61	1	10	NMRD	railroad spike	11/6/2017	211
679	636188.18	577069.68	1	6	NMRD	door handle	11/6/2017	206
680	636182.43	577098.78	2	3	NMRD	wire	11/6/2017	206
681	636182.65	577111.57	1	4	NMRD	anchor link	11/6/2017	206
682	636157.28	577177.11	1	6	NMRD	bolt	11/6/2017	206
683	636002.62	577796.86	1	3	NMRD	scrap (LIP)	11/6/2017	206
684	636122.78	577269.98	1	8	NMRD	railroad spike	11/6/2017	206
701	635185.74	581621.73	2	3	NMRD	bolt	11/20/2017	212
702	635183.03	581657.61	2	1	NMRD	railroad spike	11/20/2017	212
703	635176.68	581661.75	2	3	NMRD	railroad spike	11/20/2017	212
704	635143.85	581851.16	1	2	NMRD	bolt	11/20/2017	212
705	635141.25	581859.97	2	1	NMRD	fencing	11/20/2017	212
706	635102.68	581938.39	1	0	NMRD	cable	11/20/2017	212
707	635100.39	581946.63	1	0	MD	M2 grenade	11/20/2017	212
708	635100.05	581974.96	2	0	NMRD	rust flakes	11/20/2017	212

DIG SHEET
Ft. Hancock RI, MRS 08 Transects

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
709	635098.69	581996.89	1	2	NMRD	bolt	11/20/2017	212
710	635436.96	581205.09	1	6	NMRD	wire	11/20/2017	219
711	635436.98	581172.24	1	0	NMRD	wire (LIP)	11/20/2017	219
712	635429.47	581152.71	1	0	NMRD	fencing	11/20/2017	219
713	635080.25	582013.23	2	2	NMRD	scrap	11/20/2017	212
714	635428.97	581138.46	1	2	NMRD	bolt	11/20/2017	219
715	635179.62	582017.85	1	0	NMRD	wire/metal	11/20/2017	217
716	635183.57	581983.69	2	6	NMRD	barbed wire (LIP)	11/20/2017	217
717	flag missing			6	NMRD	wire	11/20/2017	
718	flag missing			3	NMRD	barbed wire	11/20/2017	
719	flag missing			3	NMRD	barbed wire	11/20/2017	
720	flag missing			4	NMRD	barbed wire	11/20/2017	
721	flag missing			7	NMRD	nail	11/20/2017	
722	flag missing			6	MD	frag	11/20/2017	217
723	flag missing			2	NMRD	barbed wire (LIP)	11/20/2017	
724	635280.53	580916.89	1	2	NMRD	fence post (LIP)	11/20/2017	207
725	635091.32	581736.47	1	18	NMRD	concrete pad (LIP)	11/20/2017	207
726	635071.17	581809.77	1	6	NMRD	spike	11/20/2017	207
727	flag missing			12	NMRD	asphalt (LIP)	11/20/2017	
728	634780.17	582731.52	1	3	NMRD	wire	11/20/2017	205
729	634490.09	583645.66	1	4	NMRD	spike	11/20/2017	202
730	634502.75	583605.72	1	7	NMRD	cable	11/20/2017	202
731	634785.20	582694.92	1	18	NMRD	scrap	11/20/2017	205
732	634508.72	583581.96	1	6	NMRD	bolt	11/20/2017	202
733	634785.64	582688.81	1	6	NMRD	rebar	11/20/2017	205
734	634791.94	582680.64	1	3	NMRD	spike	11/20/2017	205
735	634547.38	583417.13	1	6	NMRD	railroad tie plate (LIP)	11/20/2017	202
736	634795.49	582671.85	1	1	NMRD	railroad spike	11/20/2017	205
737	634798.64	582653.70	1	4	NMRD	scrap	11/20/2017	205
738	634578.14	583275.84	1	9	NMRD	scrap	11/20/2017	202
739	634804.97	582621.44	1	3	NMRD	eye bolt	11/20/2017	205
740	634813.65	582589.18	1	6	NMRD	pipe fragments	11/20/2017	205
741	634819.05	582565.71	1	0	NMRD	spike	11/20/2017	205

DIG SHEET
Ft. Hancock RI, MRS 08 Transects

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
742	634815.04	582564.58	1	8	NMRD	concrete box (LIP)	11/20/2017	205
743	634823.89	582543.95	1	10	NMRD	railroad tie plate	11/20/2017	205
744	634666.24	582936.24	2	3	NMRD	scrap	11/20/2017	202
745	634849.59	582455.78	1	2	NMRD	wire	11/20/2017	205
746	634897.43	582276.11	1	0	NMRD	nail, fence wire	11/20/2017	205
747	634680.31	582863.20	1	10	NMRD	bolt	11/20/2017	202
748	634909.59	582200.84	1	2	NMRD	tuna can	11/20/2017	205
749	634912.85	582189.28	1	2	NMRD	spike	11/20/2017	205
750	634920.23	582154.04	1	4	NMRD	spike	11/20/2017	205
751	flag missing			6	NMRD	spike x2	11/20/2017	202
752	634923.72	582143.98	1	1.5	NMRD	utility - water pipe (LIP)	11/20/2017	205
753	634926.07	582129.95	1	3	NMRD	utility - unknown (LIP)	11/20/2017	205
754	634725.85	582671.31	2	10	NMRD	wire (LIP)	11/20/2017	202
755	634991.01	582128.10	1	3	NMRD	nail	11/20/2017	205
756	634730.91	582619.01	2	6	NMRD	bolt	11/20/2017	202
757	634755.62	582551.95	1	10	NMRD	spike	11/20/2017	202
758	634890.86	582527.39	1	2	NMRD	wire	11/20/2017	205
759	634765.43	582490.14	2	4	NMRD	metal plate	11/20/2017	202
760	634890.83	582545.30	1	0	NMRD	pin flag	11/20/2017	205
761	634778.06	582435.34	2	10	NMRD	metal plate	11/20/2017	202
762	634878.98	582582.41	1	6	NMRD	wire	11/20/2017	205
763	634869.39	582620.55	1	2	NMRD	cable (LIP)	11/20/2017	205
764	634879.51	582613.45	1	2	NMRD	cable	11/20/2017	205
765	634865.35	582640.82	1	12	NMRD	pipe	11/20/2017	205
766	634849.46	582715.84	1	5	NMRD	piston	11/20/2017	205
767	634864.20	582700.11	1	2	NMRD	wire	11/20/2017	205
768	634830.60	582198.48	1	36	NMRD	6" diameter pipe (LIP)	11/20/2017	205
769	flag missing			6	NMRD	angle iron	11/20/2017	202
770	634857.52	582779.82	1	7	NMRD	bolt	11/20/2017	205
771	634860.99	583028.98	1	0	NMRD	scrap	11/20/2017	214
772	634945.67	582973.27	2	3	NMRD	wire	11/20/2017	218
773	634981.85	582835.80	1	1	NMRD	scrap	11/20/2017	218
774	634865.81	583010.47	1	5	NMRD	wire (LIP)	11/20/2017	214

DIG SHEET
Ft. Hancock RI, MRS 08 Transects

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
775	634865.18	583007.94	1	5	NMRD	wire (LIP)	11/20/2017	214
776	634865.26	583007.17	2	0	NMRD	pipe	11/20/2017	214
777	634868.90	583007.30	1	1	NMRD	pipe	11/20/2017	214
778	634865.96	583006.87	2	6	NMRD	mophead/scrap	11/20/2017	214
779	635053.80	582497.37	2	3	MD	frag	11/20/2017	218
780	634875.55	582995.71	1	1	NMRD	rebar	11/20/2017	214
781	634880.26	582987.67	1	6	NMRD	lock	11/20/2017	214
782	634944.81	582662.43	2	3	MD	frag	11/20/2017	213
783	636188.68	577083.51	1	0	MD	37mm slug, no fuze	11/21/2017	206
784	636258.95	577062.61	1	10	hot rock		11/21/2017	211
785	636260.94	577064.60	1	10	hot rock		11/21/2017	211
786	636257.56	577064.68	1	10	NMRD	bolt	11/21/2017	211
787	636261.92	577069.94	1	10	NMRD	bolt	11/21/2017	211
788	636258.70	577076.05	1	10	NMRD	bolt	11/21/2017	211
789	636254.19	577083.93	1	10	NMRD	scrap metal ring	11/21/2017	211
790	636256.43	577087.91	1	0	NMRD	railroad spike	11/21/2017	211
791	636249.44	577090.51	1	0	hot rock		11/21/2017	211
792	636255.37	577091.74	1	6	NMRD	railroad spike	11/21/2017	211
793	636253.41	577094.76	1	0	hot rock		11/21/2017	211
794	636254.62	577096.67	1	6	NMRD	spike	11/21/2017	211
795	636251.62	577098.21	1	10	NMRD	spike	11/21/2017	211
796	636256.01	577101.22	1	0	NMRD	scrap	11/21/2017	211
797	636253.33	577104.64	1	6	NMRD	spike	11/21/2017	211
798	636249.84	577103.95	1	6	NMRD	2 spikes	11/21/2017	211
799	636250.35	577107.47	1	2	hot rock		11/21/2017	211
800	636245.98	577106.45	1	1	NMRD	2 spikes	11/21/2017	211
801	636249.01	577109.97	1	2	hot rock		11/21/2017	211
802	636244.15	577112.06	1	2	NMRD	spike	11/21/2017	211
803	636241.31	577115.28	1	3	NMRD	spike	11/21/2017	211
804	636244.18	577120.73	1	6	hot rock		11/21/2017	211
805	636242.00	577124.78	1	4	hot rock		11/21/2017	211
806	636238.22	577122.75	1	2	NMRD	railroad spike	11/21/2017	211
807	636238.31	577125.81	1	3	NMRD	bolt	11/21/2017	211

DIG SHEET
Ft. Hancock RI, MRS 08 Transects

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
808	636237.11	577127.81	1	3	NMRD	spike	11/21/2017	211
809	636235.43	577137.67	1	3	NMRD	spike	11/21/2017	211
810	636233.85	577139.42	1	3	NMRD	spike	11/21/2017	211
811	636231.99	577152.80	1	6	hot rock		11/21/2017	211
812	636229.82	577154.24	1	4	NMRD	railroad spike	11/21/2017	211
813	636230.87	577157.81	1	4	NMRD	spike	11/21/2017	211
814	636230.84	577159.96	1	6	NMRD	spike	11/21/2017	211
815	636231.13	577161.57	1	4	NMRD	2 bolts and spike	11/21/2017	211
816	636227.91	577161.36	1	5	NMRD	spike	11/21/2017	211
817	636222.60	577168.57	1	9	NMRD	tanker bar (same as 818)	11/21/2017	211
818	636222.11	577171.81	1	1	NMRD	tanker bar (same as 817)	11/21/2017	211
819	636218.84	577185.41	1	10	NMRD	spike	11/21/2017	211
820	636219.00	577194.56	1	9	NMRD	scrap	11/21/2017	211
821	636215.73	577196.39	1	3	NMRD	spike	11/21/2017	211
822	636215.72	577201.97	1	7	NMRD	scrap	11/21/2017	211
823	636215.33	577208.82	1	2	NMRD	spike	11/21/2017	211
824	636212.09	577222.52	1	10	NMRD	spike	11/21/2017	211
825	636213.08	577226.85	1	5	NMRD	spike	11/21/2017	211
826	636213.23	577236.09	1	3	NMRD	spike	11/21/2017	211
827	636207.45	577250.31	1	12	hot rock		11/21/2017	211
828	636201.51	577277.60	1	4	NMRD	scrap	11/21/2017	211
829	636199.28	577280.45	1	2	hot rock		11/21/2017	211
830	636192.27	577282.01	1	6	NMRD	spike	11/21/2017	211
831	636201.03	577295.93	1	0	hot rock		11/21/2017	211
832	636198.16	577298.15	1	0	hot rock		11/21/2017	211
833	636193.03	577307.28	1	0	hot rock		11/21/2017	211
834	636194.25	577314.15	1	0	hot rock		11/21/2017	211
835	636196.86	577317.00	1	0	hot rock		11/21/2017	211
836	636203.83	577320.68	1	6	hot rock		11/21/2017	211
837	636205.64	577322.03	1	4	hot rock		11/21/2017	211
838	636206.18	577335.33	1	6	NMRD	metal flange	11/21/2017	211
839	636203.43	577358.34	1	0	hot rock		11/21/2017	211
840	636197.49	577365.68	1	4	hot rock		11/21/2017	211

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
841	636177.57	577376.59	1	10	NMRD	bolt	11/21/2017	211
842	636178.34	577372.94	1	0	hot rock		11/21/2017	211
843	636164.18	577367.83	1	0	hot rock		11/21/2017	211
844	636161.90	577370.52	1	0	hot rock		11/21/2017	211
845	636178.35	577381.54	1	0	NMRD	land scaping stake	11/21/2017	211
846	636161.03	577393.67	1	0	hot rock		11/21/2017	211
847	636157.95	577404.72	1	12	NMRD	scrap metal (LIP)	11/21/2017	211
848	636184.38	577060.16	1	3	NMRD	railroad spike	11/28/2017	206
849	636182.61	577066.19	1	12	NMRD	bolt	11/28/2017	206
850	636189.34	577083.54	1	0	MD	small frag pieces	11/28/2017	206
851	636190.93	577094.01	1	10	NMRD	bolt pin	11/28/2017	206
852	636191.28	577097.03	1	6	NMRD	railroad spike	11/28/2017	206
853	636176.21	577120.41	2	4	hot rock		11/28/2017	206
854	636166.33	577123.50	1	0	NMRD	nails	11/28/2017	206
855	636162.83	577125.38	1	0	NMRD	nails	11/28/2017	206
856	636160.10	577153.55	1	0	NMRD	wire	11/28/2017	206
857	636163.73	577177.38	1	1	NMRD	shackle	11/28/2017	206
858	636137.26	577226.08	1	4	NMRD	wire	11/28/2017	206
859	636137.48	577232.78	1	8	NMRD	railroad tie	11/28/2017	206
860	636137.38	577234.86	1	4	NMRD	nail	11/28/2017	206
861	636136.55	577238.72	1	6	NMRD	nails	11/28/2017	206
862	636126.31	577255.60	1	8	NMRD	railroad spike	11/28/2017	206
863	636123.30	577277.57	1	0	NMRD	railroad spike	11/28/2017	206
864	636131.87	577283.61	2	8	NMRD	bolt	11/28/2017	206
865	636133.58	577298.85	1	8	NMRD	railroad spike	11/28/2017	206
866	636132.51	577304.84	1	6	NMRD	railroad spike	11/28/2017	206
867	636133.38	577308.48	1	6	NMRD	railroad spike	11/28/2017	206
868	636129.52	577325.28	1	0	NMRD	railroad spike	11/28/2017	206
869	636125.93	577327.61	1	12	NMRD	railroad spike	11/28/2017	206
870	636114.11	577349.22	2	6	MD	frag	11/28/2017	206
871	636114.01	577366.28	1	4	MD	frag	11/28/2017	206
872	636107.23	577375.44	1	0	MD	frag	11/28/2017	206
873	636109.52	577378.17	1	6	MD	frag	11/28/2017	206

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
874	636106.94	577381.23	1	4	NMRD	washer	11/28/2017	206
875	636097.90	577401.20	1	8	NMRD	railroad spike	11/28/2017	206
876	636094.30	577449.60	1	12	NMRD	scrap	11/28/2017	206
877	636092.55	577456.27	1	12	NMRD	nail and scrap	11/28/2017	206
878	636096.44	577460.87	1	6	NMRD	nails	11/28/2017	206
879	636092.33	577470.02	1	7	NMRD	L-joint	11/28/2017	206
880	636094.52	577483.71	1	12	NMRD	railroad spike	11/28/2017	206
881	636093.35	577486.58	1	6	NMRD	giant railroad spike	11/28/2017	206
882	636094.13	577490.50	1	12	NMRD	giant railroad spike	11/28/2017	206
883	636096.25	577495.89	1	20	NMRD	giant railroad spike	11/28/2017	206
884	636097.30	577500.02	1	20	NMRD	giant railroad spike	11/28/2017	206
885	636095.39	577505.08	1	12	NMRD	pipe (same as 886)	11/28/2017	206
886	636096.97	577506.41	1	12	NMRD	pipe (same as 885)	11/28/2017	206
887	636092.33	577515.81	1	8	NMRD	large bolt	11/28/2017	206
888	636079.30	577541.80	1	20	NMRD	metal debris (LIP)	11/28/2017	206
889	636055.51	577578.96	1	8	NMRD	railroad spike	11/28/2017	206
890	636046.20	577586.30	1	12	NMRD	railroad spike	11/28/2017	206
891	636035.30	577624.17	1	3	NMRD	bolt	11/28/2017	206
892	636033.38	577619.44	1	24	NMRD	large scrap metal	11/28/2017	206
893	636025.73	577613.24	1	6	NMRD	railroad spike	11/28/2017	206
894	635998.48	577648.04	1	4	NMRD	rebar	11/28/2017	206
895	635995.31	577653.87	1	8	NMRD	railroad spike	11/28/2017	206
896	635991.40	577663.47	1	12	NMRD	nails	11/28/2017	206
897	636005.16	577688.46	1	36	NMRD	cable (LIP)	11/28/2017	206
898	636005.13	577692.06	1	36	NMRD	cable (LIP)	11/28/2017	206
899	636007.63	577697.03	1	36	NMRD	cable (LIP)	11/28/2017	206
900	636105.08	577657.67	1	6	hot rock		11/21/2017	211
901	636110.88	577650.69	1	4	hot rock		11/21/2017	211
902	636109.33	577649.53	1	6	hot rock		11/21/2017	211
903	636110.42	577648.54	1	6	hot rock		11/21/2017	211
904	636112.23	577647.20	1	6	hot rock		11/21/2017	211
905	636110.83	577641.45	1	6	hot rock		11/21/2017	211
906	636115.64	577639.17	1	6	hot rock		11/21/2017	211

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
907	636119.79	577625.72	1	6	hot rock		11/21/2017	211
908	636120.33	577622.51	1	1	hot rock		11/21/2017	211
909	636118.98	577618.24	1	6	hot rock		11/21/2017	211
910	636130.81	577581.47	1	2	NMRD	fence post (LIP)	11/21/2017	211
911	636131.40	577572.54	1	8	hot rock		11/21/2017	211
912	636133.68	577570.86	1	6	hot rock		11/21/2017	211
913	636135.12	577551.53	1	1	hot rock		11/21/2017	211
914	636135.62	577550.31	1	1	hot rock		11/21/2017	211
915	636139.93	577529.47	1	1	hot rock		11/21/2017	211
916	636141.12	577525.14	1	2	NMRD	fence post (LIP)	11/21/2017	211
917	636142.73	577519.87	1	2	hot rock		11/21/2017	211
918	636143.09	577515.91	1	24	NMRD	fence post (LIP)	11/21/2017	211
919	636144.00	577513.95	1	24	NMRD	fence post (LIP)	11/21/2017	211
920	636146.56	577501.55	1	1	hot rock		11/21/2017	211
921	636149.11	577501.18	1	2	hot rock		11/21/2017	211
922	636146.93	577474.15	1	4	hot rock		11/21/2017	211
923	636137.75	577473.48	1	6	hot rock		11/21/2017	211
924	flag missing			1	NMRD	scrap	11/21/2017	215
925	636288.67	577091.25	1	1	NMRD	scrap	11/21/2017	215
926	636289.19	577095.65	1	12	NMRD	scrap	11/21/2017	215
927	636303.73	577117.51	1	8	NMRD	railroad spike	11/21/2017	215
928	636255.02	577203.36	1	6	NMRD	railroad spike	11/21/2017	215
929	636274.65	577257.47	1	6	hot rock		11/21/2017	215
930	636273.75	577266.28	1	8	hot rock		11/21/2017	215
931	636273.68	577270.19	1	6	hot rock		11/21/2017	215
932	636272.10	577276.07	1	6	hot rock		11/21/2017	215
933	636271.66	577281.59	1	6	hot rock		11/21/2017	215
934	636271.64	577288.61	1	6	hot rock		11/21/2017	215
935	flag missing			8	hot rock		11/21/2017	215
936	flag missing			1	hot rock		11/21/2017	215
937	flag missing			6	NMRD	wire (LIP)	11/28/2017	111
938	635163.72	583491.34	2	3	NMRD	wire (LIP)	11/28/2017	110
939	635167.55	583500.56	2	1	NMRD	pressure gauge	11/28/2017	110

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
940	635218.53	583619.65	1	2	NMRD	steel cable (LIP)	11/28/2017	113
941	635225.12	583548.94	2	0	NMRD	fence post (LIP)	11/28/2017	113
942	635237.51	583542.10	2	2	NMRD	rebar	11/28/2017	113
943	flag missing			4	hot rock		11/28/2017	113
944	635234.65	583535.03	2	9	NMRD	wire (LIP)	11/28/2017	113
945	635269.25	583690.61	1	0	seed	blind seed 13 (small ISO)	11/28/2017	116
946	635316.19	583814.49	1	1	NMRD	rebar (LIP)	11/28/2017	118
947	635317.37	583804.78	1	2	NMRD	wire (LIP)	11/28/2017	118
948	635397.13	584481.34	1	2	NMRD	wire (LIP)	11/28/2017	130
949	635538.25	584566.95	1	2	NMRD	wire (LIP)	11/28/2017	138
950	635360.53	584861.88	1	3	hot rock		11/28/2017	136
951	flag missing			18	NMRD	railroad tie (LIP)	11/28/2017	126
952	flag missing			12	NMRD	asphalt and rocks (LIP)	11/28/2017	126
953	flag missing			8	NMRD	railroad tie (LIP)	11/28/2017	126
954	flag missing			9	NMRD	pot with handle	11/28/2017	123
955	flag missing			13	NMRD	sheet metal (LIP)	11/28/2017	123
956	635364.33	585284.97	1	6	MD	8 inch projectile fragment	11/28/2017	141
957	635276.80	585246.78	1	6	NMRD	scrap	11/28/2017	139
958	flag missing			10	MD	frag	11/28/2017	119
959	634253.17	587186.53	1	13	NMRD	11 railroad spikes	11/28/2017	119
960	634075.63	587735.83	1	2	MD	8 inch projectile fragment	11/28/2017	119
961	635180.60	585698.39	1	6	MD	frag	11/28/2017	139
962	635061.10	586113.83	1	6	NMRD	barbed wire	11/28/2017	139
963	635276.12	585248.82	1	3	NMRD	barbed wire	11/28/2017	139
964	635274.57	585255.48	1	0	NMRD	wire	11/28/2017	139
965	635276.04	585291.37	1	6	NMRD	scrap	11/28/2017	139
966	635024.14	586170.01	1	6	NMRD	chain	11/28/2017	139
967	635997.66	577716.81	1	6	NMRD	scrap	11/28/2017	139
968	635995.52	577720.45	1	1	MD	frag	11/28/2017	206
968A	flag missing			2	NMRD	large bolt	11/29/2017	206
969	635991.93	577723.82	1	6	NMRD	railroad spike	11/29/2017	206
970	635971.26	577739.59	1	0	NMRD	nail	11/29/2017	206
971	635968.48	577740.49	1	0	NMRD	bolt	11/29/2017	206

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
972	635971.45	577748.88	1	24	NMRD	railroad tie (LIP)	11/29/2017	206
973	635984.65	577756.72	1	4	NMRD	nail	11/29/2017	206
974	636002.80	577765.93	1	2	NMRD	fence post	11/29/2017	206
975	636016.77	577769.11	1	20	hot rock		11/29/2017	206
976	636016.07	577781.62	1	6	hot rock		11/29/2017	206
977	636023.04	577779.66	1	4	hot rock		11/29/2017	206
978	636013.28	577793.05	1	4	hot rock		11/29/2017	206
979	636007.49	577791.72	1	0	hot rock		11/29/2017	206
980	636007.79	577797.52	1	0	hot rock		11/29/2017	206
981	636006.30	577799.47	1	0	hot rock		11/29/2017	206
982	636003.13	577796.77	1	2	NMRD	fence post (LIP)	11/29/2017	206
983	636003.20	577803.40	1	1	hot rock		11/29/2017	206
984	636001.61	577803.91	1	1	hot rock		11/29/2017	206
985	635999.38	577807.12	1	1	hot rock		11/29/2017	206
986	635998.50	577808.78	1	1	hot rock		11/29/2017	206
987	635997.13	577810.25	1	1	hot rock		11/29/2017	206
988	635996.69	577811.51	1	1	hot rock		11/29/2017	206
989	635998.66	577815.01	1	0	hot rock		11/29/2017	206
990	635998.25	577816.92	1	0	hot rock		11/29/2017	206
991	636001.26	577818.16	1	0	hot rock		11/29/2017	206
992	635997.36	577824.47	1	0	hot rock		11/29/2017	206
993	635998.76	577826.86	1	0	hot rock		11/29/2017	206
994	636000.13	577826.41	1	0	hot rock		11/29/2017	206
995	635998.68	577828.08	1	0	hot rock		11/29/2017	206
996	635997.60	577829.90	1	0	hot rock		11/29/2017	206
997	636001.07	577831.04	1	0	hot rock		11/29/2017	206
998	635999.00	577832.12	1	0	hot rock		11/29/2017	206
999	635998.54	577834.42	1	0	hot rock		11/29/2017	206
1000	635997.89	577840.59	1	0	hot rock		11/29/2017	206
1001	635995.45	577850.33	1	8	NMRD	brake part	11/29/2017	206
1002	635996.82	577858.84	1	2	hot rock		11/29/2017	206
1003	635995.54	577870.29	1	4	hot rock		11/29/2017	206
1004	635992.49	577870.05	1	4	hot rock		11/29/2017	206

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	Easting	Northing						
1005	635990.64	577880.21	1	6	NMRD	rebar (same as 1006)	11/29/2017	206
1006	635988.29	577881.30	1	6	NMRD	rebar (same as 1005)	11/29/2017	206
1007	635986.13	577898.42	1	6	hot rock		11/29/2017	206
1008	635986.44	577909.32	1	10	hot rock		11/29/2017	206
1009	635982.13	577916.04	1	10	NMRD	large stake	11/29/2017	206
3-01	633003.26	590654.58	1	4	MD	frag	12/4/2017	3
3-02	633024.82	590567.66	1	6	NMRD	rebar	12/4/2017	3
3-03	633140.02	590174.31	1	4	NMRD	roofing (LIP)	12/4/2017	3
5-01	632915.75	590915.17	1	10	MPPEH	4 inch MK10 APHE projectile, with base plug, unfuzed	12/4/2017	5
5-02	632806.05	591223.44	1	8	NMRD	pipe (LIP)	12/4/2017	5
5-03	632792.41	591343.62	1	4	NMRD	rebar	12/4/2017	5
7-01	633251.31	590093.31	1	6	NMRD	scrap	12/4/2017	7
7-02	633238.43	590139.56	1	4	NMRD	scrap	12/4/2017	7
7-03	633183.19	590324.18	1	8	MD	frag	12/4/2017	7
8-01	632962.38	591049.55	2	2	NMRD	rebar (LIP)	12/1/2017	8
8-02	632899.63	591161.54	2	6	MD	frag	12/1/2017	8
8-03	632882.3	591186.13	2	4	MD	frag	12/1/2017	8
12-3	633205.27	590436.56	1	4	NMRD	scrap	12/4/2017	11
12-4	633261.59	590251.71	1	24	MD	fragment of 16 inch projectile (~160 pounds, LIP)	12/4/2017	11
12-1	633156.20	590585.20	2	8	MD	frag	12/4/2017	12
12-2	633208.63	590505.48	1	6	MD	frag	12/4/2017	12
15-01	632578.75	592406.80	1	0	NMRD	cable (LIP)	12/5/2017	15
15-02	632581.98	592401.89	1	0	NMRD	hot concrete (LIP)	12/5/2017	15
15-03	632585.38	592394.44	1	3	NMRD	nail	12/5/2017	15
15-04	632594.78	592389.84	1	4	NMRD	bolt	12/5/2017	15
15-05	flag missing			3	NMRD	nail	12/5/2017	15
15-06	632735.04	591911.86	1	8	NMRD	barbed wire	12/5/2017	15
15-07	632728.88	591905.77	1	12	NMRD	barbed wire (LIP)	12/5/2017	15
15-08	632733.33	591871.70	1	4	NMRD	large pipe (LIP)	12/5/2017	15
15-09	632728.35	591859.43	1	6	NMRD	large pipe (LIP)	12/5/2017	15
15-10	flag missing			6	seed	blind seed 16 (small ISO)	12/5/2017	15
15-11	632672.10	592162.30	2	6	MD	frag	12/5/2017	15
15-12	632676.18	592120.83	2	6	MD	frag	12/5/2017	15

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	Easting	Northing						
15-13	632714.52	592026.09	1	4	MD	frag	12/5/2017	15
17-01	633519.95	589685.8	2	2	MD	frag	11/30/2017	17
17-02	633493.68	589779.77	2	6	MD	frag	11/30/2017	17
17-03	633459.85	589923.99	2	7	MD	frag	11/30/2017	17
17-04	633464.35	589941.44	1	3	MD	frag	11/30/2017	17
17-05	633452.45	589951.14	1	4	NMRD	scrap	11/30/2017	17
17-06	633442.35	589991.56	1	5	NMRD	barbed wire (LIP)	11/30/2017	17
17-07	633437.9	589995.41	1	11	NMRD	barbed wire (LIP)	11/30/2017	17
18-01	632950.89	591649.29	1	12	NMRD	scrap	12/1/2017	18
18-02	632938.18	591681.01	1	10	NMRD	scrap	12/1/2017	18
18-03	632934.56	591688.42	1	12	NMRD	pipe	12/1/2017	18
18-04	632930.71	591697.73	1	12	NMRD	scrap	12/1/2017	18
18-05	632925.5	591703.4	1	10	NMRD	scrap	12/1/2017	18
18-06	632910.14	591745.43	1	10	hot rock	(LIP)	12/1/2017	18
18-07	632899.58	591766.65	1	2	NMRD	scrap	12/1/2017	18
18-08	632870.98	591843.83	1	4	NMRD	piston	12/1/2017	18
18-09	632852.42	591883.68	1	6	NMRD	scrap	12/1/2017	18
18-10	632837.05	591912.2	1	10	NMRD	angle iron	12/1/2017	18
18-11	632828.11	591936.73	1	12	NMRD	metal strap	12/1/2017	18
18-12	632823.68	591958.44	1	9	NMRD	scrap	12/1/2017	18
18-13	632821.33	591970.24	1	4	hot rock		12/1/2017	18
18-14	632799.46	592015.58	1	6	NMRD	pipe	12/1/2017	18
18-15	632777.5	592072.98	1	7	NMRD	bolt	12/1/2017	18
18-16	632771.52	592085.46	1	8	NMRD	survey marker	12/1/2017	18
18-17	632759.84	592120.76	1	7	NMRD	sheet metal	12/1/2017	18
18-18	632721.33	592238.79	1	4	NMRD	scrap	12/1/2017	18
19-01	632695.29	592401.01	1	7	NMRD	banding	12/1/2017	19
19-02	632693.33	592409.48	1	5	NMRD	bar	12/1/2017	19
101-01	634310.32	584710.73	1	1	NMRD	wire (LIP)	12/5/2017	101
101-02	634303.18	584728.09	1	0	NMRD	wire (LIP)	12/5/2017	101
101-03	634260.03	584837.53	1	12	NMRD	cable (LIP)	12/5/2017	101
101-04	634254.33	584838.50	1	14	NMRD	railroad tie (LIP)	12/5/2017	101
101-05	634245.09	584865.72	1	6	NMRD	railroad spike	12/5/2017	101

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
101-06	634248.24	584902.45	2	15	NMRD	wire (LIP)	12/5/2017	101
101-07	634226.04	584958.19	2	6	seed	blind seed 11 (small ISO)	12/5/2017	101
101-08	634190.62	585089.17	2	8	NMRD	bolt	12/5/2017	101
102-01	634058.55	585685.78	1	6	NMRD	scrap	12/5/2017	102
102-02	634322.26	584856.44	2	8	hot rock		12/5/2017	102
102-03	634345.44	584780.81	2	4	NMRD	wire	12/5/2017	102
102-04	634221.40	5851200.31	1	6	seed	blind seed 12 (small ISO)	12/6/2017	102
107-01	not mapped			3	NMRD	wire (LIP)	12/5/2017	107
107-02	not mapped			4	NMRD	wire (LIP)	12/5/2017	107
107-03	not mapped			4	NMRD	wire (LIP)	12/5/2017	107
107-04	not mapped			2	NMRD	wire (LIP)	12/5/2017	107
107-05	not mapped			0	NMRD	wire (LIP)	12/5/2017	107
107-06	not mapped			0	NMRD	wire (LIP)	12/5/2017	107
109-01	634340.34	585973.30	2	12	MD	frag	11/29/2017	109
112-01	634716.20	585012.15	2	2	MPPEH	57mm round, M303 HE with fuze	11/29/2017	112
112-02	634706.18	585023.34	2	0	MD	frag	11/29/2017	112
114-01	634399.14	586242.62	2	2	MD	frag	11/29/2017	114
114-02	634472.79	586026.37	2	2	MD	frag	11/29/2017	114
114-03	634526.75	585874.94	2	2	NMRD	tent stake	11/29/2017	114
114-04	634524.33	585862.77	2	2	MD	frag	11/29/2017	114
114-05	634658.50	585415.82	2	10	MD	frag	11/29/2017	114
114-06	634720.81	585244.46	2	9	MD	frag	11/29/2017	114
115-01	634114.84	587205.37	2	2	MD	frag	11/29/2017	115
115-02	634145.30	587141.68	3	3	MD	frag	11/29/2017	115
117-01	634050.69	587622.21	1	16	MD	frag	11/29/2017	117
117-02	634115.99	587569.64	1	12	MD	frag	11/29/2017	117
117-03	634260.07	586947.77	1	10	NMRD	nail	11/29/2017	117
117-04	634259.80	586944.36	1	4	NMRD	nails	11/29/2017	117
117-05	634263.40	586944.46	1	16	NMRD	nails	11/29/2017	117
117-06	634286.06	586911.53	1	12	MD	frag	11/29/2017	117
117-07	634296.59	586848.31	2	17	NMRD	nail in wood (LIP)	11/29/2017	117
117-08	634307.64	586833.74	1	14	NMRD	scrap	11/29/2017	117
117-09	634317.93	586769.07	2	14	NMRD	knife	11/29/2017	117

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
117-10	634327.50	586759.56	2	6	MD	frag	11/29/2017	117
117-11	634365.00	586654.65	1	10	NMRD	bolt	11/29/2017	117
117-12	634403.07	586595.79	1	14	MD	frag	11/29/2017	117
117-13	634438.34	586513.77	1	10	MD	frag	11/29/2017	117
117-14	634851.64	584990.91	2	6	MPPEH	57mm round, M86 APHE	11/29/2017	117
117-15	634834.16	585066.80	2	6	NMRD	wire	11/29/2017	117
117-16	634800.65	585188.46	2	16	MD	frag	11/29/2017	117
117-17	634776.22	585314.73	2	10	MD	frag	11/29/2017	117
117-20	634610.45	585853.58	2	10	MD	frag	11/29/2017	117
117-21	634687.18	585556.79	2	10	MD	frag	11/29/2017	117
117-22	634667.13	585605.46	2	0	MD	frag	11/29/2017	117
117-23	634606.15	585881.92	2	4	MD	frag	11/29/2017	117
117-29	634561.77	585956.47	2	6	NMRD	scrap	11/29/2017	117
117-30	634561.13	585989.16	2	12	NMRD	scrap	11/29/2017	117
117-31	634392.36	586453.88	2	12	NMRD	scrap	11/29/2017	117
121-01	634734.21	585896.56	2	2	MD	frag	11/29/2017	121
121-02	634871.08	585411.48	1	4	MD	frag	11/29/2017	121
122-01	635384.04	584030.77	1		seed	blind seed 14 (medium ISO)	11/28/2017	122
128-01	flag missing			10	NMRD	bolt and railroad spike	12/1/2017	128
128-02	flag missing			4	NMRD	scrap	12/1/2017	128
128-03	flag missing			4	NMRD	barbed wire (LIP)	12/1/2017	128
128-04	flag missing			6	MD	frag	12/1/2017	128
131-01	634623.66	586980.12	2	0	MD	frag	12/6/2017	131
132-01	634445.03	587649.98	1	4	MD	frag	12/1/2017	132
132-02	634447.57	587572.59	2	4	NMRD	cable	12/1/2017	132
132-03	634448.92	587544.62	2	2	NMRD	cable (LIP)	12/1/2017	132
132-04	634464.7	587490.37	1	6	MD	frag	12/1/2017	132
137-01	634717.42	586887.24	2	2	MD	frag	12/1/2017	137
137-02	634700.12	586989.2	1	4	hot rock		12/1/2017	137
137-03	634696.78	587046.76	2	2	NMRD	wire	12/1/2017	137
137-04	634691.77	587060.57	1	4	NMRD	cable	12/1/2017	137
137-05	634645.12	587172.16	2	6	MD	frag	12/1/2017	137
140-01	634841.52	586776.92	2	6	MD	frag	12/6/2017	140

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
140-02	634823.90	586807.41	2	6	MD	frag	12/6/2017	140
140-03	634821.82	586801.72	1	4	MD	frag	12/6/2017	140
140-04	634811.47	586802.26	1	2	MD	frag	12/6/2017	140
140-05	634796.16	586873.41	3	6	MPPEH	3 inch Mk 3 Model 7 projectile with tracer	12/6/2017	140
140-06	634794.97	586892.09	2	8	MD	frag	12/6/2017	140
140-07	634762.77	586998.87	2	6	MD	frag	12/6/2017	140
143-01	634838.88	586990.93	1	6	NMRD	rust flakes	12/6/2017	143
143-02	634913.99	586761.37	2	3	MD	frag	12/6/2017	143
143-03	634933.05	586738.39	2	2	MD	frag	12/6/2017	143
143-04	634920.88	586693.99	2	8	MD	frag	12/6/2017	143
146-01	634917.79	587035.48	1	0	MD	frag	12/6/2017	146
146-02	634913.30	587038.54	1	0	MD	frag	12/6/2017	146
203-01	635226.74	580854.92	3	1	hot rock		12/5/2017	203
203-02	635230.28	580837.37	3	4	hot rock		12/5/2017	203
203-03	635246.69	580770.79	3	6	hot rock		12/5/2017	203
203-04	635247.82	580761.68	3	4	NMRD	wire (LIP)	12/5/2017	203
203-05	635262.03	580708.97	3	10	NMRD	barbed wire	12/5/2017	203
203-06	635291.39	580590.81	3	4	hot rock		12/5/2017	203
203-07	635313.37	580499.54	3	10	hot rock		12/5/2017	203
203-08	635321.48	580480.68	3	0	NMRD	fishing line	12/5/2017	203
203-09	635321.42	580473.00	3	24	NMRD	asphalt (LIP)	12/5/2017	203
203-10	635326.80	580439.06	3	6	NMRD	wire	12/5/2017	203
203-11	635334.46	580379.69	3	2	NMRD	wire	12/5/2017	203
203-12	635336.76	580365.47	3	4	NMRD	wire	12/5/2017	203
203-13	635348.10	580333.15	3	6	NMRD	wire	12/5/2017	203
203-14	635366.06	580228.51	3	4	NMRD	wire	12/5/2017	203
203-15	635388.72	580142.81	3	4	NMRD	wire	12/5/2017	203
203-16	635399.25	580118.27	3	0	NMRD	scrap	12/5/2017	203
203-17	635426.78	579994.96	2	3	NMRD	wire	12/5/2017	203
203-18	635467.16	579848.86	2	24	NMRD	wire	12/5/2017	203
203-19	635474.87	579805.63	3	12	NMRD	wire	12/5/2017	203
203-20	635485.35	579793.69	3	0	NMRD	wire	12/5/2017	203
203-21	635485.80	579787.41	3	0	NMRD	wire	12/5/2017	203

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date	transect
	Easting	Northing						
203-22	635535.07	579561.33	3	0	NMRD	wire	12/5/2017	203
203-23	635534.00	579551.15	3	0	NMRD	wire	12/5/2017	203
203-24	635551.43	579484.24	3	0	NMRD	wire	12/5/2017	203
203-25	635573.79	579378.65	2	36	NMRD	scrap (LIP)	12/5/2017	203
203-26	635690.61	578871.84	2	2	NMRD	fence post (LIP)	12/5/2017	203
203-27	635724.48	578716.41	2	8	NMRD	scrap (LIP)	12/5/2017	203
203-28	635737.91	578674.96	2	3	hot rock		12/5/2017	203
203-29	635743.65	578646.63	2	0	NMRD	scrap	12/5/2017	203
203-30	635751.79	578586.32	2	3	hot rock		12/5/2017	203
203-31	635751.92	578500.59	2	4	NMRD	wire	12/5/2017	203
203-32	flag missing			0	NMRD	cable tie-down (LIP)	12/5/2017	203
203-33	635848.43	578134.45	2	0	NMRD	wire	12/5/2017	203
203-34	635856.97	578110.27	2	2	NMRD	wire (LIP)	12/5/2017	203
203-35	635864.16	578092.76	2	36	NMRD	scrap	12/5/2017	203
203-36	635894.37	577998.95	2	4	hot rock		12/5/2017	203
203-37	635897.47	577986.00	2	0	NMRD	wire	12/5/2017	203
203-38	635924.21	577819.81	2	6	seed	blind seed 17 (small ISO)	12/5/2017	203
203-39	636004.67	577512.32	2	2	NMRD	nail	12/5/2017	203
GP-1	634577.16	586030.83	2	6	NMRD	scrap	11/29/2017	300
GP-2	634583.44	586025.14	2	8	NMRD	scrap	11/29/2017	300
GP-3	634599.84	585960.28	2	4	MD	frag	11/29/2017	300
GP-4	634897.07	585015.07	2	10	NMRD	nail	11/29/2017	300

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
85	634610.77	587332.80	2	2	NMRD	wire	10/25/2017
86	634599.10	587329.55	2	10	NMRD	pipe	10/25/2017
87	634609.22	587312.31	1	6	NMRD	bolt	10/25/2017
88	634598.42	587323.86	2	4	NMRD	pipe (LIP)	10/25/2017
89	634599.33	587317.00	1	10	NMRD	wood and nails (LIP)	10/25/2017
90	634595.84	587315.23	1	2	NMRD	scrap	10/25/2017
91	634588.81	587264.77	2	12	seed	seed 2, medium ISO	10/25/2017
92	634585.91	587262.49	1	2	NMRD	fence cap	10/25/2017
93	634590.82	587289.49	2	5	NMRD	wire	10/25/2017
94	634574.61	587248.53	2	2	NMRD	can	10/25/2017
95	634566.58	587209.07	2	3	MPPEH	57mm HEAP Mk1 projectile, fuzed and fired	10/25/2017
96	634539.52	587156.78	2	1	NMRD	angle iron	10/25/2017
97	634549.86	587119.51	2	10	NMRD	pipe	10/25/2017
98	634531.24	587106.34	2	3	NMRD	steel bar	10/25/2017
99	634541.48	587049.60	2	1	NMRD	steel bar	10/25/2017
100	634522.47	587046.98	2	1	NMRD	scrap	10/25/2017
101	634522.55	587041.66	2	2	NMRD	railroad spike	10/25/2017
102	634526.52	587018.08	2	2	NMRD	railroad spike	10/25/2017
103	634553.84	586973.99	2	4	NMRD	Barbed wire	10/25/2017
104	634536.25	586985.75	2	2	NMRD	metal bar	10/25/2017
105	634543.86	586951.56	1	0	NMRD	Barbed wire	10/25/2017
106	634562.72	586926.56	2	4	NMRD	chain	10/25/2017
107	634564.60	586919.48	1	5	NMRD	grill	10/25/2017
108	634556.31	586921.91	1	3	NMRD	scrap	10/25/2017
109	634567.01	586907.03	1	4	NMRD	pin	10/25/2017
110	634577.68	586916.37	1	6	NMRD	chain link fence (LIP)	10/25/2017
111	634585.03	586902.39	1	4	NMRD	steel plate	10/25/2017
112	634593.39	586893.13	1	2	NMRD	steel scrap	10/25/2017
113	634604.59	586888.10	1	4	NMRD	scrap	10/25/2017
114	634620.21	586884.44	2	6	NMRD	scrap	10/25/2017
115	634622.78	586881.33	2	8	NMRD	scrap	10/25/2017
116	634605.35	586881.76	1	4	NMRD	steel (LIP)	10/25/2017

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	Easting	Northing					
117	634654.51	586833.89	2	0	NMRD	cable	10/25/2017
118	634660.37	586840.59	2	4	NMRD	nail	10/25/2017
119	634690.99	586816.43	2	58	NMRD	pipe (LIP)	10/25/2017
120	634766.67	586754.42	1	3	NMRD	scrap	10/25/2017
121	634752.94	586751.25	1	2	NMRD	wire	10/25/2017
122	634762.88	586733.44	1	3	NMRD	scrap	10/25/2017
123	634786.35	586693.06	1	3	NMRD	scrap	10/25/2017
124	634778.63	586688.29	1	2	NMRD	rod	10/25/2017
125	634790.49	586681.15	1	2	NMRD	gear	10/25/2017
126	634799.81	586676.92	1	3	NMRD	nail	10/25/2017
127	634801.17	586666.21	1	2	NMRD	nail	10/25/2017
128	634820.18	586653.35	1	4	NMRD	scrap	10/25/2017
129	634872.00	586600.54	1	3	NMRD	rod	10/25/2017
130	634905.25	586546.41	1	2	NMRD	chain and valve	10/25/2017
131	634904.47	586521.10	2	6	NMRD	rebar	10/25/2017
132	634930.47	586500.28	2	4	NMRD	bolt	10/25/2017
133	634943.40	586448.59	2	2	NMRD	scrap	10/25/2017
134	634941.32	586443.69	2	4	NMRD	scrap	10/25/2017
135	634958.25	586409.15	2	0	NMRD	scrap	10/26/2017
136	634971.73	586384.62	3	0	NMRD	concrete	10/26/2017
137	634979.98	586376.72	2	2	NMRD	screwdriver	10/26/2017
138	634981.27	586363.15	2	3	NMRD	nail	10/26/2017
139	634986.44	586359.80	1	6	NMRD	can	10/26/2017
140	634980.86	586359.88	1	3	NMRD	scrap	10/26/2017
141	634998.03	586349.22	1	4	NMRD	can	10/26/2017
142	634981.55	586357.37	2	6	NMRD	scrap	10/26/2017
143	635007.40	586337.28	1	2	NMRD	can	10/26/2017
144	635032.52	586321.35	1	0	NMRD	steel grate	10/26/2017
145	635060.41	586301.09	1	8	NMRD	steel bar	10/26/2017
146	635104.69	586272.38	1	36	NMRD	scrap	10/26/2017
147	635144.72	586154.56	2	3	NMRD	nail	10/26/2017
148	635175.18	586088.17	2	3	NMRD	scrap	10/26/2017

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	Easting	Northing					
149	635177.35	586056.99	2	5	NMRD	scrap	10/26/2017
150	635188.27	586037.03	1	0	NMRD	pipe	10/26/2017
151	635201.11	586027.88	1	6	NMRD	bottle cap	10/26/2017
153	635217.40	585960.26	3	2	NMRD	scrap	10/26/2017
182	635435.89	584962.71	1	2	NMRD	rebar	10/27/2017
183	635435.18	585029.16	1	1	NMRD	spike	10/27/2017
184	635426.29	584996.70	1	3	NMRD	scrap (LIP)	10/27/2017
185	635434.97	585080.19	1	2	NMRD	scrap	10/27/2017
186	635426.58	585080.61	1	3	NMRD	scrap	10/27/2017
187	635427.35	585127.25	2	2	NMRD	comm. Wire	10/27/2017
188	635432.77	585105.46	1	3	NMRD	wire	10/27/2017
189	635432.45	585123.95	2	6	NMRD	wire	10/27/2017
190	635428.34	585145.99	2	13	NMRD	rod	10/27/2017
191	635429.98	585151.71	2	4	NMRD	wire	10/27/2017
192	635440.82	585152.74	2	8	NMRD	fence post (LIP)	10/27/2017
193	635446.30	585171.53	1	2	NMRD	scrap	10/27/2017
194	635459.45	585256.65	1	3	NMRD	cable	10/27/2017
195	635467.39	585254.34	2	6	NMRD	nail	10/27/2017
199	635440.82	585308.64	1	2	MPPEH	5 inch Naval projectile, fired, unfuzed	10/27/2017
200	635459.11	585386.30	2	3	NMRD	scrap	10/27/2017
290	635411.94	584757.01	1	3	NMRD	scrap	10/30/2017
291	635420.09	584785.70	1	8	NMRD	wire	10/30/2017
292	635415.73	584763.69	2	6	NMRD	wire	10/30/2017
629	635088.06	582134.97	2	12	NMRD	steel plate (LIP)	11/6/2017
630	635480.95	582672.89	2	4	seed	blind seed 9 (vertical small ISO)	11/6/2017
631	635463.74	582612.33	2	2	NMRD	railroad spike	11/6/2017
632	635114.28	582160.26	2	10	NMRD	steel plate (LIP)	11/6/2017
633	635117.04	582167.09	2	6	NMRD	steel plate (LIP)	11/6/2017
634	635499.18	582365.11	2	4	coverage seed	pink butter knife	11/6/2017
635	635250.90	582258.02	3	6	NMRD	bolt	11/6/2017
636	635258.47	582255.65	1	2	NMRD	railroad spike	11/6/2017
637	635433.37	582305.66	2	8	NMRD	railroad spike	11/6/2017

DIG SHEET
Ft. Hancock RI, MRS 08 Trails

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
639	635382.51	581388.05	2	6	NMRD	rebar	11/6/2017
640	635396.56	581426.16	2	10	NMRD	railroad spike	11/6/2017
641	635370.24	581823.30	2	2	NMRD	bolt	11/6/2017
642	635359.71	581815.13	2	10	NMRD	railroad spike	11/6/2017
643	635322.29	581796.24	2	6	NMRD	railroad spike	11/6/2017
644	635337.06	581641.66	2	2	NMRD	bolt	11/6/2017
645	635308.05	581792.35	2	8	NMRD	railroad spike	11/6/2017
646	635406.07	581336.02	2	6	NMRD	rebar	11/6/2017
648	635381.54	580992.30	2	18	NMRD	bicycle rim	11/6/2017
649	635377.58	580998.69	2	10	NMRD	rod	11/6/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
1	634334.84	587996.83	1	4	NMRD	Wire	10/24/2017
2	634333.01	587994.66	1	3	NMRD	Wire	10/24/2017
3	634338.76	587993.88	1	3	NMRD	Comm Wire	10/24/2017
4	634341.68	587980.71	1	4	NMRD	Comm Wire, broken	10/24/2017
5	634343.11	587987.20	1	8	NMRD	Steel rod, 12 in long	10/24/2017
6	634347.23	587969.23	1	3	NMRD	Comm Wire	10/24/2017
7	634351.10	587959.41	1	3	NMRD	Comm Wire	10/24/2017
8	634352.95	587954.98	2	3	NMRD	Comm Wire	10/24/2017
9	634365.62	587928.65	2	1	NMRD	Nail	10/24/2017
10	634350.90	587968.66	1	16	NMRD	Steel bar	10/24/2017
11	634366.01	587942.23	1	2	hot rock		10/24/2017
12	634362.80	587942.45	1	2	NMRD	can	10/24/2017
13	634369.37	587927.01	1	3	NMRD	can	10/24/2017
14	634375.32	587918.53	1	2	NMRD	angle iron	10/24/2017
15	634386.90	587891.25	1	1	NMRD	scrap	10/24/2017
16	634384.49	587900.77	1	2	NMRD	scrap	10/24/2017
17	634380.18	587917.05	2	12	NMRD	scrap	10/24/2017
18	634392.83	587909.58	2	48	NMRD	concrete box/utilities (LIP)	10/24/2017
19	634397.51	587849.60	2	2	NMRD	Steel rod	10/24/2017
20	634404.79	587837.69	1	18	NMRD	Steel bar	10/24/2017
21	634398.44	587859.83	2	30	NMRD	Steel pipe (LIP)	10/24/2017
22	634406.68	587847.28	1	1	seed	seed 1, small ISO	10/24/2017
23	634413.54	587842.89	1	8	NMRD	rebar	10/24/2017
24	634409.38	587847.18	1	6	NMRD	scrap (bar)	10/24/2017
25	634400.35	587842.74	2	4	NMRD	sheet metal	10/24/2017
26	634412.18	587825.46	2	12	NMRD	pipe	10/24/2017
27	634420.87	587824.97	2	4	NMRD	scrap, railroad spike	10/24/2017
28	634418.74	587842.51	2	12	NMRD	banding (LIP)	10/24/2017
29	634409.81	587873.17	2	18	NMRD	Steel bar	10/24/2017
30	634405.79	587890.89	2	12	NMRD	Steel bar	10/24/2017
31	634365.57	587961.24	2	2	NMRD	Barbed wire	10/24/2017
32	634353.53	587988.45	2	28	NMRD	pipe	10/24/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
33	634351.33	587997.92	2	30	NMRD	pipe	10/24/2017
34	634430.45	587804.34	2	3	NMRD	U-bolt	10/24/2017
35	634433.34	587808.23	2	2	NMRD	Nail	10/24/2017
36	634441.02	587807.49	2	4	NMRD	bolt	10/24/2017
37	634437.08	587796.14	2	2	hot rock	hot brick	10/24/2017
38	634433.34	587795.13	2	12	NMRD	railroad spike	10/24/2017
39	634436.31	587782.42	2	2	NMRD	metal ring	10/24/2017
40	634447.79	587772.40	1	18	NMRD	scrap	10/24/2017
41	634437.99	587777.48	2	3	NMRD	scrap	10/24/2017
42	634467.14	587714.92	2	6	NMRD	scrap	10/24/2017
43	634474.61	587721.65	2	2	NMRD	nail	10/24/2017
44	634469.19	587715.07	2	6	NMRD	scrap	10/24/2017
45	634472.39	587704.07	2	1	NMRD	metal hook	10/24/2017
46	634481.76	587705.03	2	3	NMRD	banding	10/24/2017
47	634507.45	587649.33	2	3	NMRD	track debris	10/24/2017
48	634499.88	587681.87	1	62	NMRD	pipe	10/24/2017
49	634510.60	587644.20	2	4	NMRD	scrap	10/24/2017
50	634505.51	587670.75	1	2	NMRD	debris	10/24/2017
51	634515.28	587644.57	2	6	NMRD	debris	10/24/2017
52	634522.56	587622.14	2	20	NMRD	pipe	10/24/2017
52A	634522.88	587597.16	2	16	NMRD	debris	10/24/2017
53	634531.11	587596.44	2	8	NMRD	scrap	10/24/2017
54	634541.68	587600.43	1	12	NMRD	scrap	10/24/2017
55	634545.55	587599.04	2	1	NMRD	vertical metal post	10/24/2017
56	634542.29	587594.16	1	6	MD	frag	10/24/2017
57	634541.83	587584.03	1	2	NMRD	vertical metal post	10/24/2017
58	634549.54	587580.34	1	7	NMRD	concrete	10/25/2017
59	634540.18	587566.99	2	2	NMRD	Barbed wire	10/25/2017
60	634547.33	587553.06	2	3	NMRD	scrap	10/25/2017
61	634555.00	587576.46	1	9	NMRD	concrete (LIP)	10/25/2017
62	634556.75	587545.97	2	12	NMRD	scrap	10/25/2017
63	634555.29	587558.88	2	8	NMRD	concrete (LIP)	10/25/2017
64	634554.24	587534.03	2	2	NMRD	cable	10/25/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
65	634559.24	587556.35	2	9	NMRD	pipe (LIP)	10/25/2017
66	634561.92	587512.02	2	0	NMRD	pipe (LIP)	10/25/2017
67	634564.05	587514.65	2	0	NMRD	battery, pipe end	10/25/2017
68	634573.69	587531.81	1	12	NMRD	trash, wire, nails	10/25/2017
69	634579.05	587498.12	1	18	NMRD	16 railroad spikes	10/25/2017
70	634582.04	587507.01	1	16	NMRD	fencing wire	10/25/2017
71	634577.41	587495.29	1	12	NMRD	scrap	10/25/2017
72	634575.43	587489.38	1	2	NMRD	Barbed wire	10/25/2017
73	634584.21	587462.78	2	1	NMRD	scrap	10/25/2017
74	634585.27	587457.96	2	6	NMRD	scrap	10/25/2017
75	634601.71	587443.90	2	4	NMRD	scrap	10/25/2017
76	634588.29	587441.34	2	12	NMRD	Steel bar (LIP)	10/25/2017
77	634607.31	587436.29	1	4	NMRD	nail pit (LIP)	10/25/2017
78	634594.02	587437.10	2	2	NMRD	steel sign	10/25/2017
79	634595.96	587410.32	2	4	NMRD	concrete (LIP)	10/25/2017
80	634600.27	587401.15	1	10	NMRD	rebar (LIP)	10/25/2017
81	634607.45	587430.85	1	26	NMRD	Steel bar (LIP)	10/25/2017
82	634601.92	587410.64	1	14	NMRD	wire	10/25/2017
83	634606.68	587427.76	1	30	NMRD	Steel bar (LIP)	10/25/2017
84	634605.68	587415.82	1	38	NMRD	2 in. diameter pipe (LIP)	10/25/2017
152	635214.66	585986.39	2	2	NMRD	wire	10/26/2017
154	635355.94	585875.17	1	3	NMRD	scrap	10/26/2017
155	635398.12	585820.44	1	3	NMRD	nail	10/26/2017
156	635397.68	585817.05	1	4	NMRD	bolt	10/26/2017
157	635467.70	585769.46	1	6	NMRD	nail	10/26/2017
158	635471.62	585761.90	2	4	NMRD	Barbed wire	10/26/2017
159	635463.27	585737.84	1	10	NMRD	fence post point	10/26/2017
160	635470.85	585714.03	1	30	NMRD	steel bar (LIP)	10/26/2017
161	635471.30	585692.22	1	6	NMRD	concrete	10/26/2017
162	635467.78	585683.77	1	4	NMRD	clamp	10/26/2017
163	635462.18	585651.45	1	1	NMRD	scrap	10/26/2017
164	635458.25	585636.38	2	3	NMRD	wire	10/27/2017
165	634334.50	588014.03	1	14	NMRD	shale, asphalt	10/27/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
166	634319.04	588056.43	2	1	NMRD	wire	10/27/2017
167	634318.76	588016.52	1	18	NMRD	rebar (LIP)	10/27/2017
168	634310.88	588070.76	1	2	NMRD	steel rod	10/27/2017
169	634315.84	588029.86	2	4	NMRD	cable	10/27/2017
170	634320.43	588028.46	1	3	NMRD	nut	10/27/2017
171	634307.87	588041.51	2	1	NMRD	cable	10/27/2017
172	634299.60	588063.60	1	2	NMRD	cable	10/27/2017
173	634294.22	588111.65	1	6	NMRD	scrap	10/27/2017
174	634303.38	588070.77	1	20	NMRD	rebar (LIP)	10/27/2017
175	634295.53	588072.87	1	2	NMRD	cable	10/27/2017
176	634273.38	588159.74	2	1	NMRD	metal bar	10/27/2017
177	634279.86	588109.01	1	2	NMRD	arrow	10/27/2017
178	634255.70	588184.51	1	6	NMRD	railroad spike	10/27/2017
179	634264.81	588147.09	1	2	NMRD	scrap	10/27/2017
180	634258.50	588158.94	1	2	NMRD	comm. Wire	10/27/2017
181	634241.87	588192.36	1	3	NMRD	fence post x2	10/27/2017
196	635449.25	585393.56	2	0	NMRD	steel post	10/27/2017
197	635439.15	585436.01	2	2	NMRD	scrap	10/27/2017
198	635458.67	585440.89	2	8	NMRD	scrap	10/27/2017
201	635219.08	586313.89	2	2	NMRD	Barbed wire	10/27/2017
202	635247.80	586315.90	2	6	MD	frag	10/27/2017
203	635353.36	586305.99	2	2	NMRD	Barbed wire	10/27/2017
204	635404.03	586295.67	1	4	NMRD	scrap	10/27/2017
205	635508.75	586354.03	1	4	seed	seed 7, small ISO	10/27/2017
206	635520.49	586373.17	2	74	NMRD	debris	10/27/2017
207	635524.13	586376.81	1	4	MD	frag	10/27/2017
208	635527.21	586373.27	1	68	NMRD	debris	10/27/2017
209	635561.18	586408.54	2	36	NMRD	pipe (LIP)	10/27/2017
210	635637.05	586460.80	1	18	NMRD	pipe (LIP)	10/27/2017
211	635628.65	586452.30	1	18	NMRD	rebar	10/27/2017
212	635666.92	586462.03	1	8	MD	frag	10/27/2017
213	635683.32	586465.82	1	10	NMRD	scrap	10/27/2017
214	635675.04	586485.03	1	4	NMRD	rebar	10/27/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
215	635685.46	586506.11	1	3	NMRD	rebar	10/27/2017
216	635714.22	586541.78	1	2	NMRD	spring	10/27/2017
217	635742.38	586622.33	1	6	NMRD	fence post (LIP)	10/27/2017
218	635738.92	586594.26	1	4	NMRD	bolt of rebar (LIP)	10/27/2017
219	635730.45	586608.86	1	10	NMRD	fence post (LIP)	10/27/2017
220	635749.51	586646.94	1	4	NMRD	steel cable	10/27/2017
221	635765.16	586648.28	1	6	NMRD	scrap	10/27/2017
222	635774.30	586657.73	1	4	NMRD	scrap	10/27/2017
223	635731.13	586381.49	1	6	NMRD	wire	10/27/2017
224	635723.13	586395.62	1	8	NMRD	fence post (LIP)	10/27/2017
225	635702.27	586407.59	1	62	NMRD	concrete pipe (LIP)	10/27/2017
226	634114.73	588222.57	2	4	NMRD	wire	10/30/2017
227	634115.78	588226.81	1	8	NMRD	rod	10/30/2017
228	634096.35	588269.99	1	4	NMRD	scrap	10/30/2017
229	633966.50	588305.66	1	6	NMRD	steel cable (LIP)	10/30/2017
230	633947.64	588306.93	1	2	NMRD	railroad spike	10/30/2017
231	633947.84	588301.73	1	4	NMRD	scrap	10/30/2017
232	633940.33	588313.25	1	6	NMRD	scrap	10/30/2017
233	633942.97	588317.33	1	10	NMRD	scrap	10/30/2017
234	633940.31	588326.10	1	6	NMRD	railroad spike	10/30/2017
235	633944.87	588326.11	1	10	NMRD	railroad spike	10/30/2017
236	633949.54	588330.35	1	2	NMRD	angle iron	10/30/2017
237	633939.61	588332.26	1	4	NMRD	railroad spike	10/30/2017
238	633938.95	588338.78	1	6	NMRD	scrap	10/30/2017
239	633935.81	588342.05	1	1	NMRD	steel cable (LIP)	10/30/2017
240	633932.60	588342.07	1	6	NMRD	braided cable fragments	10/30/2017
241	633926.88	588338.14	1	4	NMRD	braided cable fragments	10/30/2017
242	633928.63	588341.55	1	6	NMRD	braided cable fragments	10/30/2017
243	633924.73	588351.39	1	4	NMRD	railroad spike	10/30/2017
244	633918.85	588355.50	1	2	NMRD	comm. Wire	10/30/2017
245	633910.53	588353.65	1	6	NMRD	scrap	10/30/2017
246	633885.06	588351.92	1	3	NMRD	railroad spike	10/30/2017
247	633847.28	588288.52	1	2	NMRD	railroad spike x2	10/30/2017

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Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
248	633855.09	588272.57	1	1	NMRD	scrap	10/30/2017
249	633850.86	588269.47	1	0	NMRD	railroad rail (LIP)	10/30/2017
250	633861.09	588263.33	1	4	NMRD	U-bolt	10/30/2017
251	633865.49	588254.49	1	4	NMRD	scrap	10/30/2017
252	633870.28	588248.51	1	4	NMRD	railroad spike	10/30/2017
253	633872.83	588237.96	1	2	NMRD	railroad tie (LIP)	10/30/2017
254	633870.65	588234.42	1	2	NMRD	railroad tie (LIP)	10/30/2017
255	633869.72	588225.83	1	6	NMRD	pipe (LIP)	10/30/2017
256	633873.91	588222.66	1	0	NMRD	comm. Wire	10/30/2017
257	633867.43	588219.49	1	3	NMRD	steel plate	10/30/2017
258	633876.18	588220.93	1	2	NMRD	angle iron	10/30/2017
259	633859.76	588207.29	1	3	NMRD	railroad spike	10/30/2017
260	633865.18	588202.74	1	6	NMRD	steel plate	10/30/2017
261	633847.49	588190.85	1	3	NMRD	railroad spike x9	10/30/2017
262	633842.35	588183.40	1	3	NMRD	railroad piece	10/30/2017
263	633851.52	588183.10	1	8	NMRD	scrap	10/30/2017
264	633831.28	588181.68	1	4	NMRD	railroad spike x12	10/30/2017
265	633814.41	588163.12	1	3	NMRD	railroad spike x4	10/30/2017
266	633826.37	588181.59	1	6	NMRD	steel bar (LIP)	10/30/2017
267	633811.12	588160.23	1	8	NMRD	railroad spike x8	10/30/2017
268	633795.72	588146.21	1	10	NMRD	steel bar	10/30/2017
269	633799.59	588157.56	1	8	NMRD	rebar (LIP)	10/30/2017
270	633787.83	588146.79	1	8	NMRD	metal bar	10/30/2017
271	633776.16	588142.63	1	0	NMRD	steel slab	10/30/2017
272	633760.43	588116.33	1	6	NMRD	scrap	10/30/2017
273	633769.26	588127.14	1	4	NMRD	steel plate x2	10/30/2017
274	633787.31	588132.86	1	6	MD	frag	10/30/2017
275	633735.09	588105.68	1	4	MD	frag	10/30/2017
276	633728.13	588102.06	1	8	MD	frag	10/30/2017
277	633752.85	588119.78	1	12	NMRD	scrap	10/30/2017
278	633737.70	588106.00	1	3	MD	2 inch projectile, empty	10/30/2017
279	633738.92	588112.23	1	6	NMRD	scrap	10/30/2017
280	633742.17	588108.28	1	6	NMRD	bolt	10/30/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
281	flag missing			4	NMRD	steel bar	10/30/2017
282	633731.39	588109.17	1	6	MD	2 inch projectile, empty	10/30/2017
283	633729.76	588109.50	1	8	MD	frag	10/30/2017
284	633744.32	588094.33	1	10	NMRD	sheet metal	10/30/2017
285	633734.82	588089.87	1	4	MD	2 inch projectile, empty	10/30/2017
286	634021.16	588283.80	1	4	seed	blind seed 3 (small stainless steel ISO)	10/30/2017
287	635472.06	584905.02	1	8	NMRD	wire	10/30/2017
288	635464.98	584896.04	1	0	NMRD	concrete with rebar sticking out	10/30/2017
289	635476.29	584885.64	1	6	NMRD	Barbed wire	10/30/2017
293	635523.53	584643.88	1	4	seed	blind seed 8 (small ISO)	10/30/2017
294	635581.53	584538.38	2	6	NMRD	pin	10/30/2017
295	635613.99	584537.68	2	4	NMRD	mesh screen	10/30/2017
296	635655.66	584534.65	1	8	NMRD	pipe	10/30/2017
297	635729.02	584534.96	1	10	NMRD	pulley	10/30/2017
298	635867.99	584450.88	1	6	NMRD	tent stake	10/30/2017
299	635869.30	584286.15	1	28	NMRD	rod (LIP)	10/30/2017
300	635845.33	583867.53	1	16	NMRD	fence post (LIP)	10/30/2017
301	635827.75	583845.92	1	30	NMRD	tire (LIP)	10/30/2017
302	635830.61	583836.78	1	34	NMRD	metal bands (LIP)	10/30/2017
303	635832.30	583790.58	1	24	NMRD	2 inch diameter pipe (LIP)	10/30/2017
304	635833.15	583779.25	1	18	NMRD	2 inch diameter pipe (LIP)	10/30/2017
305	635841.29	583773.28	1	26	NMRD	fence post (LIP)	10/30/2017
306	635832.18	583767.44	1	24	NMRD	2 inch diameter pipe (LIP)	10/30/2017
307	635836.67	583759.47	1	20	NMRD	rebar (LIP)	10/30/2017
308	635828.70	583755.51	1	20	NMRD	scrap (LIP)	10/30/2017
309	635831.77	583748.17	1	24	NMRD	steel bar	10/30/2017
310	635837.23	583738.16	1	18	NMRD	fence post (LIP)	10/30/2017
311	635854.82	583626.71	1	36	NMRD	scrap (LIP)	10/30/2017
312	635700.85	582857.73	1	14	NMRD	wire	10/30/2017
313	635717.60	582865.33	1	30	NMRD	fence post (LIP)	10/30/2017
314	628680.89	598663.89	1	6	NMRD	fence post (LIP)	10/31/2017
315	628646.26	598535.72	1	8	NMRD	bolt	10/31/2017
316	628780.57	598082.87	1	8	NMRD	scrap	10/31/2017

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Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
317	628808.85	598049.45	1	10	NMRD	nail	10/31/2017
318	628816.16	598046.88	1	12	NMRD	nail	10/31/2017
319	628835.87	598005.98	1	0	NMRD	stake	10/31/2017
320	628852.59	597987.83	1	12	NMRD	wire	10/31/2017
321	628853.34	597984.68	1	18	NMRD	scrap	10/31/2017
322	628853.15	597980.28	1	8	NMRD	rebar	10/31/2017
323	628863.43	597978.01	1	30	NMRD	wire	10/31/2017
324	628870.60	597962.80	1	12	NMRD	wire	10/31/2017
325	628875.20	597960.04	1	18	NMRD	wire	10/31/2017
326	628755.57	598061.17	1	14	NMRD	scrap (LIP)	10/31/2017
327	628747.38	597957.75	1	3	NMRD	pipe	10/31/2017
328	628869.07	597726.78	1	2	NMRD	bolt	10/31/2017
329	628926.17	597608.94	1	4	NMRD	scrap	10/31/2017
330	628879.82	597958.78	1	30	NMRD	scrap	10/31/2017
331	628889.43	597945.83	1	10	NMRD	scrap	10/31/2017
332	628899.15	597929.96	1	24	NMRD	railroad tie with spikes	10/31/2017
333	628910.56	597897.70	1	9	NMRD	wood with nails	10/31/2017
334	628926.66	597846.38	1	6	NMRD	bolt	10/31/2017
335	629181.06	597366.83	1	6	NMRD	spike	10/31/2017
335	630252.35	596957.52	1	6	NMRD	pipe (LIP)	11/2/2017
336	629186.47	597365.59	1	0	NMRD	scrap	10/31/2017
337	629185.56	597357.35	1	4	NMRD	scrap	10/31/2017
338	629181.82	597353.70	1	2	NMRD	scrap	10/31/2017
339	628830.33	597254.37	1	2	NMRD	bolt	10/31/2017
340	628896.38	597278.53	1	6	NMRD	scrap	10/31/2017
341	628927.68	597277.44	1	6	NMRD	bolt	10/31/2017
342	629105.42	597212.32	1	14	NMRD	wood with spikes (LIP)	10/31/2017
343	629114.39	597218.05	1	18	NMRD	wood with spikes (LIP)	10/31/2017
344	629153.60	597195.04	2	10	NMRD	wood with spikes (LIP)	10/31/2017
345	629201.39	597179.46	2	4	NMRD	wire	10/31/2017
346	628947.50	597584.17	1	10	NMRD	rod	10/31/2017
347	628972.89	597560.90	1	18	NMRD	spike	10/31/2017
348	629070.04	597427.37	1	2	NMRD	rod	10/31/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
349	629111.01	597379.68	1	3	NMRD	scrap	10/31/2017
350	flag missing			10	NMRD	bolts	10/31/2017
351	629122.02	597350.06	1	8	NMRD	scrap	10/31/2017
352	629154.81	597304.38	1	8	NMRD	spike	10/31/2017
353	629160.72	597281.41	1	10	NMRD	railroad tie (LIP)	10/31/2017
354	629219.53	597225.00	1	4	NMRD	wood with nails (LIP)	10/31/2017
355	629224.31	597237.59	1	6	NMRD	spike	10/31/2017
356	629222.72	597299.19	1	2	NMRD	nail	10/31/2017
357	629215.13	597316.65	1	8	NMRD	wood with nails (LIP)	10/31/2017
358	629201.83	597322.11	1	2	NMRD	pipe	10/31/2017
359	629283.11	597151.50	1	18	NMRD	scrap	10/31/2017
360	629289.19	597151.94	1	10	NMRD	rebar (LIP)	10/31/2017
361	629284.68	597154.92	1	18	NMRD	metal bar	10/31/2017
362	629302.44	597144.62	1	6	NMRD	rebar (LIP)	10/31/2017
363	629342.75	597099.46	1	10	NMRD	wire	10/31/2017
364	629321.81	597115.57	1	8	NMRD	wood with nails (LIP)	10/31/2017
365	629384.44	597038.89	1	1	NMRD	steel plate	10/31/2017
366	629399.36	597001.75	1	4	NMRD	wire	10/31/2017
367	629411.68	596981.45	1	36	NMRD	2 inch diameter pipe (LIP)	10/31/2017
368	629426.93	596976.25	1	32	NMRD	2 inch diameter pipe (LIP)	10/31/2017
369	629451.09	596962.05	1	8	NMRD	asphalt	10/31/2017
370	629470.21	596955.74	1	8	NMRD	wire	10/31/2017
371	629477.28	596958.14	1	10	NMRD	pipe	10/31/2017
372	629481.49	596960.12	2	0	NMRD	manhole cover/concrete (LIP)	10/31/2017
373	629387.51	597045.35	1	0	NMRD	3 inch diameter pipe (LIP)	10/31/2017
374	629384.70	597049.82	1	4	NMRD	rebar	10/31/2017
375	629397.31	597064.34	1	6	NMRD	clamp	10/31/2017
376	629395.95	597078.17	1	10	NMRD	pipe with 'T' (LIP)	10/31/2017
377	629411.81	597084.40	1	6	NMRD	dice	10/31/2017
378	629426.53	597081.62	1	8	NMRD	sheet metal	10/31/2017
379	629433.13	597080.07	1	12	NMRD	metal box	10/31/2017
380	629445.65	597085.12	1	6	NMRD	chain	10/31/2017
381	629457.19	597092.68	1	10	NMRD	pipe (LIP)	10/31/2017

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
382	629466.69	597107.12	1	20	NMRD	rebar	10/31/2017
383	629484.94	597135.34	1	24	NMRD	rebar (LIP)	10/31/2017
384	629483.81	597122.06	1	28	NMRD	scrap (LIP)	10/31/2017
385	629493.67	597135.40	1	16	NMRD	scrap (LIP)	10/31/2017
386	629502.21	597141.68	1	12	NMRD	scrap (LIP)	10/31/2017
387	629556.73	597140.52	1	6	NMRD	scrap	10/31/2017
388	629570.24	597148.99	1	8	NMRD	wire	10/31/2017
389	629634.59	597236.64	1	60	NMRD	pipe (LIP)	10/31/2017
390	629673.51	597226.67	1	64	NMRD	pipe (LIP)	10/31/2017
391	629688.29	597228.15	1	13	NMRD	metal drum (LIP)	10/31/2017
392	629801.38	597263.26	1	13	NMRD	rebar (LIP)	10/31/2017
393	629821.32	597282.53	1	18	NMRD	wood with metal spikes (LIP)	10/31/2017
394	629824.03	597266.03	1	0	NMRD	rebar (LIP)	10/31/2017
395	629836.49	597280.44	1	15	NMRD	fence post (LIP)	10/31/2017
396	flag missing			8	NMRD	scrap (LIP)	10/31/2017
397	629848.86	597275.43	1	6	NMRD	tire (LIP)	10/31/2017
398	629868.19	597270.84	1	4	NMRD	scrap	10/31/2017
399	629878.73	597258.09	1	0	NMRD	braided cable	10/31/2017
400	629891.75	597258.18	1	3	seed	blind seed 6 (small ISO)	10/31/2017
401	629960.06	597239.95	1	20	NMRD	scrap (LIP)	10/31/2017
402	629946.74	597254.94	1	28	NMRD	scrap (LIP)	10/31/2017
403	629938.31	597252.79	1	8	NMRD	Barbed wire	10/31/2017
404	629951.02	597250.26	1	36	NMRD	rebar (LIP)	10/31/2017
405	629996.35	597229.09	1	44	NMRD	scrap (LIP)	10/31/2017
406	629982.81	597244.34	1	48	NMRD	scrap (LIP)	10/31/2017
407	630000.23	597225.93	1	30	NMRD	scrap (LIP)	10/31/2017
408	630016.33	597215.85	1	30	NMRD	scrap (LIP)	10/31/2017
409	630009.34	597232.19	1	18	NMRD	rebar	10/31/2017
410	630014.84	597229.00	1	26	NMRD	scrap	10/31/2017
411	630046.50	597220.17	1	0	NMRD	nail	10/31/2017
412	630040.34	597206.37	1	2	NMRD	fence post	10/31/2017
413	630080.28	597216.42	1	28	NMRD	scrap (LIP)	10/31/2017
414	630080.48	597223.70	1	18	NMRD	scrap (LIP)	10/31/2017

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
415	630088.05	597220.25	1	20	NMRD	scrap (LIP)	10/31/2017
416	630091.24	597214.60	1	14	NMRD	scrap (LIP)	10/31/2017
417	630095.97	597224.97	1	8	NMRD	scrap	10/31/2017
418	630094.49	597217.60	1	12	NMRD	scrap (LIP)	10/31/2017
419	630101.27	597225.51	1	8	NMRD	steel rod	10/31/2017
420	630161.79	597178.19	1	18	NMRD	scrap (LIP)	10/31/2017
421	630435.01	597071.99	1	1	NMRD	scrap, nail	10/31/2017
422	630421.59	597069.82	1	4	NMRD	scrap, bolt	10/31/2017
423	630249.81	597149.84	1	12	NMRD	rebar (LIP)	10/31/2017
424	630177.96	597174.77	1	12	NMRD	scrap	10/31/2017
425	630158.93	597182.27	1	3	NMRD	wire	10/31/2017
426	630117.83	597201.69	1	6	NMRD	bolt	10/31/2017
427	630139.99	597196.86	1	14	NMRD	scrap (LIP)	10/31/2017
428	630132.85	597195.26	1	12	NMRD	scrap	10/31/2017
429	630121.02	597191.96	1	12	NMRD	scrap (LIP)	10/31/2017
430	630122.67	597200.78	1	18	NMRD	bolt (LIP)	10/31/2017
431	630123.04	597185.46	1	12	NMRD	scrap	10/31/2017
432	630115.53	597176.56	1	18	NMRD	scrap (LIP)	10/31/2017
433	630114.40	597161.40	1	20	NMRD	pipe	10/31/2017
434	630105.03	597146.73	1	12	NMRD	wood with nails	10/31/2017
435	630112.34	597163.77	1	16	NMRD	pipe (LIP)	10/31/2017
436	630070.63	597093.25	1	14	NMRD	spike	11/1/2017
437	629680.38	596946.90	1	6	NMRD	Barbed wire	11/1/2017
438	629703.44	596936.29	1	8	NMRD	scrap	11/1/2017
439	630067.33	597086.34	1	36	NMRD	banding (LIP)	11/1/2017
440	629714.07	596932.89	1	6	NMRD	steel cable	11/1/2017
441	630056.83	597085.65	1	18	NMRD	3 inch diameter pipe (LIP)	11/1/2017
442	629723.78	596940.97	2	3	NMRD	wire	11/1/2017
443	629728.78	596938.02	1	3	NMRD	fencing wire	11/1/2017
444	629731.64	596940.77	1	2	NMRD	bolt	11/1/2017
445	629730.70	596946.04	1	6	NMRD	rebar, nail	11/1/2017
446	629742.05	596952.95	1	4	NMRD	wire	11/1/2017
447	630017.22	597072.56	2	8	NMRD	wire	11/1/2017

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
448	629777.05	596972.56	1	6	NMRD	bolt	11/1/2017
449	630996.06	596114.52	1	4	NMRD	nail	11/1/2017
450	631027.66	596101.31	1	3	NMRD	spike	11/1/2017
451	631816.04	596305.40	1	6	NMRD	rebar	11/1/2017
452	631857.53	596308.86	1	30	NMRD	beach chair (LIP)	11/1/2017
453	631609.20	596237.37	1	6	NMRD	fence post (LIP)	11/1/2017
454	631658.01	596254.20	1	24	NMRD	fencing wire (LIP)	11/1/2017
455	631570.55	596238.97	1	18	NMRD	metal bolt (LIP)	11/1/2017
456	631497.04	596215.59	1	1	NMRD	fence post	11/1/2017
457	631499.08	596215.27	1	6	NMRD	fence post (LIP)	11/1/2017
458	631564.48	596243.92	1	36	NMRD	pipe	11/1/2017
459	631488.47	596212.48	1	30	NMRD	pipe (LIP)	11/1/2017
460	631491.29	596216.55	1	32	NMRD	pipe (LIP)	11/1/2017
461	631496.05	596209.57	1	32	NMRD	pipe (LIP)	11/1/2017
462	631437.16	596185.03	1	20	NMRD	steel cable	11/1/2017
463	631413.15	596179.77	1	2	NMRD	axe head	11/1/2017
464	631406.08	596170.06	1	18	NMRD	scrap (LIP)	11/1/2017
465	631401.01	596173.12	1	12	NMRD	scrap (LIP)	11/1/2017
466	631395.46	596168.12	1	12	NMRD	scrap (LIP)	11/1/2017
467	631391.02	596158.81	1	12	NMRD	scrap (LIP)	11/1/2017
468	631385.48	596169.15	1	20	NMRD	scrap (LIP)	11/1/2017
469	631396.10	596175.90	1	12	MD	frag	11/1/2017
470	631372.06	596150.04	1	8	NMRD	scrap	11/1/2017
471	631377.62	596152.85	1	8	NMRD	scrap	11/1/2017
472	631372.35	596160.48	1	4	NMRD	concrete (LIP)	11/1/2017
473	631366.10	596156.39	1	2	NMRD	railroad spike	11/1/2017
474	631367.80	596139.71	1	4	NMRD	bolt	11/1/2017
475	631365.72	596152.54	1	2	NMRD	scrap	11/1/2017
476	631357.71	596138.96	1	3	NMRD	pipe	11/1/2017
477	631361.83	596150.87	1	6	NMRD	scrap	11/1/2017
478	631354.14	596128.70	1	16	NMRD	scrap (LIP)	11/1/2017
479	631359.20	596147.45	1	4	NMRD	scrap (LIP)	11/1/2017
480	631346.06	596126.42	1	4	NMRD	scrap (LIP)	11/1/2017

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
481	631340.68	596122.42	1	6	NMRD	scrap (LIP)	11/1/2017
482	631347.97	596136.41	1	4	NMRD	scrap (LIP)	11/1/2017
483	631331.03	596111.84	1	6	NMRD	nail	11/1/2017
484	631345.91	596133.20	1	8	NMRD	scrap (LIP)	11/1/2017
485	631342.37	596132.62	1	10	NMRD	wire	11/1/2017
486	631342.42	596129.84	1	6	NMRD	scrap (LIP)/railroad spike	11/1/2017
487	631338.59	596125.17	1	3	NMRD	railroad spike x3	11/1/2017
488	631338.25	596128.54	1	2	NMRD	scrap	11/1/2017
489	631324.97	596109.87	1	2	NMRD	scrap	11/1/2017
490	631315.27	596099.92	1	4	NMRD	plate	11/1/2017
491	631305.32	596092.72	1	10	NMRD	scrap	11/1/2017
492	631309.25	596096.93	1	36	NMRD	pipe (LIP)	11/1/2017
493	631335.30	596124.74	1	14	NMRD	scrap	11/1/2017
494	631286.69	596084.66	1	30	NMRD	scrap (LIP)	11/1/2017
495	631266.06	596075.43	1	10	NMRD	scrap (LIP)	11/1/2017
496	631325.39	596114.82	1	10	NMRD	spring and bolt	11/1/2017
497	631251.69	596069.90	1	12	NMRD	bolts and nuts	11/1/2017
498	631249.94	596076.29	1	8	NMRD	cable	11/1/2017
499	631231.51	596058.78	1	14	NMRD	scrap (LIP)	11/1/2017
500	631243.59	596072.50	1	8	NMRD	scrap	11/1/2017
501	631220.78	596059.67	1	18	NMRD	cable	11/1/2017
502	631215.84	596065.02	1	28	NMRD	water pipe	11/1/2017
503	630991.45	596103.71	1	4	NMRD	angle iron	11/1/2017
504	631008.69	596095.80	1	3	NMRD	metal bar	11/1/2017
505	631030.62	596100.46	1	6	NMRD	scrap	11/1/2017
506	631030.87	596096.51	1	4	NMRD	railroad spike	11/1/2017
507	631025.54	596092.88	1	8	NMRD	scrap (LIP)	11/1/2017
508	631048.68	596088.38	1	12	NMRD	scrap	11/1/2017
509	631046.51	596083.88	1	10	NMRD	scrap	11/1/2017
510	631057.39	596086.29	1	7	MD	frag	11/1/2017
511	631067.10	596078.65	1	8	NMRD	scrap train nail	11/1/2017
512	631070.47	596083.39	1	3	MPPEH	8 inch MK19 HEAP Projectile	11/1/2017
513	631075.80	596082.18	1	4	NMRD	scrap, pipe	11/1/2017

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Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
514	631087.97	596072.95	1	10	NMRD	scrap (LIP)	11/1/2017
515	631108.50	596062.82	1	8	NMRD	scrap, bolt	11/1/2017
516	631111.19	596065.67	1	3	NMRD	wire	11/1/2017
517	631113.41	596061.76	1	8	NMRD	rebar	11/1/2017
518	631127.61	596062.84	1	10	NMRD	railroad spike	11/1/2017
519	631128.83	596059.46	1	6	NMRD	wire, pipe	11/1/2017
520	631138.98	596064.74	1	8	NMRD	bolt	11/1/2017
521	631145.11	596056.76	1	13	MPPEH	8 inch HE Projectile, Mk 24/25	11/1/2017
522	631149.93	596066.36	1	12	NMRD	scrap, bolt	11/1/2017
523	631147.02	596058.66	1	4	MD	frag	11/1/2017
524	631209.98	596030.37	1	4	seed	blind seed 5 (medium ISO)	11/1/2017
525	630267.31	597123.90	1	2	NMRD	bolt	11/2/2017
526	630270.56	597099.97	1	8	NMRD	nails	11/2/2017
527	630281.70	597082.24	1	6	NMRD	rebar (LIP)	11/2/2017
528	630280.14	597077.70	1	4	NMRD	bolt	11/2/2017
529	630306.67	597071.28	1	16	NMRD	rebar (LIP)	11/2/2017
530	630306.14	597063.08	1	6	NMRD	U-bolt	11/2/2017
531	630303.26	597057.53	1	4	NMRD	spray paint can	11/2/2017
532	630329.40	597016.15	1	6	NMRD	bolt	11/2/2017
533	630287.36	596972.26	1	48	NMRD	scrap (LIP)	11/2/2017
534	630255.57	596963.14	1	3	NMRD	scrap	11/2/2017
536	630270.70	596940.12	1	3	NMRD	scrap	11/2/2017
537	630275.18	596938.37	1	14	NMRD	pipe (LIP)	11/2/2017
538	630566.54	596991.56	1	2	NMRD	scrap	11/2/2017
539	630673.13	596902.22	1	3	NMRD	spike	11/2/2017
540	630741.34	596867.09	1	6	NMRD	nails	11/2/2017
541	630759.91	596853.42	1	12	NMRD	fence post (LIP)	11/2/2017
542	630813.72	596815.12	1	8	NMRD	tire (LIP)	11/2/2017
543	630886.01	596771.87	1	6	NMRD	scrap	11/2/2017
544	630893.61	596766.09	1	3	NMRD	nail	11/2/2017
545	630926.44	596743.80	1	4	NMRD	nails	11/2/2017
546	630972.90	596682.74	1	18	NMRD	scrap	11/2/2017
547	630989.80	596660.95	1	2	NMRD	bolt	11/2/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
548	631007.12	596655.44	1	26	NMRD	pipe (LIP)	11/2/2017
549	631114.45	596636.53	1	10	NMRD	bolts	11/2/2017
550	631227.38	596608.47	1	6	NMRD	bolt	11/2/2017
551	631216.20	596571.52	1	4	NMRD	rebar (LIP)	11/2/2017
552	631257.18	596542.56	1	12	NMRD	bolts	11/2/2017
553	631276.93	596529.11	1	18	NMRD	bolt	11/2/2017
554	631283.16	596520.40	1	10	NMRD	banding	11/2/2017
555	631301.66	596504.61	1	8	NMRD	spray paint cans	11/2/2017
556	631329.58	596426.52	1	24	NMRD	scrap (LIP)	11/2/2017
557	631318.96	596378.80	1	2	NMRD	can	11/2/2017
558	631379.99	596346.63	1	4	NMRD	wire	11/2/2017
559	631426.00	596244.77	1	20	NMRD	pipe (LIP)	11/2/2017
560	631247.37	596331.74	1	16	NMRD	rebar (LIP)	11/2/2017
561	631213.83	596281.27	1	0	NMRD	steel tank on surface (approx. 7 ft x 5 ft)	11/2/2017
562	631265.14	596183.54	1	10	NMRD	scrap	11/2/2017
563	631229.22	596143.62	1	0	NMRD	debris	11/2/2017
564	631192.52	596053.95	1	20	NMRD	water pipe (LIP)	11/2/2017
565	631481.30	595974.92	1	8	NMRD	rebar	11/2/2017
566	631473.15	595970.22	1	4	NMRD	rebar	11/2/2017
567	631461.57	595980.46	1	0	NMRD	scrap	11/2/2017
568	631390.62	595987.70	1	4	NMRD	pipe	11/2/2017
569	631329.33	595983.51	1	18	NMRD	scrap (LIP)	11/2/2017
570	631317.02	595985.06	1	12	NMRD	nail	11/2/2017
571	631299.18	595985.91	1	12	NMRD	pipe (LIP)	11/2/2017
572	631277.52	595987.66	1	4	NMRD	scrap	11/2/2017
573	631274.75	595987.48	1	4	NMRD	scrap	11/2/2017
574	631244.69	595989.70	1	8	NMRD	metal bar	11/2/2017
575	631238.83	595987.68	1	4	NMRD	nut	11/2/2017
576	631235.17	595989.25	1	1	NMRD	rebar (LIP)	11/2/2017
577	631224.56	595989.00	1	6	NMRD	scrap	11/2/2017
578	631218.53	596006.33	1	0	NMRD	scrap, steel bar (LIP)	11/2/2017
579	631236.83	596001.86	1	6	NMRD	scrap	11/2/2017
580	631242.68	596001.69	1	8	NMRD	scrap	11/2/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
581	631295.41	595997.71	1	4	NMRD	scrap	11/2/2017
582	631391.57	595999.90	1	10	NMRD	rebar (LIP)	11/2/2017
583	631451.92	595997.55	1	8	NMRD	cable (LIP)	11/2/2017
584	631197.88	595980.60	1	4	NMRD	scrap	11/3/2017
585	631183.25	595989.90	1	8	NMRD	scrap	11/3/2017
586	631070.05	595910.03	1	6	NMRD	scrap	11/3/2017
587	631066.21	595907.30	1	2	NMRD	scrap	11/3/2017
588	631062.45	595903.66	1	5	NMRD	scrap	11/3/2017
589	631070.93	595899.19	1	6	NMRD	scrap	11/3/2017
590	631024.33	595881.69	1	2	NMRD	scrap	11/3/2017
591	631037.59	595867.82	1	10	NMRD	hammer	11/3/2017
592	631045.24	595881.35	1	10	NMRD	wire	11/3/2017
593	631039.42	595865.86	1	4	NMRD	U-bolt	11/3/2017
594	631043.03	595863.85	1	8	NMRD	stake	11/3/2017
595	631038.45	595854.62	1	12	NMRD	railroad rail (LIP)	11/3/2017
596	631052.82	595839.77	1	8	NMRD	nails and wire	11/3/2017
597	631073.30	595823.41	1	10	NMRD	scrap	11/3/2017
598	632133.76	595582.76	1	18	NMRD	cable (LIP)	11/3/2017
599	632144.56	595586.27	1	10	NMRD	scrap (LIP)	11/3/2017
600	632236.19	595641.91	1	12	NMRD	scrap	11/3/2017
601	635800.04	583080.04	1	12	NMRD	Barbed wire (LIP)	11/3/2017
602	635802.32	583071.00	1	18	NMRD	Barbed wire (LIP)	11/3/2017
603	635797.60	583074.24	1	0	NMRD	wire (LIP)	11/3/2017
604	635796.96	583064.57	1	10	NMRD	pipe (LIP)	11/3/2017
605	635795.73	583051.21	1	6	NMRD	scrap	11/3/2017
606	635793.28	583057.56	1	4	NMRD	rebar	11/3/2017
607	635799.66	583028.61	1	6	NMRD	fence post (LIP)	11/3/2017
608	635789.36	583013.14	1	8	NMRD	rebar (LIP)	11/3/2017
609	635788.33	582988.94	1	12	NMRD	cable (LIP)	11/3/2017
610	635795.77	582987.49	1	16	NMRD	scrap (LIP)	11/3/2017
611	635793.46	582978.11	1	0	NMRD	pipe fitting (LIP)	11/3/2017
612	635778.19	582924.38	1	24	NMRD	bolt (LIP)	11/3/2017
613	635779.04	582938.29	1	30	NMRD	bolt (LIP)	11/3/2017

DIG SHEET
Ft. Hancock RI, Trails outside MRS 08

Anomaly ID	NJ State Plane, US Survey		GPS qual.	Depth (in)	Contact Type (MPPEH, MD, NMRD, hot rock, seed)	Description (frag, nail, Livens, comments, LIP, etc.)	dig date
	Easting	Northing					
614	635765.31	582915.13	1	36	NMRD	rebar (LIP)	11/3/2017
615	635760.44	582898.71	1	12	NMRD	fence post (LIP)	11/3/2017
616	631169.95	595963.12	1	36	NMRD	pipe (LIP)	11/3/2017
617	631133.02	595954.09	1	20	NMRD	wire (LIP)	11/3/2017
618	631130.35	595951.85	1	12	NMRD	fence post (LIP)	11/3/2017
619	635701.27	582721.71	1	10	NMRD	fence post in concrete (LIP)	11/3/2017
620	635707.34	582838.73	1	6	NMRD	wire	11/3/2017
621	635704.72	582827.87	1	10	NMRD	wire	11/3/2017
622	635611.78	582889.57	1	0	NMRD	fence post (LIP)	11/3/2017
623	635559.84	582334.22	1	8	NMRD	nail	11/3/2017
624	635515.71	582329.21	1	4	NMRD	bolt	11/3/2017
625	635520.23	582323.76	1	6	NMRD	spike	11/3/2017
626	635553.38	582209.56	1	2	NMRD	wire	11/3/2017
627	635567.11	581944.66	1	18	NMRD	cable (LIP)	11/3/2017
628	635550.23	581937.76	1	12	NMRD	wire	11/3/2017
647	635431.24	580902.98	2	3	NMRD	rebar	11/6/2017
650	635317.47	581201.42	2	2	NMRD	scrap	11/6/2017
651	635530.16	580837.55	2	22	MD	Cannon ball, 6 inch diameter	11/6/2017
652	635537.18	580838.22	2	10	NMRD	rebar	11/6/2017
653	635547.89	580840.42	2	8	NMRD	scrap	11/6/2017
654	635552.19	580843.02	2	4	NMRD	scrap	11/6/2017
655	635665.19	580844.79	2	48	NMRD	pipe (LIP)	11/6/2017
656	635707.47	580804.47	2	18	NMRD	pipe (LIP)	11/6/2017
657	635891.90	580830.49	2	24	NMRD	fence post	11/6/2017
658	635876.31	580773.90	2	20	NMRD	fence post	11/6/2017
659	flag missing			24	NMRD	power line	11/6/2017
685	flag missing			6	NMRD	fence post (LIP)	11/6/2017
686	636914.05	575984.90		4	seed	blind seed 10 (small ISO)	11/6/2017
638	flag missing			4	coverage seed	pink bolt	11/6/2017
687	632563.60	592983.33	1	6	NMRD	wire	11/8/2017
688	632573.65	593008.40	1	36	NMRD	concrete (LIP)	11/8/2017
689	632628.53	593040.80	1	10	NMRD	fence post (LIP)	11/8/2017
690	632654.62	593080.09	1	4	seed	blind seed 4 (small ISO)	11/8/2017

Appendix C-3:
Disposition Documentation

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NAME

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Archaeological items provided to NPS
(material documented as safe - MDAS)

Memorandum for Record

12-06-17

To whom it may concern,

ERT Inc. Headquartered in Laurel, MD. Is supplying the National Park Service, represented by Marilou Ehrler, on Fort Hancock with:

2 each – QF 2 Pounder / Base loaded gun projectiles, Unfuzed, INERT

1 each – QF 2 Pounder / Point loaded gun projectile, Unfuzed, INERT

1 each – 6" Cannonball, "Chain – shot" projectile, Unfuzed, INERT. Item is NOT and Never was Explosively filled.

1 each – 8", Mk 19 Mods 1-5, Armor Piercing High Explosive projectile (APHE), Item is NOT and Never was Explosively filled.

1 each – 8", Mk 24/25 Mods 1-5, Armor Piercing High Explosive projectile (APHE), Item is NOT and Never was Explosively filled.

1 each - 5", Mk 3 Mod 1-3, Armor Piercing High Explosive projectile (APHE), Item is NOT and Never was Explosively filled.

1 each – Mk II, Training Hand Grenade, Inert, Unfuzed, Item is NOT and Never was Explosively filled.

All items are certified to be free of any Explosive components or Hazards.

8 Items in Total transferred.

Materials Documented As Safe (MDAS) certified by:

Nolan Thompson

UXOSO/QC

David Sykes

SUXOS

The undersigned assumes all responsibility for proper handling and use of the above listed items.

Marilou Ehrler

National Park Service

"This certifies that the material listed has been 100 percent properly inspected and, to the best of our knowledge and belief, is free of explosive hazards"

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Adobe Designer 7.0

1. TOTAL PRICE										2. SHIP FROM										3. SHIP TO																																							
DOLLARS										CTS										EAT, Inc.										NPS, Bldg. 58																													
UNIT PRICE										DOLLARS CTS										4. MARK FOR																																							
5. DOC DATE										6. NMFC										7. FRT RATE										8. TYPE CARGO										9. PS																			
10. QTY. REC'D										11. UP										12. UNIT WEIGHT										13. UNIT CUBE										14. UFC										15. SL									
1 EA.										16 lb.																																																	
16. FREIGHT CLASSIFICATION NOMENCLATURE																																																											
N/A																																																											
17. ITEM NOMENCLATURE																																																											
Chain Shot Cannonball, Inert																																																											
18. TY CONT										19. NO CONT										20. TOTAL WEIGHT										21. TOTAL CUBE																													
16 lb.																																																											
22. RECEIVED BY										J. Hensee										23. DATE RECEIVED										12-6-17																													

EA. 1 Bldg. 58

David A. Sykes
SAX05
EAT Inc.

David A. Sykes
Nolan L. Thompson
W050/AC
EAT Inc.

Item is certified as Material Documented as Safe (MDAS).

24. DOCUMENT NUMBER & SUFFIX (30-44)										25. NATIONAL STOCK NO. & ADD (6-22)										26. RIC (4-6) UI (23-24) QTY (25-29) CON CODE (71) DIST (55-58) UP (74-80)										27. ADDITIONAL DATA									

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Appendix D: MRSPP

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Table A

MRS Background Information

DIRECTIONS: Record the background information below for the MRS to be evaluated. Much of this information is available from Service and DoD databases. If the MRS is located on a FUDS property, the suitable FUDS property information should be substituted. In the **MRS Summary**, briefly describe the UXO, DMM, or MC that are known or suspected to be present, the exposure setting (the MRS's physical environment), any other incidental nonmunitions-related contaminants (e.g., benzene, trichloroethylene) found at the MRS, and any potentially exposed human and ecological receptors. If possible, include a map of the MRS.

Munitions Response Site Name: NPS Excluded Area

Component: U.S. Army Corps of Engineers, Formerly Used Defense Site (FUDS) Program

Installation/Property Name: (NJ29799F69240) FORT HANCOCK

Location (City, County, State): Highlands, Monmouth County, New Jersey

Site Name/Project Name (Project No.): C02NJ000408R01 NPS Excluded Area

Date Information Entered/Updated: 02/08/2018

Point of Contact (Name/Phone): Public Affairs – (917) 790-8007

Project Phase (check only one):

<input type="checkbox"/> PA	<input type="checkbox"/> SI	<input checked="" type="checkbox"/> RI	<input type="checkbox"/> FS	<input type="checkbox"/> RD
<input type="checkbox"/> RA-C	<input type="checkbox"/> RI	<input type="checkbox"/> RA-O	<input type="checkbox"/> RC	<input type="checkbox"/> LTM

Media Evaluated (check all that apply):

<input checked="" type="checkbox"/> Groundwater	<input checked="" type="checkbox"/> Sediment (human receptor)
<input checked="" type="checkbox"/> Surface soil	<input checked="" type="checkbox"/> Surface Water (ecological receptor)
<input checked="" type="checkbox"/> Sediment (ecological receptor)	<input checked="" type="checkbox"/> Surface Water (human receptor)

MRS Summary:

MRS Description: Describe the munitions-related activities that occurred at the installation, the dates of operation, and the UXO, DMM, or MC known or suspected to be present. When possible, identify munitions, CWM, and MC by type:

The Fort Hancock NPS Excluded Area was used by the U.S. Army from 1874 to 1918 for testing weapons and ordnance; it consists of 140 acres encompassing portions of the six MRS's described in the 2014 RI covering the former proving ground: southwest corner of MRS-1; western edges of MRS-2 and MRS-6; small northwest and southwest corners of MRS-3; western one-third of MRS-4; and western two-thirds of MRS-5. The National Park Service restricted access to these areas during the 2014 RI because of concerns about impacts to sensitive plant communities (i.e., maritime forest). Based on the 2018 RI Addendum #3 investigation, MEC exists in the MRS: 4-inch Mk10 APHE projectile, 57mm Mk1 APHE projectile, 57mm M86 and M303 rounds, and a 3-inch Mk3 projectile (See 2018 RI Addendum #3 Report).

The RI Addendum #3 effort provided additional information about the locations and potential locations of MEC and MD within MRS 08, and areas known or suspected to contain MEC or MD are now smaller. Consequently, the MRS 08 boundary has been reduced accordingly. The revised MRS footprint for MRS 08 is based on identified CMUAs assessed to present an Unacceptable explosive risk, as shown in Figure 10. The new acreage for the revised MRS 08 is 71.0 acres; the remaining 69 acres became part of MRS 07.

Five groundwater samples collected during the 2014 RI were used to represent conditions across all MRSs. No explosives were detected; metals detected are not attributable to the FUDS because they reflect background conditions (Secs 4.2.3 and 5.3.3, RI Report).

Sediment and surface water samples were collected from three locations in the Nike pond within MRS 08 during the 2014 RI. No explosives were detected in the surface water samples, but several MC metals were detected above background concentrations. 2,6-Dinitrotoluene was detected in sediment, along with several metals above background. However, the human health and ecological risk assessments determined that no unacceptable risk is posed by surface water or sediment (Sections 6.2.3.3 and 6.2.3.8, 2014 RI Report).

Per the soil sampling data quality objective (DQO) in the approved 2014 RI work plan and approved Work Plan Addendum, no soil samples were collected in MRS 08 during the 2018 RI Addendum #3 investigation, as no visible evidence of energetic material, e.g., munitions items which are breached, was observed. However, in adjacent MRS 06, 5 surface soil samples were collected during the 2007 SI, and 21 surface soil samples were collected during the 2014 RI. No explosives were detected, and all metals were consistent with background concentrations (Secs 5.3.1.2, 6.1.1, and 6.2.3.5, 2014 RI Report).

Based on the 2018 RI Addendum #3 investigation munitions findings, the EHE module has been assigned a 'B' rating.

Table A

MRS Background Information

DIRECTIONS: Record the background information below for the MRS to be evaluated. Much of this information is available from Service and DoD databases. If the MRS is located on a FUDS property, the suitable FUDS property information should be substituted. In the **MRS Summary**, briefly describe the UXO, DMM, or MC that are known or suspected to be present, the exposure setting (the MRS's physical environment), any other incidental nonmunitions-related contaminants (e.g., benzene, trichloroethylene) found at the MRS, and any potentially exposed human and ecological receptors. If possible, include a map of the MRS.

The human health and ecological risk assessments determined that no unacceptable risk is posed by these media, and therefore the HHE module has been assigned a No Known or Suspected MC Hazard rating.

Both physical and historical evidence indicates that CWM was not present at this MRS (Secs 1.2.1 and 1.4.2, RI Report). Therefore, the CHE module has been assigned the alternative rating of No Known or Suspected CWM Hazard.

The overall Priority Rating for MRS 08 is '3', based on the EHE module.

Stakeholder coordination of the MRSP evaluation occurred through the technical project planning process for the RI. Documentation of stakeholder coordination can be found in FRMD at C02NJ000403_01.22_0500.

Throughout the MRSP, the reference to the "2014 RI Report" refers to the "Final MMRP Remedial Investigation Report, Remedial Investigation/Feasibility Study, Fort Hancock Formerly Used Defense Site, Monmouth County, New Jersey," dated January 2014, found on FRMD at C02NJ000403.10_500 and _501.

Description of Pathways for Human and Ecological Receptors: The potential exposure media and associated exposure pathways for human receptors are: Soil: direct contact with surface soil (ingestion, dermal contact); inhalation via the soil-to-air pathway; Sediment: direct contact (ingestion, dermal contact); Surface water: direct contact (ingestion, dermal contact); and Groundwater: direct contact (ingestion, dermal contact). The potential exposure pathways for ecological receptors are: Soil: Direct contact; and Bioaccumulation into plants, soil invertebrates, and small mammals, and consumption of these food items (Sections 6.2.1 and 6.3.1, 2014 RI Report).

Description of Receptors (Human and Ecological): Based on the current land use, the following human receptors were identified: (1) Outdoor maintenance worker (represents a National Park Service [NPS] ranger who spends the majority of his/her time patrolling the area on foot); (2) Adult and child recreational user (represent members of the public who partake in recreational activities at Fort Hancock); and (3) NPS Archaeologist. Ecological receptors include three potentially-affected terrestrial avian communities (granivores, insectivores, and carnivores) are represented by the mourning dove (granivore), American woodcock (insectivore), red-tailed hawk (carnivore) and the great blue heron (piscivore). For terrestrial mammals, the representative species will be the meadow vole (herbivore), short-tailed shrew (insectivore), and red fox (carnivore)(see Sections 6.2.1.2 and 6.3.1 2014 RI Report).

Table 1**EHE Module: Munitions Type Data Element Table**

DIRECTIONS: Below are 11 classifications of munitions and their descriptions. Circle the scores that correspond with all the munitions types known or suspected to be present at the MRS.

Note: The terms *practice munitions*, *small arms ammunition*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Sensitive	<ul style="list-style-type: none"> UXO that are considered most likely to function upon any interaction with exposed persons (e.g., submunitions, 40mm high-explosive [HE] grenades, white phosphorus [WP] munitions, high-explosive antitank [HEAT] munitions, and practice munitions with sensitive fuzes, but excluding all other practice munitions). Hand grenades containing energetic filler. Bulk primary explosives, or mixtures of these with environmental media, such that the mixture poses an explosive hazard. 	30
High explosive (used or damaged)	<ul style="list-style-type: none"> UXO containing a high-explosive filler (e.g., RDX, Composition B), that are not considered "sensitive." DMM containing a high-explosive filler that have: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	25
Pyrotechnic (used or damaged)	<ul style="list-style-type: none"> UXO containing a pyrotechnic filler other than white phosphorus (e.g., flares, signals, simulators, smoke grenades). DMM containing a pyrotechnic filler other than white phosphorus (e.g., flares, signals, simulators, smoke grenades) that have: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	20
High explosive (unused)	<ul style="list-style-type: none"> DMM containing a high-explosive filler that: <ul style="list-style-type: none"> Have not been damaged by burning or detonation Are not deteriorated to the point of instability. 	15
Propellant	<ul style="list-style-type: none"> UXO containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor) that are: <ul style="list-style-type: none"> Damaged by burning or detonation Deteriorated to the point of instability. 	15
Bulk secondary high explosives, pyrotechnics, or propellant	<ul style="list-style-type: none"> DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). DMM that are bulk secondary high explosives, pyrotechnic compositions, or propellant (not contained in a munition), or mixtures of these with environmental media such that the mixture poses an explosive hazard. 	10
Pyrotechnic (not used or damaged)	<ul style="list-style-type: none"> DMM containing a pyrotechnic filler (i.e., red phosphorus), other than white phosphorus filler, that: <ul style="list-style-type: none"> Have not been damaged by burning or detonation Are not deteriorated to the point of instability. 	10
Practice	<ul style="list-style-type: none"> UXO that are practice munitions that are not associated with a sensitive fuze. DMM that are practice munitions that are not associated with a sensitive fuze and that have not: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	5
Riot control	<ul style="list-style-type: none"> UXO or DMM containing a riot control agent filler (e.g., tear gas). 	3
Small arms	<ul style="list-style-type: none"> Used munitions or DMM that are categorized as small arms ammunition. (Physical evidence or historical evidence that no other types of munitions [e.g., grenades, subcaliber training rockets, demolition charges] were used or are present on the MRS is required for selection of this category.) 	2
Evidence of no munitions	<ul style="list-style-type: none"> Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present. 	0
MUNITIONS TYPE	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	25

DIRECTIONS: Document any MRS-specific data used in selecting the *Munitions Type* classifications in the space provided.

Based on the 2018 RI Addendum #3 investigation, MEC exists in the MRS: 4-inch Mk10 APHE projectile, 57mm Mk1 APHE projectile, 57mm M86 and M303 rounds, and a 3-inch Mk3 projectile. These items are not considered inherently sensitive (See 2018 RI Addendum #3 Report, see photos of MEC items in Appendix G).

Table 2
EHE Module: Source of Hazard Data Element Table

DIRECTIONS: Below are 11 classifications describing sources of explosive hazards. Circle the scores that correspond with all the sources of explosive hazards known or suspected to be present at the MRS.

Note: The terms *former range*, *practice munitions*, *small arms range*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Former range	♦ The MRS is a former military range where munitions (including practice munitions with sensitive fuzes) have been used. Such areas include impact or target areas and associated buffer and safety zones.	10
Former munitions treatment (i.e., OB/OD) unit	♦ The MRS is a location where UXO or DMM (e.g., munitions, bulk explosives, bulk pyrotechnic, or bulk propellants) were burned or detonated for the purpose of treatment prior to disposal.	8
Former practice munitions range	♦ The MRS is a former military range on which only practice munitions without sensitive fuzes were used.	6
Former maneuver area	♦ The MRS is a former maneuver area where no munitions other than flares, simulators, smokes, and blanks were used. There must be evidence that no other munitions were used at the location to place an MRS into this category.	5
Former burial pit or other disposal area	♦ The MRS is a location where DMM were buried or disposed of (e.g., disposed of into a water body) without prior thermal treatment.	5
Former industrial operating facilities	♦ The MRS is a location that is a former munitions maintenance, manufacturing, or demilitarization facility.	4
Former firing points	♦ The MRS is a firing point, where the firing point is delineated as an MRS separate from the rest of a former military range.	4
Former missile or air defense artillery emplacements	♦ The MRS is a former missile defense or air defense artillery (ADA) emplacement not associated with a military range.	2
Former storage or transfer points	♦ The MRS is a location where munitions were stored or handled for transfer between different modes of transportation (e.g., rail to truck, truck to weapon system).	2
Former small arms range	♦ The MRS is a former military range where only small arms ammunition was used. (There must be evidence that no other types of munitions [e.g., grenades] were used or are present to place an MRS into this category.)	1
Evidence of no munitions	♦ Following investigation of the MRS, there is physical evidence that no UXO or DMM are present, or there is historical evidence indicating that no UXO or DMM are present.	0
SOURCE OF HAZARD	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	10

DIRECTIONS: Document any MRS-specific data used in selecting the **Source of Hazard** classifications in the space provided. MRS 08 was part of the United States Army's first official proving ground for testing weapons and ordnance. Firing points and targets are as identified in the Ordnance History-Fort Hancock (1874-1919) (see Sections 1.2.2 and 1.3 of the 2014 RI Report).

Table 3
EHE Module: Location of Munitions Data Element Table

DIRECTIONS: Below are eigmuh classifications of munitions locations and their descriptions. Circle the scores that correspond with all the locations where munitions are known or suspected to be present at the MRS.
Note: The terms *confirmed*, *surface*, *subsurface*, *small arms ammunition*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Confirmed surface	<ul style="list-style-type: none"> Physical evidence indicates that there are UXO or DMM on the surface of the MRS. Historical evidence (i.e., a confirmed report such as an explosive ordnance disposal [EOD], police, or fire department report that an incident or accident that involved UXO or DMM occurred) indicates there are UXO or DMM on the surface of the MRS. 	25
Confirmed subsurface, active	<ul style="list-style-type: none"> Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS, and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM. Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM. 	20
Confirmed subsurface, stable	<ul style="list-style-type: none"> Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed. Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed. 	15
Suspected (physical evidence)	<ul style="list-style-type: none"> There is physical evidence (e.g., munitions debris such as fragments, penetrators, projectiles, shell casings, links, fins), other than the documented presence of UXO or DMM, indicating that UXO or DMM may be present at the MRS. 	
Suspected (historical evidence)	<ul style="list-style-type: none"> There is historical evidence indicating that UXO or DMM may be present at the MRS. 	5
Subsurface, physical constraint	<ul style="list-style-type: none"> There is physical or historical evidence indicating that UXO or DMM may be present in the subsurface, but there is a physical constraint (e.g., pavement, water depth over 120 feet) preventing direct access to the UXO or DMM. 	2
Small arms (regardless of location)	<ul style="list-style-type: none"> The presence of small arms ammunition is confirmed or suspected, regardless of other factors such as geological stability. (There must be evidence that no other types of munitions [e.g., grenades] were used or are present at the MRS to place an MRS into this category.) 	1
Evidence of no munitions	<ul style="list-style-type: none"> Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present. 	0
LOCATION OF MUNITIONS	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 25).	20

DIRECTIONS: Document any MRS-specific data used in selecting the **Location of Munitions** classifications in the space provided.

Based on the 2018 RI Addendum #3 investigation (Sections 5.1 and 5.7), MEC exists in the subsurface of the MRS: 4-inch Mk10 APHE projectile, 57mm Mk1 APHE projectile, 57mm M86 and M303 rounds, and a 3-inch Mk3 projectile. As this is a coastal environment, the possibility exists for naturally occurring phenomena (e.g., flooding, erosion, or tidal action) at the MRS to expose munitions items.

Table 4

EHE Module: Ease of Access Data Element Table

DIRECTIONS: Below are four classifications of barrier types that can surround an MRS and their descriptions. The barrier type is directly related to the ease of public access to the MRS. Circle the score that corresponds with the ease of access to the MRS.

Note: The term *barrier* is defined in Appendix C of the Primer.

Classification	Description	Score
No barrier	♦ There is no barrier preventing access to any part of the MRS (i.e., all parts of the MRS are accessible).	10
Barrier to MRS access is incomplete	♦ There is a barrier preventing access to parts of the MRS, but not the entire MRS.	8
Barrier to MRS access is complete but not monitored	♦ There is a barrier preventing access to all parts of the MRS, but there is no surveillance (e.g., by a guard) to ensure that the barrier is effectively preventing access to all parts of the MRS.	5
Barrier to MRS access is complete and monitored	♦ There is a barrier preventing access to all parts of the MRS, and there is active, continual surveillance (e.g., by a guard, video monitoring) to ensure that the barrier is effectively preventing access to all parts of the MRS.	0
EASE OF ACCESS	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	8

DIRECTIONS: Document any MRS-specific data used in selecting the **Ease of Access** classification in the space provided.

The MRS is open to the public, upon entry into the Sandy Hook Unit of Gateway National Recreation Area (a national park). There is a significant amount of dense, brushy vegetation, including poison ivy, in portions of the MRS that may impede access and act as a partial barrier. (2018 RI Addendum #3, Section 2.1).

Table 5

EHE Module: Status of Property Data Element Table

DIRECTIONS: Below are three classifications of the status of a property within the Department of Defense (DoD) and their descriptions. Circle the score that corresponds with the status of property at the MRS.

Classification	Description	Score
Non-DoD control	<ul style="list-style-type: none">♦ The MRS is at a location that is no longer owned by, leased to, or otherwise possessed or used by DoD. Examples are privately owned land or water bodies; land or water bodies owned or controlled by state, tribal, or local governments; and land or water bodies managed by other federal agencies.♦ The MRS is at a location that is owned by DoD, but that DoD has leased to another entity and for which DoD does not control access 24 hours per day.	5
Scheduled for transfer from DoD control	<ul style="list-style-type: none">♦ The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD, and DoD plans to transfer that land or water body to the control of another entity (e.g., a state, tribal, or local government; a private party; another federal agency) within 3 years from the date the Protocol is applied.	3
DoD control	<ul style="list-style-type: none">♦ The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD. With respect to property that is leased or otherwise possessed, DoD must control access to the MRS 24 hours per day, every day of the calendar year.	0
STATUS OF PROPERTY	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the *Status of Property* classification in the space provided.



The MRS is located on the Sandy Hook Peninsula of New Jersey. This peninsula, which encompasses approximately 1,700 acres, is known as the Sandy Hook Unit of the Gateway National Recreation Area and is a National Historic Landmark. The location of the MRS is currently managed by the Department of the Interior (NPS) and is used for a variety of recreational purposes year-round. (2018 RI Addendum #3, Section 1.2).

Table 6

EHE Module: Population Density Data Element Table

DIRECTIONS: Below are three classifications for population density and their descriptions. Determine the population density per square mile that most closely corresponds with the population of the MRS, including the area within a two-mile radius of the MRS's perimeter. Circle the most appropriate score.

Note: Use the U.S. Census Bureau tract data available to capture the highest population density within a two-mile radius of the perimeter of the MRS.

Classification	Description	Score
> 500 persons per square mile	♦ There are more than 500 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	
100–500 persons per square mile	♦ There are 100 to 500 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	3
< 100 persons per square mile	♦ There are fewer than 100 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	1
POPULATION DENSITY	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	

DIRECTIONS: Document any MRS-specific data used in selecting the *Population Density* classification in the space provided.

The population density of Monmouth County, NJ is 1,344.7 persons per square mile
<https://www.census.gov/quickfacts/fact/table/monmouthcountynewjersey,US/PST045217>

Table 7

EHE Module: Population Near Hazard Data Element Table

DIRECTIONS: Below are six classifications describing the number of inhabited structures near the MRS. The number of inhabited buildings relates to the potential population near the MRS. Determine the number of inhabited structures within two miles of the MRS boundary and circle the score that corresponds with the number of inhabited structures.

Note: The term *inhabited structures* is defined in Appendix C of the Primer.

Classification	Description	Score
26 or more inhabited structures	♦ There are 26 or more inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	5
16 to 25 inhabited structures	♦ There are 16 to 25 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	4
11 to 15 inhabited structures	♦ There are 11 to 15 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	3
6 to 10 inhabited structures	♦ There are 6 to 10 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	2
1 to 5 inhabited structures	♦ There are 1 to 5 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	1
0 inhabited structures	♦ There are no inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	0
POPULATION NEAR HAZARD	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the ***Population Near Hazard*** classification in the space provided.

Inhabited structures include NPS and USCG buildings, residences, a school and daycare facility, and beach houses for use by recreational visitors (see Section 2.1.7 of the 2014 RI Report; Google Earth was used to calculate the total number of inhabited structures within the two-mile radius for this MRS).

Table 8

EHE Module: Types of Activities/Structures Data Element Table

DIRECTIONS: Below are five classifications of activities and/or inhabited structures and their descriptions. Review the types of activities that occur and/or structures that are present within two miles of the MRS and circle the scores that correspond with all the activities/structure classifications at the MRS.

Note: The term *inhabited structure* is defined in Appendix C of the Primer.

Classification	Description	Score
Residential, educational, commercial, or subsistence	<ul style="list-style-type: none"> Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with any of the following purposes: residential, educational, child care, critical assets (e.g., hospitals, fire and rescue, police stations, dams), hotels, commercial, shopping centers, playgrounds, community gathering areas, religious sites, or sites used for subsistence hunting, fishing, and gathering. 	5
Parks and recreational areas	<ul style="list-style-type: none"> Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with parks, nature preserves, or other recreational uses. 	4
Agricultural, forestry	<ul style="list-style-type: none"> Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with agriculture or forestry. 	3
Industrial or warehousing	<ul style="list-style-type: none"> Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with industrial activities or warehousing. 	2
No known or recurring activities	<ul style="list-style-type: none"> There are no known or recurring activities occurring up to two miles from the MRS's boundary or within the MRS's boundary. 	1
TYPES OF ACTIVITIES/STRUCTURES	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the *Types of Activities/Structures* classifications in the space provided.

Types of activities/structures within 2 miles include NPS and U.S. Coast Guard (USCG) buildings, residences, a school and daycare facility, and beach houses for use by recreational visitors. An active USCG Station is positioned on the northwest corner of the peninsula (approximately 68 acres) (see Section 2.1.7 of the 2014 RI Report).

Table 9

EHE Module: Ecological and/or Cultural Resources Data Element Table

DIRECTIONS: Below are four classifications of ecological and/or cultural resources and their descriptions. Review the types of resources present and circle the score that corresponds with the ecological and/or cultural resources present on the MRS.

Note: The terms *ecological resources* and *cultural resources* are defined in Appendix C of the Primer.

Classification	Description	Score
Ecological and cultural resources present	♦ There are both ecological and cultural resources present on the MRS.	5
Ecological resources present	♦ There are ecological resources present on the MRS.	3
Cultural resources present	♦ There are cultural resources present on the MRS.	3
No ecological or cultural resources present	♦ There are no ecological resources or cultural resources present on the MRS.	0
ECOLOGICAL AND/OR CULTURAL RESOURCES	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the *Ecological and/or Cultural Resources* classification in the space provided.

This MRS exhibits a diverse fauna that depend on a wide variety of habitats including forest, wetland, dune shrubland, dune grassland, and beach as well as intertidal marine habitats. Beach and dune flora is predominantly characterized by grasses, forbs and stunted shrubs. Inland flora is predominantly characterized by evergreen and mixed maritime forests, with deciduous forests (both maritime and non-maritime) on the western portion of the MRS. Based on previous archaeological investigations, Fort Hancock may include archaeological artifacts, features and locations that are associated with the former military use of Fort Hancock. The Fort Hancock and Sandy Hook Proving Ground Historic District, which includes all of the Fort's structures, and the Sandy Hook Lighthouse are National Historic Landmarks (see Sections 1.2 and 2.1.8 of the 2014 RI Report).

Table 10
Determining the EHE Module Rating

Source Score Value

DIRECTIONS:

1. From Tables 1–9, record the data element scores in the **Score** boxes to the right.
2. Add the **Score** boxes for each of the three factors and record this number in the **Value** boxes to the right.
3. Add the three **Value** boxes and record this number in the **EHE Module Total** box below.
4. Circle the appropriate range for the **EHE Module Total** below.
5. Circle the **EHE Module Rating** that corresponds to the range selected and record this value in the **EHE Module Rating** box found at the bottom of the table.

Note:

An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

Munitions Type	Table 1	25	35
Source of Hazard	Table 2	10	
Accessibility Factor Data Elements			
Location of Munitions	Table 3	20	33
Ease of Access	Table 4	8	
Status of Property	Table 5	5	
Receptor Factor Data Elements			
Population Density	Table 6	5	20
Population Near Hazard	Table 7	5	
Types of Activities/Structures	Table 8	5	
Ecological and /or Cultural Resources	Table 9	5	
EHE MODULE TOTAL			88
EHE Module Total		EHE Module Rating	
92 to 100		A	
82 to 91		B	
71 to 81		C	
60 to 70		D	
48 to 59		E	
38 to 47		F	
less than 38		G	
Alternative Module Ratings		Evaluation Pending	
		No Longer Required	
		No Known or Suspected Explosive Hazard	
EHE MODULE RATING		B	

Table 11

CHE Module: CWM Configuration Data Element Table

DIRECTIONS: Below are seven classifications of CWM configuration and their descriptions. Circle the scores that correspond with all the CWM configurations known or suspected to be present at the MRS.

Note: The terms *CWM/UXO*, *CWM/DMM*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
CWM, that are either UXO, or explosively configured damaged DMM	The CWM known or suspected of being present at the MRS are: <ul style="list-style-type: none"> ♦ CWM that are UXO (i.e., CWM/UXO) ♦ Explosively configured CWM that are DMM (i.e., CWM/DMM) that have been damaged. 	30
CWM mixed with UXO	<ul style="list-style-type: none"> ♦ The CWM known or suspected of being present at the MRS are undamaged CWM/DMM or CWM not configured as a munition that are commingled with conventional munitions that are UXO. 	25
CWM, explosive configuration that are undamaged DMM	<ul style="list-style-type: none"> ♦ The CWM known or suspected of being present at the MRS are explosively configured CWM/DMM that have not been damaged. 	20
CWM/DMM, not explosively configured or CWM, bulk container	The CWM known or suspected of being present at the MRS are: <ul style="list-style-type: none"> ♦ Nonexplosively configured CWM/DMM either damaged or undamaged ♦ Bulk CWM (e.g., ton container). 	15
CAIS K941 and CAIS K942	<ul style="list-style-type: none"> ♦ The CWM/DMM known or suspected of being present at the MRS are CAIS K941-toxic gas set M-1 or CAIS K942-toxic gas set M-2/E11. 	12
CAIS (chemical agent identification sets)	<ul style="list-style-type: none"> ♦ CAIS, other than CAIS K941 and K942, are known or suspected of being present at the MRS. 	10
Evidence of no CWM	<ul style="list-style-type: none"> ♦ Following investigation, the physical evidence indicates that CWM are not present at the MRS, or the historical evidence indicates that CWM are not present at the MRS. 	0
CWM CONFIGURATION	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	0

DIRECTIONS: Document any MRS-specific data used in selecting the *CWM Configuration* classifications in the space provided.

Both physical and historical evidence indicates that CWM was not present at this MRS (see Sections 1.2.1 and 1.4.2 of the 2014 RI Report).

Tables 12 through 19 are intentionally omitted
Per Army Guidance (U.S. Army, 2009)

Table 20
Determining the CHE Module Rating

Source Score Value				
<p>DIRECTIONS:</p> <ol style="list-style-type: none"> 1. From Tables 11–19, record the data element scores in the Score boxes to the right. 2. Add the Score boxes for each of the three factors and record this number in the Value boxes to the right. 3. Add the three Value boxes and record this number in the CHE Module Total box below. 4. Circle the appropriate range for the CHE Module Total below. 5. Circle the CHE Module Rating that corresponds to the range selected and record this value in the CHE Module Rating box found at the bottom of the table. <p>Note: An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.</p>	CWM Hazard Factor Data Elements			
	CWM Configuration	Table 11	0	0
	Sources of CWM	Table 12		
	Accessibility Factor Data Elements			0
	Location of CWM	Table 13		
	Ease of Access	Table 14		
	Status of Property	Table 15		0
	Receptor Factor Data Elements			
	Population Density	Table 16		
	Population Near Hazard	Table 17		
	Types of Activities/Structures	Table 18		0
	Ecological and /or Cultural Resources	Table 19		
	CHE MODULE TOTAL			0
	CHE Module Total		CHE Module Rating	
	92 to 100		A	
	82 to 91		B	
	71 to 81		C	
	60 to 70		D	
48 to 59		E		
38 to 47		F		
less than 38		G		
Alternative Module Ratings		Evaluation Pending		
		No Longer Required		
		No Known or Suspected CWM Hazard		
CHE MODULE RATING		No Known or Suspected CWM Hazard		

Table 21

HHE Module: Groundwater Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's groundwater and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional groundwater contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard present in the groundwater, select the box at the bottom of the table.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
CHF Scale	CHF Value	Sum The Ratios	
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the groundwater migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the groundwater is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in groundwater has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the groundwater to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the groundwater receptors at the MRS.

Classification	Description	Value
Identified	There is a threatened water supply well downgradient of the source and the groundwater is a current source of drinking water or source of water for other beneficial uses such as irrigation/agriculture (equivalent to Class I or IIA aquifer).	H
Potential	There is no threatened water supply well downgradient of the source and the groundwater is currently or potentially usable for drinking water, irrigation, or agriculture (equivalent to Class I, IIA, or IIB aquifer).	M
Limited	There is no potentially threatened water supply well downgradient of the source and the groundwater is not considered a potential source of drinking water and is of limited beneficial use (equivalent to Class IIIA or IIIB aquifer, or where perched aquifer exists only).	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Groundwater samples from multiple MRSs were used to represent conditions across all MRSs; groundwater samples did not contain MC above background (Secs 4.2.3 and 5.3.3, 2014 RI Report).

No Known or Suspected Groundwater MC Hazard




Table 22

HHE Module: Surface Water – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)


DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface water and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional surface water contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with human endpoints present in the surface water, select the box at the bottom of the table.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
Antimony	0.61	6	0.10
Arsenic	2.8	4.5	0.62
Copper	18	620	0.03
Iron	777	11000	0.07
Lead	6.6	15	0.44
Manganese	37.3	320	0.12
Thallium	1.3	.016	8.125
CHF Scale	<i>CHF Value</i>	Sum The Ratios	9.505
CHF > 100	H (High)		
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		

CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).	
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Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	
Confined	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface water to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface water to which contamination has moved or can move.	
Limited	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Surface water results are summarized in Table 2.12 of Appendix G-1, 2014 RI Report

No Known or Suspected Surface Water (Human Endpoint) MC Hazard


Table 23

HHE Module: Sediment – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)


DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's sediment and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional sediment contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with human endpoints present in the sediment, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
2,6-Dinitrotoluene	0.16	18	0.009
Antimony	2.2	31	0.071
Arsenic	7.7	34	0.226
Chromium	34.6	1600	0.022
Copper	41.2	3100	0.013
Iron	14,600	55,000	0.265
Lead	286	400	0.715
CHF Scale	<i>CHF Value</i>	Sum The Ratios	2.167
CHF > 100	H (High)		
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		

CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).	
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Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	
Confined	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to sediment to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to sediment to which contamination has moved or can move.	
Limited	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Sediment sample results are summarized in Table 2.11 of Appendix G-1, 2014 RI Report.

No Known or Suspected Sediment (Human Endpoint) MC Hazard

Table 24

HHE Module: Surface Water – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface water and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional surface water contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with ecological endpoints present in the surface water, select the box at the bottom of the table.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
Antimony	0.61	30	0.02
Arsenic	2.8	150	0.02
Copper	18	9.0	2
Iron	777	1,000	.777
Lead	6.6	2.5	2.64
Manganese	37.3	120	.311
Thallium	1.3	0.8	1.625
CHF Scale	<i>CHF Value</i>	Sum the Ratios	7.393
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		

CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).	M
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Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface water to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface water to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	M

Surface water sample results are summarized in Tables 2.12 of Appendix G-1, RI Report.

No Known or Suspected Surface Water (Ecological Endpoint) MC Hazard

Table 25

HHE Module: Sediment – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's sediment and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional sediment contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with ecological endpoints present in the sediment, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
2,6-dinitrotoluene	0.16	0.039	4.1
Antimony	2.2	2	1.1
Arsenic	7.7	9.8	0.78
Chromium	34.6	43.4	0.79
Copper	41.2	31.6	1.3
Iron	14,600	20,000	0.73
Lead	286	35.8	7.9
Mercury	0.34	0.18	1.9
Selenium	2.5	2	1.25
CHF Scale	<i>CHF Value</i>	Sum the Ratios	19.85
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		

CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).	M
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Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to sediment to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to sediment to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	M

Sediment sample results are summarized in Table 2.11 of Appendix G-1, 2014 RI Report.

No Known or Suspected Sediment (Ecological Endpoint) MC Hazard

Table 26

HHE Module: Surface Soil Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface soil and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional surface soil contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard present in the surface soil, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratio
CHF Scale	CHF Value	Sum the Ratios	
CHF > 100	H (High)	CHF = ∑ $\frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface soil migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface soil is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface soil has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the surface soil to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface soil receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface soil to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface soil to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to surface soil to which contamination has moved or can move.	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	

Per the soil sampling DQO in the approved 2014 RI work plan and approved Work Plan Addendum, no soil samples were collected in MRS 08 during the 2018 RI Addendum #3 investigation, as no visible evidence of energetic material, e.g., munitions items which are breached, was observed. However, in adjacent MRS 06, 5 surface soil samples were collected during the 2007 SI and 21 surface soil samples were collected during the 2014 RI. No explosives were detected, and all metals were consistent with background concentrations (Secs 5.3.1.2, 6.1.1, and 6.2.3.5, 2014 RI Report).

No Known or Suspected Surface Soil MC Hazard



HHE Module: Supplemental Contaminant Hazard Factor Table

DIRECTIONS: Only use this table if there are more than five contaminants in any given medium present at the MRS.

Note: Do not add ratios from different media.

[illegible]

Table 28

Determining the HHE Module Rating

DIRECTIONS:

- Record the letter values (H, M, L) for the **Contaminant Hazard, Migration Pathway, and Receptor Factors** for the media (from Tables 21–26) in the corresponding boxes below.
- Record the media's three-letter combinations in the **Three-Letter Combination** boxes below (three-letter combinations are arranged from Hs to Ms to Ls).
- Using the **HHE Ratings** provided below, determine each media's rating (A–G) and record the letter in the corresponding **Media Rating** box below.

Media (Source)	Contaminant Hazard Factor Value	Migratory Pathway Factor Value	Receptor Factor Value	Three-Letter Combination (Hs-Ms-Ls)	Media Rating (A-G)
Groundwater (Table 21)					No Known or Suspected Hazard
Surface Water/Human Endpoint (Table 22)	M	M	M	MMM	D
Sediment/Human Endpoint (Table 23)	M	M	M	MMM	D
Surface Water/Ecological Endpoint (Table 24)	M	M	M	MMM	D
Sediment/Ecological Endpoint (Table 25)	M	M	M	MMM	D
Surface Soil (Table 26)					No Known or Suspected Hazard

DIRECTIONS (cont.): 4. Select the single highest Media Rating (A is highest; G is lowest) and enter the letter in the HHE Module Rating box. <i>Note:</i> An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more media, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.	HHE MODULE RATING	
	HHE Ratings (for reference only)	
	Combination	Rating
	HHH	A
	HHM	B
	HHL	C
	HMM	
	HML	D
	MMM	
	HLL	E
MML		
MLL	F	
LLL	G	
Alternative Module Ratings	Evaluation Pending	
	No Longer Required	
	No Known or Suspected MC Hazard	
Based on the risk assessments showing no risks present (2014 RI), this module is evaluated as NKSH.		

Table 29
MRS Priority

DIRECTIONS: In the chart below, circle the letter rating for each module recorded in Table 10 (EHE), Table 20 (CHE), and Table 28 (HHE). Circle the corresponding numerical priority for each module. If information to determine the module rating is not available, choose the appropriate alternative module rating. The MRS Priority is the single highest priority; record this relative priority in the MRS Priority or Alternative MRS Rating at the bottom of the table.

Note: An MRS assigned Priority 1 has the highest relative priority; an MRS assigned Priority 8 has the lowest relative priority. Only an MRS with CWM known or suspected to be present can be assigned Priority 1; an MRS that has CWM known or suspected to be present cannot be assigned Priority 8.

EHE Rating	Priority	CHE Rating	Priority	HHE Rating	Priority
		A	1		
A	2	B	2	A	2
B	3	C	3	B	3
C	4	D	4	C	4
D	5	E	5	D	5
E	6	F	6	E	6
F	7	G	7	F	7
G	8			G	8
Evaluation Pending		Evaluation Pending		Evaluation Pending	
No Longer Required		No Longer Required		No Longer Required	
No Known or Suspected Explosive Hazard		No Known or Suspected CWM Hazard		No Known or Suspected MC Hazard	
MRS PRIORITY or ALTERNATIVE MRS RATING				3	

Table A

MRS Background Information

DIRECTIONS: Record the background information below for the MRS to be evaluated. Much of this information is available from Service and DoD databases. If the MRS is located on a FUDS property, the suitable FUDS property information should be substituted. In the **MRS Summary**, briefly describe the UXO, DMM, or MC that are known or suspected to be present, the exposure setting (the MRS's physical environment), any other incidental non munitions-related contaminants (e.g., benzene, trichloroethylene) found at the MRS, and any potentially exposed human and ecological receptors. If possible, include a map of the MRS.

Munitions Response Site Name: Eastern Shoreline

Component: U.S. Army Corps of Engineers Formerly Used Defense Site (FUDS) Program

Installation/Property Name: (NJ29799F692400) FORT HANCOCK

Location (City, County, State): Highlands, Monmouth County, New Jersey

Site Name/Project Name (Project No.): C02NJ000410R01 Eastern Shoreline

Date Information Entered/Updated: 06/05/2018

Point of Contact (Name/Phone): Public Affairs – (917) 790-8007

Project Phase (check only one):

<input type="checkbox"/> PA	<input type="checkbox"/> SI	<input checked="" type="checkbox"/> RI	<input type="checkbox"/> FS	<input type="checkbox"/> RD
<input type="checkbox"/> RA-C	<input type="checkbox"/> RI	<input type="checkbox"/> RA-O	<input type="checkbox"/> RC	<input type="checkbox"/> LTM

Media Evaluated (check all that apply):

<input checked="" type="checkbox"/> Groundwater	<input checked="" type="checkbox"/> Sediment (human receptor)
<input checked="" type="checkbox"/> Surface soil	<input checked="" type="checkbox"/> Surface Water (ecological receptor)
<input checked="" type="checkbox"/> Sediment (ecological receptor)	<input checked="" type="checkbox"/> Surface Water (human receptor)

MRS Summary:

MRS Description: Describe the munitions-related activities that occurred at the installation, the dates of operation, and the UXO, DMM, or MC known or suspected to be present. When possible, identify munitions, CWM, and MC by type:

Project/MRS 10 was created from MRS 07 dynamic shoreline acreage as part of RI Addendum #3. It was developed to address munitions that have historically been found on the beaches after storm events. It is 179 acres encompassing the beach and surf zone on the eastern side of the Sandy Hook peninsula, where MEC washes onto the shore after large storm events in the Atlantic Ocean. In part, the MRS encompasses portions of the former proving ground that have eroded into the ocean. Although none were found during the 2014 RI, munitions historically found on the beaches have been investigated by Explosives Ordnance Disposal (EOD) units. Items that have washed up on the Atlantic beaches since 2010 include: 3.5-inch, 6-inch, and 8-inch projectiles, Marine flare, Mk-25 Marine Marker, and 5-inch AP projectile. These items were identified as live and blown in place by EOD units from Naval Weapons Station Earle. The MRS extends to the northernmost end of the Sandy Hook peninsula and to the southernmost boundary of the national recreation area. Portions of the southern part of the MRS were used from 1874 to 1918 as part of the Army's first proving ground for testing weapons and ordnance. Portions of the northern part were used for coastal defense; multiple firing batteries facing the Atlantic Ocean were just west of the shoreline MRS. Munitions items historically wash up on the beaches after significant storm events, and there is a risk to users of the Gateway National Recreation Area including fishermen, beachgoers, and hikers. In addition, ongoing erosion and shifting sand dunes in this dynamic environment could expose potential subsurface MEC in the portions of the MRS that were not investigated during the RI (i.e., the northern portions). Potential munitions include any UXO that was fired both in the proving ground as well as at off-shore targets in the Atlantic Ocean and may wash ashore during storm events.

No soil, surface water, or groundwater samples were collected directly from the shoreline area, but many MC samples were collected from various MRS locations near MRS 10 during the RI. No explosives were detected in surface water samples collected from nearby Nike Pond, but several MC metals were detected above background concentrations. No explosives compounds were detected in surface soil samples. Metals were found to be at or below background concentrations (Secs 6.2.3.1-5, RI Report). Five groundwater samples collected during the RI were used to represent conditions across all MRSs. No explosives were detected, and no metals were detected above background concentrations (Secs 4.2.3 and 5.3.3, RI Report). Because the human health and ecological risk assessments determined that no unacceptable risk is posed by any media (Sections 6.2.3.3 and 6.2.3.8, RI Report), the HHE module has been assigned an overall rating of No Known or Suspected Hazard.

Both physical and historical evidence indicates that CWM was not present at this MRS (Secs 1.2.1 and 1.4.2, RI Report). Therefore, the CHE module has been assigned the alternative rating of No Known or Suspected CWM Hazard.

Stakeholder coordination of the MRSPP evaluation occurred through review of the RI Addendum #3. Documentation of stakeholder coordination can be found on FRMD at C02NJ000403.

Throughout this MRSPP:

- “RI Report” refers to the “Final MMRP Remedial Investigation Report, Remedial Investigation/Feasibility Study, Fort Hancock Formerly Used Defense Site, Monmouth County, New Jersey,” dated January 2014, on FRMD at C03NJ000403_03.10_0500 and _0501.
- “RI Addendum #1” refers to the “Final Military Munitions Response Program, Remedial Investigation Addendum #1 Report,” dated XX, 2016, located on FRMD at C03NJ000403_03.XX.
- “EOD, 2015” refers to an e-mail from EOD, Naval Weapons Station Earle, to USACE listing items found at Sandy Hook in 2010, 2011, and 2013, dated October 29, 2015 and located on FRMD at C03NJ000407_01.01_0500.

Description of Pathways for Human and Ecological Receptors:

The potential exposure media and associated exposure pathways for human receptors are: Soil: direct contact with surface soil (ingestion, dermal contact); inhalation via the soil-to-air pathway; Groundwater: direct contact (ingestion, dermal contact). The potential exposure pathways for ecological receptors are: Soil: Direct contact; and Bioaccumulation into plants, soil invertebrates, and small mammals, and consumption of these food items.

Potential for contact with MEC includes walking over surface MEC, handling/collecting MEC, or contact with subsurface MEC due to any intrusive activities (Sections 6.2.1 and 6.3.1, RI Report).

Description of Receptors (Human and Ecological):

Based on the current land use, the following human receptors were identified: Outdoor maintenance worker (represents a National Park Service [NPS] ranger who spends the majority of his/her time patrolling the area on foot); Adult and child recreational user (represent members of the public who partake in recreational activities at Fort Hancock); and NPS Archaeologist. Ecological receptors include three potentially-affected terrestrial avian communities (granivores, insectivores, and carnivores) are represented by the mourning dove (granivore), American woodcock (insectivore), red-tailed hawk (carnivore) and the great blue heron (piscivore). For terrestrial mammals, the representative species will be the meadow vole (herbivore), short-tailed shrew (insectivore), and red fox (carnivore) (Sections 6.2.1.2 and 6.3.1, RI Report).

Based on the 2014 RI investigation findings, the EHE module has been assigned a ‘B’ rating.

Both physical and historical evidence indicates that CWM was not present at this MRS (Secs 1.2.1 and 1.4.2, RI Report). Therefore, the CHE module has been assigned the alternative rating of No Known or Suspected CWM Hazard.

The human health and ecological risk assessments determined that no unacceptable risk is posed by any media, and the HHE module has been assigned the alternative rating of No Known or Suspected MC Hazard.

The overall Priority Rating for MRS 10 is ‘3’, based on the EHE module.

Table 1

EHE Module: Munitions Type Data Element Table

DIRECTIONS: Below are 11 classifications of munitions and their descriptions. Circle the scores that correspond with all the munitions types known or suspected to be present at the MRS.

Note: The terms *practice munitions*, *small arms ammunition*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Sensitive	<ul style="list-style-type: none"> UXO that are considered most likely to function upon any interaction with exposed persons (e.g., submunitions, 40mm high-explosive [HE] grenades, white phosphorus [WP] munitions, high-explosive antitank [HEAT] munitions, and practice munitions with sensitive fuzes, but excluding all other practice munitions). Hand grenades containing energetic filler. Bulk primary explosives, or mixtures of these with environmental media, such that the mixture poses an explosive hazard. 	30
High explosive (used or damaged)	<ul style="list-style-type: none"> UXO containing a high-explosive filler (e.g., RDX, Composition B), that are not considered "sensitive." DMM containing a high-explosive filler that have: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	25
Pyrotechnic (used or damaged)	<ul style="list-style-type: none"> UXO containing a pyrotechnic filler other than white phosphorus (e.g., flares, signals, simulators, smoke grenades). DMM containing a pyrotechnic filler other than white phosphorus (e.g., flares, signals, simulators, smoke grenades) that have: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	20
High explosive (unused)	<ul style="list-style-type: none"> DMM containing a high-explosive filler that: <ul style="list-style-type: none"> Have not been damaged by burning or detonation Are not deteriorated to the point of instability. 	15
Propellant	<ul style="list-style-type: none"> UXO containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor) that are: <ul style="list-style-type: none"> Damaged by burning or detonation Deteriorated to the point of instability. 	15
Bulk secondary high explosives, pyrotechnics, or propellant	<ul style="list-style-type: none"> DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). DMM that are bulk secondary high explosives, pyrotechnic compositions, or propellant (not contained in a munition), or mixtures of these with environmental media such that the mixture poses an explosive hazard. 	10
Pyrotechnic (not used or damaged)	<ul style="list-style-type: none"> DMM containing a pyrotechnic filler (i.e., red phosphorus), other than white phosphorus filler, that: <ul style="list-style-type: none"> Have not been damaged by burning or detonation Are not deteriorated to the point of instability. 	10
Practice	<ul style="list-style-type: none"> UXO that are practice munitions that are not associated with a sensitive fuze. DMM that are practice munitions that are not associated with a sensitive fuze and that have not: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	5
Riot control	<ul style="list-style-type: none"> UXO or DMM containing a riot control agent filler (e.g., tear gas). 	3
Small arms	<ul style="list-style-type: none"> Used munitions or DMM that are categorized as small arms ammunition. (Physical evidence or historical evidence that no other types of munitions [e.g., grenades, subcaliber training rockets, demolition charges] were used or are present on the MRS is required for selection of this category.) 	2
Evidence of no munitions	<ul style="list-style-type: none"> Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present. 	0
MUNITIONS TYPE	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	25

DIRECTIONS: Document any MRS-specific data used in selecting the *Munitions Type* classifications in the space provided.

MEC found in MRS 10 includes the following UXO that were identified as HE items: 3.5-inch, 6-inch, and 8-inch projectiles, Marine flare, Mk-25 Marine Marker, and 5-inch AP projectile. These items were found between 2010 and 2015 and responded to by EOD units out of Naval Weapons Station Earle. The items were identified as live and blown in place by EOD (EOD, 2015).

Table 2

EHE Module: Source of Hazard Data Element Table

DIRECTIONS: Below are 11 classifications describing sources of explosive hazards. Circle the scores that correspond with all the sources of explosive hazards known or suspected to be present at the MRS.

Note: The terms *former range*, *practice munitions*, *small arms range*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Former range	<ul style="list-style-type: none"> The MRS is a former military range where munitions (including practice munitions with sensitive fuzes) have been used. Such areas include impact or target areas and associated buffer and safety zones. 	10
Former munitions treatment (i.e., OB/OD) unit	<ul style="list-style-type: none"> The MRS is a location where UXO or DMM (e.g., munitions, bulk explosives, bulk pyrotechnic, or bulk propellants) were burned or detonated for the purpose of treatment prior to disposal. 	8
Former practice munitions range	<ul style="list-style-type: none"> The MRS is a former military range on which only practice munitions without sensitive fuzes were used. 	6
Former maneuver area	<ul style="list-style-type: none"> The MRS is a former maneuver area where no munitions other than flares, simulators, smokes, and blanks were used. There must be evidence that no other munitions were used at the location to place an MRS into this category. 	5
Former burial pit or other disposal area	<ul style="list-style-type: none"> The MRS is a location where DMM were buried or disposed of (e.g., disposed of into a water body) without prior thermal treatment. 	5
Former industrial operating facilities	<ul style="list-style-type: none"> The MRS is a location that is a former munitions maintenance, manufacturing, or demilitarization facility. 	4
Former firing points	<ul style="list-style-type: none"> The MRS is a firing point, where the firing point is delineated as an MRS separate from the rest of a former military range. 	4
Former missile or air defense artillery emplacements	<ul style="list-style-type: none"> The MRS is a former missile defense or air defense artillery (ADA) emplacement not associated with a military range. 	2
Former storage or transfer points	<ul style="list-style-type: none"> The MRS is a location where munitions were stored or handled for transfer between different modes of transportation (e.g., rail to truck, truck to weapon system). 	2
Former small arms range	<ul style="list-style-type: none"> The MRS is a former military range where only small arms ammunition was used. (There must be evidence that no other types of munitions [e.g., grenades] were used or are present to place an MRS into this category.) 	1
Evidence of no munitions	<ul style="list-style-type: none"> Following investigation of the MRS, there is physical evidence that no UXO or DMM are present, or there is historical evidence indicating that no UXO or DMM are present. 	0
SOURCE OF HAZARD	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	10

DIRECTIONS: Document any MRS-specific data used in selecting the **Source of Hazard** classifications in the space provided.

MRS 10 is part of the former proving ground and firing range complex, with gun batteries that fired at off-shore targets. The southern portion encompasses a part of the former proving ground; the northern portion encompasses the land portion of the range fans associated with the batteries that fired east, including the 9-Gun Battery (Sec 1.3, RI Report and Sec 6.2, RI Addendum #1).

Table 3

EHE Module: Location of Munitions Data Element Table

DIRECTIONS: Below are eight classifications of munitions locations and their descriptions. Circle the scores that correspond with all the locations where munitions are known or suspected to be present at the MRS.

Note: The terms *confirmed*, *surface*, *subsurface*, *small arms ammunition*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Confirmed surface	<ul style="list-style-type: none"> Physical evidence indicates that there are UXO or DMM on the surface of the MRS. Historical evidence (i.e., a confirmed report such as an explosive ordnance disposal [EOD], police, or fire department report that an incident or accident that involved UXO or DMM occurred) indicates there are UXO or DMM on the surface of the MRS. 	25
Confirmed subsurface, active	<ul style="list-style-type: none"> Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS, and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM. Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM. 	20
Confirmed subsurface, stable	<ul style="list-style-type: none"> Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed. Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed. 	15
Suspected (physical evidence)	<ul style="list-style-type: none"> There is physical evidence (e.g., munitions debris such as fragments, penetrators, projectiles, shell casings, links, fins), other than the documented presence of UXO or DMM, indicating that UXO or DMM may be present at the MRS. 	10
Suspected (historical evidence)	<ul style="list-style-type: none"> There is historical evidence indicating that UXO or DMM may be present at the MRS. 	5
Subsurface, physical constraint	<ul style="list-style-type: none"> There is physical or historical evidence indicating that UXO or DMM may be present in the subsurface, but there is a physical constraint (e.g., pavement, water depth over 120 feet) preventing direct access to the UXO or DMM. 	2
Small arms (regardless of location)	<ul style="list-style-type: none"> The presence of small arms ammunition is confirmed or suspected, regardless of other factors such as geological stability. (There must be evidence that no other types of munitions [e.g., grenades] were used or are present at the MRS to place an MRS into this category.) 	1
Evidence of no munitions	<ul style="list-style-type: none"> Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present. 	0
LOCATION OF MUNITIONS	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 25).	20

DIRECTIONS: Document any MRS-specific data used in selecting the *Location of Munitions* classifications in the space provided.

Historical evidence (confirmed reports by EOD) indicate that UXO or DMM exist in the subsurface and conditions at the MRS are likely to cause items to be exposed, as evidenced by the discovery of UXO or DMM on the beaches of the Gateway National Recreation Area (Sandy Hook) after significant storm events (EOD, 2015).

Table 4

EHE Module: Ease of Access Data Element Table

DIRECTIONS: Below are four classifications of barrier types that can surround an MRS and their descriptions. The barrier type is directly related to the ease of public access to the MRS. Circle the score that corresponds with the ease of access to the MRS.

Note: The term *barrier* is defined in Appendix C of the Primer.

Classification	Description	Score
No barrier	<ul style="list-style-type: none"> There is no barrier preventing access to any part of the MRS (i.e., all parts of the MRS are accessible). 	10
Barrier to MRS access is incomplete	<ul style="list-style-type: none"> There is a barrier preventing access to parts of the MRS, but not the entire MRS. 	8
Barrier to MRS access is complete but not monitored	<ul style="list-style-type: none"> There is a barrier preventing access to all parts of the MRS, but there is no surveillance (e.g., by a guard) to ensure that the barrier is effectively preventing access to all parts of the MRS. 	5
Barrier to MRS access is complete and monitored	<ul style="list-style-type: none"> There is a barrier preventing access to all parts of the MRS, and there is active, continual surveillance (e.g., by a guard, video monitoring) to ensure that the barrier is effectively preventing access to all parts of the MRS. 	0
EASE OF ACCESS	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	10

DIRECTIONS: Document any MRS-specific data used in selecting the *Ease of Access* classification in the space provided.

The MRS is open to the public, as it is located in a national park known as the Sandy Hook Unit of Gateway National Recreation Area (Sec 1.2, RI Report).

Table 5

EHE Module: Status of Property Data Element Table

DIRECTIONS: Below are three classifications of the status of a property within the Department of Defense (DoD) and their descriptions. Circle the score that corresponds with the status of property at the MRS.

Classification	Description	Score
Non-DoD control	<ul style="list-style-type: none"> The MRS is at a location that is no longer owned by, leased to, or otherwise possessed or used by DoD. Examples are privately owned land or water bodies; land or water bodies owned or controlled by state, tribal, or local governments; and land or water bodies managed by other federal agencies. The MRS is at a location that is owned by DoD, but that DoD has leased to another entity and for which DoD does not control access 24 hours per day. 	5
Scheduled for transfer from DoD control	<ul style="list-style-type: none"> The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD, and DoD plans to transfer that land or water body to the control of another entity (e.g., a state, tribal, or local government; a private party; another federal agency) within 3 years from the date the Protocol is applied. 	3
DoD control	<ul style="list-style-type: none"> The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD. With respect to property that is leased or otherwise possessed, DoD must control access to the MRS 24 hours per day, every day of the calendar year. 	0
STATUS OF PROPERTY	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the *Status of Property* classification in the space provided.

The MRS is located on the Sandy Hook Peninsula. This peninsula, which encompasses approximately 1,700 acres, is known as the Sandy Hook Unit of the Gateway National Recreation Area and is a National Historic Landmark. The location of the MRS is currently managed by the Department of the Interior (NPS) and is used for a variety of recreational purposes year-round (see Section 1.2 of the RI Report).

Table 6

EHE Module: Population Density Data Element Table

DIRECTIONS: Below are three classifications for population density and their descriptions. Determine the population density per square mile that most closely corresponds with the population of the MRS, including the area within a two-mile radius of the MRS's perimeter. Circle the most appropriate score.

Note: Use the U.S. Census Bureau tract data available to capture the highest population density within a two-mile radius of the perimeter of the MRS.

Classification	Description	Score
> 500 persons per square mile	♦ There are more than 500 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	5
100–500 persons per square mile	♦ There are 100 to 500 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	3
< 100 persons per square mile	♦ There are fewer than 100 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	1
POPULATION DENSITY	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the **Population Density** classification in the space provided.

The MRS is a public beach. The population density of Monmouth County, NJ is 1,344.7 persons per square mile
<https://www.census.gov/quickfacts/fact/table/monmouthcountynewjersey,US/PST045217>

Table 7

EHE Module: Population Near Hazard Data Element Table

DIRECTIONS: Below are six classifications describing the number of inhabited structures near the MRS. The number of inhabited buildings relates to the potential population near the MRS. Determine the number of inhabited structures within two miles of the MRS boundary and circle the score that corresponds with the number of inhabited structures.

Note: The term *inhabited structures* is defined in Appendix C of the Primer.

Classification	Description	Score
26 or more inhabited structures	♦ There are 26 or more inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	5
16 to 25 inhabited structures	♦ There are 16 to 25 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	4
11 to 15 inhabited structures	♦ There are 11 to 15 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	3
6 to 10 inhabited structures	♦ There are 6 to 10 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	2
1 to 5 inhabited structures	♦ There are 1 to 5 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	1
0 inhabited structures	♦ There are no inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	0
POPULATION NEAR HAZARD	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the ***Population Near Hazard*** classification in the space provided.

Inhabited structures near MRS 10 include NPS buildings, residences, a school and daycare facility, and beach houses for use by recreational visitors (see Section 2.1.7 of the RI Report; Google Earth was used to calculate the total number of inhabited structures within the two-mile radius for this MRS).

Table 8

EHE Module: Types of Activities/Structures Data Element Table

DIRECTIONS: Below are five classifications of activities and/or inhabited structures and their descriptions. Review the types of activities that occur and/or structures that are present within two miles of the MRS and circle the scores that correspond with all the activities/structure classifications at the MRS.

Note: The term *inhabited structure* is defined in Appendix C of the Primer.

Classification	Description	Score
Residential, educational, commercial, or subsistence	<ul style="list-style-type: none"> Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with any of the following purposes: residential, educational, child care, critical assets (e.g., hospitals, fire and rescue, police stations, dams), hotels, commercial, shopping centers, playgrounds, community gathering areas, religious sites, or sites used for subsistence hunting, fishing, and gathering. 	5
Parks and recreational areas	<ul style="list-style-type: none"> Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with parks, nature preserves, or other recreational uses. 	4
Agricultural, forestry	<ul style="list-style-type: none"> Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with agriculture or forestry. 	3
Industrial or warehousing	<ul style="list-style-type: none"> Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with industrial activities or warehousing. 	2
No known or recurring activities	<ul style="list-style-type: none"> There are no known or recurring activities occurring up to two miles from the MRS's boundary or within the MRS's boundary. 	1
TYPES OF ACTIVITIES/STRUCTURES	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the *Types of Activities/Structures* classifications in the space provided.

Types of activities/structures within 2 miles include NPS buildings, a school and daycare facility, and beach houses for use by recreational visitors (see Section 2.1.7 of the RI Report).

Table 9

EHE Module: Ecological and/or Cultural Resources Data Element Table

DIRECTIONS: Below are four classifications of ecological and/or cultural resources and their descriptions. Review the types of resources present and circle the score that corresponds with the ecological and/or cultural resources present on the MRS.

Note: The terms *ecological resources* and *cultural resources* are defined in Appendix C of the Primer.

Classification	Description	Score
Ecological and cultural resources present	♦ There are both ecological and cultural resources present on the MRS.	5
Ecological resources present	♦ There are ecological resources present on the MRS.	3
Cultural resources present	♦ There are cultural resources present on the MRS.	3
No ecological or cultural resources present	♦ There are no ecological resources or cultural resources present on the MRS.	0
ECOLOGICAL AND/OR CULTURAL RESOURCES	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the *Ecological and/or Cultural Resources* classification in the space provided.

This MRS encompasses a wide variety of habitats including wetland, dune shrubland, dune grassland, and beach as well as intertidal marine habitats. Beach and dune flora is predominantly characterized by grasses, forbs and stunted shrubs. Based on previous archaeological investigations, the MRS may contain archaeological artifacts (features and locations that are associated with the former military use of Fort Hancock) (see Sections 1.2 and 2.1.8 of the RI Report).

Table 10
Determining the EHE Module Rating

Source Score Value					
<p>DIRECTIONS:</p> <ol style="list-style-type: none"> From Tables 1–9, record the data element scores in the Score boxes to the right. Add the Score boxes for each of the three factors and record this number in the Value boxes to the right. Add the three Value boxes and record this number in the EHE Module Total box below. Circle the appropriate range for the EHE Module Total below. Circle the EHE Module Rating that corresponds to the range selected and record this value in the EHE Module Rating box found at the bottom of the table. <p>Note: An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.</p>	Accessibility Factor Data Elements				
	Munitions Type	Table 1	25	35	
	Source of Hazard	Table 2	10		
	Location of Munitions	Table 3	20	35	
	Ease of Access	Table 4	10		
	Status of Property	Table 5	5		
	Receptor Factor Data Elements			20	
	Population Density	Table 6	5		
	Population Near Hazard	Table 7	5		
	Types of Activities/Structures	Table 8	5		
	Ecological and /or Cultural Resources	Table 9	5		
	EHE MODULE TOTAL			90	
	EHE Module Total		EHE Module Rating		
	92 to 100		A		
	82 to 91		B		
	71 to 81		C		
	60 to 70		D		
	48 to 59		E		
38 to 47		F			
less than 38		G			
Alternative Module Ratings		Evaluation Pending			
		No Longer Required			
		No Known or Suspected Explosive Hazard			
EHE MODULE RATING		B			

Table 11

CHE Module: CWM Configuration Data Element Table

DIRECTIONS: Below are seven classifications of CWM configuration and their descriptions. Circle the scores that correspond with all the CWM configurations known or suspected to be present at the MRS.

Note: The terms *CWM/UXO*, *CWM/DMM*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
CWM, that are either UXO, or explosively configured damaged DMM	The CWM known or suspected of being present at the MRS are: <ul style="list-style-type: none"> ♦ CWM that are UXO (i.e., CWM/UXO) ♦ Explosively configured CWM that are DMM (i.e., CWM/DMM) that have been damaged. 	30
CWM mixed with UXO	<ul style="list-style-type: none"> ♦ The CWM known or suspected of being present at the MRS are undamaged CWM/DMM or CWM not configured as a munition that are commingled with conventional munitions that are UXO. 	25
CWM, explosive configuration that are undamaged DMM	<ul style="list-style-type: none"> ♦ The CWM known or suspected of being present at the MRS are explosively configured CWM/DMM that have not been damaged. 	20
CWM/DMM, not explosively configured or CWM, bulk container	The CWM known or suspected of being present at the MRS are: <ul style="list-style-type: none"> ♦ Nonexplosively configured CWM/DMM either damaged or undamaged ♦ Bulk CWM (e.g., ton container). 	15
CAIS K941 and CAIS K942	<ul style="list-style-type: none"> ♦ The CWM/DMM known or suspected of being present at the MRS are CAIS K941-toxic gas set M-1 or CAIS K942-toxic gas set M-2/E11. 	12
CAIS (chemical agent identification sets)	<ul style="list-style-type: none"> ♦ CAIS, other than CAIS K941 and K942, are known or suspected of being present at the MRS. 	10
Evidence of no CWM	<ul style="list-style-type: none"> ♦ Following investigation, the physical evidence indicates that CWM are not present at the MRS, or the historical evidence indicates that CWM are not present at the MRS. 	<input type="radio"/>
CWM CONFIGURATION	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	<input type="radio"/>

DIRECTIONS: Document any MRS-specific data used in selecting the *CWM Configuration* classifications in the space provided.

Both physical and historical evidence indicates that CWM was not present at this MRS (see Sections 1.2.1 and 1.4.2 of the RI Report).

Tables 12 through 19 are intentionally omitted
Per Active Army Guidance (U.S. Army, 2009)

Table 20
Determining the CHE Module Rating

Source Score Value				
<p>DIRECTIONS:</p> <ol style="list-style-type: none"> From Tables 11–19, record the data element scores in the Score boxes to the right. Add the Score boxes for each of the three factors and record this number in the Value boxes to the right. Add the three Value boxes and record this number in the CHE Module Total box below. Circle the appropriate range for the CHE Module Total below. Circle the CHE Module Rating that corresponds to the range selected and record this value in the CHE Module Rating box found at the bottom of the table. <p>Note: An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.</p>	CWM Hazard Factor Data Elements			
	CWM Configuration	Table 11	0	0
	Sources of CWM	Table 12		
	Accessibility Factor Data Elements			0
	Location of CWM	Table 13		
	Ease of Access	Table 14		
	Status of Property	Table 15		0
	Receptor Factor Data Elements			
	Population Density	Table 16		
	Population Near Hazard	Table 17		
	Types of Activities/Structures	Table 18		0
	Ecological and /or Cultural Resources	Table 19		
	CHE MODULE TOTAL			0
	CHE Module Total		CHE Module Rating	
	92 to 100		A	
	82 to 91		B	
	71 to 81		C	
	60 to 70		D	
48 to 59		E		
38 to 47		F		
less than 38		G		
Alternative Module Ratings		Evaluation Pending		
		No Longer Required		
		No Known or Suspected CWM Hazard		
CHE MODULE RATING		No Known or Suspected CWM Hazard		

Table 21

HHE Module: Groundwater Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's groundwater and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional groundwater contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard present in the groundwater, select the box at the bottom of the table.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
CHF Scale	CHF Value	Sum The Ratios	
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		
Migratory Pathway Factor			
DIRECTIONS: Circle the value that corresponds most closely to the groundwater migratory pathway at the MRS.			
Classification	Description		Value
Evident	Analytical data or observable evidence indicates that contamination in the groundwater is present at, moving toward, or has moved to a point of exposure.		H
Potential	Contamination in groundwater has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.		M
Confined	Information indicates a low potential for contaminant migration from the source via the groundwater to a potential point of exposure (possibly due to the presence of geological structures or physical controls).		L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
Receptor Factor			
DIRECTIONS: Circle the value that corresponds most closely to the groundwater receptors at the MRS.			
Classification	Description		Value
Identified	There is a threatened water supply well downgradient of the source and the groundwater is a current source of drinking water or source of water for other beneficial uses such as irrigation/agriculture (equivalent to Class I or IIA aquifer).		H
Potential	There is no threatened water supply well downgradient of the source and the groundwater is currently or potentially usable for drinking water, irrigation, or agriculture (equivalent to Class I, IIA, or IIB aquifer).		M
Limited	There is no potentially threatened water supply well downgradient of the source and the groundwater is not considered a potential source of drinking water and is of limited beneficial use (equivalent to Class IIIA or IIIB aquifer, or where perched aquifer exists only).		L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
No Known or Suspected Groundwater MC Hazard <input checked="checked" type="checkbox"/>			

Groundwater samples did not contain any MC above background (Secs 4.2.3 and 5.3.3, RI Report)

Table 22

HHE Module: Surface Water – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface water and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional surface water contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with human endpoints present in the surface water, select the box at the bottom of the table.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
Antimony	0.61	6	.10
Arsenic	2.8	4.5	.62
Copper	18	620	0.03
Iron	777	11000	0.07
Lead	6.6	15	.44
Manganese	37.3	320	.12
Thallium	1.3	0.16	8.125
CHF Scale	CHF Value	Sum The Ratios	9.505
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		M

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	M

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface water to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface water to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	M

No Known or Suspected Surface Water (Human Endpoint) MC Hazard

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Table 23

HHE Module: Sediment – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's sediment and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional sediment contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with human endpoints present in the sediment, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios	
2,6-Dinitrotoluene	0.16	18	0.009	
Antimony	2.2	31	0.071	
Arsenic	7.7	34	0.226	
Chromium	34.6	1600	0.022	
Copper	41.2	3100	0.013	
Iron	14,600	55,000	0.265	
Lead	286	400	0.715	
CHF Scale	<i>CHF Value</i>	Sum The Ratios	2.167	
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$		
100 > CHF > 2	M (Medium)			
2 > CHF	L (Low)			
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		M	
Migratory Pathway Factor DIRECTIONS: Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.				
Classification	Description	Value		
Evident	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.	H		
Potential	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	<div style="border: 1px solid black; padding: 2px; display: inline-block;">M</div>		
Confined	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L		
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		M	
Receptor Factor DIRECTIONS: Circle the value that corresponds most closely to the sediment receptors at the MRS.				
Classification	Description	Value		
Identified	Identified receptors have access to sediment to which contamination has moved or can move.	H		
Potential	Potential for receptors to have access to sediment to which contamination has moved or can move.	<div style="border: 1px solid black; padding: 2px; display: inline-block;">M</div>		
Limited	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.	L		
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		M	
No Known or Suspected Sediment (Human Endpoint) MC Hazard			<input type="checkbox"/>	

Sediment sample results from nearby Nike Pond are summarized in Table 2.11 of Appendix G-1, RI Report.

Table 24

HHE Module: Surface Water – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface water and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional surface water contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with ecological endpoints present in the surface water, select the box at the bottom of the table.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
Antimony	0.61	30	0.02
Arsenic	2.8	150	0.02
Copper	18	9.0	2
Iron	777	1,000	.777
Lead	6.6	2.5	2.64
Manganese	37.3	120	.311
Thallium	1.3	0.8	1.625
CHF Scale	<i>CHF Value</i>	Sum the Ratios	7.393
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		

CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).	M
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Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	<input checked="" type="checkbox"/> M
Confined	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L

MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	M
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Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface water to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface water to which contamination has moved or can move.	<input checked="" type="checkbox"/> M
Limited	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.	L

RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	M
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No Known or Suspected Surface Water (Ecological Endpoint) MC Hazard



Surface water sample results from nearby Nike Pond are summarized in Tables 2.12 of Appendix G-1, RI Report.

Table 25
HHE Module: Sediment – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's sediment and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional sediment contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with ecological endpoints present in the sediment, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
2,6-dinitrotoluene	0.16	0.039	4.1
Antimony	2.2	2	1.1
Arsenic	7.7	9.8	0.78
Chromium	34.6	43.4	0.79
Copper	41.2	31.6	1.3
Iron	14,600	20,000	
Lead	286	35.8	7.9
Mercury	0.34	0.18	1.9
Selenium	2.5	2	1.25
CHF Scale	CHF Value	Sum the Ratios	19.83
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		M

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to the presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	M

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to sediment to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to sediment to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	M

No Known or Suspected Sediment (Ecological Endpoint) MC Hazard

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Sediment sample results from nearby Nike Pond are summarized in Table 2.11 of Appendix G-1, RI Report.

Table 26
HHE Module: Surface Soil Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the MRS's surface soil and their **comparison values** (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the contaminant **ratios** together, including any additional surface soil contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record **CHF Value**. If there is no known or suspected MC hazard with present in the surface soil, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
CHF Scale	CHF Value	Sum the Ratios	
CHF > 100	H (High)	$\text{CHF} = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		

CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).	
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Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface soil migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface soil is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface soil has moved only slightly beyond the source (i.e. tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the surface soil to a potential point of exposure (possibly due to the presence of geological structures or physical controls.)	L

MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	
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Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface soil receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface soil to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface soil to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to surface soil to which contamination has moved or can move.	L

RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	
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No Known or Suspected Surface Soil MC Hazard ☒

No explosives compounds were detected in surface soil samples, and metals were found to be at or below background concentrations (Secs 6.2.3.1-5, RI Report).

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Table 28

Determining the HHE Module Rating

DIRECTIONS:

1. Record the letter values (H, M, L) for the **Contaminant Hazard, Migration Pathway, and Receptor Factors** for the media (from Tables 21-26) in the corresponding boxes below.
2. Record the media's three-letter combinations in the **Three-Letter Combination** boxes below (three-letter combinations are arranged from Hs to Ms to Ls).
3. Using the **HHE Ratings** provided below, determine each media's rating (A-G) and record the letter in the corresponding **Media Rating** box below.

Media (Source)	Contaminant Hazard Factor Value	Migratory Pathway Factor Value	Receptor Factor Value	Three-Letter Combination (Hs-Ms-Ls)	Media Rating (A-G)
Groundwater (Table 21)					No Known or Suspected Hazard
Surface Water/Human Endpoint (Table 22)	M	M	M	MMM	D
Sediment/ Human Endpoint (Table 23)	M	M	M	MMM	D
Surface Water/Ecological Endpoint (Table 24)	M	M	M	MMM	D
Sediment/Ecological Endpoint (Table 25)	M	M	M	MMM	D
Surface Soil (Table 26)					No Known or Suspected Hazard

DIRECTIONS (cont.): 4. Select the single highest Media Rating (A is the highest; G is the lowest) and enter the letter in the HHE Module Rating box. Note: An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more media, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.	HHE MODULE RATING		D
	HHE Ratings (for reference only)		
	Combination	Rating	
	HHH	A	
	HHM	B	
	HHL	C	
	HMM		
	HML	D	
	MMM		
	HLL	E	
MML			
MLL	F		
LLL	G		
Alternative Module Ratings	Evaluation Pending		
	No Longer Required		
	No Known or Suspected MC Hazard		

Because the human health and ecological risk assessments determined that no unacceptable risk is posed by any media (Sections 6.2.3.3 and 6.2.3.8, RI Report), the HHE module has been assigned an overall rating of No Known or Suspected Hazard.

Table 29

MRS Priority

DIRECTIONS: In the chart below, circle the letter rating for each module recorded in Table 10 (EHE), Table 20 (CHE), and Table 28 (HHE). Circle the corresponding numerical priority for each module. If information to determine the module rating is not available, choose the appropriate alternative module rating. The MRS Priority is the single highest priority; record this relative priority in the MRS Priority or Alternative MRS Rating at the bottom of the table.

Note: An MRS assigned Priority 1 has the highest relative priority; an MRS assigned Priority 8 has the lowest relative priority. Only an MRS with CWM known or suspected to be present can be assigned Priority 1; an MRS that has CWM known or suspected to be present cannot be assigned Priority 8.

EHE Rating	Priority	CHE Rating	Priority	HHE Rating	Priority
		A	1		
A	2	B	2	A	2
B	3	C	3	B	3
C	4	D	4	C	4
D	5	E	5	D	5
E	6	F	6	E	6
F	7	G	7	F	7
G	8			G	8
Evaluation Pending		Evaluation Pending		Evaluation Pending	
No Longer Required		No Longer Required		No Longer Required	
No Known or Suspected Explosive Hazard		No Known or Suspected CWM Hazard		No Known or Suspected MC Hazard	
MRS PRIORITY or ALTERNATIVE MRS RATING				3	

Appendix E: MEC Risk Assessment Matrices (MRS 08)

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Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

The area is considered to be a CMUA. The following MEC and MD items were found in the subsurface of MRS 08A (CMUA-1):

- MEC: 4 inch MK10 APHE projectile, with base plug (anomaly 5-01), 10 inch depth
- MD: 14 MD items were found, at depths ranging from 2 to 24 inches

The distribution of MEC and MD indicates the likelihood of side-shot relative to the historical target areas of old MRS-1 and MRS-2 (see Figure 2, Appendix A).

Access Condition Justification:

This portion of the MRS is in proximity to paved Atlantic drive and there are no man-made barriers preventing access. However, but this is not a location of pedestrian traffic and areas of dense natural vegetation function to limit pedestrian access. Therefore, access or frequency of use is assessed as *Intermittent*.

Matrix 1 Result: *Occasional*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

Detonation of the identified MEC item while being handled by a human would likely result in partial disability or hospitalization. Therefore, the severity is assessed as **Catastrophic/Critical**.

Matrix 2 Result: B

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

The identified MEC item contained some amount of HE, although it was not considered inherently sensitive. Therefore, the sensitivity is assessed as **Moderate**.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. However, park trespassers ('treasure hunters', etc) using metal detectors could discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 2

Matrix 4 – Acceptable and Unacceptable Site Conditions. This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: B

Matrix 3 Result: 2

Matrix 4 Result: Unacceptable

The risk matrices demonstrate that MRS 08A (CMUA-1) currently has an unacceptable risk from MEC hazards on the MRS due to the combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 08A (CMUA-1) is assessed to be *Unacceptable*.

Unacceptable initial conditions typically proceed to the next phase of the CERCLA response process, where remedial action is warranted.

Evaluation of the matrices indicates that the unacceptable risk for this area could be reduced to an acceptable risk by either reducing/eliminating the likelihood for humans to encounter the MEC in this area or by reducing the relative energy imparted to munitions during land use activities.

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

The area is considered to be a CMUA. The following MEC and MD items were found in the subsurface of MRS 08B (CMUA-2):

- MEC: 57mm Mk1 APHE projectile, fuze and fired (anomaly 95), 3 inch depth
- MEC: 57mm round, M303 HE w/fuze (anomaly 112-01), 2 inch depth
- MEC: 57mm round, M86 APHE (anomaly 117-14), 6 inch depth
- MEC: 3 inch Mk 3 Model 7 projectile with tracer (anomaly 140-05), 6 inch depth
- MD: 45 items were found, at depths ranging from 0 to 16 inches.

The distribution of MEC and MD indicates the likelihood of side-shot relative to the historical target area of old MRS-4 (see Figure 2, Appendix A).

Access Condition Justification:

Unpaved recreational trails and the paved Multi-Use Path pass through this portion of the MRS. It is in proximity to paved Hartshorne drive and there are no man-made barriers preventing access. However, MRS 08B is primarily a low pedestrian traffic location with areas of dense natural vegetation functioning to limit pedestrian access. Therefore, access or frequency of use is assessed as *Intermittent*.

Matrix 1 Result: *Occasional*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

Detonation of the identified MEC items while being handled by a human would likely result in partial disability or hospitalization. Therefore, the severity is assessed as **Catastrophic/Critical**.

Matrix 2 Result: B

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

The identified MEC items contained some amount of HE, although they were not considered inherently sensitive. Therefore, the sensitivity is assessed as **Moderate**.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. While the unpaved trails have undergone a 100% UXO clearance, park trespassers ('treasure hunters', etc) deviating from the trails could use metal detectors to unintentionally discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 2

Matrix 4 – Acceptable and Unacceptable Site Conditions. This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: B

Matrix 3 Result: 2

Matrix 4 Result: Unacceptable

The risk matrices demonstrate that MRS 08B (CMUA-2) currently has an unacceptable risk from MEC hazards on the MRS due to the combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 08B (CMUA-2) is assessed to be **Unacceptable**.

Unacceptable initial conditions typically proceed to the next phase of the CERCLA response process, where remedial action is warranted.

Evaluation of the matrices indicates that the unacceptable risk for this area could be reduced to an acceptable risk by either reducing/eliminating the likelihood for humans to encounter the MEC in this area or by reducing the relative energy imparted to munitions during land use activities.

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

No MEC was found in this CMUA. The area is considered to be a CMUA as it is likely a buffer zone of one of the old historical target impact areas and the MD finds represent side-shot to the impact area. See Figure 8, Appendix A.

The presence of MEC is therefore suspected only, based on historical evidence of munitions use.

The following MD items were found in the subsurface of MRS 08C (CMUA-3):

- 1 inert M2 grenade, on the surface.
- 3 pieces of frag, at depths ranging from 3 to 6 inches.
- One 6 inch diameter cannonball at a depth of 24 inches was found just outside of MRS 08 but in close proximity to this CMUA

Access Condition Justification:

Unpaved recreational trails and the paved Multi-Use Path pass through this portion of the MRS. It is in proximity to paved Hartshorne drive and there are no man-made barriers preventing access. However, MRS 08C is primarily a low pedestrian traffic location with areas of dense natural vegetation functioning to limit pedestrian access. Therefore, access or frequency of use is assessed as *Intermittent*.

Matrix 1 Result: *Unlikely*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

No MEC was found and no severity is associated with MD. Therefore, the severity is assessed as **Improbable**.

Matrix 2 Result: D

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

No MEC was found and no level of sensitivity is associated with MD. Therefore, the sensitivity is assessed as **Not Sensitive**.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. Park trespassers ('treasure hunters', etc) deviating from the trails or roads could use metal detectors to unintentionally discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 3

Matrix 4 – Acceptable and Unacceptable Site Conditions. This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *D*

Matrix 3 Result: *3*

Matrix 4 Result: *Acceptable*

The risk matrices demonstrate that MRS 08C (CMUA-3) currently has an acceptable risk from MEC hazards on the MRS due to the absence of MEC and the resulting combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 08C (CMUA-3) is assessed to be ***Acceptable***.

Acceptable baseline conditions do not need to proceed to the next phase of the CERCLA response process, as no further action is warranted.

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

No MEC was found in this CMUA. The area is considered to be a CMUA as it is likely a buffer zone of one of the old historical target impact areas and the MD finds represent side-shot to the impact area. See Figure 8, Appendix A.

The presence of MEC is therefore suspected only, based on historical evidence of munitions use.

The following MD items were found in the subsurface of MRS 08D (CMUA-4):

- 1 inert 37 mm slug at the surface
- 6 pieces of frag, at depths ranging from 0 to 6 inches

Access Condition Justification:

An unpaved access road passes through this portion of the MRS. It is in proximity to paved Hartshorne drive and there are no man-made barriers preventing access. However, MRS 08D is primarily a low pedestrian traffic location with areas of dense natural vegetation functioning to limit pedestrian access. Therefore, access or frequency of use is assessed as *Intermittent*.

Matrix 1 Result: *Unlikely*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

No MEC was found and no severity is associated with MD. Therefore, the severity is assessed as **Improbable**.

Matrix 2 Result: D

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

No MEC was found and no level of sensitivity is associated with MD. Therefore, the sensitivity is assessed as ***Not Sensitive***.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. Park trespassers ('treasure hunters', etc) deviating from the trails or roads could use metal detectors to unintentionally discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as ***Modest***.

Matrix 3 Result: 3

Matrix 4 – Acceptable and Unacceptable Site Conditions. This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: D

Matrix 3 Result: 3

Matrix 4 Result: Acceptable

The risk matrices demonstrate that MRS 08D (CMUA-4) currently has an acceptable risk from MEC hazards on the MRS due to the absence of MEC and the resulting combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 08D (CMUA-4) is assessed to be *Acceptable*.

Acceptable baseline conditions do not need to proceed to the next phase of the CERCLA response process, as no further action is warranted.

Appendix F:
MEC Risk Assessment Matrices (Previously Existing MRSs)

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This appendix updates MEC risk evaluations for previously existing Fort Hancock MRSs as a means to standardize MEC risk across the multiple RI efforts using the current USACE methodology to assess risk posed by explosive hazards (USACE, 2017c).

Risk analysis for each MRS is summarized below; the risk matrix forms follow.

Table 1: Summary of MEC Risk Assessment Matrix Analysis				
MRS	Matrix 1: Likelihood of Encounter	Matrix 2: Severity of Incident	Matrix 3: Likelihood of Detonation	Matrix 4: Acceptable and Unacceptable Site Conditions
MRS 03	Frequent - (Confirmed MEC, Regular Access)	A - (Catastrophic Severity, Frequent Likelihood)	1 - (Moderate Sensitivity, High Likelihood)	Unacceptable
MRS 05A	Unlikely - (MEC Suspected, Intermittent Access)	D - (Improbable Severity, Unlikely Likelihood)	3 - (Not Sensitive, Modest Likelihood)	Acceptable
MRS 05B	Occasional - (Confirmed MEC, Intermittent Access)	B - (Catastrophic Severity, Occasional Likelihood)	2 - (Moderate Sensitivity, Modest Likelihood)	Unacceptable
MRS 05C	Unlikely - (MEC Suspected, Intermittent Access)	D - (Improbable Severity, Unlikely Likelihood)	3 - (Not Sensitive, Modest Likelihood)	Acceptable
MRS 05D	Seldom - (MEC Suspected, Often Access)	D - (Improbable Severity, Seldom Likelihood)	3 - (Not Sensitive, Modest Likelihood)	Acceptable
MRS 05E	Occasional - (Confirmed MEC, Intermittent Access)	B - (Catastrophic Severity, Occasional Likelihood)	2 - (Moderate Sensitivity, Modest Likelihood)	Unacceptable
MRS 05F	Seldom - (MEC Suspected, Regular Access)	D - (Improbable Severity, Seldom Likelihood)	3 - (Not Sensitive, Modest Likelihood)	Acceptable
MRS 05G	Occasional - (MEC Based on Physical Evidence, Often Access)	B - (Catastrophic Severity, Occasional Likelihood)	2 - (Moderate Sensitivity, Modest Likelihood)	Unacceptable
MRS 06	Occasional - (Confirmed MEC, Intermittent Access)	B - (Catastrophic Severity, Occasional Likelihood)	2 - (Moderate Sensitivity, Modest Likelihood)	Unacceptable
MRS 07	Seldom - (MEC Suspected, Regular Access)	D - (Improbable Severity, Seldom Likelihood)	2 - (Not Sensitive, High Likelihood)	Acceptable
MRS 10	Likely - (MEC Based on Physical Evidence, Regular Access)	A - (Catastrophic Severity, Likely Likelihood)	1 - (Moderate Sensitivity, High Likelihood)	Unacceptable

MEC Risk Assessment Matrices – MRS 03

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

MRS 03 is considered to be a CMUA. Formerly MRS 1A, it encompasses the old and new firing points of the former proving ground, a part of the 9-Gun Battery, and part of the buffer area of the 1,000-yard Impact Area. Three MEC and numerous MD items were found below the ground surface during the original 2014 RI. The MRS also includes the B003 Area where several MEC items were found during the 1998 EE/CA. Additional MD items were found on the unpaved trails investigated during RI Addendum #3.

The following MEC and MD items were found in the subsurface of MRS 03:

- MEC: 75 mm projectiles, an MK 1, 1.44-inch projectile, and a 3.5-inch armor piercing high explosive projectile. Also, items found during the EE/CA in B003 include 10-inch, 4.7-inch, 5-inch, 3-inch projectiles, and a Mark V fuze.
- MD: Numerous items including 3.5-inch, 4.7-inch, 6-inch projectiles and 75mm shells.

Access Condition Justification:

This MRS is a high traffic area, open and accessible by park visitors. It contains unpaved and paved trails, paved roads, and a large paved parking lot. While there is some semi-dense natural vegetation that limits pedestrian access, with a few exceptions of fenced areas, there are no man-made barrier restrictions. Therefore, access or frequency of use for MRS 03 is assessed as ***Regular***.

Matrix 1 Result: *Frequent*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

Detonation of the identified MEC items while being handled by a human would likely result in at least partial disability or hospitalization. Therefore, the severity is assessed as **Catastrophic/Critical**.

Matrix 2 Result: A

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

The identified MEC items contained some amount of HE. Therefore, the sensitivity is assessed as **Moderate**.

Likelihood to Impart Energy Justification:

This MRS is a high traffic area, open and accessible by park visitors. Park workers performing maintenance operations such as excavating or grading, could encounter MEC. Although not as likely in this area, park visitors ('treasure hunters', etc) could use metal detectors to discover and excavate MEC. Therefore, the likelihood to impart energy is assessed as **High**.

Matrix 3 Result: 1

Matrix 4 – Acceptable and Unacceptable Site Conditions. *This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.*

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: A

Matrix 3 Result: 1

Matrix 4 Result: *Unacceptable*

The risk matrices demonstrate that MRS 03 currently has an unacceptable risk from MEC hazards due to the combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 03 is assessed to be *Unacceptable*.

Unacceptable initial conditions typically proceed to the next phase of the CERCLA response process, where remedial action is warranted. Evaluation of the matrices indicates that the unacceptable risk for this area could be reduced to an acceptable risk by reducing/eliminating the likelihood for humans to encounter the MEC in this area.

MEC Risk Assessment Matrices – MRS 05A

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

No MEC was found in MRS 05A (formerly 1B). The area is likely an undershot zone of the historical 1,000-yard target impact area, where MD was found short of the impact area. See Figure A-5-6 of the 2014 RI Report.

The presence of MEC is therefore suspected only, based on historical evidence of munitions use.

The following MD item was found in the subsurface of MRS 05A:

- 1 piece of MD frag, at a depth of approximately 3 inches.

Access Condition Justification:

Unpaved recreational trails pass nearby and it is in proximity to paved Atlantic Drive and there are no man-made barriers preventing access. However, MRS 05A is primarily a low pedestrian traffic location with areas of dense natural vegetation functioning to limit pedestrian access. Therefore, access or frequency of use is assessed as ***Intermittent***.

Matrix 1 Result: *Unlikely*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		<u>Frequent:</u> Regular, or inevitable occurrences	<u>Likely:</u> Several or numerous occurrences	<u>Occasional:</u> Sporadic or intermittent occurrences	<u>Seldom:</u> Infrequent, rare occurrences	<u>Unlikely:</u> Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

No MEC was found and no severity is associated with MD. Therefore, the severity is assessed as **Improbable**.

Matrix 2 Result: D

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

No MEC was found and no level of sensitivity is associated with MD. Therefore, the sensitivity is assessed as **Not Sensitive**.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. Park trespassers ('treasure hunters', etc) deviating from the trails or roads could use metal detectors to unintentionally discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 3

Matrix 4 – Acceptable and Unacceptable Site Conditions. *This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.*

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *D*

Matrix 3 Result: *3*

Matrix 4 Result: *Acceptable*

The risk matrices demonstrate that MRS 05A currently has an acceptable risk from MEC hazards on the MRS due to the absence of MEC and the resulting combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 05A is assessed to be *Acceptable*.

Acceptable baseline conditions do not need to proceed to the next phase of the CERCLA response process, as no further action is warranted.

MEC Risk Assessment Matrices – MRS 05B

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

MRS 05B contains MEC and MD and is considered to be a CMUA. Formerly MRS 2A, the area is partially within and partially an undershot zone of the historical 2,000-yard target impact area. In the southern tip of the MRS, two 12-inch unfired projectiles, encountered during the EE/CA investigation, were left in the ground (and remain there).

See Figure A-5-7 of the 2014 RI Report.

The following MEC and MD items were found in the surface and subsurface of MRS 05B:

- MEC: 5-inch APHE round (surface), two 12-inch unfired projectiles.
- MD: 10 MD items identified as frag.

Access Condition Justification:

Paved Atlantic Drive passes through MRS 05B, and there are no man-made barriers preventing access. However, MRS 05B is primarily a low pedestrian traffic location with areas of dense natural vegetation functioning to limit pedestrian access. Therefore, access or frequency of use is assessed as *Intermittent*.

Matrix 1 Result: *Occasional*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

Detonation of the identified MEC items while being handled by a human would likely result in at least partial disability or hospitalization. Therefore, the severity is assessed as **Catastrophic/Critical**.

Matrix 2 Result: B

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

The identified MEC items contained HE. Therefore, the sensitivity is assessed as **Moderate**.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. However, park trespassers ('treasure hunters', etc) using metal detectors could discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 2

Matrix 4 – Acceptable and Unacceptable Site Conditions. This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *B*

Matrix 3 Result: *2*

Matrix 4 Result: *Unacceptable*

The risk matrices demonstrate that MRS 05B currently has an unacceptable risk from MEC hazards due to the combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 05B is assessed to be *Unacceptable*.

Unacceptable initial conditions typically proceed to the next phase of the CERCLA response process, where remedial action is warranted. Evaluation of the matrices indicates that the unacceptable risk for this area could be reduced to an acceptable risk by either reducing/eliminating the likelihood for humans to encounter the MEC in this area or by reducing the relative energy imparted to munitions during land use activities.

MEC Risk Assessment Matrices – MRS 05C

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

No MEC was found in MRS 05C (formerly 3A). The area is likely an undershot zone of the historical 2,500-yard target impact area, where MD was found short of the impact area. See Figure A-5-8 of the 2014 RI Report.

The presence of MEC is therefore suspected only, based on historical evidence of munitions use.

The following MD items were found in the subsurface of MRS 05C:

- 2 pieces of MD frag, at a depth of approximately 12 inches.

Access Condition Justification:

Unpaved recreational trails pass nearby, paved Atlantic Drive is just to the west, and there are no man-made barriers preventing access. However, MRS 05C is primarily a low pedestrian traffic location (no walking trails along Atlantic Drive in this area) with areas of dense natural vegetation functioning to limit pedestrian access. Therefore, access or frequency of use is assessed as *Intermittent*.

Matrix 1 Result: *Unlikely*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		<u>Frequent:</u> Regular, or inevitable occurrences	<u>Likely:</u> Several or numerous occurrences	<u>Occasional:</u> Sporadic or intermittent occurrences	<u>Seldom:</u> Infrequent, rare occurrences	<u>Unlikely:</u> Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

No MEC was found and no severity is associated with MD. Therefore, the severity is assessed as **Improbable**.

Matrix 2 Result: D

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

No MEC was found and no level of sensitivity is associated with MD. Therefore, the sensitivity is assessed as ***Not Sensitive***.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. Park trespassers ('treasure hunters', etc) deviating from the trails or roads could use metal detectors to unintentionally discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as ***Modest***.

Matrix 3 Result: 3

Matrix 4 – Acceptable and Unacceptable Site Conditions. *This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.*

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *D*

Matrix 3 Result: *3*

Matrix 4 Result: *Acceptable*

The risk matrices demonstrate that MRS 05C currently has an acceptable risk from MEC hazards on the MRS due to the absence of MEC and the resulting combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 05C is assessed to be *Acceptable*.

Acceptable baseline conditions do not need to proceed to the next phase of the CERCLA response process, as no further action is warranted.

MEC Risk Assessment Matrices – MRS 05D

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

No MEC was found in MRS 05D (formerly 3B). The area is likely a side shot zone of the historical 2,500-yard target impact area, where MD was found west of the impact area. See Figure A-5-8 of the 2014 RI Report.

The presence of MEC is therefore suspected only, based on historical evidence of munitions use.

The following MD items were found in the subsurface of MRS 05D:

- 3 pieces of MD frag, at a depth of approximately 12 inches.

Access Condition Justification:

An unpaved recreational trail and paved Atlantic Drive pass through the MRS, and there are no man-made barriers preventing access. MRS 05D is still a relatively low pedestrian traffic location with areas of dense natural vegetation functioning to limit pedestrian access to the narrow trail, and it should be noted that part of the scope of RI Addendum #3 was to clear MEC/MD from trails such as these that are within previous existing MRSs; thus, this trail has been cleared of MEC/MD hazards. However, as a function of access or frequency of use, the MRS is assessed as *Often*.

Matrix 1 Result: *Seldom*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

No MEC was found and no severity is associated with MD. Therefore, the severity is assessed as **Improbable**.

Matrix 2 Result: D

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

No MEC was found and no level of sensitivity is associated with MD. Therefore, the sensitivity is assessed as **Not Sensitive**.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. Park trespassers ('treasure hunters', etc) deviating from the trails or roads could use metal detectors to unintentionally discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 3

Matrix 4 – Acceptable and Unacceptable Site Conditions. *This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.*

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *D*

Matrix 3 Result: *3*

Matrix 4 Result: *Acceptable*

The risk matrices demonstrate that MRS 05D currently has an acceptable risk from MEC hazards on the MRS due to the absence of MEC and the resulting combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 05D is assessed to be *Acceptable*.

Acceptable baseline conditions do not need to proceed to the next phase of the CERCLA response process, as no further action is warranted.

MEC Risk Assessment Matrices – MRS 05E

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

MRS 05E contains MEC and MD and is considered to be a CMUA. Formerly MRS 4A, the area is within the historical 3,000-yard target impact area.

See Figure A-5-9 of the 2014 RI Report.

The following MEC and MD items were found in the subsurface of MRS 05E:

- MEC: a 3-inch Stokes mortar and a 75mm projectile.
- MD: 5 MD items identified as 75mm shells (3) and misc frag.

Access Condition Justification:

This area is just west of the beach with no man-made barriers preventing access. However, MRS 05E is primarily a low pedestrian traffic location with areas of semi-dense natural vegetation limit pedestrian access. Therefore, access or frequency of use is assessed as *Intermittent*.

Matrix 1 Result: *Occasional*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

Detonation of the identified MEC items while being handled by a human would likely result in at least partial disability or hospitalization. Therefore, the severity is assessed as **Catastrophic/Critical**.

Matrix 2 Result: B

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

The identified MEC items contained some amount of HE. Therefore, the sensitivity is assessed as **Moderate**.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. However, park trespassers ('treasure hunters', etc) using metal detectors could discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 2

Matrix 4 – Acceptable and Unacceptable Site Conditions. This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *B*

Matrix 3 Result: *2*

Matrix 4 Result: *Unacceptable*

The risk matrices demonstrate that MRS 05E currently has an unacceptable risk from MEC hazards due to the combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 05E is assessed to be *Unacceptable*.

Unacceptable initial conditions typically proceed to the next phase of the CERCLA response process, where remedial action is warranted. Evaluation of the matrices indicates that the unacceptable risk for this area could be reduced to an acceptable risk by either reducing/eliminating the likelihood for humans to encounter the MEC in this area or by reducing the relative energy imparted to munitions during land use activities.

MEC Risk Assessment Matrices – MRS 05F

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

No MEC was found in MRS 05F (formerly 5A). The area is just south of the historical 3,000-yard target impact area and likely represents an overshoot zone, where several MD items were found. See Figure A-5-10 of the 2014 RI Report.

The presence of MEC is therefore suspected only, based on historical evidence of munitions use.

The following MD items were found in the subsurface of MRS 05F:

- 3 separate pieces of MD scrap from a 75mm projectile, at depths ranging from 12-48 inches.
- 1 piece of MD scrap from a 90mm projectile at a depth of 12 inches.

Access Condition Justification:

This area is just west of the beach with unpaved recreational trails intersecting the MRS, and no man-made barriers preventing access. MRS 05F is a somewhat regular pedestrian traffic location with regard to the trails, but areas of semi-dense natural vegetation limit pedestrian access to the trails. It should be noted that part of the scope of RI Addendum #3 was to clear MEC/MD from trails such as these that are within previous existing MRSs; thus, these trails have been cleared of MEC/MD hazards. However, as a function of access or frequency of use, the MRS is assessed as ***Regular***.

Matrix 1 Result: *Seldom*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		<u>Frequent:</u> Regular, or inevitable occurrences	<u>Likely:</u> Several or numerous occurrences	<u>Occasional:</u> Sporadic or intermittent occurrences	<u>Seldom:</u> Infrequent, rare occurrences	<u>Unlikely:</u> Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

No MEC was found and no severity is associated with MD. Therefore, the severity is assessed as **Improbable**.

Matrix 2 Result: D

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

No MEC was found and no level of sensitivity is associated with MD. Therefore, the sensitivity is assessed as ***Not Sensitive***.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. Park trespassers ('treasure hunters', etc) deviating from the trails could use metal detectors to unintentionally discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as ***Modest***.

Matrix 3 Result: 3

Matrix 4 – Acceptable and Unacceptable Site Conditions. *This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.*

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *D*

Matrix 3 Result: *3*

Matrix 4 Result: *Acceptable*

The risk matrices demonstrate that MRS 05F currently has an acceptable risk from MEC hazards on the MRS due to the absence of MEC and the resulting combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 05F is assessed to be *Acceptable*.

Acceptable baseline conditions do not need to proceed to the next phase of the CERCLA response process, as no further action is warranted.

MEC Risk Assessment Matrices – MRS 05G

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

MRS 05G contained one MEC item. Formerly MRS 5B, the area is possibly an overshoot zone of the historical 3,000-yard target impact area. It lies just east of MRS 06 (Livens Discovery Area). However, it is also a beach area and the MEC item may have washed up on shore following a storm event.

MEC presence is therefore based on physical evidence (MEC find), although the area is not a CMUA. The following MEC item was found in the subsurface of MRS 05G:

- MEC: a 4.5-inch Mark V APHE round.

See Figure A-5-10 of the 2014 RI Report.

Access Condition Justification:

While it is in a location of relatively low pedestrian traffic, the area is on the public beach with no man-made barriers preventing access and there is a small unpaved trail nearby. Therefore, access or frequency of use is assessed as *Often*.

Matrix 1 Result: *Occasional*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

Detonation of the identified MEC item while being handled by a human would likely result in at least partial disability or hospitalization. Therefore, the severity is assessed as **Catastrophic/Critical**.

Matrix 2 Result: B

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

The identified MEC item contained HE. Therefore, the sensitivity is assessed as **Moderate**.

Likelihood to Impart Energy Justification:

The area is a beach area and park visitors ('treasure hunters', etc) using metal detectors could discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. However, its location makes it a relatively low pedestrian traffic area. Therefore, likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 2

Matrix 4 – Acceptable and Unacceptable Site Conditions. *This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.*

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *B*

Matrix 3 Result: *2*

Matrix 4 Result: *Unacceptable*

The risk matrices demonstrate that MRS 05G currently has an unacceptable risk from MEC hazards due to the combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 05G is assessed to be *Unacceptable*.

Unacceptable initial conditions typically proceed to the next phase of the CERCLA response process, where remedial action is warranted. Evaluation of the matrices indicates that the unacceptable risk for this area could be reduced to an acceptable risk by either reducing/eliminating the likelihood for humans to encounter the MEC in this area or by reducing the relative energy imparted to munitions during land use activities.

MEC Risk Assessment Matrices – MRS 06

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

MEC and MD have been found in MRS 06 (Livens Discovery Area). MRS 06 encompasses 5 acres where a 1927 munitions storehouse fire occurred and where Livens projectiles, originally contained in the former storehouse, were discovered in 1981. These Livens contained titanium tetrachloride (FM smoke). The original Livens Discovery Area footprint was a 29-acre circle, with the location of the storehouse in the middle and a radius of 600 feet (plus a buffer) representing the fragmentation distance for a Livens. MRS 06 also falls approximately midway between the 3,000-yard and 3-mile historical target impact areas.

During the 1988 EE/CA, one 3-inch and one 4.7-inch projectile, one full Livens projectile containing FM smoke, and a potentially live Stokes mortar fuze were discovered, along with numerous MD items. While no MEC was found during the current RI investigations, 22 MD items were found. See Figures 6 and 10 of this RI Addendum #3 Report.

The area is considered to be a CMUA. The following MEC and MD items were found in the subsurface of MRS 06:

- MEC items include one 3-inch and one 4.7-inch projectile, one full Livens projectile containing FM smoke, and a potentially live Stokes mortar fuze.
- Numerous separate pieces of MD including empty gas grenades, smoke dispensers, Stokes mortar fuzes, base of a 4.7" projectile, empty Livens projectiles, and MD frag.

Access Condition Justification:

Unpaved recreational trails pass nearby, and Fishing Beach Road is approximately 200 feet north. However, while there are no man-made barriers preventing access, MRS 06 is primarily a low pedestrian traffic location with areas of dense natural vegetation functioning to limit pedestrian access. Therefore, access or frequency of use for MRS 06 is assessed as *Intermittent*.

Matrix 1 Result: *Occasional*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

Detonation of a Livens or Stokes mortar while being handled by a human would likely result in partial disability or hospitalization. Therefore, the severity is assessed as **Catastrophic/Critical**.

Matrix 2 Result: B

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

The identified MEC items contained some amount of HE. Therefore, the sensitivity is assessed as **Moderate**.

Likelihood to Impart Energy Justification:

The area is an undeveloped portion of park land and will remain so for the foreseeable future. However, park trespassers ('treasure hunters', etc) using metal detectors could discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, the likelihood to impart energy is assessed as **Modest**.

Matrix 3 Result: 2

Matrix 4 – Acceptable and Unacceptable Site Conditions. This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *B*

Matrix 3 Result: *2*

Matrix 4 Result: *Unacceptable*

The risk matrices demonstrate that MRS 06 currently has an unacceptable risk from MEC hazards due to the combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 06 is assessed to be *Unacceptable*.

Unacceptable initial conditions typically proceed to the next phase of the CERCLA response process, where remedial action is warranted. Evaluation of the matrices indicates that the unacceptable risk for this area could be reduced to an acceptable risk by either reducing/eliminating the likelihood for humans to encounter the MEC in this area or by reducing the relative energy imparted to munitions during land use activities.

Note that an explosive risk assessment was conducted as part of the 1998 EE/CA, and MRS 06 was recommended for MEC clearance to depth. The removal actions were never undertaken, and while that risk assessment would not be a true risk characterization as would be conducted today, it further supports the potential need to evaluate remedial actions.

MEC Risk Assessment Matrices – MRS 07

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

No MEC was found in MRS 07 (Remaining Land). While no MD was found in this area during the current RI investigations, MD was found in various portions of this MRS during the 1998 EE/CA investigations; those finds were associated with the historical target impact areas. The MRS extends to the northernmost extent of the Sandy Hook peninsula and to the southernmost boundary of the recreation area, including the acreage of the historical target impact areas (or surrounding acreage). MRS 07 constitutes those portions of previous land-based MRSs investigated during the various phases of the RI that would now be considered non-CMUAs. See Figure 10 of this RI Addendum #3 Report.

The presence of MEC is therefore suspected only, based on historical evidence of munitions use.

The exact number of MD items is anecdotal, but using the 1998 EE/CA report, the following types of items have been found in MRS 07:

- Numerous separate pieces of MD ‘frag’ (dig sheet description), and portions of a practice grenade, 6-inch projectile, and 4.7-inch projectile. These were found at depths ranging from 3-48 inches.

Access Condition Justification:

This MRS is open and accessible by park visitors. It contains many unpaved and paved trails as well as paved roads. While much of the area contains semi-dense natural vegetation that limits pedestrian access, with a few exceptions of fenced areas, there are no man-made barrier restrictions. Therefore, access or frequency of use for MRS 07 is assessed as ***Regular***.

Matrix 1 Result: *Seldom*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		<u>Frequent:</u> Regular, or inevitable occurrences	<u>Likely:</u> Several or numerous occurrences	<u>Occasional:</u> Sporadic or intermittent occurrences	<u>Seldom:</u> Infrequent, rare occurrences	<u>Unlikely:</u> Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

No MEC was found and no severity is associated with MD. Therefore, the severity is assessed as **Improbable**.

Matrix 2 Result: D

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

No MEC was found and no level of sensitivity is associated with MD. Therefore, the sensitivity is assessed as ***Not Sensitive***.

Likelihood to Impart Energy Justification:

The MRS includes developed and undeveloped portions of park land. Park trespassers ('treasure hunters', etc) could use metal detectors to unintentionally discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. Therefore, likelihood to impart energy is assessed as ***High***.

Matrix 3 Result: 2

Matrix 4 – Acceptable and Unacceptable Site Conditions. *This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.*

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: *D*

Matrix 3 Result: *2*

Matrix 4 Result: *Acceptable*

The risk matrices demonstrate that MRS 05F currently has an acceptable risk from MEC hazards on the MRS due to the absence of MEC and the resulting combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 05F is assessed to be *Acceptable*.

Acceptable baseline conditions do not need to proceed to the next phase of the CERCLA response process, as no further action is warranted.

MEC Risk Assessment Matrices – MRS 10

Matrix 1 – Likelihood of Encounter. This matrix relates the site characterization data for amount of MEC to site use (including accessibility) to determine the likelihood of encountering MEC at a specific site.

Matrix 1. Likelihood of Encounter

Likelihood of Encounter, Matrix 1: Amount of MEC vs. Access Conditions		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Amount of MEC	<ul style="list-style-type: none"> MEC is visible on the surface and detected in the subsurface. 	Frequent	Frequent	Likely	Occasional
	<ul style="list-style-type: none"> The area is identified as a Concentrated Munitions Use Area (CMUA) where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in surface and subsurface. 	Frequent	Likely	Occasional	Seldom
	<ul style="list-style-type: none"> MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95% confidence). 	Likely	Occasional	Seldom	Unlikely
	<ul style="list-style-type: none"> MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface not addressed) or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95% confidence). 	Occasional	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> MEC presence is suspected based on historical evidence of munitions use only, or A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains to support this selection), or The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95% confidence). 	Seldom	Seldom	Unlikely	Unlikely
	<ul style="list-style-type: none"> Investigation of the MRS did not identify evidence of MEC presence, or A DERP response action has been conducted that will achieve UU/UE. 	Unlikely	Unlikely	Unlikely	Unlikely

Amount of MEC Justification:

MRS 10 was developed from dynamic shoreline acreage of MRS 07 and was defined to address munitions that have historically been found on the beaches after storm events. It encompasses the beach and surf zone on the eastern side of the Sandy Hook peninsula, where MEC washes onto the shore after large storm events in the Atlantic Ocean. In part, the MRS encompasses portions of the former proving ground that have eroded into the ocean. See Figure 10 of this RI Addendum #3 Report.

While no MEC or MD were found during the current RI investigations, historical finds include the following UXO that were identified as HE items: 3.5-inch, 6-inch, and 8-inch projectiles, Marine flare, Mk-25 Marine Marker, and a 5-inch AP projectile. These items were found between 2010 and present and were responded to by EOD units out of Naval Weapons Station Earle. The items were identified as live and were blown in place by EOD.

MEC presence is therefore based on physical evidence (MEC finds), although the area is not a CMUA. The following MEC items were found MRS 10:

- MEC items include: 3.5-inch, 6-inch, and 8-inch projectiles, Marine flare, Mk-25 Marine Marker, and a 5-inch AP projectile.

Access Condition Justification:

This MRS is the open beach area and is highly trafficked by pedestrians. Therefore, access or frequency of use for MRS 10 is assessed as ***Regular***.

Matrix 1 Result: *Likely*

Matrix 2 – Severity of Incident. This matrix assesses the likelihood of encounter rating (from Matrix 1) as related to the severity of an unintentional detonation.

Matrix 2. Severity of Incident

Severity of Explosive Incident, Matrix 2: Severity vs. Likelihood of Encounter		Likelihood of Encounter				
		Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent, rare occurrences	Unlikely: Not probable
Severity Associated with Specific Munitions items	Catastrophic/Critical: May result in 1 or more deaths, permanent total or partial disability, or hospitalization	A	A	B	B	D
	Modest: May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization	B	B	B	C	D
	Minor: May result in 1 or more injuries requiring first aid or medical treatment	B	C	C	C	D
	Improbable: No injury is anticipated	D	D	D	D	D

"A" indicates conditions most likely to result in determination of an unacceptable risk.

"D" indicates conditions most likely to result in determination of an acceptable scenarios.

Severity Justification:

Detonation of the identified MEC items while being handled by a human would likely result in at least partial disability or hospitalization. Therefore, the severity is assessed as **Catastrophic/Critical**.

Matrix 2 Result: A

Matrix 3 – Likelihood of Detonation. This matrix relates sensitivity of the MEC items to the likelihood for energy to be imparted to an item during an encounter by specific land users.

Matrix 3. Likelihood of Detonation

Likelihood of Detonation, Matrix 3: Munitions Sensitivity vs. Likelihood of Energy to be Imparted		Likelihood to Impart Energy on an Item		
		High e.g., areas planned for development, or seasonally tilled	Modest e.g., undeveloped, wildlife refuge, parks	Inconsequential e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (e.g., classified as sensitive)	1	1	3
	Moderate (e.g., high explosive (HE) or pyrotechnics)	1	2	3
	Low (e.g., propellant or bulk secondary explosives)	1	3	3
	Not Sensitive	2	3	3

Sensitivity Justification:

The identified MEC items contained some amount of HE as identified by the EOD units. Therefore, the sensitivity is assessed as **Moderate**.

Likelihood to Impart Energy Justification:

This MRS is the open beach area and is highly trafficked by pedestrians. Park visitors ('treasure hunters', etc) using metal detectors could discover and excavate MEC, or park workers performing maintenance operations such as excavating or grading, could encounter MEC. MEC has historically washed up on shore following storm events. Therefore, the likelihood to impart energy is assessed as **High**.

Matrix 3 Result: 1

Matrix 4 – Acceptable and Unacceptable Site Conditions. This final matrix combines the results of Matrices 2 and 3 to differentiate Acceptable and Unacceptable site conditions.

Matrix 4: Acceptable and Unacceptable Site Conditions

Acceptable and Unacceptable Site Conditions		Result From Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

Matrix 2 Result: A

Matrix 3 Result: 1

Matrix 4 Result: *Unacceptable*

The risk matrices demonstrate that MRS 10 currently has an unacceptable risk from MEC hazards due to the combination of severity of incident and likelihood of detonation factors.

Therefore, the baseline site condition for MRS 10 is assessed to be *Unacceptable*.

Unacceptable initial conditions typically proceed to the next phase of the CERCLA response process, where remedial action is warranted. Evaluation of the matrices indicates that the unacceptable risk for this area could be reduced to an acceptable risk by reducing/eliminating the likelihood for humans to encounter the MEC in this area (unlikely in a public beach environment).

Appendix G: Photographic Log



Photo 01 - Three industry standard objects (ISOs) buried in instrument verification strip (IVS).

Date: 23 Oct. 2017



Photo 02 - Recreational trail, outside of MRS 08. Date: 24 Oct. 2017



Photo 03 - UXO team digging anomalies on recreational trail. Date: 2 Nov. 2017

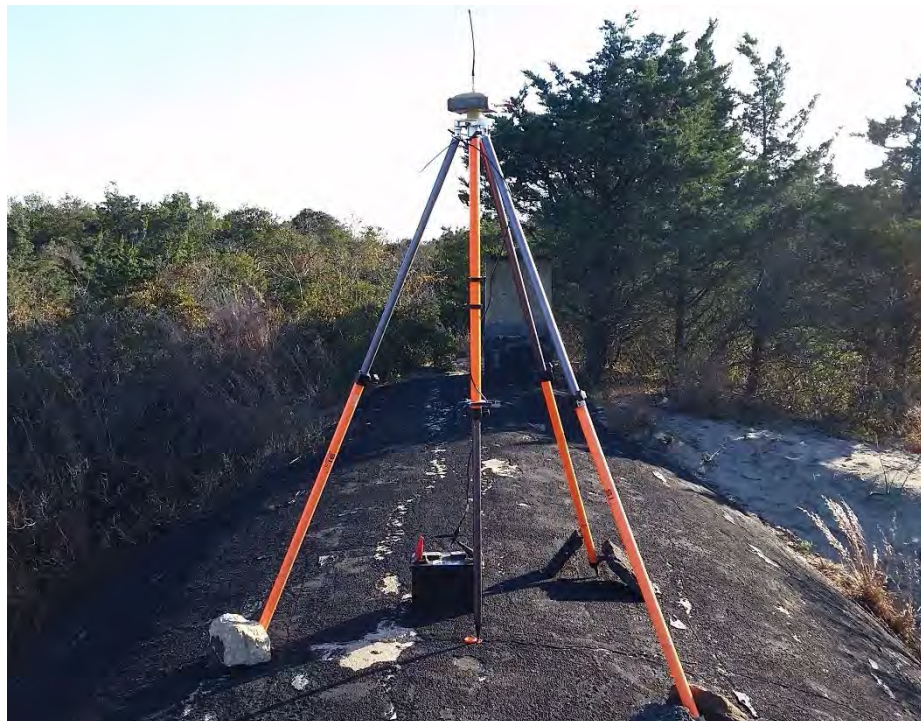


Photo 04 - RTK GPS base station set up on 1938 Magazine. Date: 20 Nov. 2017



Photo 05 - Phragmites swamp/standing water, central MRS 08, facing east at center. Date: 20 Nov. 2017



Photo 06 - Recreational trail and dead vegetation, central MRS 08. Date: 21 Nov. 2017



Photo: 07- Flooded area, northern MRS 08, transect 5. Date: 8 Dec. 2017



Photo 08 - 57mm HEAP projectile (MEC, anom. 95). Date: 25 Oct. 2017



Photo 09 – 5 inch Naval projectile, fired, unfuzed (MD, anom. 199). Date: 27 Oct. 2017



Photo 10 – “BLANK” printed on 5 inch projectile (MD, anom. 199). Date: 27 Oct. 2017



Photo 11 – 2-pound projectiles (MD, anom. 278, 282, 285). Date: 30 Oct. 2017



Photo 12 - Cannonball, 6 inch diameter (MD, anom. 651). Date: 6 Nov. 2017



Photo 13 – Post-detonation photo of 4 inch MK10 APHE projectile with base plug (MEC, left, anom. 5-01), and 3 inch Mk 3 Model 7 projectile with tracer (MEC, right, anom. 140-05). Date: 7 Dec. 2017



Photo 14 - 57mm round, M86 APHE (MEC, anom. 117-14). Date: 30 Nov. 2017



Photo 15 - 57mm round, M303 HE w/fuze (MEC, anom. 112-01). Date: 30 Nov. 2017



Photo 16 - 8 inch Mk19 HEAP Projectile (MD, anom. 512, on trail outside MRS 08). Date: 1 Nov. 2017



Photo 17 - 8 inch Mk 24/25 HE Projectile (MD, anom. 521, on trail outside MRS 08). Date: 1 Nov. 2017



Photo 18 - Post-detonation photo of 5 inch Naval projectile, fired, unfuzed (MD, top, anom. 199), 8 inch Mk19 HEAP Projectile (MD, center, anom. 512), and 8 inch Mk 24/25 HE Projectile (MD, bottom, anom. 521).

Date: 6 Nov. 2017