FINAL
FOCUSED FEASIBILITY STUDY ADDENDUM
FORMER OAK AND MAPLE HOUSING AREAS

FORMER FORT DEVENS ARMY INSTALLATION, DEVENS, MA

MARCH 2013

Prepared for:
U.S. Army Corp of Engineers
New England District
Concord, Massachusetts

Prepared by:
Sovereign Consulting Inc.
and HydroGeoLogic, Inc.
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SOVEREIGN CONSULTING INC.

HGL
HydroGeoLogic, Inc
Exceeding Expectations

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CERTIFICATION:

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-10-D-0003 TO No. 007. This document was prepared in accordance with the U.S. Army Corps of Engineers (USACE) Scope of Work and is hereby submitted for Government Approval.

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3.26.13

HGL Project Manager **Date**

3-27-13

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3/29/2013

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

ACEC	Areas of Critical Environmental Concern
ARARs	Applicable or Relevant and Appropriate Requirements
ASR	Archive Search Report
Army	U.S. Army
bgs	below ground surface
BCT	Base Closure Team
BRAC	Base Realignment and Closure
CEHNC	U.S. Army Corps of Engineers, Huntsville Engineering and Support Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Devens	former Fort Devens Army Installation
DGM	digital geophysical mapping
DMM	discarded military munitions
DoD	Department of Defense
DOI	Department of Interior
ECSM	Expanded Site Conceptual Model
ESD	Explanation of Significant Differences
EPA	U.S. Environmental Protection Agency
FFS	Focused Feasibility Study
ft	feet
HA	Hazard Assessment
HFA	Human Factors Applications, Inc.
HGL	HydroGeoLogic, Inc.
IA	investigation area
LUC	Land Use Controls
LUCIP	Land Use Controls Implementation Plan
MassDEP	Massachusetts Department of Environmental Protection
MassDevelopment	Massachusetts Development and Finance Agency
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NHESP	National Heritage and Endangered Species Program

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE), New England District and the Base Realignment and Closure Office for the former Fort Devens Army Installation (Devens) have contracted the Sovereign Consulting Inc. (Sovereign)/HydroGeoLogic, Inc. team to prepare an Addendum to the 2008 Focused Feasibility Study (FFS) prepared for the Grant Housing Area and 37-millimeter (mm) Impact Area. The 2008 FFS (Weston, 2008) was developed, along with the Proposed Plan and Record of Decision (ROD), to address Munitions and Explosives of Concern (MEC) that may potentially impact the re-development of the former Grant Housing Area and a former 37-mm Impact Area located on the northern slope of the Oak Housing Area. This FFS Addendum incorporates the adjacent Oak and Maple Housing Areas within the framework of the 2008 FFS.

USACE, New England District is administering the contract as well as providing technical support and oversight for this FFS Addendum. Regulatory coordination is provided by the U.S. Environmental Protection Agency (EPA) Region 1 with support from the Massachusetts Department of Environmental Protection (MassDEP). Additional stakeholders for this effort include the Massachusetts Development and Finance Agency and the Restoration Advisory Board (RAB).

This document presents the FFS Addendum portion of the list of documents described above. This FFS Addendum has been prepared in the format of the EPA document 540/G-89/004, *Guidance for Conducting Remedial Investigations and Feasibility Studies under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)* (EPA, 1998).

This FFS Addendum includes evaluation of alternatives performed during the 2008 FFS but is limited to the evaluations performed for the Grant Housing Area. The additional alternatives considered for the 37-mm impact area are not applicable to the Oak and Maple Housing Areas. The remedial alternative selected for the Grant Housing Area was determined to be applicable and appropriate to the Oak and Maple Housing Areas; however, the non-selected alternatives were included for comparative purposes. The selected alternative is expected to mitigate, reduce, or eliminate MEC hazards to human health and the environment based on current and intended future use of the property.

Section 1 provides a description of the former housing areas (Grant, Oak and Maple) and 37-mm Impact Area site locations, a historical background, and physical description of Devens, including proximity of various habitats and potential and human ecological receptors, as it pertains to the Grant, Oak, and Maple Housing Areas and a summary of historical investigations and remedial actions that are pertinent to the these sites. Section 1 also contains a discussion of potential risk to human health and the environment due to the potential presence of MEC at Former Oak and Maple Housing Areas and the evaluation of that risk using the technical reference guidance *Munitions of Explosive Concern Hazard Assessment* (HA). The following conclusions are reached with regard to residual risk at the Former Oak and Maple Housing Areas:

- The probability of encountering MEC within the previously developed Oak and Maple Housing Areas is low. At total of 3,647 anomalies were investigated during the MEC RI (HGL, 2012) and one MEC item (a 37-mm black powder practice

projectile) was found. In addition, several previous MEC investigations have overlapped portions of the site; however, the presence of munitions debris (MD) within the developed areas and the discovery of the 37-mm projectile on the slopes of Oak Hill between the two housing areas indicate a possibility that MEC may be present within the un-surveyed portions of the housing areas.

- Based on the results of the munitions constituents (MC) sampling conducted at the nearby Grant Housing Area and 37-mm Impact Area, MC related to MEC do not pose a risk to human health or the environment.
- There are currently no known impacts to groundwater from MEC-related sources in the nearby Grant Housing Area and adjacent to the 37-mm Impact Area; therefore, there are no groundwater receptor issues.

Finally, Section 1 sets forth the following remedial action objective (RAO) for this FFS Addendum:

- Prevent direct contact with MEC which may remain in soils at the site.

The RAOs guide the development of the alternatives to address remaining risk for each area and focuses the comparison of acceptable remedial action alternatives. The remedial action alternatives that were considered for the Grant Housing Area and 37-mm Impact Area in the 2008 FFS were; No Action, Land Use Controls (LUC), Containment, Removal, Treatment and Disposal. These technologies were screened against three criteria, namely implementability, effectiveness, and cost. No Action, LUCs, and Removal (subsurface clearance to depth) were retained as alternatives for the Grant Housing and 37-mm Impact Area. This approach was retained for evaluation of the Former Oak and Maple Housing Areas within this FFS Addendum with exception that the Containment remedial alternative was not evaluated. This remedial alternative was not evaluated because it was solely applicable to the 37-mm Impact Area and not relevant for the former Oak and Maple Housing Areas.

Section 2 presents a summary of potential Applicable or Relevant and Appropriate Requirements (ARAR) and "To Be Considered" (TBC) criteria for the remedial alternatives evaluated in this FFS.

The three categories of ARARs evaluated for the 2008 FFS and this FFS Addendum are chemical-specific, location-specific, and action-specific. Chemical-specific laws, regulations, and policies are not considered applicable, since historic investigation activities have shown levels of no significant risk resulting from residual chemical concentrations in soil and groundwater. Location-specific ARARs generally are restrictions placed on the concentration of hazardous substances or the conduct of activities to prevent damage to unique or sensitive areas, such as floodplains, wetlands, historic places, and sensitive ecosystems or habitats. Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to cleanup actions, or requirements to conduct certain actions to address particular circumstances at a site. Location and action-specific ARARs either do not apply or will be addressed based on the selected alternatives.

Section 3, 4 and 5 provide an evaluation of remedial alternatives deemed as viable against the evaluation criteria described in the *National Oil and Hazardous Substances Pollution Contingency*

Plan (EPA, 1994), Section 300.430. The alternatives considered during development of this FFS Addendum include:

Table ES.1 Remedial Alternatives

Remedial Alternative No.	Remedial Alternatives	Potential Actions	MEC Investigation and Removal	
			Detection	Removal
OM-1	No Action	NA	NA	NA
OM-2	Land Use Controls	Land use prohibition/ restrictions, public education, perform a limited MEC Survey and MEC physical preview prior to construction, and MEC construction support during intrusive activities.	Yes	Yes(1)
OM-3	Subsurface Clearance to Depth	Land clearing, overburden soil removal with UXO technician support, further MEC survey, MEC disposal, soil replacement, grading, and erosion control.	Yes	Yes(1)

Notes:
NA = Not applicable
(1) = If encountered

The resulting screening from the 2008 FFS indicated that LUCs provided the most appropriate and reasonable means of addressing the remaining hazard associated with any potential undiscovered MEC remaining within the Grant Housing Area or 37-mm Impact Area. This resulting screening also applies to the adjacent former Oak and Maple Housing Areas, as detailed within this FFS Addendum. The former Oak and Maple Housing Areas were evaluated for their potential MEC hazard during the MEC RI (HGL, 2012) and were determined to have a remaining MEC risk that was adequately addressed by implementation of LUCs and incorporation within the LUCs implemented for the adjacent Grant Housing and 37-mm Impact Area. The former Oak and Maple Housing Areas costs associated with the selected LUC remedy are detailed within Section 3.1.

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DEVENS, MASSACHUSETTS

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New England District and the U.S. Army (Army) Base Realignment and Closure (BRAC) Office for the former Fort Devens Army Installation (Devens) have contracted Sovereign Consulting Inc. (Sovereign)/HydroGeoLogic, Inc. (HGL) team to prepare a Focused Feasibility Study (FFS) Addendum to address Munitions and Explosives of Concern (MEC) that may potentially impact the re-development of portions of the former Oak and Maple Housing Areas. The Oak and Maple Housing Areas are directly adjacent to the Grant Housing Area and 37-mm Impact Area for which a FFS was accomplished in 2008 (Weston, 2008). This addendum incorporates the former Oak and Maple Housing Areas within the larger framework of the former 37-mm training area and provides a standardized remedy for the training area. A location map for the area addressed in this FFS Addendum is provided as **Figure 1-1**. The housing areas are located on the Main Post of Devens and are depicted on **Figure 1-2**.

The FFS (Weston, 2008) and the FFS Addendum were both prepared in the format of the U.S. Environmental Protection Agency (EPA) document 540/G-89/004, *Guidance for Conducting Remedial Investigations and Feasibility Studies under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)* (EPA, 1998), and taking guidance from *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, OSWER 9355.0-75 (EPA, 2000), USACE EP 1110-1-18, *Ordnance and Explosives Response* (USACE, 2000), and the USACE, Huntsville Engineering and Support Center (CEHNC) *Military Munitions Center of Expertise (MM CX) Technical Update for developing a Military Munitions Feasibility Study Report under CERCLA* (CEHNC, 2005). This FFS Addendum has been prepared in accordance with USACE, New England Request for Proposal for a Task Order Modification under Contract No. W912WJ-I0-D-0003 Task Order 0007 - Removal Action at The Markley Range and Implementation of Land Use Controls (LUC) at the Grant Housing Area, former Oak and Maple Housing Areas, and the 37-mm Impact Area Former Fort Devens Army Installation Devens, Massachusetts, dated 16 July 2012.

USACE, New England is administering the contract as well as providing technical support and oversight for this FFS Addendum. Regulatory coordination is provided by EPA Region 1 with support from the Massachusetts Department of Environmental Protection (MassDEP). Additional stakeholders for this effort include the Massachusetts Development and Finance Agency (Mass Development) and the Restoration Advisory Board (RAB).

1.1 PURPOSE

The purpose of this FFS Addendum is to incorporate the former Oak and Maple Housing Areas based on their location adjacent to the Grant Housing Area and 37-mm Impact Area. Therefore, this FFS Addendum evaluates the applicability of the remedy proposed for the Grant Housing Area and 37-mm Impact Area, with respect to the former Oak and Maple Housing Areas. The remedy for the former Oak and Maple Housing Areas has been discussed with the Base Closure Team (BCT) and RAB and is essentially equivalent to the one developed for Grant Housing Area and 37-mm Impact Area with a few caveats. The 2008 FFS identified, developed, and performed a detailed analysis of potential remedial alternatives that would meet remedial action objectives (RAO), so that the decision-makers would have adequate information to select the most appropriate remedial alternative(s). The recommended alternatives in the 2008 FFS were expected to mitigate, reduce, or eliminate unacceptable risk to human health and the environment from MEC[1], based on current and intended future use of the property. Due to the former Oak and Maple Housing Areas proximity and similarity to the Grant Housing Area and 37-mm Impact Area and the actual inclusion of portions of the former housing areas within the former IA-2 37-mm anti-tank range firing fan as detailed in the RI (HGL, 2012), the level of detailed analyses required to prepare this FFS Addendum was much less than the 2008 FFS. The following major steps were followed for the detailed analysis included in the 2008 FFS and this FFS Addendum:

- Identification of existing risk at the sites.
- Identification of RAOs (Subsection 1.4).
- Identification of Applicable or Relevant and Appropriate Requirements (ARAR) and To Be Considered criteria (TBC) (Section 2).
- Identification of general remedial actions (Section 3).
- Identification and screening of potentially applicable remedial technologies and process options for the general response actions (Section 3).
- Development and screening of a range of remedial alternatives based on combinations of the remedial technologies that were retained (Section 4).
- Performance of a detailed analysis for each of the remedial alternatives using the evaluation criteria as required by the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP) (EPA, 1994) (Section 5).
- Identification of the most appropriate/viable remedial alternative(s) that meet the RAOs (Section 5).

[1] Unexploded ordnance; discarded military munitions, or munitions constituents (e.g., explosives) present in high enough concentrations to pose an explosive hazard.

1.2 BACKGROUND

1.2.1 Project Background

Due to the decision to close Fort Devens, and in accordance with federal, state, local, and Army regulations, multiple investigations and remedial actions have been conducted to eliminate risk to human health and the environment associated with MEC and related chemical munitions constituents (MC) to support the transfer of property. In addition to risk associated with MEC, additional investigation and remedial actions have occurred within the former housing areas (Grant, Oak and Maple) and 37-mm Impact Area to evaluate and eliminate risk associated with non-MEC impacts. These efforts are addressed in other reports. This FFS Addendum only develops and evaluates remedial alternatives for MEC within the former Oak and Maple Housing Areas.

1.2.2 Site History

Devens is located in the towns of Ayer and Shirley (Middlesex County) and Harvard and Lancaster (Worcester County), Massachusetts, approximately 35 miles west of Boston, Massachusetts.

According to local officials, residences and farmland occupied the area prior to the establishment of Fort Devens in 1917. Fort Devens was established as a temporary training area and disembarkment point for soldiers entering the European theatre during World War I (WWI). In 1931, Fort Devens became a permanent installation with the primary mission of commanding, training, and providing logistical support for non-divisional troop units. The installation occupied approximately 9,300 acres and was divided into three major areas referred to as the North, Main and South Posts. The former Oak and Maple Housing Areas are located within the Main Post. Fort Devens was used for a variety of training missions between 1917 and 1990, in addition to providing housing for military personnel from the mid-1950s until closure in 1996. The installation also supported and continues to support the Army Readiness Regional Reserve and National Guard units in the New England area.

On December 21, 1989, Fort Devens was placed on the National Priorities List (NPL) pursuant to CERCLA and was identified for cessation of operations and closure under Public Law 101-510, the Defense BRAC Act of 1990. Fort Devens was officially closed in September 1996. Portions of the property formerly occupied by Fort Devens were retained by the Army for reserve forces training and renamed the Devens Reserve Forces Training Area (RFTA). Areas not retained as part of the Devens RFTA were, or are in the process of being, transferred to new owners (MassDevelopment) for reuse and redevelopment. MassDevelopment currently owns the property that encompasses the former Oak and Maple Housing Areas.

Historical records indicate that training (physical and tactical as well as use of military equipment); including the use of munitions occurred throughout the history of Fort Devens. During and following WWI, training was conducted on all three posts. Following the construction of the airport on the North Post, and establishment of the Main Post for logistical support, and the construction of housing units within the Main Post most training activities associated with munitions were transitioned to the South Post. Currently, the South Post is the only active range located in New England.

In 1995, a facility-wide archival search was conducted by the USACE-St. Louis District, for the former Fort Devens and the findings were published in an ASR (USACE, 1995) to document the locations of all known training areas and ranges at Fort Devens. The ASR report identified a former training range, later determined to be a 37-mm anti-tank range and designated as IA-2, in the vicinity of the former Oak and Maple Housing Areas. A munitions investigation was subsequently performed in 1995 in the vicinity of the housing areas that uncovered a number of MEC items (HFA, 1996). A subsequent removal action (1996) was performed within an area designated as Site 12 located within the former training range and encompassing the former 37-mm Impact Area and extending into the two former housing areas. Additional information on the investigation and removal action is provided in Section 1.3.1.

In 2004, USACE, New England prepared a *Final Expanded Conceptual Site Model (ECSM) Report* (USACE, 2004) on the training areas and ranges in the vicinity of the Grant Housing Area to aid in the development and execution of subsequent actions within the housing areas. The report evaluated three ranges within the Grant Housing Area and adjacent Oak Housing Area [Investigation Area 1- Former Training Area (Circa, 1922), Investigation Area 2 (IA-2) – Former Training Area 37-mm Anti-Tank Range, and Investigation Area 5 (IA-5) – Sub-caliber Anti-Tank Range (i.e., .22-caliber range)].

From 2004 to 2005, Weston conducted Preliminary Assessment/Site Inspection and Supplemental Site Investigation (PA/SI/SSI) efforts within the Grant Housing Area, which included; IA-1 – Former Training Area (Circa, 1922), IA-2– Former Training Area 37-mm Anti-Tank Range, Investigation Area 3 – Possible Rifle Range, IA-5 – Sub-Caliber Anti-Tank Range, Investigation Area 8 – Former Base laundry Facility, Investigation Area 10 – Grant Housing Area to assess whether military activities in these areas resulted in the release of MC to soil and groundwater and if so, what risk those releases would pose to human health and the environment. Based on the results of the investigation work, MC were not detected within the investigation areas and did not pose a risk to human health or the environment. It was recommended that a MEC investigation be performed for the former Oak and Maple Housing Areas in order to characterize the potential MEC safety hazard and determine the need for additional MEC removals and/or LUCs within these areas.

In the fall of 2004, MassDevelopment contracted Ordnance & Explosive Remediation, Inc. (OER) to conduct a digital geophysical survey and *mag and flag* mapping for MEC throughout the entire Grant Housing Area and portions of surrounding housing areas, including the 37-mm Impact Area associated with IA-2 [located on north slope of Oak Housing Area (see Figure 1-1 of the 2008 FFS)]. The purpose of the survey was to evaluate whether MEC and potential unexploded ordnance (UXO) existed in the area MassDevelopment wanted to redevelop. The survey and subsequent MEC/UXO removal action was conducted from the fall of 2004 through 2005.

A MEC remedial investigation (RI) was conducted at former Oak and Maple Housing Areas in 2010/2011 based on recommendations in the 2008 PA/SI/SSI Comprehensive Report (Weston, 2008). The findings of the Oak and Maple RI are provided in the *Draft Final Munitions and Explosives of Concern Remedial Investigation Report, Former Oak and Maple Housing Areas Munitions Response Site* (HGL, 2012). The investigation revealed that the probability of encountering MEC within the previously developed former Oak and Maple Housing Areas was considered to be extremely low. The low probability was based on the number of anomalies investigated (3,647)

versus the number of MEC found (1) and the fact that several previous investigations have overlapped portions of the investigated area.

1.2.3 Physical Description

The terrain of the former Oak and Maple Housing Areas varies from flat level cut-and-fill graded elevations for the former residential housing units to steep hillsides towards the northern and western boundary of the project site. Some slopes are natural, while the grade of some peripheral areas has been steepened by sloped fill. The 2008 Final PA/SI/SSI Comprehensive Report (Weston, 2008) for the adjacent Grant, Locust, and Cavite Housing Areas, as shown on Figure 5-12 of the 2008 report, reveals that as a result of the housing area development, the western portion of the Oak Housing Area and the eastern portion of the Maple Housing Area were fill areas while the central portion of the Oak Housing Area is a cut area. Vegetation at the site consists of various grasses, broadleaf plants, bushes and trees. Portions of the site are heavily wooded. The site is accessible with paved roads throughout the site. Re-use of the former Oak and Maple Housing Areas is currently designated for commercial redevelopment.

Typical meteorological conditions for Devens include an annual mean air temperature of 50 degrees Fahrenheit, an annual mean precipitation total of 56 inches, an annual mean snow fall depth of 65 inches and an annual mean wind speed of 13 miles per hour (Iacono, 2007).

1.2.4 Geology

The geology description of the Grant Housing Area and 37-mm Impact Area provided in the 2008 FFS and other previous investigation reports is applicable to the former Oak and Maple Housing areas due to proximity of the housing areas. The greater Grant Housing Area and the former Oak and Maple Housing Areas encompass a variety of glacial landforms and materials, as well as recent riverine (fluvial) features, deposited upon bedrock of varying composition.

The landforms are the result of unconsolidated materials being deposited by ice and/or water in various environments below, within, and beyond the glacial margin, which was influenced, in part, by the pre-existing bedrock geology. Maps depicting information on the regional topography, regional bedrock geologic features identifying distinct bedrock formations, and on regional surficial geology identifying sand and gravel, till or bedrock, and floodplain alluvial deposits, are provided in the PA/SI/SSI (Weston, 2007).

The housing areas are located on a former glacial outwash plain consisting of mostly sand and gravel deposits. The glacial outwash sediments have been reworked by the Nashua River along the northwestern edge of Grant Housing Area, which is part of the Nashua River floodplain [U.S. Department of Agriculture Soil Conservation Service, 1985; MassGIS, 1999].

1.2.5 Groundwater

Groundwater at the former Oak and Maple Housing Areas was not investigated during the 2012 MEC RI (HGL, 2012); however, due to proximity was assumed to be representative of groundwater encountered at the adjacent Grant Housing Area. Depth to groundwater beneath both Grant Housing Area and the 37-mm Impact Area was documented during the PA/SI/SSI effort (Weston, 2007). Groundwater depths measured in four monitoring wells and six

piezometers installed in Grant Housing Area and at the base of the 37-mm Impact Area slope is approximately 40 feet (ft) below ground surface (bgs) in the Grant Housing Area and approximately 15 ft bgs at the base of the slope on which the 37-mm Impact Area is located.

Groundwater flow beneath the Grant Housing Area and 37-mm Impact Area is generally southwesterly to westerly. Groundwater flow directions are variable beneath the Grant Housing Area, likely the result of the presence of the varied depositional environments that provide preferential pathways for groundwater flow.

The towns of Ayer and Shirley operate and maintain public drinking water supplies in the Devens area. The Town of Ayer obtains water from two groundwater sources, which are located cross-gradient of the housing areas. The two Town of Ayer Grove Pond overburden wells are located immediately east of the MassDevelopment Grove Pond overburden well field. The Town of Shirley obtains water from three groundwater sources, only one of which is located down gradient of the housing areas. The Town of Shirley Patterson overburden well is located approximately 2,300 ft north of the northern portion of the former housing areas, and is the closest drinking water well to the housing areas, with the interim (not formally calculated) area of contribution to the well extending into the northern portion of Grant Housing Area (MassDevelopment, 1997; MassDEP 2004a). No known private drinking water wells are located at the housing areas.

1.2.6 Surface Water Hydrology

Surface water hydrology at the former Oak and Maple Housing Areas was not investigated during the 2012 MEC RI (HGL, 2012) but was determined to be similar to the surface water hydrology described for the adjacent Grant Housing Area. Runoff from Grant Housing Area, and former Oak and Maple Housing Areas is controlled by a storm water system which drains to the Nashua River. Storm water on the elevated portions of Oak Hill would infiltrate and become groundwater or run overland down slope and then westerly to the Nashua River which is located approximately 100 ft to the west. Current conditions do not indicate erosion or preferential pathways (i.e., natural drainage pathways). The housing areas are located above the 500-year flood elevation of the Nashua River and its tributaries (Federal Emergency Management Agency, 1983).

1.2.7 Potential Ecological and Biological Impact

There are no freshwater wetlands, Surface Water Supply Zone A areas, certified vernal pools, protected open spaces, National Heritage and Endangered Species Program (NHESP) Priority Habitats of Rare Species, NHESP Estimated Habitats of Rare Wildlife, or Areas of Critical Environmental Concern (ACEC) within or near the former Oak and Maple Housing Areas (MassDEP, MassGIS database, 2003a, 2003b, 2003c, 2003d, 2004b, 2004c, and 2005).

Habitats of Rare Wildlife, ACECs, and protected open spaces associated with the Nashua River are located west of housing areas. Figure 1-3 of the 2008 FFS depicts available wetland and other environmental data for the Grant Housing Area and the 37-mm Impact Area.

According to base history, any explosives release would be to open surfaces in the identified ranges. Any release from the ranges would be through overland flow and would likely have occurred near the time of range activities. Since releases of explosives would have occurred

pre-1960, it is unlikely that releases to surface water from the soil would still be occurring. Testing completed during the PA/SI/SSI and during the OER MEC survey activities did not detect the presence of explosive or metals (contaminants associated with 37-mm MEC) in the 37-mm Impact Area.

More detailed information regarding the physical characteristics of Grant Housing Area and 37-mm Impact Area are provided in the *PA/SI/SSI* (Weston, 2007) and the *Site Specific Final Report Digital Geophysical Mapping (DGM) & UXO Removal, Grant Housing Area, Former Ft. Devens, Harvard, Worcester, Massachusetts* (OER, 2006) reports.

1.3 SUMMARY OF REMEDIAL INVESTIGATIONS AND ACTIONS

To facilitate property transfer to MassDevelopment, RIs and removals have been conducted to comply with CERCLA requirements, and to assure that future exposure to potential risk associated with MEC and MC have been mitigated to the extent required for the intended re-use of the property. The following subsections address actions that are directly related to the investigation and remediation of MEC/UXO or provide supporting evidence on the remaining risk associated with MEC within specific areas. **Figure 1.3** shows areas investigated during previous MEC investigations at the former housing areas.

1.3.1 Investigations and Remedial Actions

1.3.1.1 Archives Search Report and Ordnance & Explosives Removal Report Summary

The *Archive Search Reports* (ASR) (USACE, 1995a; 1995b; and 1995c) documents the locations of all known training areas and ranges at Devens. The range identified as a 37-mm Training in the ASR was subsequently investigated in 1995 by Human Factors Applications (HFA) and the former training range and adjacent land areas were designated as Area 11. Area 11 consisted of the majority of the former Grant Housing Area and portions of the Oak and Maple Housing Areas. The ranges near the former Locust Housing Area were designated as Area 17 and investigated concurrently with Area 11. In 1995, HFA performed munitions response investigation that confirmed the presence of MEC throughout Area 11 with a clustering of MEC located at the southern end of Area 11, north of the former Oak Housing Area. The 1995 investigation was conducted via 100-ft x 100-ft grid stats as shown on **Figure 1.3**. A subsequent removal action was initiated in 1996 by the Army through HFA. The area considered to have a high MEC probability based on the 1995 investigation was identified as Site 12. Site 12 extended south, beyond the initial extent of Area 11 and encompassed the entire former range impact area and a majority of the former Oak Housing Area. The 1996 removal action, conducted within 100-ft x 200-ft remediation grids at Site 12, located and removed 45 37-mm practice round projectiles discovered primarily near the vicinity of the Oak Hill impact area (HFA, 1996). The 1996 site removal action grids overlapped a portion of the 1995/1996 investigation areas as shown on **Figure 1.3**. The removal action findings are summarized in the Final Removal Action Report (HFA, 1996).

1.3.1.2 Expanded Conceptual Site Model

The *ECSM* (USACE, 2004 and revised in 2006) documented the potential for training and range areas to have existed within the study area (i.e., Grant, Locust, and Cavite Housing Areas and

adjacent properties), the potential concerns related to those areas, and supporting information on the expectations of MEC distribution and impacts to human health and the environment.

The *ECSM* (USACE, 2004 and revised in 2006) identified three areas of concern within or associated with the Grant Housing Area including:

- IA-1: suspect rifle range, MC: lead.
- IA-2: identified as a 37-mm Anti-Tank Range, MC: metals, explosives, MEC/UXO.
- IA-5: identified as a 1,000-inch Sub-Caliber Anti-Tank Range (i.e., .22-caliber range), MC: lead.

The *ECSM* (USACE, 2004 and revised in 2006) suggested IA-1 and IA-5, which are considered as small-arms ranges, should be addressed through metals (particularly lead) analysis in the berm and at the firing point to determine the existence and potential for impacts associated with the range activities (conducted as part of PA/SI/SSI activities, see *Final PA/SI/SSI Comprehensive Report* (Weston, 2008) for results).

The *ECSM* (USACE, 2004 and revised in 2006) also identified IA-2 which had been identified in the *ASR* (USACE, 1995a; 1995b; 1995c) and had subsequent investigation and removal actions conducted in 1995 and 1996 in the vicinity of the 37-mm Impact Area. The use of the Oak Housing Area hillside was confirmed as the target area during the investigation and removal. In excess of 50 unexploded 37-mm projectiles were located and destroyed. Most of the UXO located were in two dense clusters within the 37-mm Impact Area, however, lone UXO were located some distances away from the 37-mm Impact Area. The UXO not within the 37-mm Impact Area could be due to either incorrect aiming or munitions that ricocheted off some object within the 37-mm Impact Area.

The *ECSM* (USACE, 2004 and revised in 2006) indicated that the potential for finding 37-mm projectiles is dependent on the instrumentation used to investigate the range. Based on the current investigation and remedial activities conducted to date (USACE, 1995; 1996; and OER, 2004; 2005), the presence of additional 37-mm projectiles in shallow soils of the 37-mm Impact Area is expected to be minimal and any additional surveying for remnant 37-mm MEC is unlikely to locate remnant MEC (if present) or provide any substantial benefit towards reducing the already low probability of encountering MEC. The majority of projectiles found have been located within the 37-mm Impact Area. Areas adjacent to the 37-mm Impact Area have a lower potential for the presence of intact 37-mm projectiles (UXO) as these areas were not the intended point of impact (i.e., target areas). Based on the investigation activities conducted to date (USACE and OER), the continued presence of surficial 37-mm UXO within the 37-mm Impact Area or Grant Housing Area is unlikely.

Theoretical 37-mm projectile penetration can range from 0 to 95 inches depending on site conditions; however, it is reasonable to expect that 37-mm projectile penetration would typically not exceed 20 inches based on the soil types and angle of penetration. The National Defense Center for Environmental Excellence compiled a database of 385 records of 35-mm and 37-mm projectile that were recovered from depths ranging from surficial to 40 inches below grade. Based on the database and remedial experience at removal sites throughout the U.S., a penetration depth not exceeding 20 inches is typical. Based on the remedial activities conducted

by OER which found MEC up to 2 ft below grade within the 37-mm Impact Area, it is reasonable to assume a depth of penetration of 20 to 24 inches is reasonable.

The *ECSM* (USACE, 2004 and revised in 2006) recommended construction support in the 37-mm Impact Area along with safety training and notification to workers, residents, and the surrounding community. For the Grant Housing Area, the *ECSM* (USACE, 2004 and revised in 2006) recommended safety training and notification to the construction workers, residents and surrounding community.

1.3.1.3 Preliminary Assessment Site Investigation/Supplemental Site Investigation

A PA/SI and a subsequent SSI were conducted to evaluate the potential for release of CERCLA-regulated compounds within the three former housing areas (Grant, Locust, and Cavite) at which pesticide soil remedial actions were being conducted. Included in this investigation was the evaluation of potential contaminants associated with MEC (i.e., explosives, perchlorate, and metals) in soil or groundwater within the Grant Housing Area and 37-mm Impact Area.

A total of 32 soil samples from within the IA-2 range (includes a portion of the Grant Housing Area and the 37-mm Impact Area) and a total of four groundwater samples from within the Grant Housing Area and adjacent to the 37-mm Impact Area were collected and submitted for explosives, perchlorate, and metals analysis to determine if MC had impacted soil or groundwater. Analytical results obtained from these samples indicate that no chemical constituents related to MEC were detected above the reporting limit or background concentrations in soil or groundwater. Results of the IA-2 investigation activities are summarized in the *Final PA/SI/SSI Comprehensive Report* (Weston, 2008).

The PA/SI also recommended that a Focused Feasibility Study be conducted to address any potential MEC within areas impacted by the former IA-2 training/range area. In addition, based on concerns that the IA-2 training/range activities may have impacted the adjacent former Oak and Maple Housing Areas, a follow-on remedial investigation was recommended to address any potential remnant MEC in these areas and any related explosive safety hazards.

1.3.1.4 Digital Geophysical Mapping Investigation and MEC Removal

During 2004 and 2005, OER was contracted by MassDevelopment to perform a DGM investigation and MEC removal at Grant Housing Area and the 37-mm Impact Area due to its usage for 37-mm firing training and maneuver and small unit tactic training.

The DGM was performed using a Geonics EM-61 unit to identify subsurface electromagnetic anomalies that could be MEC-related items. Following the DGM, OER and its subcontractors reacquired and marked the anomalies, and excavated, identified, and removed those items.

Per the results of the DGM, OER excavated and removed 37,494 anomalies, of which 34 pieces were UXO items, 30 were inert training ordnance and several hundred rounds of blank small arms ammunition. A total of 1,870 pounds of ordnance-related scrap metal was removed from the Grant Housing Area and 37-mm Impact Area.

MEC recovered from the 37-mm Impact Area include 17 fired, fused (armed), unexploded black powder-filled 37-mm projectiles and one fired armor piercing round (solid steel), an empty rifle

grenade, and a mine flare container with an unfired detonator. Other ordnance recovered in the Grant Housing Area included; empty or training rifle grenades, mine flares, anti-tank mine fuses, training grenades, and blank small arms ammunition. These ordnances indicate that this area had been used for small unit tactics and maneuver type training.

Also recovered were six 3-inch Stokes mortars and case fragments. However, OER indicated that the area where the Stokes were recovered was all lowland areas that appeared to have been filled. Additionally, OER indicated that given the very small amount of Stokes-related fragments recovered from Grant Housing Area and 37-mm Impact Area, they do not believe this area was a Stokes impact area. The only area in which OER consistently found MEC was the former 37-mm Impact Area. Two distinct concentrations of 37-mm related finds were located in the 37-mm Impact Area with the density thinning rapidly with distance. All other 37-mm finds away from these two concentrations were not in any predictable pattern and not deeply buried indicating that they were probably ricochets.

The DGM and recovery operations addressed soil to depth of 18 inches within the areas of concern. The 37-mm Impact Area was an investigated area that yielded recovery of MEC to a depth of up to 24 inches, though most 37-mm projectiles were recovered within 8 inches of the surface.

OER concluded that with the exception of the two areas of concentration within the 37-mm Impact Area the remainder of the Grant Housing Area and 37-mm Impact Area are suitable for residential end use (OER, 2006).

1.3.1.5 MEC Remedial Investigation – Former Oak and Maple Housing Areas

A MEC RI was conducted at former Oak and Maple Housing Areas in 2010/2011 (HGL, 2012) per recommendations detailed in the 2008 PA/SI/SSI (Weston, 2008). The area was surveyed for MEC IAW the RI Work Plan (HGL, 2010). The clearance activities were focused in areas thought to have the greatest likelihood of MEC discovery. The investigation determined that the probability of encountering MEC within the previously developed former Oak and Maple Housing Areas is considered to be extremely low (HGL, 2012). The low probability is based on the number of anomalies investigated (3,647) versus the number of MEC found (1) and the fact that several previous investigations have overlapped portions of the investigated area. The one discovered MEC item (a 37-mm black powder practice projectile) was found half way across Oak Hill about 10-20 feet downslope of the housing lot. MD was scattered across the top and slope of Oak Hill. The location of the discovered MEC projectile corresponds to an area where MEC was discovered during previous investigations and is in proximity to the former presumed impact area and within the presumed artillery firing fan. At the Maple Housing Area, 37-mm MD was scattered across the northern edge, with one 37-mm fragment found in the center of the housing area. MD and the discovered MEC item may have been re-distributed from their original deposition point during construction of the housing areas when the local soils were graded and leveled to accommodate construction of the housing units; however, the presence of MD within the developed areas and the discovery of the one 37-mm projectile on the slopes of Oak Hill between the two housing areas indicate a possibility that additional MEC may exist within portions of the housing areas.

1.3.2 Supporting Evidence

1.3.2.1 Pesticide Soil Remedial Action

In 2002, the Army conducted a pesticide soil remedial action within the Grant Housing Area. It had been determined that during and potentially following the construction of the Grant Housing Area in the late 1950s and early 1960s; the Army had applied pesticides around the housing units as an appropriate pest control method. The Army agreed with the stakeholders to excavate and dispose of pesticide-impacted soils in order to eliminate risk to human health and the environment associated with the pesticides. The action resulted in the excavation and disposal of more than 150,000 tons of soil and concrete from the housing area. During the remedial action, which was conducted throughout the Grant Housing Area and within the IA-2 Range, no MEC/UXO was found during the excavation activities. Further details on the pesticide soil remedial action are provided in the *Draft Final Release Abatement Measure Completion Report/Partial Response Action Outcome Statement - Grant Housing Area, December 2006* (Weston, 2006).

1.3.2.2 Polychlorinated Biphenyl Time Critical Removal Action

From 2002 through 2005, a Time Critical Removal Action was conducted in southeast portion of the Grant Housing Area to address an unknown source release of polychlorinated biphenyls (PCBs) to soil. The area excavated also included a portion of the former range IA-5. A total of approximately 12,000 tons of soil was excavated and disposed as part of the remedial action. Similar to the pesticide remedial action, MEC was never encountered in the excavation areas. Further details on the PCB remedial action are provided in the *Draft Final Polychlorinated Biphenyls Time Critical Removal Action Closure Report - Former Grant Housing Area, Devens, Massachusetts, August, 2006* (Weston, 2006).

1.4 HUMAN HEALTH RISK ASSESSMENT

The primary risk concerns are related to assessing chronic chemical exposure risk and assessing acute explosive hazards for MC and MEC presence in surface and subsurface soil.

Chronic risk is associated with the release of MC (e.g., metals, perchlorate, and explosives) into surface and subsurface soil at a site. Infiltration/percolation could transport soluble MC to deeper soils and groundwater beneath a site. Once in groundwater, MC could be transported via groundwater flow. Storm water run-off and wind could transport MC in surface soil to adjacent areas. Chronic risk is addressed through investigation of a site. Results of the investigation are compared to regulatory standards to evaluate the level of risk and the potential for harm to receptors.

Acute risk is associated with explosive hazards from remnant MEC that could lead to immediate injury or death. Risk from MEC is evaluated as a hazard being present or not present.

Human receptors most likely to come in contact with MEC or MC impacted soil primarily include residents and construction workers within the Grant Housing Area, the general public for the open space of the 37-mm Impact Area and construction workers within the former Oak and Maple Housing Areas.

1.4.1 Munitions and Explosives-Related Constituents of Concern Risk

A summary of the analytical results obtained from soil and groundwater samples collected from former 37-mm anti-tank range IA-2 is provided in the *Final PA/SI/SSI Comprehensive Report* (Weston, 2008) and indicated that no chemical constituents related to MEC were detected above the reporting limit or background concentrations in soil or groundwater. Therefore, no risk to human health from direct exposure to soil or groundwater is anticipated for Grant Housing Area and the 37-mm Impact Area. This risk finding also applies to the former Oak and Maple Housing Areas based on proximity to the Grant Housing Area and 37-mm Impact Area. Based on these risk findings no chemical constituents related to MEC were carried forward as COCs for Grant Housing Area and 37-mm Impact Area in the 2008 FFS and Oak and Maple Housing Areas in this FFS Addendum.

1.4.2 Munitions and Explosives of Concern Risk

The four subject areas, Grant Housing Area, 37-mm Impact Area, and former Oak and Maple Housing Areas, have been evaluated extensively for potential explosive safety hazards related to MEC as described in Subsection 1.3. These activities have included historical document reviews as well as subsurface investigation and screening with subsequent removal actions. Additionally, the Army prepared an *ECSM* (USACE, 2006) that evaluated the potential hazard and exposure pathways relating to presence of MEC at the Grant Housing Area and 37-mm Impact Area. This information included:

- Estimated 50+ years have elapsed since military training has occurred and 70+ years since 37-mm training occurred.
- Construction of a 130-unit Grant Housing Area and associate infrastructure.
- Pesticide soil and PCB remedial actions within the Grant Housing Area which during site activities, no MEC/UXO was found.
- 100% coverage MEC survey of undeveloped portions of the Grant Housing Area and 37-mm Impact Area.
- Removal of all detected anomalies within 18 inches of surface in surveyed areas in order to remove MEC at the Grant Housing Area and 37-mm Impact Area.

A conceptual site model was also included in the recent former Oak and Maple Housing Areas RI report (HGL, 2012). The conclusions presented in the *ECSM* (USACE, 2006) were not altered in light of the subsequent data collection at the former Oak and Maple Housing Areas. Activities conducted in 2010/2011 as part of the former Oak and Maple Housing Areas RI were performed in accordance with the RI Work Plan (HGL, 2010) which specified 32% of the housing areas would be investigated. The actual survey coverage from the combined analog and digital methods investigated approximately 14 acres or nearly 38% of the project site. Digital geophysical mapping using Geonics EM61 equipment over 100-foot by 100-foot grids was followed by intrusive investigation of 75% to 80% of detected anomalies over 5 millivolts. Analog geophysical mapping using Schonstedt GA52cx magnetic locators, followed by intrusive investigation of all identified anomalies, was conducted in areas inaccessible to the EM61 equipment.

The potential for an explosive safety hazard depends upon the presence of three critical elements to complete the risk pathway. If any one of these three elements is missing, there is no complete pathway and, therefore, no resulting MEC hazard. The three elements are:

- A source of MEC (or the presence of MEC);
- A receptor or person; and
- The potential for interaction between the source and the receptor.

Additional factors affecting hazard level associated with a MEC source are the quantity and density of the MEC. The more MEC present at a property, the greater the likelihood for an interaction between the receptor and MEC. Furthermore, at military training facilities, it is customary to conduct training exercises using practice munitions, including those ranges designated for use of explosive filled (high explosive) munitions. Only after troops demonstrate proficiency in firing tactics are troops allowed to use explosive filled munitions. As a result, remaining munitions at training ranges may consist mostly of practice munitions. Practice munitions may pose explosive hazards, however.

The presence of MEC in the Oak and Maple Housing Areas was assessed in part by the OER survey (OER, 2006) which included the north slope of Oak Housing Area. The OER survey indicated a limited amount of MEC was present within the Grant Housing Area and a limited area of MEC was concentrated within the 37-mm Impact Area (which has been removed). The OER survey identified practice munitions use within both the Grant Housing Area and 37-mm Impact Area. The 2010/2011 MEC RI for former Oak and Maple Housing Areas confirmed the potential for MEC, based on the discovery of one MEC item (a 37-mm black powder-filled practice projectile) in the perimeter area of the former Oak and Maple Housing Areas. The presence of MD within the developed areas and the discovery of MEC on the slopes of Oak Hill between the two housing areas indicate the possibility that additional MEC may exist within the uninvestigated portions of the housing areas and possibly under foundation slabs and road asphalt within the investigated areas.

Based on the findings of the investigations performed at the site, the predominant remaining hazard for the Oak and Maple housing areas would be associated to construction workers during the future commercial reuse of the property (utility installation or other excavation activities). Future hazards for commercial workers are anticipated to be minimal to non-existent and fully addressed by implementation and compliance with the LUCIP.

1.4.3 Munitions and Explosives of Concern Hazard Assessment

The CERCLA process for responding to releases or potential releases of hazardous substances includes the development of site-specific risk assessments appropriate to the requirements of the site. The results of the risk assessments are used to help site managers decide whether a response action is required, and to support the risk management decisions that are made through the remedy evaluation, selection, and implementation process: However, the CERCLA methodology for human health chemical risk assessment was not designed to address explosive safety hazards at MEC sites. In January 2008, the Technical Working Group for Hazard Assessment, which includes representatives from the Department of Defense (DoD), Department of the Interior (DOI), EPA and other officials, made available the technical

reference document *Interim MEC HA Methodology* (EPA, 2008) designed to be used as the CERCLA hazard assessment methodology for Munitions Response Sites where there is an explosive hazard from the known or suspected presence of MEC.

The MEC HA is structured around three components of a potential explosive hazard incident:

- Severity, which is the potential consequences (e.g., death, severe injury, property damage, etc) of an MEC item functioning.
- Accessibility, which is the likelihood that a receptor will be able to come in contact with a MEC item.
- Sensitivity, which is the likelihood that a receptor will be able to interact with an MEC item such that it will detonate.

Each of these components is assessed in the MEC HA by input factors. The sum of the input factor scores falls within one of four defined ranges, called hazard levels. Each of the four levels reflects site attributes that describe groups of site and site conditions ranging from highest to lowest hazards. The MEC HA hazards levels are:

Hazard Level 1: A site with the highest potential explosive hazards. Typical characteristics of Hazard Level 1 conditions include the following:

- High explosive-filled UXO on the surface;
- Subsurface MEC with intrusive activities to the depth of subsurface MEC;
- A former target area or open burning/open detonation (OB/OD) area;
- An MRS with full or moderate accessibility;
- An MRS with additional human receptors inside the MRS or Explosive Safety Quantity -Distance;
- An MRS that has not undergone cleanup.

Hazard Level 2: A site with high potential explosive hazard conditions. Typical characteristics of a Hazard Level 2 MRS include the following:

- Former target area, OB/OD area, function test range, or maneuver area;
- UXO, or Fuzed Sensitive discarded military munitions (DMM) on the surface, or intrusive activities that overlap with minimum depths of UXO or Fuzed Sensitive DMM located only subsurface;
- Has full or moderate accessibility to human receptors who will engage in intrusive activities.

Hazard Level 3: A site with moderate potential explosive hazard conditions. Typical characteristics of a Hazard Level 3 MRS include the following:

- DMM on the surface, or intrusive activities that overlap with minimum depths of DMM located only subsurface;

- Former target area, OB/OD area, function test range, or maneuver area that has undergone a surface cleanup;
- An MRS with moderate or limited accessibility, and a low number of receptor contact hours.

A Hazard Level 3 Munitions Response Site would be considered safe for the current land use without further munitions responses, although not necessarily suitable for any reasonable anticipated future use.

Hazard Level 4: A site with low potential explosive hazard conditions. Typical characteristics of an MRS in Hazard Level 4 include the following:

- A MEC cleanup was performed or MEC is only located subsurface, below the depth of receptor intrusive activities
- Energetic Material Type is propellant, spotting charge, or incendiary
- Accessibility is limited or very limited, and contact hours are few or very few. This may be the result of LUCs.

A Hazard Level 4 Munitions Response Site would be compatible with current and determined or reasonably anticipated future use.

The MEC HA fits into the CERCLA nine-point remedial alternative analysis process and addresses the NCP requirements to conduct site-specific risk assessments for threats to human health and the environment, however it does not directly address environmental or ecological concerns that might be associated with MEC. The information presented in a MEC HA and hazard level ranking are inputs to the "threshold factors" for protection of human health and the environment, and compliance with ARARs. Information also assists in the analysis of four of the "balancing criteria" - long-term effectiveness, short-term effectiveness, implementability, and reduction in toxicity, mobility, or volume through treatment. The MEC HA, however, does not address the criteria of cost. The MEC HA scores are qualitative references only and should not be interpreted as quantitative measures of explosive hazard, or as the sole basis for determining whether or not further action is necessary at a site.

The MEC HA guidance document includes Appendix A: Automated Workbook, which develops site scoring through standardized input and formulas. The MEC HA scoring was performed on three sub-areas (the Oak Housing Area, the Maple Housing Area, and perimeter areas to reflect differences in land use) for the RI and this FFS Addendum. Although variation in numerical scores resulted, the overall hazard level category for the subsites was the same. As a result, in Section 5, MEC HA scores are discussed at the munitions response site level, rather than at the subsite level. An evaluation of the impact of each remedial alternative on the hazard level for the anticipated future reuse scenario in the former Oak and Maple Housing Area is discussed in Section 5. Hazard level scoring summaries for current and future reuse scenarios as well as for each remedial alternative are provided in **Appendix A** (by sub-area).

1.5 ECOLOGICAL RISK ASSESSMENT

A detailed land use and habitat survey was conducted at eleven investigation areas (IA)s as part of the 2008 PA/SI/SSI effort. One of the IAs, IA-2, is identified as the former 37-mm anti-tank

range, which includes Grant Housing Area and 37-mm Impact Area, and a substantial part of Oak and Maple Housing Areas. As a result of this survey, as detailed in the 2008 FFS, no areas of current land use were identified as ecological habitat within Grant HA or 37-mm Impact Area. Additionally, an evaluation of future reuse plans found that neither Grant HA or 37-mm Impact Area have foreseeable land use as ecological habitat. Based on a substantial portion of Oak and Maple Housing Areas located within IA-2, and the remaining portion adjacent to IA-2, the ecological conclusions detailed in the 2008 FFS are applicable to the Oak and Maple Housing Areas.

The 2008 FFS also indicated that based on the results of the sampling and removal actions conducted at Grant HA and Impact Area, MEC and MEC-related COCs do not pose unacceptable risk to the environment. This conclusion is also applicable to Oak and Maple Housing Areas based on the reasoning presented above (i.e., a substantial portion of Oak and Maple Housing Areas located is within IA-2 and the remaining portion is adjacent to IA-2).

1.6 REMEDIAL ACTION OBJECTIVES

The goal of a remedial action is to reduce explosives safety hazards or MC contamination to ensure protection of human health, public safety, and the environment. To achieve this goal at the Oak and Maple Housing Areas, the appropriateness and effectiveness of past and potential future remedial actions for minimizing the public's exposure to MEC while maintaining the intended future land use was evaluated. As described in Subsection 1.3 of the 2008 FFS and this FFS Addendum, extensive document reviews, soil screening, removal actions, and sampling has been conducted within shallow subsurface soils at the Grant Housing Area, 37-mm Impact Area and the Oak and Maple Housing Areas. Therefore, remedial actions evaluated for this FFS Addendum were developed to meet the following objective:

- Prevent direct contact with UXO/MEC which may remain in soils at Oak and Maple Housing Areas.

This RAO is equivalent to the RAO developed for the Grant Housing Area and the 37-mm Impact Area.

2.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED CRITERIA

ARARs are restrictions or regulations that must be satisfied during site remediation. Therefore, ARARs play an important role in determining which remedial alternatives, if any, may be applied to a site.

Applicable requirements are federal or state requirements that are invoked to specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site. Relevant and appropriate requirements are federal or state laws, that while not applicable to a hazardous substance, pollutant, or contaminant, remedial action, location or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the site.

Three categories of ARARs exist and have been evaluated for this FFS. These are chemical-specific, location-specific, and action-specific.

Chemical-specific ARARs are health-based or risk-based numerical values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment.

Location-specific ARARs generally are restrictions placed on the concentration of hazardous substances or the conduct of activities to prevent damage to unique or sensitive areas, such as floodplains, wetlands, historic places, and sensitive ecosystems or habitats.

Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to cleanup actions, or requirements to conduct certain actions to address particular circumstances at a site.

In addition to legally binding requirements established by ARARs, many state and federal programs have developed criteria, advisories, guidance, and proposed standards that are not legally binding but are TBC in the development of remedial alternatives.

A screening summary of ARARs and TBCs identified for the Grant Housing Area and 37-mm Impact Area and determinations regarding their status as applicable, or relevant and appropriate or TBC were provided in Table 2-1 of the 2008 FFS. The ARARs and TBCs were subsequently revised and included as Table 4 in the 2009 ROD for the Grant Housing and 37-mm Impact Area. **Table 2-1** in this Addendum reflects Table 4 of the ROD with the exception of the insertion USACE EP 75-1-2 (Chapter 6 MEC Support during Construction Activities) and the status of the Grant of Environmental Restrictions and Easement (GERE) TBC. The GERE TBC implemented at the adjacent 37-mm Impact Area is not required within the Oak or Maple Housing Areas and is not applicable.

Table 2.1 Applicable or Relevant and Appropriate Requirements

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
Chemical-Specific Applicable and/or Relevant and Appropriate Requirements					
Federal	DoD Facilities	Munitions and Explosives of Concern Hazard Assessment Methodology (October 2008).	TBC	Provides a methodology for assessment of hazards in support of reuse/redevelopment of sites contaminated with ammunition, explosives, or chemical agents.	MEC size, flight path, and penetration depth for each type of MEC found on-site will be considered in remedial planning/ redevelopment decision-making.
Location-Specific Applicable and/or Relevant and Appropriate Requirements					
State	Wetlands	Wetlands Protection Act – M.G.L. c. 131, Section 40 and 310 CMR 10	Applicable	Provides for protection of wetlands and requirement of Conservation Commission review and permit or waiver for work within the 100-ft buffer zone of a state wetland.	No work is being performed in wetlands or wetland buffer zones during the project. However, hay bales and silt fencing have been previously placed as appropriate to eliminate any potential adverse affects from adjacent on-site construction activities. Erosion control will be maintained in accordance with state regulations.
Federal	Wetlands	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. A]	Applicable	Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetlands areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values. Not yet promulgated as of July 2007.	No work is being performed in wetlands during the project. In addition, this regulation is not yet promulgated. However, in consideration of state and local wetlands regulations and in the interest of minimizing environmental impacts during remediation, hay bales and silt fencing will be placed as appropriate to eliminate any potential adverse affects from adjacent on-site construction activities. Erosion control will be maintained in accordance with federal regulations.

Table 2.1 Applicable or Relevant and Appropriate Requirements (continued)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
Action-Specific Applicable and/or Relevant and Appropriate Requirements					
Federal	Regulation of Waste Management Portion of Response Actions that involve treatment or disposal of UXO.	RCRA - 40 CFR 266 Subpart M – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste management Facilities	Applicable	266.203 – Provides standards for the transportation of solid waste military munitions. 266.204 – Standards applicable to emergency response. 266.205 - Standards applicable to storage of solid waste military munitions. 266.206 - Standards applicable to treatment and disposal of solid waste military munitions.	Should the need for MEC disposal/treatment arise, the requirements of Subpart M regarding transportation and disposal will be followed.
Federal	Regulation of Waste Management Portion of Response Actions that involve treatment or disposal of UXO.	RCRA - 40 CFR 264 Subpart X – Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities; Miscellaneous units	Relevant and Appropriate if UXO blown in place. Applicable if UXO moved from site prior to detonation.	264.601- A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment.	Should the need for UXO disposal/treatment arise, it could require the use of technologies defined as "miscellaneous units" in Subpart X, including OB/OD units, shredders, crushers, etc.

Table 2.1 Applicable or Relevant and Appropriate Requirements (continued)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
Federal	Regulation of Waste Management Portion of Response Actions that involve treatment or disposal of UXO.	RCRA - 40 CFR 264 Subpart X – Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities; Miscellaneous units	Relevant and Appropriate if UXO blown in place. Applicable if UXO moved from site prior to detonation.	Subpart X outlines procedures for issuing permits to miscellaneous units that treat, store, or dispose of hazardous waste. Miscellaneous units include OB/OD units, enclosed combustion devices, carbon and catalyst regeneration units, thermal desorption units, shredders, crushers, filter presses, and geologic repositories. Subpart X does not specify minimum technology requirements or monitoring requirements for miscellaneous units. Subpart X specifies an environmental performance standard that must be met through conformance with appropriate design, operating, and monitoring requirements.	
U.S. Army Corps of Engineers	Army Project Sites	USACE EP 75-1-2 Chapter 6 – MEC Support during Construction Activities	Applicable	Chapter 6 details MEC support during construction activities. Key components of the MEC support includes UXO team composition, planning, responsibilities, authority, standby support, subsurface removal in support of construction activities, MEC destruction and quality management.	Construction support will be conducted in accordance with Chapter 6.

Table 2.1 Applicable or Relevant and Appropriate Requirements (continued)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
State	Regulation of Waste Management Portion of Response Actions that involve treatment or disposal of UXO.	310 CMR 30.606 – Standards for treatment, storage and disposal facilities, miscellaneous units.	Applicable and/or relevant and Appropriate to the extent that implementation authority for RCRA has been delegated to the Commonwealth of Massachusetts.	Miscellaneous Unit means a hazardous waste management unit where hazardous waste is treated, stored, or disposed of and that is not one of the following: a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, unit excluded from licensing requirements pursuant to 310 CMR 30.801, or a research facility. Part 606 prescribes environmental performance standards for miscellaneous units including location, design, construction, operation, maintenance, and closure. Operation, monitoring, inspection, and post-closure care provisions are included to protect public health, safety, welfare, and the environment.	Should the need for UXO disposal/treatment arise, it could require the use of technologies defined as "miscellaneous units" in Subpart X, including OB/OD units, shredders, crushers, etc.

Table 2.1 Applicable or Relevant and Appropriate Requirements (continued)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
To Be Considered (TBC)					
State	Soil	GERE M.G.L. c. 21E § 6, 310 CMR 40.1071-1073	Not Applicable for Oak and Maple Housing Areas.	Massachusetts provides regulatory guidance for the preparation of a Grant of Environmental Restriction to address site restrictions.	Restriction could be applied as a means of LUC at adjacent 37-mm Impact Area, as detailed in 2008 FFS. This restriction is not required for the Oak and Maple Housing Areas.

Notes:
CFR=Code of Federal Regulations
CMR=Code of Massachusetts Regulations
M.G.L.=Massachusetts General Law
OB/OD=open burn/open detonation
RCRA=Resource Conservation and Recovery Act

3.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

Section 3 of the 2008 FFS identified and described general remedial actions and potential MEC remedial technologies for the Grant Housing Area and 37-mm Impact Area. The general remedial actions identified and described in this section were analyzed in the Development and Screening of Alternatives (Section 4) and Detailed Analysis (Section 5) sections of the 2008 FFS report. Each technology identified in Section 3.0 of the 2008 FFS was screened for effectiveness, implementability, and cost to evaluate their viability at the Grant Housing Area and 37-mm Impact Area. A similar analysis in Sections 3 through 5 of this FFS Addendum is detailed below for the former Oak and Maple Housing Areas, with the exception that "Containment Engineered Controls" is not analyzed as it is only deemed applicable to the 37-mm Impact Area.

3.1 GENERAL REMEDIAL ACTIONS

General remedial actions are those actions that will achieve the RAOs. The following general remedial actions will be considered for the former Oak and Maple Housing Areas:

- **No Action** – The No Action alternative is evaluated to satisfy the NCP requirement of 40 Code of Federal Regulations 300.430 (e) (6), which requires consideration of this alternatives as a baseline against which other alternatives may be compared.

- **LUCs** – LUCs are considered a "limited" action alternative by EPA, and include components of access control, Land Use prohibitions/restrictions, and/or public education (EPA, 1988).

- **Removal/Subsurface Clearance** – Clearance is a means of reducing potential MEC hazards through detection surveys to identify anomalies, investigation of each anomaly and removal and disposal of any identified MEC. After disposal via detonation, MD is inspected, certified free of explosive hazards, and shipped off site for demilitarization via smelting.

- **Treatment and Disposal–** Treatment and disposal MEC is generally limited to disposal via detonation, and is typically addressed as subsequent steps of a removal/subsurface clearance action, discussed above.

3.2 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

3.2.1 Screening Criteria

Remedial technologies are first evaluated against three general categories of effectiveness, implementability, and cost to ensure that they meet the minimum standards of the criteria within each category in the FFS process. The three general categories are first used to screen the technologies described in Subsection 3.2.2 and later used to screen the alternatives developed in Subsection 4.1. The three general categories are described below.

3.2.1.1 Effectiveness

Technologies or alternatives that have been identified should be evaluated further on their effectiveness relative to other processes within the same technology/alternative type. This

evaluation should focus on: (1) the potential effectiveness of technology/alternative options in handling the estimated areas or volumes of media and meeting the remediation goals identified in the RAOs; (2) the potential impacts to human health and the environment during the construction and implementation phase; and (3) how proven and reliable the technology/ alternative is with respect to the contaminants and conditions at a site (EPA, 1988).

3.2.1.2 Implementability

Implementability, as a measure of both the technical and administrative feasibility of constructing, operating, and maintaining a remedial action alternative, is used during screening to evaluate the combinations of technology/alternative options with respect to conditions at a specific site. Technical feasibility refers to the ability to construct, operate, and meet technology-specific regulations for technology/alternative options until a remedial action is complete; it also includes operation, maintenance, replacement, and monitoring of technical components of a technology/alternative, if required after the remedial action is complete. Administrative feasibility refers to the ability to obtain approvals from other offices and agencies, the availability of treatment, storage, and disposal services and capacity, and the requirements for, and availability of, specific equipment and technical specialists (EPA, 1988).

The determination that a technology/alternative is not technically feasible will usually preclude it from further consideration unless steps can be taken to change the conditions responsible for the determination. Typically, this type of "fatal flaw" will be identified during technology screening, and an alternative consisting of infeasible technology will not be assembled. Negative factors affecting administrative feasibility will normally involve coordination steps to lessen the negative aspects of the technology/alternative but will not necessarily eliminate a technology/alternative from consideration (EPA, 1988).

3.2.1.3 Cost

Typically, technologies/alternatives will have been defined well enough before screening that some estimates of cost are available for comparisons among technologies/alternatives. However, because uncertainties associated with the definition of technologies/alternatives often remain, it may not be practicable to define the costs of technologies/alternatives with the accuracy desired for the detailed analysis (i.e., +50% to -30%) (EPA, 1988).

According to EPA guidance, a high level of accuracy in cost estimates during screening is not required. The focus should be to make comparative estimates for technologies/alternatives with relative accuracy so that cost decisions among technologies/alternatives will be sustained as the accuracy of cost estimates improves beyond the screening process.

In the detailed analysis in Section 5, when the costs of remedial action alternatives are evaluated, both capital and operation and maintenance (O&M) costs will be considered, where appropriate. The evaluation will include those O&M costs that will be incurred for as long as necessary, even after the initial remedial action is complete. In addition, potential future remedial action costs will be considered during alternatives evaluation to the extent they can be defined. Present worth analyses will be used during alternatives evaluation to evaluate expenditures that occur over different time periods. By discounting all costs to a common base year, the costs for different technologies/alternatives can be compared on the basis of a single

figure for each alternative. Included in each cost calculation is an estimate as to the amount of time that will be necessary to complete the proposed alternative.

3.2.2 Evaluation of Technologies

Various technologies and approaches exist for the remediation of MEC. A description of the technologies used in each step is presented in the following subsections. At the end of each subsection, the technologies are screened against the three screening criteria to determine their viability at Oak and Maple Housing Areas.

3.2.2.1 No Action

"No Action" involves maintaining a site exactly as it currently exists. Under this technology, no actions would be taken to mitigate hazards posed by the presence of MEC in soils at the former Oak and Maple Housing Areas. This "No Action" alternative is required to be evaluated under CERCLA guidance, so that it can serve as a baseline, to which other alternatives are compared. In terms of cost, this technology/alternative would rate the highest, in that no costs, capital, or O&M would be incurred, with the possible exception of fines or payouts for failure to comply with ARARs. As regards effectiveness, this/alternative/technology would rate the lowest, since no action(s) would be implemented to reduce site hazards or ensure protectiveness. As regards implementability, this technology/alternative is among the easiest to implement, since no actions(s) is (are) required. However, the overriding factor is that the effectiveness of reducing the hazard and ensuring protectiveness for this technology/alternative is extremely low or non-existent. However, in keeping with the intent of the CERCLA guidance to evaluate a No Action alternative as a baseline alternative, this technology will be retained for further evaluation.

3.2.2.2 Land Use Controls

LUCs in regard to real property are broadly interpreted to mean any restriction or control, arising from the need to protect human health and the environment that limits use of and/or exposure to any portion of that property including water resources. This term encompasses "institutional controls", such as those involving real estate interests, governmental permitting, zoning, public advisories, deed notices, and other "legal" restrictions. The term also may include restrictions on access, whether achieved by means of engineered barriers such as a fence or concrete pad, or by "human" means, such as the presence of security guards. Additionally, the term may involve both affirmative measures to achieve the desired restrictions (e.g., informational/educational materials or signage) and prohibitive directives (e.g., no excavation or drilling of drinking water wells). Considered together, the "LUCs" for a property will provide a blue print for how the property should be used in order to maintain the level of protectiveness intended by the remedial alternative. LUCs involve the implementation of written Land Use Control Implementation Plan (LUCIP) between the stakeholders and/or deed restrictions or marginal deed references, which would allow for protection of the public from hazards posed by MEC for current and/or future site conditions. At the former Oak and Maple Housing Areas, such LUCs may involve:

- Stipulations that current and future site users be trained for munitions awareness.

- Requirements for placement of signage warning potential site users of hazards associated with exposure to MEC.
- Requirements for placement of deed restrictions, disallowing the movement or disturbance of subsurface soil.
- Prohibition on residential usage of the site.
- Performing additional site clearance prior to implementing construction.
- Construction support during any intrusive activities.

LUCs are easily implemented and proven technologies. The costs of LUCs implementation, while not as low as for "No Action", are still very low when compared to some of the more active remedial technologies. In addition, site conditions and reuse plans are such that LUCs could prove highly effective in the protection of current and future users. Therefore, LUCs will be retained for further evaluation. LUCs would be defined in a LUCIP which would follow this FFS Addendum.

3.2.2.3 Subsurface Clearance

Subsurface clearance involves detection surveys to locate subsurface anomalies that may represent MEC, followed by the excavation, screening, segregation or disposal of MEC. MEC detection includes those methods and instruments used to locate surface and subsurface MEC. The best detection method is selected based on the MEC properties, such as the depth and size of the suspected MEC items, and the physical characteristics of the site, such as soil type, topography, vegetation, and geology.

There are two basic forms of MEC detection. The first, analog detection, employs magnetometers and metal detectors with audible signals. Typically, any MEC found during these searches is flagged or marked on a grid sheet for immediate removal.

The second form of MEC detection, digital geophysical mapping, includes a family of detection instruments designed to locate subsurface MEC and equipment and methods used for positioning. The family of instruments designed to locate subsurface MEC includes magnetic instruments, electromagnetic instruments, and ground penetrating radar. Data from digital geophysical mapping must be processed to select anomalies potentially representing subsurface MEC. The anomalies must be located and reacquired using the same equipment and then investigated.

Positioning technologies include various methods and instruments that establish geo-referenced data for anomalies located using MEC detection technologies. Positioning technologies are impacted on-site primarily by terrain, including canopy, the density of trees, and topography.

MEC detection technologies and positioning technologies/methods are based on the technical RI/Feasibility Study guidance document for Military Munitions Response Program sites distributed by CEHNC (CEHNC, 2005). The technologies described above are screened against the three criteria of effectiveness, implementability, and cost for the former Oak and Maple Housing Areas.

As there are proven technologies and available resources for MEC detection and removal, this technology is easily implemented at the former Oak and Maple Housing Areas. Based on its effectiveness in removing MEC and its implementability, subsurface clearance is retained for further evaluation.

Costs to implement removal at the former Oak and Maple Housing Areas would be expected to be high; approximately 37 acres would require screening for MEC detection below 18 inches bgs. This would be time consuming and unlikely to reveal many significant additional MEC items. However, the former Oak and Maple Housing Areas was located within the safety buffer zone for the 37-mm range and MEC deposition within the zone could have occurred due to misfires or errant rounds. 37mm projectiles could be found at depths down to 3 feet below grade. Deeper MEC items are not expected as the shallow angle of flight would likely have limited the depth of penetration. Additionally, deeper depths are not evaluated in this alternative, because there was no evidence, based on the results of the 2012 RI, that munitions with a deeper penetration depth (such as Stokes mortars, as identified in the Grant Housing Area) were used in the former Oak and Maple Housing Areas. Assuming future commercial redevelopment in the former Oak and Maple Housing Areas, excavations to 8 feet for the placement of utilities and building foundations could occur. The subsurface clearance alternative only evaluates clearance to a depth of 3 feet, adequate for the penetration depth of munitions identified in the 2012 RI (HGL, 2012).

3.2.2.4 Treatment/Disposal

As part of removal activities described in Subsection 3.2.2.3, and following detection and flagging of MEC, the MEC would be segregated from the surrounding soil. The UXO would be detonated on site or treated using other approved technologies. This technology is proven effective and implementable and is included in conjunction with the MEC subsurface clearance technology. If MEC is identified during subsurface clearance, it will be disposed via detonation by the local State Police Authorities.

3.2.3 Viable Technologies for Oak and Maple Housing Areas

Consistent with the technologies retained for the Grant Housing and 37-mm Impact Areas, the following have been retained for the former Oak and Maple Housing Areas, for assembly into remedial alternatives, screening, and detailed evaluations:

- No Action;
- LUCs; and
- Subsurface Clearance to Depth.

4.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

This section combines the technologies and general remedial actions retained for further evaluation in Section 3 to form remedial alternatives. In this section, the remedial alternatives developed, screened, and deemed highly viable for use at the former Oak and Maple Housing Areas will be evaluated against the NCP criteria in the detailed analysis in Section 5.

4.1 DEVELOPMENT OF ALTERNATIVES

Remedial alternatives for the former Oak and Maple Housing Areas are described in the following subsections. All alternatives are summarized in **Table 4-1**, located at the end of Subsection 4.1. It should be noted that CERCLA requires the review of remedial actions that have not eliminated risk to human health and the environment, no less than every 5 years to assure that human health and the environment continue to be protected. Five Year Reviews for MEC remedial actions determine if a remedial action continues to minimize explosives safety hazard and continues to be protective of human health, safety, and the environment, and provide an opportunity to assess the applicability of new technology for addressing previous technical impracticability determinations. Five-Year Reviews will be completed by USACE and include the following general steps:

- Prepare Five-Year Review Plan.
- Establish project delivery team and begin community involvement activities.
- Review existing documentation.
- Identify/review new information and current site conditions.
- Prepare preliminary Site Analysis and Work Plan.
- Conduct site visit.
- Prepare Five-Year Review Report.

Five-Year Reviews are not included in the cost estimates developed in Section 5. Due to the possibility of MEC remaining even if a subsurface clearance was completed, Five-Year Reviews would be required for all remedial alternatives, except for the No Action alternative.

4.1.1 Former Oak and Maple Housing Areas Alternative 1 (OM-1) – No Action

Alternative 1 is for the government to take no action in regards to locating, removing, and disposing of any MEC potentially present at the former Oak and Maple Housing Areas. In addition, no public awareness or education training would be initiated with regards to the hazards of MEC. The No Action alternative assumes continued land use of the former Oak and Maple Housing Areas in its present state. If the potential exposure and hazards associated with the former Oak and Maple Housing Areas are compatible with current and future development in the area, as well as the MEC response action objectives, then a No Action alternative may be warranted: It is important to note that the government will respond to any future MEC discovery at the former Oak and Maple Housing Areas; costs for response activities are not included in the alternative.

4.1.2 Former Oak and Maple Housing Areas Alternative 2 (OM-2) – Land Use Controls

This alternative includes LUC measures to help reduce and manage risks related to potential subsurface MEC. LUCs will consist of various public and worker awareness components in order to prevent workers and the public from coming into direct contact with potential MEC remaining in the former Oak and Maple Housing Areas. Public awareness can be increased through the education of residents and construction workers to the potential presence of MEC, how to identify MEC, how to avoid contact, and who to contact if MEC is encountered, by the distribution of educational materials, web-based media, or installation of local signage. Instruction on the"3Rs" (recognize, retreat, and report) of munitions safety awareness would be provided. The implementation of LUCs will provide a means to reduce MEC exposure hazards through behavior modification. Successful implementation of LUCs is contingent on the cooperation and active participation of property owners and local and regional government agencies. The Grant Housing Area and 37-mm Impact Area LUCIP will be updated to include the former Oak and Maple Housing Areas and will include additional requirements, as presented below. The updated LUCIP will specify steps and controls to be put in place that will ensure the LUCs are effectively implemented and maintained, thus, ensuring long-term effectiveness and permanence. LUCs will remain on this property indefinitely.

In general, LUCs recommended for the former Oak and Maple Housing Areas will include the following:

- Land Use Prohibitions/Restrictions;
- Annual LUC site inspection;
- Annual LUC compliance report;
- Deed restrictions (including prohibition of residential use of site);
- Zoning;
- Public Education:
  - Distribution of educational materials,
  - Live information sessions,
  - Web based visual and audio media, and
  - Signage (at site);
- MEC physical preview of proposed construction footprint;
- Requirement for pre-construction survey or clearance; and
- Construction support during any intrusive activities.

4.1.3 Former Oak and Maple Housing Areas Alternative 3 (OM-3) – Subsurface Clearance to Depth

This alternative would be conducted to address MEC concerns related to 37-mm rounds and possibly Stokes mortars. The site history and MEC depositional environments at nearby Grant Housing Area suggest that these MEC may still be present within the former Oak and Maple

Housing Areas at depths greater than those cleared during previous investigations and removal actions.

Historically, Grant Housing Area was used as a firing point for a 37-mm anti-tank practice range during and for a short time after WWI. The majority of the former range is located within the Grant Housing Area. A portion of the artillery firing fan for the pre-1940 37-mm artillery range falls within the former Oak and Maple Housing Area. As a result, portions of the former Oak and Maple Housing Areas may have been impacted by 37-mm rounds through errant shots, ricochets, or other means. Activities conducted in 2010/2011 as part of the former Oak and Maple Housing Areas RI resulted in confirmation that probability of encountering MEC within the previously developed Oak and Maple Housing Areas is low. At total of 3,647 anomalies were investigated during the RI and one MEC item (a 37-mm black powder practice projectile) was found. The presence of munitions debris (MD) within the developed areas and the discovery of the 37-mm projectile on the slopes of Oak Hill between the two housing areas indicate a possibility that MEC may be present within the un-surveyed portions of the housing areas. Additionally, munitions could potentially have penetrated site soils at depths greater than 18-inches, the limit of detection of the equipment for 37-mm projectiles. However, due to the shallow angle of fire, it is unlikely that these direct fire rounds would have penetrated to depths greater than 3 feet.

The remedial approach to address these deposits would include removing the top 18 inches of soil across the entire former Oak and Maple Housing Areas (while inspecting for potential MEC) and conducting a subsequent geophysical survey to determine the presence of additional MEC in the 18 to 36inch interval. This excavation effort would result in the removal and stockpiling and inspection of an estimated 90,000 cubic yards of soil. Detected anomalies in the 18 to 36-inch interval would be investigated. Any identified MEC destroyed in-place. Following MEC removal actions the soil would be replaced and the area restored. This effort would result in the removal of all vegetation and existing foundations from the housing area. An extensive erosion control plan would be designed to address impacts of erosion during and following construction activities so that the surrounding areas including the Nashua River are not impacted by sediment loaded stormwater runoff from the Oak and Maple Housing Areas.

Based on the findings of the OER survey, Stokes mortars were found in lowland areas where fill material had been placed at Grant Housing Area. The RI (HGL, 2012) did not find evidence of Stokes mortars in the Oak and Maple Housing Areas. Based on not finding Stokes mortars, the OM-3 alternative assumes none are present within the subsurface.

4.2 SCREENING OF ALTERNATIVES

The technologies combined to form the remedial alternatives summarized in **Table 4-1** have already been screened against the three criteria of effectiveness, implementability, and cost, and deemed viable at the former Oak and Maple Housing Areas in Section 3. Therefore, the three remedial alternatives will be evaluated in the detailed analysis in Section 5.

Table 4.1 Remedial Alternatives Evaluated

Remedial Alternative No.	Remedial Alternatives	Potential Actions	MEC Investigation and Removal	
			Detection	Removal
OM-1	No Action	NA	NA	NA
OM-2	Land Use Controls	Land use prohibition/ restrictions, public education, MEC physical preview prior to construction, construction oversight during intrusive activities.	Yes	Yes(1)
OM-3	Subsurface Clearance to Depth	Land clearing, overburden soil removal with UXO technician support, further MEC survey, MEC disposal, soil replacement, grading, and erosion control.	Yes	Yes(1)

Notes:
NA = Not applicable
(1) = If encountered

5.0 DETAILED ANALYSIS OF ALTERNATIVES

The detailed analysis of alternatives consists of the analysis and presentation of the relevant information needed to allow decision makers to select a site remedy, not the decision making process itself. During the detailed analysis, each alternative is assessed against the NCP evaluation criteria described in Subsection 5.1. The results of the detailed analysis are arrayed to compare the alternatives and identify their strengths and weaknesses relative to one another. This approach to analyzing alternatives is designed to provide decision makers with sufficient information to adequately compare the alternatives, select an appropriate remedy for each area, and demonstrate satisfaction of the CERCLA remedy selection requirements in the Record of Decision (ROD)/Explanation of Significant Differences (ESD).

5.1 EVALUATION CRITERIA

Evaluation criteria are described in the NCP, Section 300.430. The criteria were developed to address the CERCLA requirements and considerations, and to address the additional technical and policy considerations that have proven to be important for making recommendations amongst the remedial alternatives. These evaluation criteria serve as the basis for conducting the detailed analyses during the FFS and for subsequently recommending an appropriate remedial action. The evaluation criteria with the associated statutory considerations are described below.

The NCP calls the two factors described below "threshold factors" because each alternative must meet the two criteria.

1. **Overall protectiveness of human health and the environment** – Determines whether an alternative achieves the RAOs by eliminating, reducing, or controlling threats to public health and the environment through LUCs, engineering controls, or treatment. An emphasis is placed on effectiveness in terms of worker safety issues during remedial actions, and post-remedial action for local workers based on future land use.

2. **Compliance with ARARs and TBCs** – Evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified. The ARARs and TBCs are summarized in Section 2.

The five "balancing factors" described below are weighed against each other to determine which remedies are cost effective and are "permanent" to the maximum extent practicable.

1. **Long-term effectiveness and permanence** – Considers the ability of an alternative to maintain protection of human health and the environment over time. For MEC sites, this will typically fall into categories associated with LUCs that include access controls (fences, signage, etc.), education/awareness programs, and land use restrictions/prohibitions (LUCIP, deed restrictions, etc). The long-term effectiveness and permanence of LUCs will need to take into account the administrative feasibility of maintaining the LUCs and the potential risk/hazard should they fail, as well as

mechanisms like the CERCLA Five-Year Review process to evaluate on a periodic basis the long-term effectiveness and permanence, as well as protectiveness.

2. **Reduction of toxicity, mobility, or volume (TMV) of contaminants through treatment** – Evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present. For MEC sites where the treatment options are generally limited to certain disposal options, the destruction of the MEC should be considered as treatment that reduces the amount of MEC found. This is analogous to reduction in volume. Mobility in the context of hazardous, toxic, and radioactive waste treatment where a hazardous substance is immobilized does not have a direct analogy for MEC. Mobility may be considered a function of the ease of moving a MEC item, as well as physical processes (e.g., erosion, migration of sand dunes, frost heave, flooding of surrounding soil or sediment, tidal currents) that may affect movement of MEC from its original depth or location. To the extent that MEC is detected, recovered, and disposed of, its ability to move is reduced. The MEC remaining after a removal activity would maintain its ability to move, based on the physical processes described above, and should be accounted for.

3. **Short-term effectiveness** – Considers the length of time needed to implement an alternative and the risk the alternative poses to workers, residents, and the environment during implementation. In addition, for MEC, safety considerations will include an evaluation of what is available from an administrative standpoint (e.g., access) and what is available from a technical standpoint (e.g., setbacks – are buildings too close for blown-in-place; what will it take to bring the correct resources to the site to mitigate a blown-in-place, etc.).

4. **Implementability** – Considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

5. **Cost** – Includes estimated capital and annual O&M costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30%. Costs associated with recurring reviews and construction support are not included in the cost estimates developed in Subsection 5.2.

The last two criteria, the "modifying factors," are usually evaluated following comment on the FFS, and are completed after the Proposed Plan and public comment period on that plan in the ROD/ESD:

1. **Regulatory agency acceptance** – Considers whether the state (MassDEP) and EPA Region 1 agree with the Army's analyses and recommendations.

2. **Community acceptance** – Considers whether the local community agrees with the Army's analyses and preferred alternative.

5.2 INDIVIDUAL ANALYSIS OF ALTERNATIVES

Remedial alternatives for the former Oak and Maple Housing Areas with low hazard associated with MEC or with the potential for MEC to be present based on historical use are evaluated individually.

The following remedial alternatives will be evaluated against the NCP criteria in Subsections 5.2.1.1 through 5.2.1.3:

- Alternative OM-1 – No Action;
- Alternative OM-2 – LUCs; or
- Alternative OM-3 – Subsurface Clearance to Depth.

Remedial action alternatives are described generally in Section 4.

5.2.1 Former Oak and Maple Housing Areas

5.2.1.1 Alternative OM-1 – No Action

Alternative OM-1 – No Action can be evaluated relative to the NCP criteria for the former Oak and Maple Housing Areas as follows:

1. **Overall Protectiveness of Human Health and the Environment** – Based on the results of the MEC investigation and remedial activities conducted to date at the former Oak and Maple Housing Areas (SSFR, OER, 2006)(HGL, 2012), the probability of encountering MEC within the cleared portions of the former Oak and Maple Housing Areas is considered to be low. Alternative OM-1 would not address the unacceptable risk of human exposure to MEC and may not be protective of human health. Alternative OM-1 would be protective of the environment because no clearing, grubbing, or excavation would be required.

   MEC HA scoring of Alternative OM-1 resulted in Hazard Level 3 for current and future land use at the former Oak and Maple Housing Areas Munitions Response Site. The MEC HA presents only a qualitative analysis of explosive risks remaining at the site, and based on the determined low probability of encountering additional MEC, there is some likelihood that MEC may be encountered if no further actions are performed.

2. **Compliance with ARARs and TBCs** – There are no action-specific ARARs applicable to the site because there are no active remedial actions associated with this alternative. However, there are possible location-specific ARARs that may be applicable.

3. **Long-Term Effectiveness and Permanence** – Alternative OM-1 would not reduce magnitude of risk over the long term. Alternative OM-1 requires no technical components and poses no uncertainties regarding its performance. It is assumed that no future assessment of site conditions is performed in the future.

4. **Reduction of TMV of Contaminants Through Treatment** – Alternative OM-1 would not reduce the volume or mobility of any potential remnant MEC.

5. **Short-Term Effectiveness** – There would be no additional risk to the community or workers because there are no construction or operation activities associated with Alternative OM-1.

6. **Implementability** – Implementation of Alternative OM-1 poses no technical difficulties. Alternative OM-1 would be administratively feasible because it requires minimal coordination with agencies to implement.

7. **Cost** – Since there is no action associated with Alternative OM-1, the total present-worth, present-value cost to perform is $0.

5.2.1.2 Alternative OM-2 – Land Use Controls

Alternative OM-2 – LUCs can be evaluated relative to the NCP criteria for the former Oak and Maple Housing Areas as follows:

1. **Overall Protectiveness of Human Health and the Environment** – Based on the results of the MEC investigation and remedial activities conducted to date at the former Oak and Maple Housing Areas (HGL, 2012), the probability of encountering MEC within the former Oak and Maple Housing Areas is considered to be low. The LUCs would provide land use prohibitions/restrictions, public education, MEC preview of proposed construction footprint, and construction support during any future intrusive activities. Alternative OM-2 would be protective of human health by land use prohibitions, raising public awareness, and modifying public behavior relative to the activities performed onsite. Alternative OM-2 would be protective of the environment because no clearing, grubbing, or excavation would be required until the site was disturbed by future commercial development. During any intrusive activities conducted during commercial development, construction oversight would be provided to protect workers.

   MEC HA scoring of Alternative OM-2 resulted in Hazard Level 3 for future land use at the former Oak and Maple Housing Area Munitions Response Site. The MEC HA presents only a qualitative analysis of explosive risks remaining at the site and based on the determined low probability of encountering additional MEC, LUCs will provide an appropriate remedial alternative for the future land use. The scoring assumes moderate accessibility for the site (appropriate for fencing), a high number of potential contact hours (up to 999,999 receptor hours per year), and the possibility of encountering MEC if intrusive activities are performed. MEC construction support would control the exposure pathway.

2. **Compliance with ARARs and TBCs** – LUCs would be implemented to comply with all ARARs and TBCs.

3. **Long-Term Effectiveness and Permanence** – Alternative OM-2 is contingent on the cooperation and active participation of the public and local and regional government

agencies. The remedial design will specify steps and controls to be put in place that will ensure that LUCs are maintained, thus, ensuring long-term effectiveness and permanence. The components of LUCs, that are used as examples and are described in Subsection 4.1.2, require O&M of signs, printed media, and audio and visual media. Site reviews would be conducted once every 5 years as required by CERCLA to assess the site condition and the degree of protectiveness to human health and the environment.

4. **Reduction of TMV of Contaminants Through Treatment** - Alternative OM-2 would not reduce volume or mobility of remnant MEC unless MEC is encountered during construction support activities.

5. **Short-Term Effectiveness** –There may be a slight increase in risk to workers, during installation of LUCs (e.g., signs, construction oversight) at the site. Installation of LUCs requiring intrusive activity would be performed while conducting anomaly avoidance and under the supervision of a UXO technician escort. Risks encountered by field personnel would be primarily associated with construction activities. Otherwise, there would be no additional risk to the workers because there are no other construction or operation activities associated with Alternative OM-2.

6. **Implementability** - Most of the components recommended in Alternative OM-2 can be easily implemented because there are no technical difficulties associated with this alternative and the materials and services needed to implement this alternative are readily available. O&M of LUCs can be performed easily.

7. **Cost** - The total present-value cost to perform Alternative OM-2 in the former Oak and Maple Housing Areas is $255,317.80 and presented on **Table 5-1**. This cost includes performing a MEC survey of 10 additional grids at the Oak Housing Area and providing 30 days of MEC construction support. This cost may fluctuate if more or less construction support is required.

Table 5.1 Former Oak and Maple Housing Area Alternative OM-2 Land Use Controls

Capital Costs	Quantity	Unit	Cost
LUCS (from Table 5-1 of 2008 FFS, Alternative GR-2)	1	LS	$23,870.55
Pre-construction Clearance /Survey of 10 grids at Oak Housing Area	1	Each	$123,479.25
MEC Construction Support	30	days	$58,380
TOTAL			**$205,729.80**
Annual Costs			
Annual O & M Cost (from Table 5-1 of 2008 FFS, Alternative GR-2)	1	Yearly	$2,530.00
TOTAL			**$2,530.00**
Present Value Analysis			
Capital Cost (from Table 5-1 of 2008 FFS)	1	Each	$205,729.80
Annual O & M Cost for 30 years (from Table 5-1 of 2008 FFS)	1	30 years	$49,588.00
TOTAL			**$255,317.80**

5.2.1.3 Alternative OM-3 – Subsurface Clearance to Depth

Alternative OM-3 - Subsurface Clearance to depth can be evaluated relative to the NCP criteria for the former Oak and Maple Housing Areas as follows:

1. **Overall Protectiveness of Human Health and the Environment** – Based on the results of the MEC investigation and remedial activities conducted to date at the former Oak and Maple Housing Areas (HGL, 2012), the probability of encountering MEC within the housing area is considered to be low. However, the potential for potential for MEC exposure would increase with excavation activities conducted during a future commercial reuse scenario. Removal of any remaining MEC over the entire site would result in a high level of protectiveness for site users. Alternative OM-3 would not be protective of the environment as soil excavation to a depth of 18" below grade across the former Oak and Maple Housing Areas would impact the ecology within the area including removal of all vegetation.

   The MEC HA scores alternative OM-3 as a Hazard Level 4 for future land use at the former Oak and Maple Housing Areas Munitions Response Site. Based on the MEC HA score, subsurface clearance to depth could provide an appropriate remedial alternative for the future land use. The scoring assumes full accessibility for the site (no barriers), and a high number of potential contact hours (up to 999,999 receptor hours per year). Because the MEC removal depth equals construction depth, it is assumed that no MEC would be encountered.

2. **Compliance with ARARs and TBCs** - Subsurface clearance would be implemented to comply with all ARARs and TBCs.

3. **Long-Term Effectiveness and Permanence** - Subsurface clearance would provide long-term effectiveness by permanently removing MEC to depths of anticipated penetration (37-mm). However, due to the extensive excavation activities and vegetation clearing and other disruptions to the habitat the alternative may result in a long term impact on the environment and ecosystem.

4. **Reduction of TMV of Contaminants Through Treatment** - Alternative OM-3 would reduce volume and mobility of remnant MEC.

5. **Short-Term Effectiveness** - There may be hazard to workers during the remedial action. The hazard is considered manageable. There would be no or very limited risk to the community as access would be restricted during remedial activities.

6. **Implementability** – Although not technically difficult, Alternative OM-3 involves complex implementation because it would require the removal of 37 acres of vegetation, the excavation, staging, placement and grading of several hundred thousand tons of overburden soil. In addition to the difficulties of construction work and MEC survey effort, erosion control measures will have to be implemented to ensure that degradation of the disturbed areas do not occur in the short- or long-term.

7. **Cost** - The total present-value cost to perform Alternative OM-3 in the former Oak and Maple Housing Areas is $8,207,449 and presented on **Table 5-2**. This cost is based on 29% of Table 5-2 (GR-3 = $28,301,301.55 = 128 acres = 18" depth = 350,000 yd^3) of the 2008 FFS.

Table 5.2 Former Oak and Maple Area Alternative OM-3 Subsurface Clearance to Depth

Capital Costs	Quantity	Unit	Cost
Oak and Maple (28% of Table 5-2 of 2008 FFS, Alternative GR-3)	1	LS	$8,207,449
TOTAL			**$8,207,449**
Annual Costs			
None			
None			
TOTAL			**$0**
Present Value Analysis			
Oak and Maple (28% of Table 5-2 of 2008 FFS, Alternative GR-3)	1	LS	$8,207,449
TOTAL			**$8,207,449**

5.3 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

Based on the detailed analysis of remedial alternatives in Subsection 5.2, the strengths and weaknesses of the remedial alternatives relative to one another are evaluated with respect to each of the NCP criteria. Alternatives OM-1, OM-2, and OM-3 are compared for the former Oak and Maple Housing Areas below.

5.3.1 Former Oak and Maple Housing Areas

1. **Overall Protectiveness of Human Health and the Environment** – former Oak and Maple Housing Areas was evaluated to have a low probability of encountering MEC. The MEC HA indicates that Alternative OM-3 lowers the explosive hazard onsite from Hazard Category 3 (for current use) to 4 (for future use), because the depth of future intrusive activities (3 feet) will not overlap with the depth that MEC might be encountered following subsurface clearance (see Appendix A). Based on the MEC HA the other alternatives (with the exception of OM-1 (No Action), lower explosive risk but not significantly enough to change the Hazard Category of the site. The MEC HA, however, provides an over estimate of MEC hazards potentially remaining onsite, because all prior clearances have not been accounted for in the scoring.

   Alternative OM-1 does not address the hazard of human exposure to MEC and would therefore not be protective of human health. Alternative OM-2 - LUCs offers a more protective option than Alternative OM-1 because the LUCs restrict access to the site, provide measures for controlling land use, and raise public awareness to modify public behavior relative to the activities performed onsite. Alternative OM-3 - Subsurface Clearance to Depth removes potential subsurface MEC that may remain within the former Oak and Maple Housing Areas and is the most protective.

   Alternative OM-1 would be protective to the environment as no clearing, grubbing, or excavation would be required. Alternative OM-2 would also be protective of the environment because no clearing, grubbing, or excavation would be required until the site was disturbed by future commercial development. Alternative OM-3 would have significant impacts on the environment.

2. **Compliance with ARARs and TBCs** – There are no action-specific ARARs associated with Alternative OM-1 because there are no active remedial actions associated with this alternative. However, there are possible location-specific ARARs that may be applicable. Alternatives OM-2,and OM-3 would be implemented and performed to comply with all ARARs and TBCs.

3. **Long-Term Effectiveness and Permanence** – Alternative OM-1 is not effective or permanent. Alternative OM-2 is more effective and permanent than Alternative OM-1, assuming the cooperation and participation of the public and government agencies. The LUCs described in Subsection 4.1.2 will provide effectiveness in the long-term if properly implemented. Alternative OM-3 is the most effective and permanent alternative because it reducing or eliminating the presence of any remaining MEC within the former Oak and Maple Housing Area.

4. **Reduction of TMV of Contaminants through Treatment** – Alternative OM-1 will not reduce the TMV of MEC at the former Oak and Maple Housing Area. Alternative OM-2 will marginally reduce the TMV of MEC, if any MEC is encountered during construction oversight activities. Alternative OM-3 will reduce the TMV of MEC in the former Oak and Maple Housing Areas.
5. **Short-Term Effectiveness** – Because there is no construction activities associated with either alternative, Alternatives OM-1 and OM-2 will not present significant additional hazard to workers at the former Oak and Maple Housing Areas. Alternative OM-3 will result in short term risk to workers and significant impact on the environment.
6. **Implementability** – Alternative OM-1 would be easily implemented because it requires no action. Alternative OM-2 could also be easily implemented because LUCs pose no technical difficulties and the materials and services needed are available. Although not technically difficult, Alternative OM-3 would also involve complex implementation because it would require the removal of 37 acres of vegetation and the excavation, staging, placement and grading of several thousand tons of overburden soil. In addition to the difficulties of construction work and MEC survey effort, erosion control measures will also have to be implemented to ensure that degradation of the disturbed areas do not occur in the short- or long-term.
7. **Cost** – The total present-value cost (+50% to -30%) to perform each alternative is as follows:

   Alternative OM-1 = $0
   Alternative OM-2 = $255,317.80
   Alternative OM-3 = $8,207,449
   Note: Costs have been rounded to the nearest thousand dollars and do not include costs associated with Five Year Reviews and construction support.

Alternative OM-2 presents the most cost effective option, after OM-1, No Action.

5.3.2 State and Community Acceptance

State and support agencies' concerns will be considered in the final remedy decision. Also, the concerns of the community should be considered in presenting alternatives that would be acceptable to the community. These two criteria will be evaluated based on any additional comments received on this FFS Addendum during the comment period and will be addressed in the finalization of the ROD ESD.

5.3.3 Green and Sustainable Remediation

Alternatives OM-1 and OM-2 require minimal energy use for implementation and operation.

5.4 ALTERNATIVE SELECTION

Based on the information presented in the CERCLA nine-criteria screening process, the applicability of alternative OM-2 LUCs, that was selected and implemented for the Grant Housing Area and 37-mm Impact Area is the recommended remedy that is protective of human

health and the environment; complies with ARARs, and is cost-effective for the former Oak and Maple Housing Areas. The incorporation and application of LUCs for the Oak and Maple Housing Areas with the LUCs in place for the Grant Housing Area and 37-mm Impact Area provides remedy consistency over the former 37-mm training range; however, since the former Grant Housing Area is zoned for future residential use and the Oak and Maple Housing Areas are zoned for commercial redevelopment, the LUCs for the former Oak and Maple Housing Areas will include the prohibition of residential reuse.

Maple Housing Areas. The incorporation and application of LUCs for the Oak and Maple Housing Areas with the LUCs in place for the Grant Housing Area and 37-mm Impact Area provides remedy consistency over the former 37-mm training range; however, since the former Grant Housing Area is zoned for future residential use and the Oak and Maple Housing Areas are zoned for commercial redevelopment, the LUCs for the former Oak and Maple Housing Areas will include the prohibition of residential reuse.

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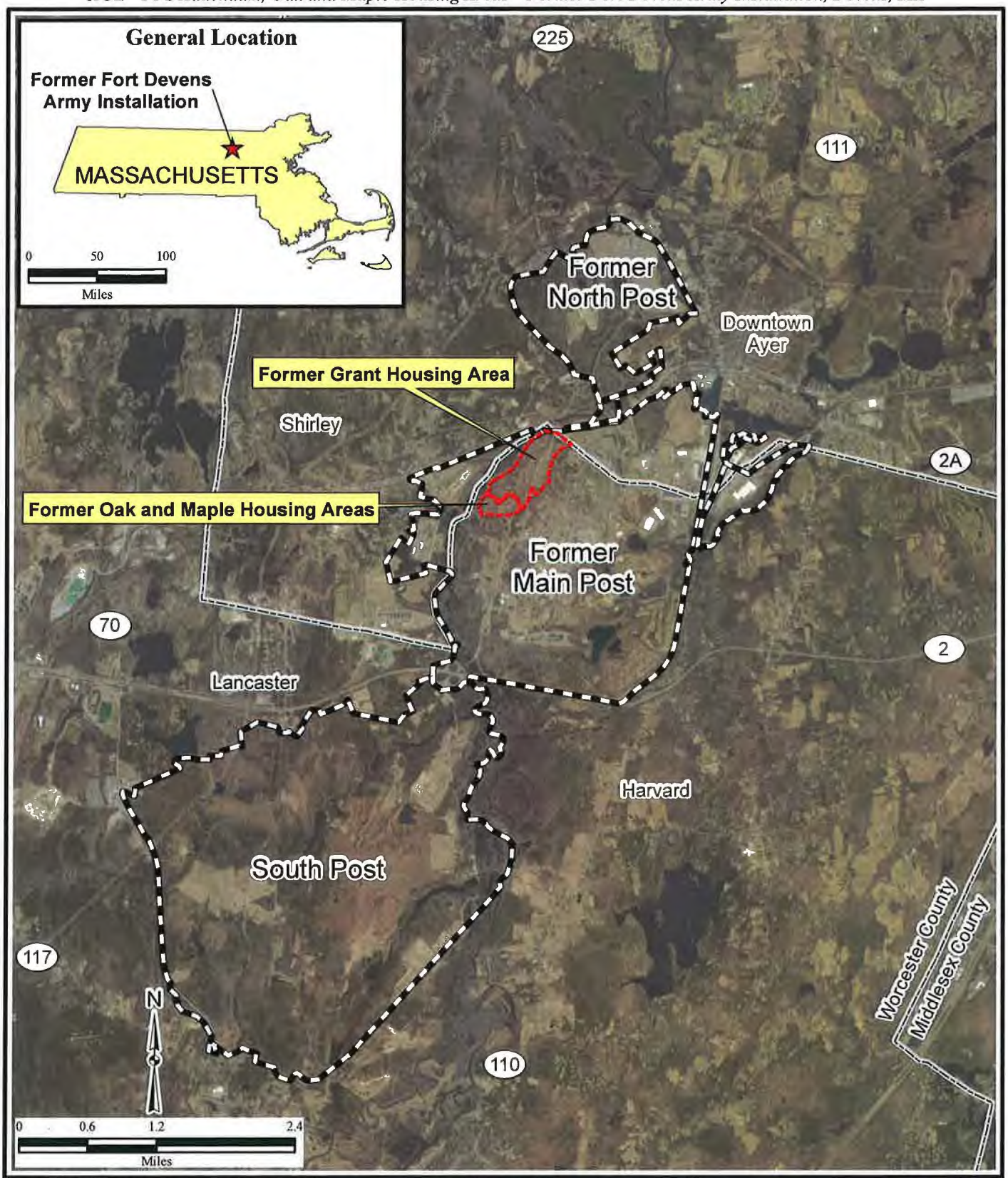
FIGURES



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Source: HGL ESRI, USACE, www.mass.gov, ESRI Online Bing Maps Aerial

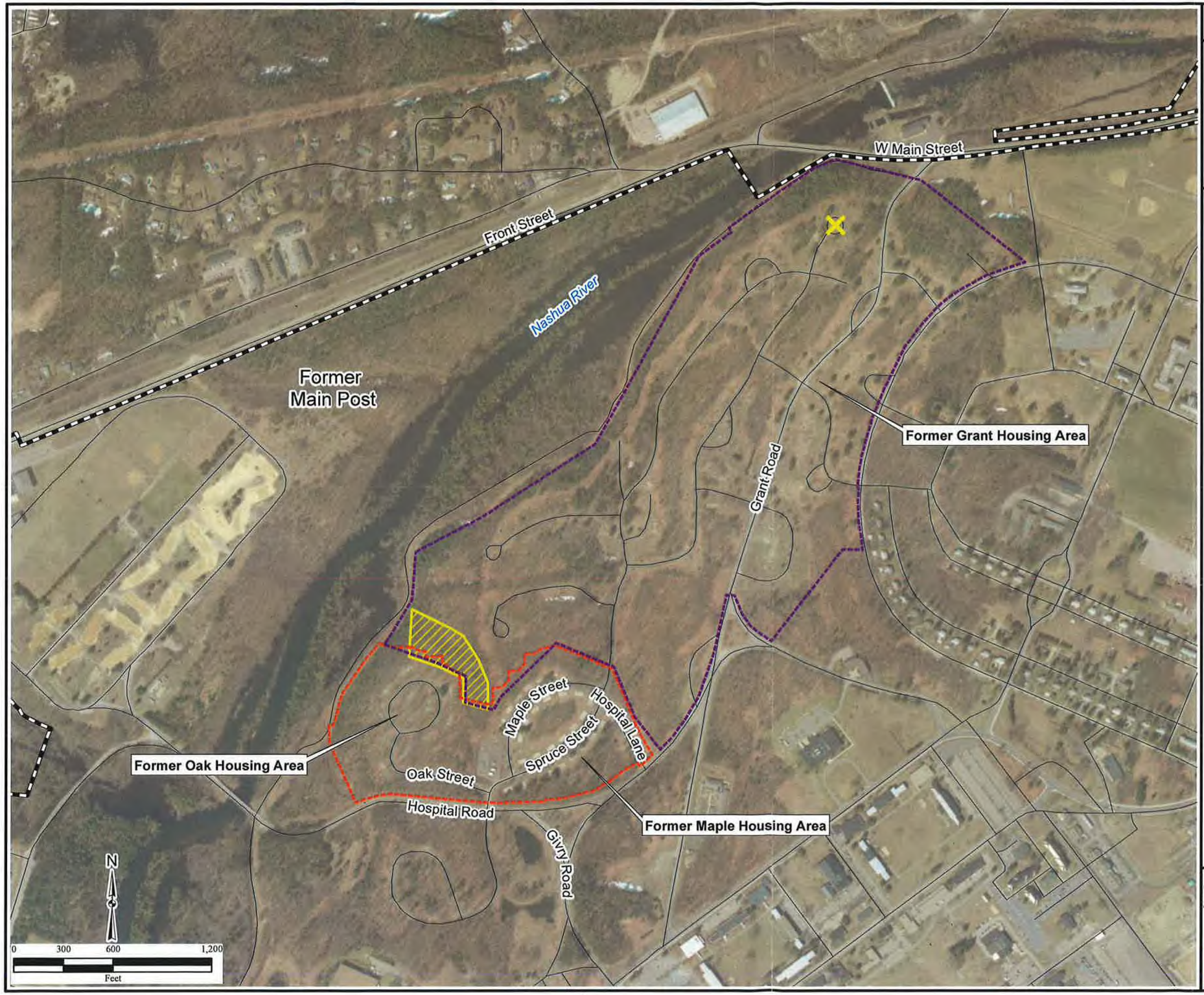
HGL HydroGeoLogic, Inc

Legend
- Major Road
- Highway
- County Line
- Site
- Former Fort Devens

Figure 1.1
Site Location
Former Fort Devens Army Installation

HGL—FFS Addendum, Oak and Maple Housing Areas
Former Fort Devens Army Installation, Devens, MA

Figure 1.2
Site Location
Grant Housing Area/
Oak and Maple Housing Areas



Legend

- Approximate Former Firing Location
- Road
- Former Fort Devens Boundary
- 37-mm Impact Area

Sites:

- Former Oak and Maple Housing Study Area
- Former Grant Road Housing Area

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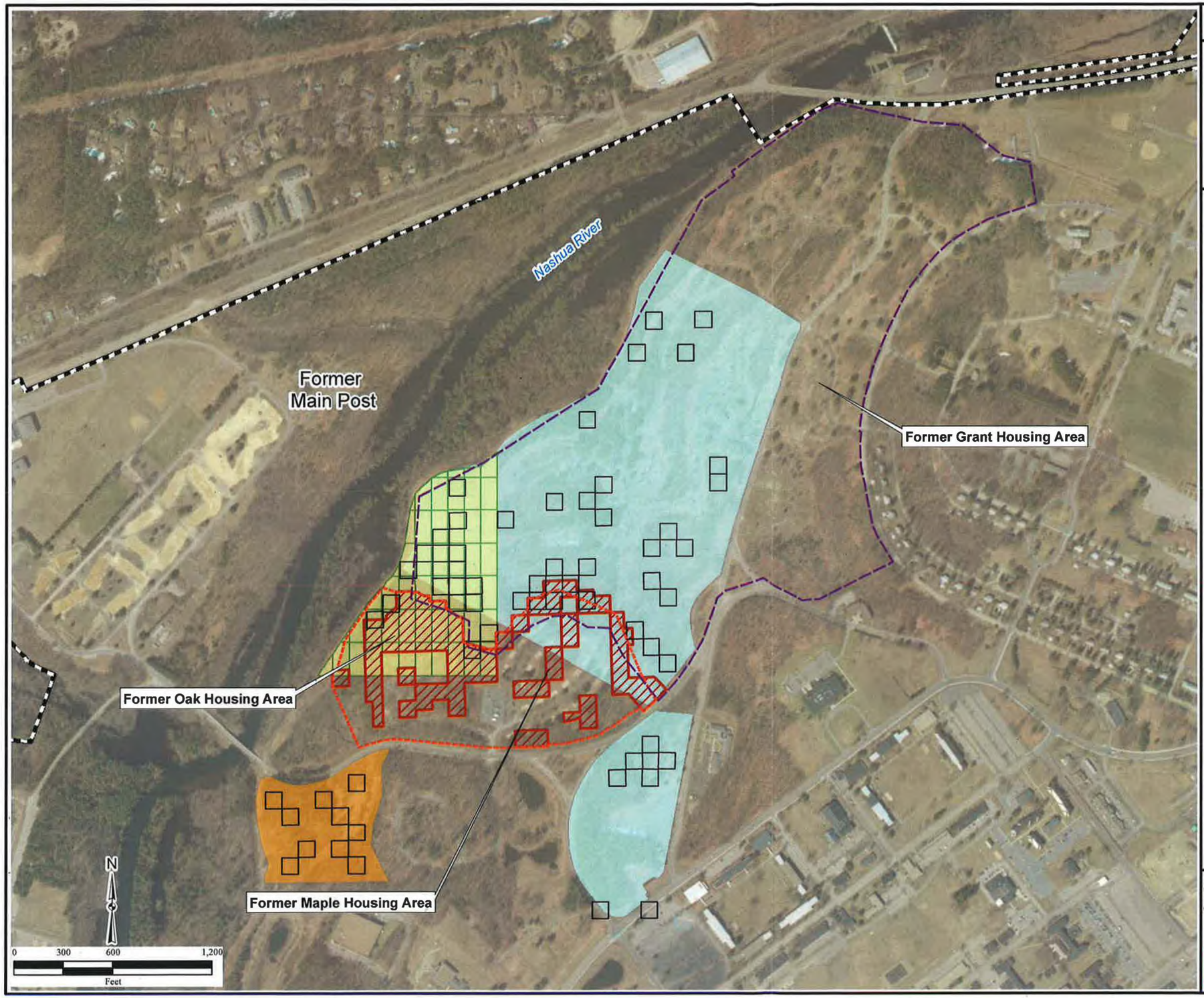
Source: HGL ESRI, USACE, Weston, www.mass.gov,
ESRI Online Bing Maps Aerial

HGL HydroGeoLogic, Inc

Figure 1.3
MEC Investigation Area



Legend

- Former Fort Devens Boundary
- Surveyed Area Within Former Oak and Maple Housing Study Area

Areas Identified with MEC Potential (1995):

- Area 11
- Area 17

Investigations:

- 1995 GridStats (100' x 100')
- 1996 Remediation Grid (100' x 200') (Site 12)
- 2005 Geophysical Suvey/ UXO Removal Action
- 2010/2011 Former Oak and Maple Housing Study Area

Note:
Mass.gov aerial photograph dated May 2008.

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Source: HGL ESRI, USACE, Weston, www.mass.gov,
ESRI Online Bing Maps Aerial

HGL HydroGeoLogic, Inc.

APPENDIX A

MUNITIONS AND EXPLOSIVES OF CONCERN HAZARD ANALYSIS SCORING

A.1

Munitions Response Site 1 Perimeter

MEC HA Summary Information

Comments

Site ID: Oak Housing Perimeter Zone
Date: 2/12/2013

Please identify the single specific area to be assessed in this hazard assessment. From this point forward, all references to "site" or "MRS" refer to the specific area that you have defined.

A. Enter: OM-2-: Land Use Controls 0

OMH Sub-Area 1

Provide a list of information sources used for this hazard assessment. As you are completing the worksheets, use the "Select Ref(s)" buttons at the ends of each subsection to select the applicable information sources from the list below.

Ref. No.	Title (include version, publication date)
1	ASR 1994
2	PA/SI 2004
3	Removal 2007
4	RI 2012
5	FFS 2013
6	
7	
8	
9	
10	
11	
12	

B. Briefly describe the site:

1. Area (include units): 10 acres
2. Past munitions-related use:

Safety Buffer Areas

3. Current land-use activities (list all that occur):

Hiking

4. Are changes to the future land-use planned? Yes
5. What is the basis for the site boundaries?

Topography and prior land-use/disturbances.

6. How certain are the site boundaries?

Certain

PA/SI 2004

C. Historical Clearances

1. Have there been any historical clearances at the site? Yes, subsurface clearance
2. If a clearance occurred:
   a. What year was the clearance performed? 1995
   b. Provide a description of the clearance activity (e.g., extent, depth, amount of munitions-related items removed, types and sizes of removed items, and whether metal detectors were used):

Since previous removal actions that were completed only over a portion of the Perimeter Sub-area, the reduction in risk is is not currently accounted for in the MEC HA scoring. Instead, the MEC HA scoring overestimates the explosive risk, since it assumes no surface or subsurface MEC clearance has occurred.

Reference(s) for Part C:

D. Attach maps of the site below (select 'Insert/Picture' on the menu bar.)

Site ID: **Oak Housing Perimeter Zone**
Date: **2/12/2013**

Cased Munitions Information

Item No.	Munition Type (e.g., mortar, projectile, etc.)	Munition Size	Munition Size Units	Mark/ Model	Energetic Material Type	Is Munition Fuzed?	Fuzing Type	Fuze Condition	Minimum Depth for Munition (ft)	Location of Munitions	Comments (include rationale for munitions that are "subsurface only")
1	OM-1: No Action	37	mm	unkown	High Explosive	Yes	Impact	UNK	0	Surface and Subsurface	
2	OM-2-: Land Use Controls	0									
3	OM-3: Subsurface Clearance	3									
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Reference(s) for table above:

[redacted]

Bulk Explosive Information

Item No.	Explosive Type	Comments
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Reference(s) for table above:

[redacted]

Site ID: **Oak Housing Perimeter Zone**
Date: **2/12/2013**

Activities Currently Occurring at the Site

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	OM-1: No Action	20	416	**8,320**	0	2 hrs/day, 260 days/yr (estimated)
2	OM-2-: Land Use Controls	0				
3	OM-3: Subsurface Clearance	3				
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr):			**8,320**		
	Maximum intrusive depth at site (ft):				**0**	

Reference(s) for table above:

[redacted]

Activities Planned for the Future at the Site (If any are planned: see 'Summary Info' Worksheet, Question 4)

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum Intrusive depth (ft)	Comments
1	Commercial/light industustrial use	10	2,080	**20,800**	0	10 hours/day x 100 days/person (estimated)
2	Landscaping/maintenance	10	40	**400**	2	(estimated)
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr):			**21,200**		
	Maximum intrusive depth at site (ft):				**2**	

Reference(s) for table above:

[redacted]

Site ID: **Oak Housing Perimeter Zone**
Date: **2/12/2013**

Planned Remedial or Removal Actions

Response Action No.	Response Action Description	Expected Resulting Minimum MEC Depth (ft)	Expected Resulting Site Accessibility	Will land use activities change if this response action is implemented?	What is the expected scope of cleanup?	Comments
1	OM-1: No Action	0	Full Accessibility	No	No MEC cleanup	
2	OM-2-: Land Use Controls	0	Moderate Accessibility	No	No MEC cleanup	
3	OM-3: Subsurface Clearance	3	Full Accessibility	No	cleanup of MECs located both on the surface and subsurface	
4						
5						
6						

For those alternatives where you answered 'No' in Column E, are land-use activities to be assessed against current or future land uses?

Reference(s) for table above:

FFS 2013

Site ID: **Oak Housing Perimeter Zone**
Date: **2/12/2013**

This worksheet needs to be completed for each remedial/removal action alternative listed in the 'Remedial-Removal Action' worksheet that will cause a change in land use.

Land Use Activities Planned After Response Alternative #1: OM-1: No Action

Activity No	OM-1: Land Use Controls	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/yr)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr)					
	Maximum intrusive depth at site (ft):					

Reference(s) for table above:

[redacted]

Land Use Activities Planned After Response Alternative #2: OM-2: Land Use Controls

Activity No	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/yr)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr)					
	Maximum intrusive depth at site (ft):					

Reference(s) for table above:

[redacted]

Land Use Activities Planned After Response Alternative #3: OM-3: Subsurface Clearance

Activity No	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/yr)	Maximum intrusive depth (ft)	Comments
1	Hiking	20	416	**8,320**	0	2 hrs/day, 260 days/yr (estimated)
2	Landscaping/maintenance	10	40	**400**	0	
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr)			**8,720**		
	Maximum intrusive depth at site (ft):				**0**	

Reference(s) for table above:

[redacted]

Site ID: **Oak Housing Perimeter Zone**
Date: **2/12/2013**

Energetic Material Type Input Factor Categories

The following table is used to determine scores associated with the energetic materials. Materials are listed in order from most hazardous to least hazardous.

	OM-1: No Action	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
High Explosive and Low Explosive Filler in Fragmenting Rounds		100	100	100
White Phosphorus		70	70	70
Pyrotechnic		60	60	60
Propellant		50	50	50
Spotting Charge		40	40	40
Incendiary		30	30	30

The most hazardous type of energetic material listed in the 'Munitions, Bulk Explosive Info' Worksheet falls under the category 'High Explosive and Low Explosive Filler in Fragmenting Rounds'. ***Score***

Baseline Conditions:	**100**
Surface Cleanup:	**100**
Subsurface Cleanup:	**100**

Location of Additional Human Receptors Input Factor Categories

1. What is the Explosive Safety Quantity Distance (ESQD) from the Explosive Siting Plan or the Explosive Safety Submission for the MRS? 1346 feet
2. Are there currently any features or facilities where people may congregate within the MRS, or within the ESQD arc? Yes
3. Please describe the facility or feature.

Transformer Station, Roads

MEC Item(s) used to calculate the ESQD for current use activities

Item #1. Artillery (37mm, High Explosive)

The following table is used to determine scores associated with the location of additional human receptors (current use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

4. Current use activities are 'Inside the MRS or inside the ESQD arc', based on Question 2.' ***Score***

Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**30**

5. Are there future plans to locate or construct features or facilities where people may congregate within the MRS, or within the ESQD arc? Yes
6. Please describe the facility or feature.

commercial or industrial buildings

MEC Item(s) used to calculate the ESQD for future use activities

Item #1. Artillery (37mm, High Explosive)

The following table is used to determine scores associated with the location of additional human receptors (future use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

7. Future use activities are 'Inside the MRS or inside the ESQD arc', based on Question 5.' ***Score***

Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**30**

Comments

Site Accessibility Input Factor Categories

The following table is used to determine scores associated with site accessibility:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Full Accessibility	No barriers to entry, including signage but no fencing	80	80	80
Moderate Accessibility	Some barriers to entry, such as barbed wire fencing or rough terrain	55	55	55
Limited Accessibility	Significant barriers to entry, such as unguarded chain link fence or requirements for special transportation to reach the site	15	15	15
Very Limited Accessibility	A site with guarded chain link fence or terrain that requires special equipment and skills (e.g., rock climbing) to access	5	5	5

Current Use Activities ***Score***

Select the category that best describes the site accessibility under the current use scenario:

Moderate Accessibility

Baseline Conditions: **55**
Surface Cleanup: **55**
Subsurface Cleanup: **55**

Future Use Activities

Select the category that best describes the site accessibility under the future use scenario:

Full Accessibility

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Reference(s) for above information:

[redacted]

Response Alternative No. 1: OM-1: No Action

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Response Alternative No. 2: OM-2-: Land Use Controls

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Moderate Accessibility'.

Baseline Conditions: **55**
Surface Cleanup: **55**
Subsurface Cleanup: **55**

Response Alternative No. 3: OM-3: Subsurface Clearance

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Response Alternative No. 4:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 5:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 6:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Potential Contact Hours Input Factor Categories

The following table is used to determine scores associated with the total potential contact time:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Many Hours	≥1,000,000 receptor-hrs/yr	120	90	30
Some Hours	100,000 to 999,999 receptor hrs/yr	70	50	20
Few Hours	10,000 to 99,999 receptor-hrs/yr	40	20	10
Very Few Hours	<10,000 receptor-hrs/yr	15	10	5

Current Use Activities:

Input factors are only determined for baseline conditions for current use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: **8,320** receptor hrs/yr
Based on the table above, this corresponds to a input factor score for baseline conditions of: **15** Score

Future Use Activities:

Input factors are only determined for baseline conditions for future use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: **21,200** receptor hrs/yr
Based on the table above, this corresponds to a input factor score of: **40** Score

Response Alternative No. 1: OM-1: No Action

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Total Potential Contact Time **21,200**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **40**
Surface Cleanup: **20**
Subsurface Cleanup: **10**

Response Alternative No. 2: OM-2-: Land Use Controls

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Total Potential Contact Time **21,200**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **40**
Surface Cleanup: **20**
Subsurface Cleanup: **10**

Response Alternative No. 3: OM-3: Subsurface Clearance

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 4:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of:
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 5:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of:
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 6:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of:
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Amount of MEC Input Factor Categories

The following table is used to determine scores associated with the Amount of MEC:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Target Area	Areas at which munitions fire was directed	180	120	30
OB/OD Area	Sites where munitions were disposed of by open burn or open detonation methods. This category refers to the core activity area of an OB/OD area. See the "Safety Buffer Areas" category for safety fans and kick-outs.	180	110	30
Function Test Range	Areas where the serviceability of stored munitions or weapons systems are tested. Testing may include components, partial functioning or complete functioning of stockpile or developmental items.	165	90	25
Burial Pit	The location of a burial of large quantities of MEC items.	140	140	10
Maneuver Areas	Areas used for conducting military exercises in a simulated conflict area or war zone	115	15	5
Firing Points	The location from which a projectile, grenade, ground signal, rocket, guided missile, or other device is to be ignited, propelled, or released.	75	10	5
Safety Buffer Areas	Areas outside of target areas, test ranges, or OB/OD areas that were designed to act as a safety zone to contain munitions that do not hit targets or to contain kick-outs from OB/OD areas.	30	10	5
Storage	Any facility used for the storage of military munitions, such as earth-covered magazines, above-ground magazines, and open-air storage areas.	25	10	5
Explosive-Related Industrial Facility	Former munitions manufacturing or demilitarization sites and TNT production plants	20	10	5

Select the category that best describes the ***most hazardous*** amount of MEC: ***Score***

Safety Buffer Areas

Baseline Conditions: **30**
Surface Cleanup: **10**
Subsurface Cleanup: **5**

Minimum MEC Depth Relative to the Maximum Intrusive Depth Input Factor Categories

Current Use Activities

The shallowest minimum MEC depth, based on the 'Cased Munitions Information' Worksheet: **0** ft
The deepest intrusive depth: **0** ft

The table below is used to determine scores associated with the minimum MEC depth relative to the maximum intrusive depth:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240	150	95
Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	240	50	25
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth overlaps with minimum MEC depth.	150	N/A	95
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth does not overlap with minimum MEC depth.	50	N/A	25

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth will overlap after cleanup. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.' For 'Current Use Activities', only Baseline Conditions are considered.

240 ***Score***

Future Use Activities

Deepest intrusive depth: **2** ft

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth overlaps. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.'. For 'Future Use Activities', only Baseline Conditions are considered.

240 ***Score***

Response Alternative No. 1: OM-1: No Action

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **0** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Maximum Intrusive Depth **0** ft

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth overlaps. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.'

Score

Baseline Conditions: **240**
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 2: OM-2-: Land Use Controls

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **0** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Maximum Intrusive Depth **8** ft

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth overlaps. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.'

Score

Baseline Conditions: **240**
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 3: OM-3: Subsurface Clearance

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **3** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Maximum Intrusive Depth **0** ft

Because the shallowest minimum MEC depth is greater than the deepest intrusive depth, the intrusive depth does not overlap. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.'

Score

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup: **25**

Response Alternative No. 4:

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): 0 ft

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section

Maximum Intrusive Depth

Not enough information has been entered to calculate this input factor.

Score

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 5:

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): 0 ft

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Maximum Intrusive Depth 0

Not enough information has been entered to calculate this input factor

Score

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 6:

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): 0 ft

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Maximum Intrusive Depth 0

Not enough information has been entered to calculate this input factor.

Score

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Migration Potential Input Factor Categories

Is there any physical or historical evidence that indicates it is possible for natural physical forces in the area (e.g., frost heave, erosion) to expose subsurface MEC items, or move surface or subsurface MEC items? Yes

If "yes", describe the nature of natural forces. Indicate key areas of potential migration (e.g., overland water flow) on a map as appropriate (attach a map to the bottom of this sheet, or as a separate worksheet).

frost heave, erosion

The following table is used to determine scores associated with the migration potential:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Possible	30	30	10
Unlikely	10	10	10

Based on the question above, migration potential is 'Possible.'

	Score
Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**10**

Reference(s) for above information:

MEC Classification Input Factor Categories

Cased munitions information has been inputed into the 'Munitions, Bulk Explosive Info' Worksheet; therefore, bulk explosives donot comprise all MECs for this MRS.

The 'Amount of MEC' category is 'Safety Buffer Areas'. It cannot be automatically assumed that the MEC items from this category are DMM. Therefore, the conservative assumption is that the MEC items in this MRS are UXO.

Has a technical professional determined that MEC in the SBA area is DMM?

Are any of the munitions listed in the 'Munitions, Bulk Explosive Info' Worksheet: No

- Submunitions
- Rifle-propelled 40mm projectiles (often called 40mm grenades)
- Munitions with white phosphorus filler
- High explosive anti-tank (HEAT) rounds
- Hand grenades
- Fuzes
- Mortars

At least one item listed in the 'Munitions, Bulk Explosive Info' Worksheet was identified as fuzed'

The following table is used to determine scores associated with MEC classification categories:

UXO	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
UXO Special Case	180	180	180
UXO	110	110	110
Fuzed DMM Special Case	105	105	105
Fuzed DMM	55	55	55
Unfuzed DMM	45	45	45
Bulk Explosives	45	45	45

Based on your answers above, the MEC classification is 'UXO'.

	Score
Baseline Conditions:	**110**
Surface Cleanup:	**110**
Subsurface Cleanup:	**110**

MEC Size Input Factor Categories

The following table is used to determine scores associated with MEC Size:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Small	Any munitions (from the 'Munitions, Bulk Explosive Info' Worksheet) weigh less than 90 lbs; small enough for a receptor to be able to move and initiate a detonation	40	40	40
Large	All munitions weigh more than 90 lbs; too large to move without equipment	0	0	0

Based on the definitions above and the types of munitions at the site (see 'Munitions, Bulk Explosive Info' Worksheet), the MEC Size Input Factor is: Small

	Score
Baseline Conditions:	**40**
Surface Cleanup:	**40**
Subsurface Cleanup:	**40**

Scoring Summary

Site ID:	Oak Housing Perimeter Zone	a. Scoring Summary for Current Use Activities	
Date:	2/12/2013	Response Action Cleanup:	No Response Action
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		0	30
III. Site Accessibility		3	55
IV. Potential Contact Hours		<10,000 receptor-hrs/yr	15
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Possible	30
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**650**
		Hazard Level Category	**3**

Site ID:	Oak Housing Perimeter Zone	b. Scoring Summary for Future Use Activities	
Date:	2/12/2013	Response Action Cleanup:	No Response Action
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		10,000 to 99,999 receptor-hrs/yr	40
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Possible	30
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**700**
		Hazard Level Category	**3**

Site ID:	Oak Housing Perimeter Zone	c. Scoring Summary for Response Alternative 1: OM-1: No Action	
Date:	2/12/2013	Response Action Cleanup:	No MEC cleanup
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		10,000 to 99,999 receptor-hrs/yr	40
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Possible	30
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**700**
		Hazard Level Category	**3**

Site ID:	Oak Housing Perimeter Zone	d. Scoring Summary for Response Alternative 2: OM-2: Land Use Controls	
Date:	2/12/2013	Response Action Cleanup:	No MEC cleanup
Input Factor		**Input Factor Category**	**Score**
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Moderate Accessibility	55
IV. Potential Contact Hours		10,000 to 99,999 receptor-hrs/yr	40
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Possible	30
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**675**
		Hazard Level Category	**3**

Site ID:	Oak Housing Perimeter Zone	e. Scoring Summary for Response Alternative 3: OM-3: Subsurface Clearance	
Date:	2/12/2013	Response Action Cleanup:	cleanup of MECs located both on the surface and subsurface
Input Factor		**Input Factor Category**	**Score**
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours			
V. Amount of MEC		Safety Buffer Areas	5
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	25
VII. Migration Potential		Possible	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**400**
		Hazard Level Category	**4**

MEC HA Hazard Level Determination			
Site ID:	**Oak Housing Perimeter Zone**		
Date:	**2/12/2013**		
		Hazard Level Category	**Score**
a. Current Use Activities		**3**	**650**
b. Future Use Activities		**3**	**700**
c. Response Alternative 1: OM-1: No Action		**3**	**700**
d. Response Alternative 2: OM-2-: Land Use Controls		**3**	**675**
e. Response Alternative 3: OM-3: Subsurface Clearance		**4**	**400**
f. Response Alternative 4:			
g. Response Alternative 5:			
h. Response Alternative 6:			
Characteristics of the MRS			
Is critical infrastructure located within the MRS or within the ESQD arc?		Yes	
Are cultural resources located within the MRS or within the ESQD arc?		No	
Are significant ecological resources located within the MRS or within the ESQD arc?		No	

A.2

Munitions Response Site 2 Oak Housing Area

MEC HA Summary Information

Site ID: Oak Housing
Date: 2/13/2012

Please identify the single specific area to be assessed in this hazard assessment. From this point forward, all references to "site" or "MRS" refer to the specific area that you have defined.

A. Enter a unique identifier for the site:

Sub-Area 2

Provide a list of information sources used for this hazard assessment. As you are completing the worksheets, use the "Select Ref(s)" buttons at the ends of each subsection to select the applicable information sources from the list below.

Ref. No.	Title (include version, publication date)
1	ASR 1994
2	PA/SI 2004
3	Removal 2007
4	RI 2012
5	FFS 2013
6	
7	
8	
9	
10	
11	
12	

B. Briefly describe the site:

1. Area (include units): 10 acres
2. Past munitions-related use:

Safety Buffer Areas

3. Current land-use activities (list all that occur):

Hiking

4. Are changes to the future land-use planned? Yes
5. What is the basis for the site boundaries?

Topography and prior land-use/disturbances

6. How certain are the site boundaries?

Certain

Reference(s) for Part B:

PA/SI 2004

C. Historical Clearances

1. Have there been any historical clearances at the site? Yes, subsurface clearance
2. If a clearance occurred:
   a. What year was the clearance performed? 1995

   b. Provide a description of the clearance activity (e.g., extent, depth, amount of munitions-related items removed, types and sizes of removed items, and whether metal detectors were used):

Since previous removal actions that were completed only over a portion of the Oak Sub-area, the reduction in risk is is not currently accounted for in the MEC HA scoring. Instead, the MEC HA scoring overestimates the explosive risk, since it assumes no surface or subsurface MEC clearance has occurred.

Reference(s) for Part C:

RI 2012

D. Attach maps of the site below (select 'Insert/Picture' on the menu bar.)

Comments

Site ID: **Oak Housing**
Date: **2/13/2012**

Cased Munitions Information

Item No.	Munition Type (e.g., mortar, projectile, etc.)	Munition Size	Munition Size Units	Mark/ Model	Energetic Material Type	Is Munition Fuzed?	Fuzing Type	Fuze Condition	Minimum Depth for Munition (ft)	Location of Munitions	Comments (Include rationale for munitions that are "subsurface only")
1	Artillery	37	mm	unkown	High Explosive	Yes	Impact	UNK	0	Surface and Subsurface	
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Reference(s) for table above:

[redacted]

Bulk Explosive Information

Item No.	Explosive Type	Comments
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Reference(s) for table above:

RI 2012

[redacted]

Site ID: **Oak Housing**
Date: **2/13/2012**

Activities Currently Occurring at the Site

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Hiking	20	416	**8,320**	0	2 hrs/day, 260 days/yr (estimated)
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr):			**8,320**		
	Maximum intrusive depth at site (ft):				**0**	

Reference(s) for table above:

[redacted]

Activities Planned for the Future at the Site (If any are planned: see 'Summary Info' Worksheet, Question 4)

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Commercial/light industustrial use	200	2,080	**416,000**	0	10 hours/day x 100 days/person (estimated)
2	Landscaping/maintenance	10	40	**400**	2	(estimated)
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr):			**416,400**		
	Maximum intrusive depth at site (ft):				**2**	

Reference(s) for table above:

[redacted]

Site ID: **Oak Housing**
Date: **2/13/2012**

Planned Remedial or Removal Actions

Response Action No.	Response Action Description	Expected Resulting Minimum MEC Depth (ft)	Expected Resulting Site Accessibility	Will land use activities change if this response action is implemented?	What is the expected scope of cleanup?	Comments
1	OM-1: No Action	0	Full Accessibility	No	No MEC cleanup	Land Use Commercial/Industrial
2	OM-2: LUCs	0	Moderate Accessibility	No	No MEC cleanup	Land Use Commercial/Industrial
3	OM-3: Subsurface Clearance	3	Full Accessibility	Yes	cleanup of MECs located both on the surface and subsurface	Land Use Recreational (due to capping)
4						
5						
6						

For those alternatives where you answered 'No' in Column E, are land-use activities to be assessed against current or future land uses? Future

Reference(s) for table above:

FFS 2013

[redacted]

Site ID: **Oak Housing**
Date: **2/13/2012**

This worksheet needs to be completed for each remedial/removal action alternative listed in the 'Remedial-Removal Action' worksheet that will cause a change in land use.

Land Use Activities Planned After Response Alternative #1: OM-1: No Action

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr):
Maximum intrusive depth at site (ft):

Reference(s) for table above:

[redacted]

Land Use Activities Planned After Response Alternative #2: OM-2: LUCs

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr):
Maximum intrusive depth at site (ft):

Reference(s) for table above:

[redacted]

Land Use Activities Planned After Response Alternative #3: OM-3: Subsurface Clearance

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Hiking	20	416	**8,320**	0	2 hrs/day, 260 days/yr (estimated)
2	Landscaping/maintenance	10	40	**400**	0	Maintenance of cap vegetation
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Total Potential Contact Time (receptor hrs/yr): **8,720**
Maximum intrusive depth at site (ft): **0**

Reference(s) for table above:

[redacted]

Site ID: **Oak Housing**
Date: **2/13/2012**

Energetic Material Type Input Factor Categories

The following table is used to determine scores associated with the energetic materials. Materials are listed in order from most hazardous to least hazardous.

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
High Explosive and Low Explosive Filler in Fragmenting Rounds	100	100	100
White Phosphorus	70	70	70
Pyrotechnic	60	60	60
Propellant	50	50	50
Spotting Charge	40	40	40
Incendiary	30	30	30

The most hazardous type of energetic material listed in the 'Munitions, Bulk Explosive Info' Worksheet falls under the category 'High Explosive and Low Explosive Filler in Fragmenting Rounds'. ***Score***

Baseline Conditions:	**100**
Surface Cleanup:	**100**
Subsurface Cleanup:	**100**

Location of Additional Human Receptors Input Factor Categories

1. What is the Explosive Safety Quantity Distance (ESQD) from the Explosive Siting Plan or the Explosive Safety Submission for the MRS? 1346 feet

2. Are there currently any features or facilities where people may congregate within the MRS, or within the ESQD arc? Yes

3. Please describe the facility or feature.
Transformer Station, Roads

MEC Item(s) used to calculate the ESQD for current use activities

Item #1. Artillery (37mm, High Explosive)

The following table is used to determine scores associated with the location of additional human receptors (current use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

4. Current use activities are 'Inside the MRS or inside the ESQD arc', based on Question 2.' ***Score***

Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**30**

5. Are there future plans to locate or construct features or facilities where people may congregate within the MRS, or within the ESQD arc? Yes

6. Please describe the facility or feature.
commercial or light industrial buildings

MEC Item(s) used to calculate the ESQD for future use activities

Item #1. Artillery (37mm, High Explosive)

The following table is used to determine scores associated with the location of additional human receptors (future use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

7. Future use activities are 'Inside the MRS or inside the ESQD arc', based on Question 5.' ***Score***

Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**30**

Comments

Site Accessibility Input Factor Categories

The following table is used to determine scores associated with site accessibility:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Full Accessibility	No barriers to entry, including signage but no fencing	80	80	80
Moderate Accessibility	Some barriers to entry, such as barbed wire fencing or rough terrain	55	55	55
Limited Accessibility	Significant barriers to entry, such as unguarded chain link fence or requirements for special transportation to reach the site	15	15	15
Very Limited Accessibility	A site with guarded chain link fence or terrain that requires special equipment and skills (e.g., rock climbing) to access	5	5	5

Current Use Activities — ***Score***

Select the category that best describes the site accessibility under the current use scenario:

`Full Accessibility`

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Future Use Activities

Select the category that best describes the site accessibility under the future use scenario:

`Full Accessibility`

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Reference(s) for above information:

Response Alternative No. 1: OM-1: No Action

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Response Alternative No. 2: OM-2: LUCs

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Moderate Accessibility'.

Baseline Conditions: **55**
Surface Cleanup: **55**
Subsurface Cleanup: **55**

Response Alternative No. 3: OM-3: Subsurface Clearance

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Response Alternative No. 4:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 5:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 6:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Potential Contact Hours Input Factor Categories

The following table is used to determine scores associated with the total potential contact time:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Many Hours	≥1,000,000 receptor-hrs/yr	120	90	30
Some Hours	100,000 to 999,999 receptor hrs/yr	70	50	20
Few Hours	10,000 to 99,999 receptor-hrs/yr	40	20	10
Very Few Hours	<10,000 receptor-hrs/yr	15	10	5

***Current Use Activities*:**

Input factors are only determined for baseline conditions for current use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: **8,320** receptor hrs/yr
Based on the table above, this corresponds to a input factor score for baseline conditions of: **15** Score

***Future Use Activities*:**

Input factors are only determined for baseline conditions for future use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: **416,400** receptor hrs/yr
Based on the table above, this corresponds to a input factor score of: **70** Score

Response Alternative No. 1: OM-1: No Action

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.
Total Potential Contact Time based on the contact time listed for future use activities (see 'Current and Future Activities' Worksheet) **416,400**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **70**
Surface Cleanup: **50**
Subsurface Cleanup: **20**

Response Alternative No. 2: OM-2: LUCs

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.
Total Potential Contact Time based on the contact time listed for future use activities (see 'Current and Future Activities' Worksheet) **416,400**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **70**
Surface Cleanup: **50**
Subsurface Cleanup: **20**

Response Alternative No. 3: OM-3: Subsurface Clearance

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will change if this alternative is implemented.
Total Potential Contact Time, based on the contact time listed for this alternative (see 'Post-Response Land Use' Worksheet) **8,720**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **70**
Surface Cleanup: **50**
Subsurface Cleanup: **20**

Response Alternative No. 4:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of: Score:
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 5:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of: Score:
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 6:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of: Score:
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Amount of MEC Input Factor Categories

The following table is used to determine scores associated with the Amount of MEC:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Target Area	Areas at which munitions fire was directed	180	120	30
OB/OD Area	Sites where munitions were disposed of by open burn or open detonation methods. This category refers to the core activity area of an OB/OD area. See the "Safety Buffer Areas" category for safety fans and kick-outs.	180	110	30
Function Test Range	Areas where the serviceability of stored munitions or weapons systems are tested. Testing may include components, partial functioning or complete functioning of stockpile or developmental items.	165	90	25
Burial Pit	The location of a burial of large quantities of MEC items.	140	140	10
Maneuver Areas	Areas used for conducting military exercises in a simulated conflict area or war zone	115	15	5
Firing Points	The location from which a projectile, grenade, ground signal, rocket, guided missile, or other device is to be ignited, propelled, or released.	75	10	5
Safety Buffer Areas	Areas outside of target areas, test ranges, or OB/OD areas that were designed to act as a safety zone to contain munitions that do not hit targets or to contain kick-outs from OB/OD areas.	30	10	5
Storage	Any facility used for the storage of military munitions, such as earth-covered magazines, above-ground magazines, and open-air storage areas.	25	10	5
Explosive-Related Industrial Facility	Former munitions manufacturing or demilitarization sites and TNT production plants	20	10	5

Select the category that best describes the ***most hazardous*** amount of MEC: ***Score***

Safety Buffer Areas

Baseline Conditions:	**30**
Surface Cleanup:	**10**
Subsurface Cleanup:	**5**

Minimum MEC Depth Relative to the Maximum Intrusive Depth Input Factor Categories

Current Use Activities

The shallowest minimum MEC depth, based on the 'Cased Munitions Information' Worksheet:	**0.5** ft
The deepest intrusive depth:	**0** ft

The table below is used to determine scores associated with the minimum MEC depth relative to the maximum intrusive depth:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240	150	95
Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	240	50	25
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth overlaps with minimum MEC depth.	150	N/A	95
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth does not overlap with minimum MEC depth.	50	N/A	25

Because the shallowest minimum MEC depth is greater than the deepest intrusive depth, the intrusive depth will not overlap after cleanup. MECs are located only subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth does not overlap with minimum MEC depth.' For 'Current Use Activities', only Baseline Conditions are considered. **240** ***Score***

Future Use Activities

Deepest Intrusive depth: **2** ft

Because the shallowest minimum MEC depth is greater than the deepest intrusive depth, the intrusive depth will not overlap after cleanup. MECs are located only subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth overlaps with minimum MEC depth.' For 'Current Use Activities', only Baseline Conditions are considered. **240** ***Score***

Response Alternative No. 1: OM-1: No Action

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **0** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for future use activities (see 'Current and Future Activities' Worksheet) **2** ft

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth overlaps. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.'

	Score
Baseline Conditions:	**240**
Surface Cleanup:	
Subsurface Cleanup:	

Response Alternative No. 2: OM-2: LUCs

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **0** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for future use activities (see 'Current and Future Activities' Worksheet) **2** ft

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth overlaps. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.'

	Score
Baseline Conditions:	**240**
Surface Cleanup:	
Subsurface Cleanup:	

Response Alternative No. 3: OM-3: Subsurface Clearance

Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **3** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for this alternative (see 'Post-Response Land Use' Worksheet) **0** ft

Because the shallowest minimum MEC depth is greater than the deepest intrusive depth, the intrusive depth does not overlap. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.'

	Score
Baseline Conditions:	
Surface Cleanup:	
Subsurface Cleanup:	**25**

Response Alternative No. 4:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Maximum Intrusive Depth

Not enough information has been entered to calculate this input factor.

Response Alternative No. 5:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Maximum Intrusive Depth

Not enough information has been entered to calculate this input factor.

Response Alternative No. 6:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Maximum Intrusive Depth

Not enough information has been entered to calculate this input factor.

Migration Potential Input Factor Categories

Is there any physical or historical evidence that indicates it is possible for natural physical forces in the area (e.g., frost heave, erosion) to expose subsurface MEC items, or move surface or subsurface MEC items? No

If 'Yes', describe the nature of natural forces. Indicate key areas of potential migration (e.g., overland water flow) on a map as appropriate (attach a map to the bottom of this sheet, or as a separate worksheet).

The following table is used to determine scores associated with the migration potential:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Possible	30	30	10
Unlikely	10	10	10

Based on the question above, migration potential is 'Unlikely.'

	Score
Baseline Conditions:	**10**
Surface Cleanup:	**10**
Subsurface Cleanup:	**10**

Reference(s) for above information:

MEC Classification Input Factor Categories

Cased munitions information has been inputed into the 'Munitions, Bulk Explosive Info' Worksheet; therefore, bulk explosives do not comprise all MECs for this MRS.

The 'Amount of MEC' category is 'Safety Buffer Areas'. It cannot be automatically assumed that the MEC items from this category are DMM. Therefore, the conservative assumption is that the MEC items in this MRS are UXO.

Use of technical judgment shows that MEC in the OB/OD Area is DMM? No

Are any of the munitions listed in the 'Munitions, Bulk Explosive Info' Worksheet:

- Submunitions
- Rifle-propelled 40mm projectiles (often called 40mm grenades)
- Munitions with white phosphorus filler
- High explosive anti-tank (HEAT) rounds
- Hand grenades
- Fuzes
- Mortars

At least one item listed in the 'Munitions, Bulk Explosive Info' Worksheet was identified as 'fuzed'

The following table is used to determine scores associated with MEC classification categories:

UXO	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
UXO Special Case	180	180	180
UXO	110	110	110
Fuzed DMM Special Case	105	105	105
Fuzed DMM	55	55	55
Unfuzed DMM	45	45	45
Bulk Explosives	45	45	45

Based on your answers above, the MEC classification is 'UXO'.

	Score
Baseline Conditions:	**110**
Surface Cleanup:	**110**
Subsurface Cleanup:	**110**

MEC Size Input Factor Categories

The following table is used to determine scores associated with MEC Size:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Small	Any munitions (from the 'Munitions, Bulk Explosive Info' Worksheet) weigh less than 90 lbs; small enough for a receptor to be able to move and initiate a detonation	40	40	40
Large	All munitions weigh more than 90 lbs; too large to move without equipment	0	0	0

Based on the definitions above and the types of munitions at the site (see 'Munitions, Bulk Explosive Info' Worksheet), the MEC Size Input Factor is: Small

	Score
Baseline Conditions:	**40**
Surface Cleanup:	**40**
Subsurface Cleanup:	**40**

Scoring Summary

Site ID:	Oak Housing	a. Scoring Summary for Current Use Activities	
Date:	2/13/2012	Response Action Cleanup:	No Response Action
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		<10,000 receptor-hrs/yr	15
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	240
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	655
		Hazard Level Category	3

Site ID:	Oak Housing	b. Scoring Summary for Future Use Activities	
Date:	2/13/2012	Response Action Cleanup:	No Response Action
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		100,000 to 999,999 receptor hrs/yr	70
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	710
		Hazard Level Category	3

Site ID:	Oak Housing	c. Scoring Summary for Response Alternative 1: OM-1: No Action	
Date:	2/13/2012	Response Action Cleanup:	No MEC cleanup
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		100,000 to 999,999 receptor hrs/yr	70
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	710
		Hazard Level Category	3

Site ID:	Oak Housing	d. Scoring Summary for Response Alternative 2: OM-2: LUCs	
Date:	2/13/2012	Response Action Cleanup:	No MEC cleanup
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Moderate Accessibility	55
IV. Potential Contact Hours		100,000 to 999,999 receptor hrs/yr	70
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	685
		Hazard Level Category	3

Site ID:	Oak Housing	e. Scoring Summary for Response Alternative 3: OM-3: Subsurface Clearance	
Date:	2/13/2012	Response Action Cleanup:	cleanup of MECs located both on the surface and subsurface
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		100,000 to 999,999 receptor hrs/yr	20
V. Amount of MEC		Safety Buffer Areas	5
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	25
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	420
		Hazard Level Category	4

MEC HA Hazard Level Determination			
Site ID:	Oak Housing		
Date:	2/13/2012		
		Hazard Level Category	Score
a. Current Use Activities		3	655
b. Future Use Activities		3	710
c. Response Alternative 1: OM-1: No Action		3	710
d. Response Alternative 2: OM-2: LUCs		3	685
e. Response Alternative 3: OM-3: Subsurface Clearance		4	420
f. Response Alternative 4:			
g. Response Alternative 5:			
h. Response Alternative 6:			

Characteristics of the MRS	
Is critical infrastructure located within the MRS or within the ESQD arc?	Yes
Are cultural resources located within the MRS or within the ESQD arc?	No
Are significant ecological resources located within the MRS or within the ESQD arc?	No

A.3

Munitions Response Site 3 Maple Housing Area

MEC HA Summary Information

Site ID: Maple Housing
Date: 2/13/2012

Please identify the single specific area to be assessed in this hazard assessment. From this point forward, all references to "site" or "MRS" refer to the specific area that you have defined.

A. Enter a unique identifier for the site:

Sub-Area 3

Provide a list of information sources used for this hazard assessment. As you are completing the worksheets, use the "Select Ref(s)" buttons at the ends of each subsection to select the applicable information sources from the list below.

Ref. No.	Title (include version, publication date)
1	ASR 1994
2	PA/SI 2004
3	Removal 2007
4	RI 2012
5	FFS 2013
6	
7	
8	
9	
10	
11	
12	

B. Briefly describe the site:

1. Area (include units): 10 acres
2. Past munitions-related use:

Safety Buffer Areas

3. Current land-use activities (list all that occur):

Hiking

4. Are changes to the future land-use planned? Yes
5. What is the basis for the site boundaries?

Topography and prior land-use/disturbances

6. How certain are the site boundaries?

Certain

Reference(s) for Part B:

[redacted]

PA/SI 2004

C. Historical Clearances

1. Have there been any historical clearances at the site? No, none
2. If a clearance occurred:
   a. What year was the clearance performed?
   b. Provide a description of the clearance activity (e.g., extent, depth, amount of munitions-related items removed, types and sizes of removed items, and whether metal detectors were used):

Reference(s) for Part C:

[redacted]

D. Attach maps of the site below (select 'Insert/Picture' on the menu bar.)

Comments

Site ID: **Maple Housing**
Date: **2/13/2012**

Cased Munitions Information

Item No.	Munition Type (e.g., mortar, projectile, etc.)	Munition Size	Munition Size Units	Mark/ Model	Energetic Material Type	Is Munition Fuzed?	Fuzing Type	Fuze Condition	Minimum Depth for Munition (ft)	Location of Munitions	Comments (include rationale for munitions that are "subsurface only")
1	Artillery	37	mm	unkown	High Explosive	Yes	Impact	UNK	0	Surface and Subsurface	
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Reference(s) for table above:

[redacted]

Bulk Explosive Information

Item No.	Explosive Type	Comments
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Reference(s) for table above:

[redacted]

Site ID: **Maple Housing**
Date: **2/13/2012**

Activities Currently Occurring at the Site

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Hiking	20	416	**8,320**	0	2 hrs/day, 260 days/yr (estimated)
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr):			**8,320**		
	Maximum intrusive depth at site (ft):				**0**	

Reference(s) for table above:

[redacted]

Activities Planned for the Future at the Site (If any are planned: see 'Summary Info' Worksheet, Question 4)

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours per year a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1	Commercial/light industrial use	200	2,080	**416,000**	0	10 hours/day x 100 days/person (estimated)
2	Landscaping/maintenance	10	40	**400**	2	(estimated)
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hrs/yr):			**416,400**		
	Maximum intrusive depth at site (ft):				**2**	

Reference(s) for table above:

[redacted]

Site ID: **Maple Housing**
Date: **2/13/2012**

Planned Remedial or Removal Actions

Response Action No.	Response Action Description	Expected Resulting Minimum MEC Depth (ft)	Expected Resulting Site Accessibility	Will land use activities change if this response action is implemented?	What is the expected scope of cleanup?	Comments
1	CM-1: No Action	0	Full Accessibility	No	No MEC cleanup	Land Use Commercial/Industrial
2	CM-2: LUCs	0	Full Accessibility	No	No MEC cleanup	Land Use Commercial/Industrial
3	CM-3: Subsurface Clearance	3	Full Accessibility	No	cleanup of MECs located both on the surface and subsurface	Land Use Recreational (due to capping)
4						
5						
6						

For those alternatives where you answered 'No' in Column E, are land-use activities to be assessed against current or future land uses? Future

Reference(s) for table above:

FFS 2013

[redacted]

Site ID: **Maple Housing**
Date: **2/13/2012**

This worksheet needs to be completed for each remedial/removal action alternative listed in the 'Remedial-Removal Action' worksheet that will cause a change in land use.

Land Use Activities Planned After Response Alternative #1: OM-1: No Action

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hr/yr):					
	Maximum intrusive depth at site (ft):					

Reference(s) for table above:

[redacted]

Land Use Activities Planned After Response Alternative #2: OM-2: LUCs

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hr/yr):					
	Maximum intrusive depth at site (ft):					

Reference(s) for table above:

[redacted]

Land Use Activities Planned After Response Alternative #3: OM-3: Subsurface Clearance

Activity No.	Activity	Number of people per year who participate in the activity	Number of hours a single person spends on the activity	Potential Contact Time (receptor hours/year)	Maximum intrusive depth (ft)	Comments
1				8,320		
2				400		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
	Total Potential Contact Time (receptor hr/yr):			8,720		
	Maximum intrusive depth at site (ft):				0	

Reference(s) for table above:

[redacted]

Site ID: **Maple Housing**
Date: **2/13/2012**

Energetic Material Type Input Factor Categories

The following table is used to determine scores associated with the energetic materials. Materials are listed in order from most hazardous to least hazardous.

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
High Explosive and Low Explosive Filler in Fragmenting Rounds	100	100	100
White Phosphorus	70	70	70
Pyrotechnic	60	60	60
Propellant	50	50	50
Spotting Charge	40	40	40
Incendiary	30	30	30

The most hazardous type of energetic material listed in the 'Munitions, Bulk Explosive Info' Worksheet falls under the category 'High Explosive and Low Explosive Filler in Fragmenting Rounds'.

	Score
Baseline Conditions:	**100**
Surface Cleanup:	**100**
Subsurface Cleanup:	**100**

Location of Additional Human Receptors Input Factor Categories

1. What is the Explosive Safety Quantity Distance (ESQD) from the Explosive Siting Plan or the Explosive Safety Submission for the MRS? 1346 feet
2. Are there currently any features or facilities where people may congregate within the MRS, or within the ESQD arc? Yes
3. Please describe the facility or feature.

Transformer Station, Roads

MEC Item(s) used to calculate the ESQD for current use activities

Item #1. Artillery (37mm, High Explosive)

The following table is used to determine scores associated with the location of additional human receptors (current use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

4. Current use activities are 'Inside the MRS or inside the ESQD arc', based on Question 2.'

	Score
Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**30**

5. Are there future plans to locate or construct features or facilities where people may congregate within the MRS, or within the ESQD arc? Yes
6. Please describe the facility or feature.

commercial or lgiht industrial buildings

MEC Item(s) used to calculate the ESQD for future use activities

Item #1. Artillery (37mm, High Explosive)

The following table is used to determine scores associated with the location of additional human receptors (future use activities):

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Inside the MRS or inside the ESQD arc	30	30	30
Outside of the ESQD arc	0	0	0

7. Future use activities are 'Inside the MRS or inside the ESQD arc', based on Question 5.'

	Score
Baseline Conditions:	**30**
Surface Cleanup:	**30**
Subsurface Cleanup:	**30**

Comments

Site Accessibility Input Factor Categories

The following table is used to determine scores associated with site accessibility:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Full Accessibility	No barriers to entry, including signage but no fencing	80	80	80
Moderate Accessibility	Some barriers to entry, such as barbed wire fencing or rough terrain	55	55	55
Limited Accessibility	Significant barriers to entry, such as unguarded chain link fence or requirements for special transportation to reach the site	15	15	15
Very Limited Accessibility	A site with guarded chain link fence or terrain that requires special equipment and skills (e.g., rock climbing) to access	5	5	5

Current Use Activities ***Score***

Select the category that best describes the site accessibility under the current use scenario:

`Full Accessibility`

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Future Use Activities

Select the category that best describes the site accessibility under the future use scenario:

`Full Accessibility`

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Reference(s) for above information:

[redacted]

Response Alternative No. 1: OM-1: No Action

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Response Alternative No. 2: OM-2: LUCs

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Response Alternative No. 3: OM-3: Subsurface Clearance

Based on the 'Planned Remedial or Removal Actions' Worksheet, this alternative will lead to 'Full Accessibility'.

Baseline Conditions: **80**
Surface Cleanup: **80**
Subsurface Cleanup: **80**

Response Alternative No. 4:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 5:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 6:

Please enter site accessibility information in the 'Planned Remedial or Removal Actions' Worksheet to continue.

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Potential Contact Hours Input Factor Categories

The following table is used to determine scores associated with the total potential contact time:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Many Hours	≥1,000,000 receptor-hrs/yr	120	90	30
Some Hours	100,000 to 999,999 receptor hrs/yr	70	50	20
Few Hours	10,000 to 99,999 receptor-hrs/yr	40	20	10
Very Few Hours	<10,000 receptor-hrs/yr	15	10	5

Current Use Activities:

Input factors are only determined for baseline conditions for current use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: **6,320** receptor hrs/yr
Based on the table above, this corresponds to a input factor score for baseline conditions of: **15** Score

Future Use Activities:

Input factors are only determined for baseline conditions for future use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is: **416,400** receptor hrs/yr
Based on the table above, this corresponds to a input factor score of: **70** Score

Response Alternative No. 1: OM-1: No Action

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.
Total Potential Contact Time based on the contact time listed for future use activities (see 'Current and Future Activities' Worksheet) **416,400**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **70**
Surface Cleanup: **50**
Subsurface Cleanup: **20**

Response Alternative No. 2: OM-2: LUCs

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.
Total Potential Contact Time based on the contact time listed for future use activities (see 'Current and Future Activities' Worksheet) **416,400**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **70**
Surface Cleanup: **50**
Subsurface Cleanup: **20**

Response Alternative No. 3: OM-3: Subsurface Clearance

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.
Total Potential Contact Time based on the contact time listed for future use activities (see 'Current and Future Activities' Worksheet) **416,400**
Based on the table above, this corresponds to input factor scores of: ***Score***
Baseline Conditions: **70**
Surface Cleanup: **50**
Subsurface Cleanup: **20**

Response Alternative No. 4:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of: Score:
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 5:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of: Score
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 6:

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Total Potential Contact Time
Based on the table above, this corresponds to input factor scores of: Score
Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Amount of MEC Input Factor Categories

The following table is used to determine scores associated with the Amount of MEC:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Target Area	Areas at which munitions fire was directed	180	120	30
OB/OD Area	Sites where munitions were disposed of by open burn or open detonation methods. This category refers to the core activity area of an OB/OD area. See the "Safety Buffer Areas" category for safety fans and kick-outs.	180	110	30
Function Test Range	Areas where the serviceability of stored munitions or weapons systems are tested. Testing may include components, partial functioning or complete functioning of stockpile or developmental items.	165	90	25
Burial Pit	The location of a burial of large quantities of MEC items.	140	140	10
Maneuver Areas	Areas used for conducting military exercises in a simulated conflict area or war zone	115	15	5
Firing Points	The location from which a projectile, grenade, ground signal, rocket, guided missile, or other device is to be ignited, propelled, or released.	75	10	5
Safety Buffer Areas	Areas outside of target areas, test ranges, or OB/OD areas that were designed to act as a safety zone to contain munitions that do not hit targets or to contain kick-outs from OB/OD areas.	30	10	5
Storage	Any facility used for the storage of military munitions, such as earth-covered magazines, above-ground magazines, and open-air storage areas.	25	10	5
Explosive-Related Industrial Facility	Former munitions manufacturing or demilitarization sites and TNT production plants	20	10	5

Select the category that best describes the ***most hazardous*** amount of MEC: ***Score***

Safety Buffer Areas

Baseline Conditions: **30**
Surface Cleanup: **10**
Subsurface Cleanup: **5**

Minimum MEC Depth Relative to the Maximum Intrusive Depth Input Factor Categories

Current Use Activities

The shallowest minimum MEC depth, based on the 'Cased Munitions Information' Worksheet: **0** ft
The deepest intrusive depth: **0** ft

The table below is used to determine scores associated with the minimum MEC depth relative to the maximum intrusive depth:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240	150	95
Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	240	50	25
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth overlaps with minimum MEC depth.	150	N/A	95
Baseline Condition: MEC located only subsurface. Baseline Condition or After Cleanup: Intrusive depth does not overlap with minimum MEC depth.	50	N/A	25

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth will overlap after cleanup. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.' For 'Current Use Activities', only Baseline Conditions are considered.

240 ***Score***

Future Use Activities
Deepest intrusive depth: **2** ft

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth overlaps. MECs are located at both the surface and subsurface, based on the 'Munitions, Bulk Explosive Info' Worksheet. Therefore, the category for this input factor is 'Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.'. For 'Future Use Activities', only Baseline Conditions are considered. **240** ***Score***

Response Alternative No. 1: OM-1: No Action
Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **0** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for future use activities (see 'Current and Future Activities' Worksheet) **2** ft

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth overlaps. MECs are located at both the surface and subsurface,

Score

Baseline Conditions: **240**
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 2: OM-2: LUCs
Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **0** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for future use activities (see 'Current and Future Activities' Worksheet) **2** ft

Because the shallowest minimum MEC depth is less than or equal to the deepest intrusive depth, the intrusive depth overlaps. MECs are located at both the surface and subsurface,

Score

Baseline Conditions: **240**
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 3: OM-3: Subsurface Clearance
Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet): **3** ft

Based on the 'Planned Remedial or Removal Actions' Worksheet, land use activities will not change if this alternative is implemented.

Maximum Intrusive Depth, based on the maximum intrusive depth listed for future use activities (see 'Current and Future Activities' Worksheet) **2** ft

Because the shallowest minimum MEC depth is greater than the deepest intrusive depth, the intrusive depth does not overlap. MECs are located at both the surface and

Score

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup: **25**

Response Alternative No. 4:
Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet):

Not enough information has been entered in the 'Planned Remedial or Removal Actions Worksheet. Please complete the table before returning to this section.

Maximum Intrusive Depth

Not enough information has been entered to calculate this input factor.

Score

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 5:
Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet):

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Maximum Intrusive Depth

Not enough information has been entered to calculate this input factor.

Score

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Response Alternative No. 6:
Expected minimum MEC depth (from the 'Planned Remedial or Removal Actions' Worksheet):

Not enough information has been entered in the 'Planned Remedial or Removal Actions' Worksheet. Please complete the table before returning to this section.

Maximum Intrusive Depth

Not enough information has been entered to calculate this input factor.

Score

Baseline Conditions:
Surface Cleanup:
Subsurface Cleanup:

Migration Potential Input Factor Categories

Is there any physical or historical evidence that indicates it is possible for natural physical forces in the area (e.g., frost heave, erosion) to expose subsurface MEC items, or move surface or subsurface MEC items? No

If "yes", describe the nature of natural forces. Indicate key areas of potential migration (e.g., overland water flow) on a map as appropriate (attach a map to the bottom of this sheet, or as a separate worksheet).

The following table is used to determine scores associated with the migration potential:

	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Possible	30	30	10
Unlikely	10	10	10

Based on the question above, migration potential is 'Unlikely.'

	Score
Baseline Conditions:	**10**
Surface Cleanup:	**10**
Subsurface Cleanup:	**10**

Reference(s) for above information:

MEC Classification Input Factor Categories

Cased munitions information has been inputed into the 'Munitions, Bulk Explosive Info' Worksheet; therefore, bulk explosives do not comprise all MECs for this MRS.

The 'Amount of MEC' category is 'Safety Buffer Areas'. It cannot be automatically assumed that the MEC items from this category are DMM. Therefore, the conservative assumption is that the MEC items in this MRS are UXO.

Has a technical assessment shown that MEC in the OB/OD Area is DMM? No

Are any of the munitions listed in the 'Munitions, Bulk Explosive Info' Worksheet:

- Submunitions
- Rifle-propelled 40mm projectiles (often called 40mm grenades)
- Munitions with white phosphorus filler
- High explosive anti-tank (HEAT) rounds
- Hand grenades
- Fuzes
- Mortars

At least one item listed in the 'Munitions, Bulk Explosive Info' Worksheet was identified as 'fuzed'

The following table is used to determine scores associated with MEC classification categories:

UXO	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
UXO Special Case	180	180	180
UXO	110	110	110
Fuzed DMM Special Case	105	105	105
Fuzed DMM	55	55	55
Unfuzed DMM	45	45	45
Bulk Explosives	45	45	45

Based on your answers above, the MEC classification is 'UXO'.

	Score
Baseline Conditions:	**110**
Surface Cleanup:	**110**
Subsurface Cleanup:	**110**

MEC Size Input Factor Categories

The following table is used to determine scores associated with MEC Size:

	Description	Baseline Conditions	Surface Cleanup	Subsurface Cleanup
Small	Any munitions (from the 'Munitions, Bulk Explosive Info' Worksheet) weigh less than 90 lbs; small enough for a receptor to be able to move and initiate a detonation	40	40	40
Large	All munitions weigh more than 90 lbs; too large to move without equipment	0	0	0

Based on the definitions above and the types of munitions at the site (see 'Munitions, Bulk Explosive Info' Worksheet), the MEC Size Input Factor is: Small

	Score
Baseline Conditions:	**40**
Surface Cleanup:	**40**
Subsurface Cleanup:	**40**

Scoring Summary

Site ID:	Maple Housing	a. Scoring Summary for Current Use Activities	
Date:	2/13/2012	Response Action Cleanup:	No Response Action
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		<10,000 receptor-hrs/yr	15
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**655**
		Hazard Level Category	**3**

Site ID:	Maple Housing	b. Scoring Summary for Future Use Activities	
Date:	2/13/2012	Response Action Cleanup:	No Response Action
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		100,000 to 999,999 receptor hrs/yr	70
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**710**
		Hazard Level Category	**3**

Site ID:	Maple Housing	c. Scoring Summary for Response Alternative 1: OM-1: No Action	
Date:	2/13/2012	Response Action Cleanup:	No MEC cleanup
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		100,000 to 999,999 receptor hrs/yr	70
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**710**
		Hazard Level Category	**3**

Site ID:	Maple Housing	d. Scoring Summary for Response Alternative 2: OM-2: LUCs	
Date:	2/13/2012	Response Action Cleanup:	No MEC cleanup
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		100,000 to 999,999 receptor hrs/yr	70
V. Amount of MEC		Safety Buffer Areas	30
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC.	240
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**710**
		Hazard Level Category	**3**

Site ID:	Maple Housing	e. Scoring Summary for Response Alternative 3: OM-3: Subsurface Clearance	
Date:	2/13/2012	Response Action Cleanup:	cleanup of MECs located both on the surface and subsurface
Input Factor		Input Factor Category	Score
I. Energetic Material Type		High Explosive and Low Explosive Filler in Fragmenting Rounds	100
II. Location of Additional Human Receptors		Inside the MRS or inside the ESQD arc	30
III. Site Accessibility		Full Accessibility	80
IV. Potential Contact Hours		100,000 to 999,999 receptor hrs/yr	20
V. Amount of MEC		Safety Buffer Areas	5
VI. Minimum MEC Depth Relative to Maximum Intrusive Depth		Baseline Condition: MEC located surface and subsurface, After Cleanup: Intrusive depth does not overlap with subsurface MEC.	25
VII. Migration Potential		Unlikely	10
VIII. MEC Classification		UXO	110
IX. MEC Size		Small	40
		Total Score	**420**
		Hazard Level Category	**4**

MEC HA Hazard Level Determination		
Site ID: Maple Housing		
Date: 2/13/2012		
	Hazard Level Category	Score
a. Current Use Activities	3	655
b. Future Use Activities	3	710
c. Response Alternative 1: OM-1: No Action	3	710
d. Response Alternative 2: OM-2: LUCs	3	710
e. Response Alternative 3: OM-3: Subsurface Clearance	4	420
f. Response Alternative 4:		
g. Response Alternative 5:		
h. Response Alternative 6:		

Characteristics of the MRS	
Is critical infrastructure located within the MRS or within the ESQD arc?	Yes
Are cultural resources located within the MRS or within the ESQD arc?	No
Are significant ecological resources located within the MRS or within the ESQD arc?	No

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
Massachusetts Department of Environmental Protection – January 25, 2013					
DC	1.	While potential remedies have been discussed with the BCT and RAB, selection of a remedy during the feasibility study phase of a remedial action is inconsistent with CERCLA. Consequently, the FFS addendum should not include statements indicating a remedy has been selected.	Sections 1.1, 5.1, 5.3.2, and 5.4		The word "select" was used in the approved 2008 FFS when referencing the preferred site remedies. This FFS addendum has been revised by removing the word "select" where appropriate and using "recommend" when referencing a preferred remedy in Sections 1.1, 5.1 and 5.4.
DC	2.	To document property transfer status, the report should identify the current owner(s) of the Oak and Maple study area.	1.2.2		Third paragraph of Section 1.2.2 revised by inserting the following sentence: "MassDevelopment currently owns the property that encompasses the Former Oak and Maple Housing Areas."
DC	3.	To ensure that LUCs would account for the significant differences between the investigations conducted in the Grant Housing Area and the Oak and Maple study area, the summary of activities conducted during the 2010-2011 investigation of the Oak and Maple study area should be clarified to indicate that geophysical mapping was only conducted across 14 acres (38 percent) of the 37-acre study area.	1.4.2		Agreed. Second paragraph of Section 1.4.2 revised with the following text update. "Activities conducted in 2010/2011 as part of the former Oak and Maple Housing Areas RI were performed in accordance with the RI Work Plan (HGL, 2010) which specified 32% of the housing areas would be investigated. The actual survey coverage, from the combined analog and digital methods, investigated approximately 14 acres or nearly 38% of the project site."
DC	4.	The action-specific TBCs should include the U.S. Army Corps of Engineers' August 2004 Engineering Pamphlet (EP) 75-1-2, *Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities*, which provides the expected construction support specification.	Table 2.1		Table 2.1 revised to include Chapter 6 of USACE EP 75-1-2 under the "Action –Specific Applicable and/or Relevant and Appropriate Requirements".

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA Version: Draft – December 21, 2012 Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)					
Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
DC	5.	The general description of LUCs should include LUCs compliance monitoring and enforcement provisions (e.g., site inspections and submission of annual LUCs compliance reports).	4.1.2		The following bullets were inserted into Section 4.1.2 in accordance with the currently approved LUCIP (2011) for Grant Housing Area and 37-mm Impact Area: • Annual LUC site inspection • Annual LUC compliance report
DC	6.	While potential remedies have been discussed with the BCT and RAB, selection of a remedy during the feasibility study phase of a remedial action is inconsistent with CERCLA. Consequently, the FFS Addendum should not include statements indicated that a remedy has been selected, indicating that a proposed plan will not be developed, or indicating that public meetings are not required. The FFS Addendum must be completed and approved before these decisions can be considered.	5.1, Final Paragraph		This paragraph was removed.
DC	7.	The FFS addendum should include the cite alternatives comparison table (or the citation should be deleted).	5.3		FFS Addendum citation revised from "Table 5-4" to "Table 5-3". Table 5-3 inserted into document in Section 5.3.

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA Version: Draft – December 21, 2012 Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)					
Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
U.S. Environmental Protection Agency – February 6, 2013					
GL	8.	As Army proceeds with preparing for an ESD and LUCIP to incorporate institutional controls (ICs) over the Oak and Maple Housing Areas via the Grant Housing Area and 37-mm Impact Area ROD, ensure that the documents address recently released EPA guidance documents on ICs: "A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites" and "A Guide to Preparing Institutional Control Implementation and Assurance Plans at Contaminated Sites," both issued in December 2012 and available at http://www.epa.gov/superfund/policy/ic/guide/index.htm and "Sample Federal Facility Land Use Control ROD Checklist with Suggested Language," dated January 4, 2013.	General		The Army had prepared internal draft documents for Former Oak and Maple Housing Areas prior to December 2012. These documents will be reviewed against the newly issued December 2012 EPA guidance documents prior to issuing the LUCIP and ESD for regulatory review.

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
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Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
GL	9.	The FFS Addendum should not indicate that OM-2 LUCs is the "selected remedy," as stated in Section 5.4. Army could indicate that it is the recommended remedial alternative of the Army and will be proposed in an ESD. However, references to the OM-2 LUC alternative as "selected" or "accepted" in the FFS Addendum should be revised. In Section 5.1 and 5.3.2, the FFS Addendum indicates that the OM-2 alternative was accepted by the regulatory and local community. Although EPA is in agreement with the Army's proposed path forward at this site, our acceptance of the remedial alternative for Oak and Maple will not be formalized until we sign the ESD. Further, local community acceptance should be supported though an opportunity for public comment on the Draft ESD once issued by the Army. Although public comment periods on ESDs are not required, Army has always provided that opportunity for ESDs in the past and EPA would request that a public comment period be provided for the planned ESD for this site.	General		The term "selected remedy" and variations of the word "select" were updated per comments #1 and #6 in Sections 5.1, 5.3.2 and 5.4. The Army agrees that the recommended remedial alternative will not be formally accepted until an ESD is approved. The Army will provide the opportunity for a public comment period for the ESD.

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
GL	10.	The text in this section refers to the inclusion of the Oak and Maple Housing Areas as part of the Grant Housing Area and 37-mm Impact Area remedy, based on "its location adjacent to" and "proximity and similarity to" "the Grant Housing Area and 37-mm Impact Area." The report should be revised to clarify that portions of the Oak and Maple Housing Areas were included within the firing fan for the former 37-mm Anti-Tank range, referred to as IA-2, and as depicted in Figure 2.1 of the Final MEC RI Report for the Former Oak and Maple Housing Areas. This is acknowledged in other areas of the report, including subsection 3.2.2.3 and 4.1.3. The fact that the Oak and Maple Housing Areas were part of the same range that covered the Grant Housing Area and 37-mm Impact Area provides a reasonable basis for incorporating these areas into the Grant Housing Area and 37-mm Impact Area remedy.	1.1	1-2	Additional text inserted into 2nd to last sentence of Section 1.1 to add clarification between the areas. Revised text detailed below. "Due to the former Oak and Maple Housing Areas proximity and similarity to the Grant Housing Area and 37-mm Impact Area, and the actual inclusion of portions of the former housing areas within the former IA-2 37-mm anti-tank range as detailed in the RI (HGL, 2012), the level of detailed analyses required to prepare this FFS Addendum was much less than the 2008 FFS."
GL	11.	This section should be revised to include the recommendation from the Final PA/SI/SSI Comprehensive Report to complete an RI-level UXO/MEC investigation at these former housing areas.	1.3.1.3	1-9	The following additional text was inserted into Section 1.3.1.3. "The PA/SI also recommended that a Focused Feasibility Study be conducted to address any potential MEC within areas impacted by the former IA-2 training/range area. In addition, based on concerns that the IA-2 training/range activities may have impacted the adjacent former Oak and Maple Housing Areas, a follow-on remedial investigation was recommended to address any potential remnant MEC in these areas and any related explosive safety hazards."

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Reviewer	**Cmt. #**	**Comment**	**Location**		**Comment Response**
			Sec.	**Page**	
GL	12.	This section indicates that munitions constituents contamination in soil or groundwater was not detected above levels of concern during the PA/SI/SSI, which covered the Grant Housing Area and 37-mm Impact Area, and that this risk finding applies to Oak and Maple "based on its proximity to the Grant Housing Area and 37-mm Impact Area." Revise this section to indicate that the PA/SI/SSI concluded that munitions constituent contamination in soil or groundwater were not detected above levels of concerns for the IA-2 range, and, therefore, munitions constituents were not carried forward as COCs for the Grant Housing Area and 37-mm Impact Area FFS nor for this Oak and Maple Housing Area FFS Addendum.	1.4.1	1-12	Revised first sentence of Section 1.4.1, which discusses constituents of concern (COC) risk, by removing "Grant Housing Area and 37-mm Impact Area" and replacing with "former 37-mm anti-tank range IA-2". The following sentence was added for clarity: "Based on these risk findings no chemical constituents related to MEC were carried forward as COCs for Grant Housing Area and 37-mm Impact Area in the 2008 FFS and Oak and Maple Housing Areas in this FFS Addendum."
GL	13.	In the last paragraph on this page, note the planned future use of the property as commercial reuse and discuss future risks to commercial workers present on-site after redevelopment.	1.4.2	1-13	Revised text to indicate "future commercial reuse of the property". Inserted the below text for future commercial workers on site after redevelopment: "Future hazards for commercial workers are anticipated to be minimal to non-existent and fully addressed by implementation and compliance with the LUCIP."
GL	14.	Revise the title of the MEC HA to "Interim" rather than "Draft."	1.4.3	1-14	The document reference has been corrected to indicate the *Interim Munitions and Explosives of Concern Hazard Assessment Methodology.*

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GL	15.	The report presents a definition of each of the hazard levels from the MEC HA. For the descriptions of Hazard Levels 2, 3 and 4, the definition should indicate these represent high, moderate, and low hazards. It is also recommended that the definitions be revised to be consistent with the hazard level definitions provided in Section 5 of the MEC HA.	1.4.3	1-14	Section 1.4.3 has been revised to indicate that Hazard Levels 2, 3, and 4 represent high, moderate, and low potential explosive hazards, respectively. In addition, the definitions of each hazard level have been revised to be consistent with the *Interim Munitions and Explosives of Concern Hazard Assessment Methodology* (EPA, 2008).
GL	16.	Provide additional details on the findings of the ecological risk assessment and clarify that they are applicable to Oak and Maple.	1.5	1-15	Section 1.5 revised to add more detail on the ecological risk assessment and clarify its applicability to Oak and Maple Housing Areas.
GL	17.	On page 2-3, for the two Federal regulatory entries in the "Action Specific" table, delete the first sentence in the "Action to be Taken" column. The likelihood or unlikelihood of discovery of MEC or UXO and on-site treatment does not belong in this section. On page 2-5, delete the same sentence in the State regulatory entry, in the "Action to be Taken" column. This sounds more like conclusion/argument, rather than an "action to be taken."	2	Table 2-1	Table 2-1 revisions made to commented areas.
GL	18.	The "Action Specific" table should include the U.S. Army Corps of Engineers' August 2004 Engineering Pamphlet (EP) 75-1-1, *Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities* as a TBC ARAR, as this provides the specification for MEC construction support.	2	Table 2-1	The table was updated as indicated in comment #4.

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			Sec.	Page	
GL	19.	Clarify that subsurface clearance is retained for further evaluation. In addition, the text indicates "additional hazard reduction in the commercial area" for the 3 to 8 foot soil layer "is not needed based upon not finding stokes mortars during the 2012 RI." This reasoning is unclear and does not appear to be a finding of the 2012 RI. Page 4-2, Section 4.1.3, states that the 2012 RI did not find evidence of Stokes mortars, and therefore the Army assumed that "none are present within the subsurface." The text indicates that stokes could be located at greater depths than 37-mm and the potential depth of utilities is up to 8 feet. However, the text does not explain that, since it is assumed that stokes are not present, the subsurface clearance alternative only evaluated clearance to 3 feet, not to 8 feet. Revise to clarify.	3.2.2.3	3-5	Section 3.2.2.3 has been revised to directly state that subsurface clearance is retained for further evaluation. The last paragraph of this section has been revised to read: "37-mm projectiles could be located at depths 3 feet below grade. Deeper MEC items are not expected as the shallow angle of flight would likely have limited the depth of penetration. Additionally, deeper depths are not evaluated in this alternative, because there was no evidence, based on the results of the 2012 RI that munitions with a deeper penetration depth (such as Stokes mortars, as identified in the Grant Housing Area) were used in the former Oak and Maple Housing Areas. Assuming future commercial redevelopment in the former Oak and Maple Housing Areas, excavations to 8 feet for the placement of utilities and building foundations could occur. The subsurface clearance alternative only evaluates clearance to a depth of 3 feet, adequate for the penetration depth of munitions identified in the 2012 RI (HGL, 2012).
GL	20.	Since subsurface clearance is retained and would require treatment/disposal if selected, it is unclear why treatment/disposal is not retained. The role of the local State Police as a basis for not retaining the alternative is also unclear. Revise to clarify.	3.2.2.4	3-5	The last two sentences of Section 3.2.2.4 have been revised to read: "This technology is proven effective and implementable and is included in conjunction with the MEC subsurface clearance technology. If MEC is identified during subsurface clearance, it will be disposed via detonation by the local State Police Authorities."

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GL	21.	Overall Protectiveness of Human Health and the Environment: This section states, "Based on the MEC HA score, the Munitions Response Site would be considered safe for the current land use without further munitions responses" and "Level 3 areas generally have restricted access and low number of contact hours and typically MEC only in the subsurface." Provide the basis for these statements.	4.1	4-1	In Section 5.2.1.1 (Alternative OM-1-No Action), this statement has been removed and the paragraph has been revised to read: "MEC HA scoring of Alternative OM-1 resulted in Hazard Level 3 for current and future land use at the former Oak and Maple Housing Areas Munitions Response Site. The MEC HA presents only a qualitative analysis of explosive risks remaining at the site, and based on the determined low probability of encountering additional MEC, there is some likelihood that MEC may be encountered if no further actions are performed."
GL	22.	This section references Table 5-4. However, the table is not included in the document.	5.3	5-8	Table 5-4 was not included. Text will be revised to reference and include Table 5-3.
GL	23.	Overall Protectiveness of Human Health and the Environment: This section states, "The MEC HA indicates that Alternative OM-3 lowers the explosive hazard on site from Hazard Category 3 to 4." Provide the basis for this statement.	5.3.1	5-8	The statement has been revised to read: "The MEC HA indicates that Alternative OM-3 lowers the explosive hazard onsite from Hazard Category 3 (for current use) to 4 (for future use), because the depth of future intrusive activities (3 feet) will not overlap with the depth that MEC might be encountered following subsurface clearance (see Appendix A).
MassDEP – David Chaffin (DC) - 03/15/2013					
DC	1.	Table 5.3: Alternatives should be compared using the CERCLA alternatives comparison criteria described in Section 5.1, rather than the three technology screening criteria described in Section 3. Accordingly, Table 5.3 should be revised to present a comparison based on the CERCLA alternatives comparison criteria or the table should be deleted and replaced with summary text.			The three alternatives are compared against each other in Section 5.3 based on the criteria detailed in Section 5.1. Table 5.3 was abbreviated relative to the text in Section 5.3 and has been removed from the FFS Addendum document. No additional summary text is required as it would be redundant to what is presented in Section 5.3.

March 29, 2013

Mr. Robert Simeone
BRAC Environmental Coordinator
U.S. Army Garrison Fort Devens
30 Quebec Street
Devens, Massachusetts 01432-4429

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Simeone:

On behalf of Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL), enclosed please find one (1) set of replacement pages and one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 draft report and the February 2013 Draft Final report.

Enclosed please find:

1. Response to Comment form.
2. Revised Report Cover and Spine.
3. Signed Title page.
4. Revised List of Tables
5. Revised pages 5-8 through 5-10.
6. CD containing the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas and Response to Comment form.

Copies were also submitted to Ms. Maryellen Iorio (USACE), Ms. Ginny Lombardo (USEPA), Mr. David Chaffin (MassDEP), Ms. Hui Laing (MassDEP), Mr. Ron Ostrowski (MassDevelopment), Ms. Deborah Gevalt (MassDevelopment), Harvard Board of Selectmen Chair, Harvard Town Administrator, Ms. Julia Corenzwit (RAB Co-Chair), Ms. Laurie Nehring (PACE), Mr. Richard Doherty (Engineering and Consultant Resources), and Mr. James Greacen (Mabbett & Associates, Inc.).

If you have any questions regarding the enclosed document, please call me at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures: 1 CD-ROM and 1 Hard Copy

March 29, 2013

Ms. Maryellen Iorio, P.E.
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Iorio:

On behalf of Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL), enclosed please find one (1) set of replacement pages and one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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If you have any questions regarding the enclosed document, please call me at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures: 1 CD-ROM and1 Hard Copy

March 29, 2013

Ms. Ginny Lombardo
U.S. Environmental Protection Agency
5 Post Office Square
Suite 100
Boston, MA 02109-3912

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Lombardo:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) set of replacement pages and one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

Enclosures: 1 CD-ROM and 1 Hard Copy

March 29, 2013

Julia Corenzwit
RAB Co-Chair
5 Brilaina Court
Ayer, MA 01432

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Corenzwit:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operation

March 29, 2013

Ms. Laurie Nehring
PACE
35 Highland Ave.
Ayer, MA 01432

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Nehring:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operation

March 29, 2013

Ms. Deborah Gevalt
MassDevelopment
Haley & Aldrich, Inc.
465 Medford Street
Boston, MA 02129

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Gevalt:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

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HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operation

March 29, 2013

Mr. Ron Ostrowski
MassDevelopment
Devens Commerce Center
33 Andrews Parkway
Devens, MA 01432

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Ostrowski:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy and one (1) set of replacement pages of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

Enclosures: 1 CD-ROM and 1 Hard Copy

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

March 29, 2013

Ms. Hui Liang
Massachusetts Department of Environmental Protection
627 Main Street
Worcester, MA 01605

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Liang:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy and one (1) set of replacement pages of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

Enclosures: 1 CD-ROM and 1 Hard Copy

March 29, 2013

Mr. David Chaffin
Massachusetts Department of Environmental Protection
One Winter Street
Boston, MA 02108

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Chaffin:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy and one (1) set of replacement pages of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

Enclosures: 1 CD-ROM and 1 Hard Copy

March 29, 2013

James R. Greacen, Director
Site Assessment and Remediation Group
Mabbett & Associates, Inc.
5 Alfred Circle
Bedford, MA 01730-2318

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Greacen:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
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HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operation

March 29, 2013

Chair, Board of Selectmen
Town Hall
13 Ayer Road
Harvard, MA 01451

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Chair:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

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Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
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Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
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HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operation

March 29, 2013

Town Administrator
Town Hall
13 Ayer Road
Harvard, MA 01451

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Administrator:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

March 29, 2013

Mr. Richard Doherty
Engineering and Consultant Resources
P.O. Box 966
Acton, MA 01720

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Doherty:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 Draft report and the February 2013 Draft Final report.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

March 29, 2013

Mr. Robert Simeone
BRAC Environmental Coordinator
U.S. Army Garrison Fort Devens
30 Quebec Street
Devens, Massachusetts 01432-4429

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Simeone:

On behalf of Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL), enclosed please find one (1) set of replacement pages and one (1) electronic copy of the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The final document was generated based on revisions made in response to comments received on the December 2012 draft report and the February 2013 Draft Final report.

Enclosed please find:

1. Response to Comment form.
2. Revised Report Cover and Spine.
3. Signed Title page.
4. Revised List of Tables
5. Revised pages 5-8 through 5-10.
6. CD containing the Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas and Response to Comment form.

Copies were also submitted to Ms. Maryellen Iorio (USACE), Ms. Ginny Lombardo (USEPA), Mr. David Chaffin (MassDEP), Ms. Hui Laing (MassDEP), Mr. Ron Ostrowski (MassDevelopment), Ms. Deborah Gevalt (MassDevelopment), Harvard Board of Selectmen Chair, Harvard Town Administrator, Ms. Julia Corenzwit (RAB Co-Chair), Ms. Laurie Nehring (PACE), Mr. Richard Doherty (Engineering and Consultant Resources), and Mr. James Greacen (Mabbett & Associates, Inc.).

If you have any questions regarding the enclosed document, please call me at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures: 1 CD-ROM and 1 Hard Copy

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operations

February 28, 2013

Mr. Robert Simeone
BRAC Environmental Coordinator
U.S. Army Garrison Fort Devens
30 Quebec Street
Devens, Massachusetts 01432-4429

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Simeone:

On behalf of Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL), please find enclosed one (1) electronic copy and one (1) hard copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. A response date of April 15, 2013 was requested from the appropriate BCT members per the established 45 day review period.

Copies were also submitted to Ms. Maryellen Iorio (USACE), Ms. Ginny Lombardo (USEPA), Mr. David Chaffin (MassDEP), Ms. Hui Laing (MassDEP), Mr. Ron Ostrowski (MassDevelopment), Ms. Deborah Gevalt (MassDevelopment), Harvard Board of Selectmen Chair, Harvard Town Administrator, Ms. Julia Corenzwit (RAB Co-Chair), Ms. Laurie Nehring (PACE), Mr. Richard Doherty (Engineering and Consultant Resources), and Mr. James Greacen (Mabbett & Associates, Inc.).

If you have any questions regarding the enclosed document, please call me at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures:
1 CD-ROM
1 Hard Copy

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operations

February 28, 2013

Mr. Robert Simeone
BRAC Environmental Coordinator
U.S. Army Garrison Fort Devens
30 Quebec Street
Devens, Massachusetts 01432-4429

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Simeone:

On behalf of Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL), please find enclosed one (1) electronic copy and one (1) hard copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. A response date of April 15, 2013 was requested from the appropriate BCT members per the established 45 day review period.

Copies were also submitted to Ms. Maryellen Iorio (USACE), Ms. Ginny Lombardo (USEPA), Mr. David Chaffin (MassDEP), Ms. Hui Laing (MassDEP), Mr. Ron Ostrowski (MassDevelopment), Ms. Deborah Gevalt (MassDevelopment), Harvard Board of Selectmen Chair, Harvard Town Administrator, Ms. Julia Corenzwit (RAB Co-Chair), Ms. Laurie Nehring (PACE), Mr. Richard Doherty (Engineering and Consultant Resources), and Mr. James Greacen (Mabbett & Associates, Inc.).

If you have any questions regarding the enclosed document, please call me at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures:
1 CD-ROM
1 Hard Copy

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operations

February 28, 2013

Ms. Maryellen Iorio, P.E.
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Iorio:

On behalf of Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL), please find enclosed one (1) electronic copy and one (1) hard copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. A response date of April 15, 2013 was requested from the appropriate BCT members per the established 45 day review period.

Copies were also submitted to Mr. Robert Simeone (BEC), Ms. Ginny Lombardo (USEPA), Mr. David Chaffin (MADEP), Ms. Hui Laing (MADEP), Mr. Ron Ostrowski (MassDevelopment), Ms. Deborah Gevalt (MassDevelopment), Harvard Board of Selectmen Chair, Harvard Town Administrator, Ms. Julia Corenzwit (RAB Co-Chair), Ms. Laurie Nehring (PACE), Mr. Richard Doherty, (Engineering and Consultant Resources), and Mr. James Greacen (Mabbett & Associates, Inc.).

If you have any questions regarding the enclosed document, please call me at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures:
1 CD-ROM
1 Hard Copy

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operations

February 28, 2013

Ms. Ginny Lombardo
U.S. Environmental Protection Agency
5 Post Office Square
Suite 100
Boston, MA 02109-3912

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Lombardo:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy and one (1) hard copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The Army respectfully requests any comments on the enclosed document on or about April 15, 2013.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures:
1 CD-ROM
1 Hard Copy

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

February 28, 2013

Julia Corenzwit
RAB Co-Chair
5 Brilaina Court
Ayer, MA 01432

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Corenzwit:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

February 28, 2013

Ms. Laurie Nehring
PACE
35 Highland Ave.
Ayer, MA 01432

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Nehring:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

February 28, 2013

Ms. Deborah Gevalt
MassDevelopment
Haley & Aldrich, Inc.
465 Medford Street
Boston, MA 02129

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Gevalt:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The Army respectfully requests any comments on the enclosed document on or about April 15, 2013.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operations

February 28, 2013

Mr. Ron Ostrowski
MassDevelopment
Devens Commerce Center
33 Andrews Parkway
Devens, MA 01432

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Ostrowski:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy and one (1) hard copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The Army respectfully requests any comments on the enclosed document on or about April 15, 2013.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures:
1 CD-ROM
1 Hard Copy

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

February 28, 2013

Ms. Hui Liang
Massachusetts Department of Environmental Protection
627 Main Street
Worcester, MA 01605

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Ms. Liang:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy and one (1) hard copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The Army respectfully requests any comments on the enclosed document on or about April 15, 2013.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures:
1 CD-ROM
1 Hard Copy

February 28, 2013

Mr. David Chaffin
Massachusetts Department of Environmental Protection
One Winter Street
Boston, MA 02108

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Chaffin:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy and one (1) hard copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation. The Army respectfully requests any comments on the enclosed document on or about April 15, 2013.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosures:
1 CD-ROM
1 Hard Copy

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operations

February 28, 2013

James R. Greacen, Director
Site Assessment and Remediation Group
Mabbett & Associates, Inc.
5 Alfred Circle
Bedford, MA 01730-2318

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Greacen:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operations

February 28, 2013

Chair, Board of Selectmen
Town Hall
13 Ayer Road
Harvard, MA 01451

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Chair:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

February 28, 2013

Town Administrator
Town Hall
13 Ayer Road
Harvard, MA 01451

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Administrator:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

HGL
HydroGeoLogic, Inc
Exceeding Expectations

Albany Operations

February 28, 2013

Mr. Richard Doherty
Engineering and Consultant Resources
P.O. Box 966
Acton, MA 01720

Re: Former Fort Devens Army Installation, Devens, Massachusetts
Draft Final Focused Feasibility Study Addendum
Former Oak and Maple Housing Areas
Contract Number: W912WJ-10-D-003

Dear Mr. Doherty:

On behalf of the U.S. Army, Sovereign Consulting, Inc., and HydroGeoLogic, Inc. (HGL) are submitting one (1) electronic copy of the Draft Final Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, for the above referenced contract at the former Fort Devens Army Installation.

If you have any questions regarding the enclosed document, please contact Mr. Robert Simeone, BRAC Environmental Coordinator at (978) 796-2205; or myself at (518) 877-0390.

Sincerely,

Peter I. Dacyk
Project Manager

Enclosure:
1 CD-ROM

Northway 10 Executive Park, 313 Ushers Road, Ballston Lake, NY 12019
Phone: (518) 877-0390 Fax: (518) 877-0414
www.hgl.com

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
Massachusetts Department of Environmental Protection – January 25, 2013					
DC	1.	While potential remedies have been discussed with the BCT and RAB, selection of a remedy during the feasibility study phase of a remedial action is inconsistent with CERCLA. Consequently, the FFS addendum should not include statements indicating a remedy has been selected.	Sections 1.1, 5.1, 5.3.2, and 5.4		The word "select" was used in the approved 2008 FFS when referencing the preferred site remedies. This FFS addendum has been revised by removing the word "select" where appropriate and using "recommend" when referencing a preferred remedy in Sections 1.1, 5.1 and 5.4.
DC	2.	To document property transfer status, the report should identify the current owner(s) of the Oak and Maple study area.	1.2.2		Third paragraph of Section 1.2.2 revised by inserting the following sentence: "MassDevelopment currently owns the property that encompasses the Former Oak and Maple Housing Areas."
DC	3.	To ensure that LUCs would account for the significant differences between the investigations conducted in the Grant Housing Area and the Oak and Maple study area, the summary of activities conducted during the 2010-2011 investigation of the Oak and Maple study area should be clarified to indicate that geophysical mapping was only conducted across 14 acres (38 percent) of the 37-acre study area.	1.4.2		Agreed. Second paragraph of Section 1.4.2 revised with the following text update. "Activities conducted in 2010/2011 as part of the former Oak and Maple Housing Areas RI were performed in accordance with the RI Work Plan (HGL, 2010) which specified 32% of the housing areas would be investigated. The actual survey coverage, from the combined analog and digital methods, investigated approximately 14 acres or nearly 38% of the project site."
DC	4.	The action-specific TBCs should include the U.S. Army Corps of Engineers' August 2004 Engineering Pamphlet (EP) 75-1-2, *Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities*, which provides the expected construction support specification.	Table 2.1		Table 2.1 revised to include Chapter 6 of USACE EP 75-1-2 under the "Action –Specific Applicable and/or Relevant and Appropriate Requirements".

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
DC	5.	The general description of LUCs should include LUCs compliance monitoring and enforcement provisions (e.g., site inspections and submission of annual LUCs compliance reports).	4.1.2		The following bullets were inserted into Section 4.1.2 in accordance with the currently approved LUCIP (2011) for Grant Housing Area and 37-mm Impact Area: • Annual LUC site inspection • Annual LUC compliance report
DC	6.	While potential remedies have been discussed with the BCT and RAB, selection of a remedy during the feasibility study phase of a remedial action is inconsistent with CERCLA. Consequently, the FFS Addendum should not include statements indicated that a remedy has been selected, indicating that a proposed plan will not be developed, or indicating that public meetings are not required. The FFS Addendum must be completed and approved before these decisions can be considered.	5.1, Final Paragraph		This paragraph was removed.
DC	7.	The FFS addendum should include the cite alternatives comparison table (or the citation should be deleted).	5.3		FFS Addendum citation revised from "Table 5-4" to "Table 5-3". Table 5-3 inserted into document in Section 5.3.

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA Version: Draft – December 21, 2012 Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)					
Reviewer	**Cmt. #**	**Comment**	**Location**		**Comment Response**
			Sec.	**Page**	
U.S. Environmental Protection Agency – February 6, 2013					
GL	8.	As Army proceeds with preparing for an ESD and LUCIP to incorporate institutional controls (ICs) over the Oak and Maple Housing Areas via the Grant Housing Area and 37-mm Impact Area ROD, ensure that the documents address recently released EPA guidance documents on ICs: "A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites" and "A Guide to Preparing Institutional Control Implementation and Assurance Plans at Contaminated Sites," both issued in December 2012 and available at http://www.epa.gov/superfund/policy/ic/guide/index.htm and "Sample Federal Facility Land Use Control ROD Checklist with Suggested Language," dated January 4, 2013.	General		The Army had prepared internal draft documents for Former Oak and Maple Housing Areas prior to December 2012. These documents will be reviewed against the newly issued December 2012 EPA guidance documents prior to issuing the LUCIP and ESD for regulatory review.

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
GL	9.	The FFS Addendum should not indicate that OM-2 LUCs is the "selected remedy," as stated in Section 5.4. Army could indicate that it is the recommended remedial alternative of the Army and will be proposed in an ESD. However, references to the OM-2 LUC alternative as "selected" or "accepted" in the FFS Addendum should be revised. In Section 5.1 and 5.3.2, the FFS Addendum indicates that the OM-2 alternative was accepted by the regulatory and local community. Although EPA is in agreement with the Army's proposed path forward at this site, our acceptance of the remedial alternative for Oak and Maple will not be formalized until we sign the ESD. Further, local community acceptance should be supported though an opportunity for public comment on the Draft ESD once issued by the Army. Although public comment periods on ESDs are not required, Army has always provided that opportunity for ESDs in the past and EPA would request that a public comment period be provided for the planned ESD for this site.	General		The term "selected remedy" and variations of the word "select" were updated per comments #1 and #6 in Sections 5.1, 5.3.2 and 5.4. The Army agrees that the recommended remedial alternative will not be formally accepted until an ESD is approved. The Army will provide the opportunity for a public comment period for the ESD.

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
GL	10.	The text in this section refers to the inclusion of the Oak and Maple Housing Areas as part of the Grant Housing Area and 37-mm Impact Area remedy, based on "its location adjacent to" and "proximity and similarity to" "the Grant Housing Area and 37-mm Impact Area." The report should be revised to clarify that portions of the Oak and Maple Housing Areas were included within the firing fan for the former 37-mm Anti-Tank range, referred to as IA-2, and as depicted in Figure 2.1 of the Final MEC RI Report for the Former Oak and Maple Housing Areas. This is acknowledged in other areas of the report, including subsection 3.2.2.3 and 4.1.3. The fact that the Oak and Maple Housing Areas were part of the same range that covered the Grant Housing Area and 37-mm Impact Area provides a reasonable basis for incorporating these areas into the Grant Housing Area and 37-mm Impact Area remedy.	1.1	1-2	Additional text inserted into 2nd to last sentence of Section 1.1 to add clarification between the areas. Revised text detailed below. "Due to the former Oak and Maple Housing Areas proximity and similarity to the Grant Housing Area and 37-mm Impact Area, and the actual inclusion of portions of the former housing areas within the former IA-2 37-mm anti-tank range as detailed in the RI (HGL, 2012), the level of detailed analyses required to prepare this FFS Addendum was much less than the 2008 FFS."
GL	11.	This section should be revised to include the recommendation from the Final PA/SI/SSI Comprehensive Report to complete an RI-level UXO/MEC investigation at these former housing areas.	1.3.1.3	1-9	The following additional text was inserted into Section 1.3.1.3. "The PA/SI also recommended that a Focused Feasibility Study be conducted to address any potential MEC within areas impacted by the former IA-2 training/range area. In addition, based on concerns that the IA-2 training/range activities may have impacted the adjacent former Oak and Maple Housing Areas, a follow-on remedial investigation was recommended to address any potential remnant MEC in these areas and any related explosive safety hazards."

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
GL	12.	This section indicates that munitions constituents contamination in soil or groundwater was not detected above levels of concern during the PA/SI/SSI, which covered the Grant Housing Area and 37-mm Impact Area, and that this risk finding applies to Oak and Maple "based on its proximity to the Grant Housing Area and 37-mm Impact Area." Revise this section to indicate that the PA/SI/SSI concluded that munitions constituent contamination in soil or groundwater were not detected above levels of concerns for the IA-2 range, and, therefore, munitions constituents were not carried forward as COCs for the Grant Housing Area and 37-mm Impact Area FFS nor for this Oak and Maple Housing Area FFS Addendum.	1.4.1	1-12	Revised first sentence of Section 1.4.1, which discusses constituents of concern (COC) risk, by removing "Grant Housing Area and 37-mm Impact Area" and replacing with "former 37-mm anti-tank range IA-2". The following sentence was added for clarity: "Based on these risk findings no chemical constituents related to MEC were carried forward as COCs for Grant Housing Area and 37-mm Impact Area in the 2008 FFS and Oak and Maple Housing Areas in this FFS Addendum."
GL	13.	In the last paragraph on this page, note the planned future use of the property as commercial reuse and discuss future risks to commercial workers present on-site after redevelopment.	1.4.2	1-13	Revised text to indicate "future commercial reuse of the property". Inserted the below text for future commercial workers on site after redevelopment: "Future hazards for commercial workers are anticipated to be minimal to non-existent and fully addressed by implementation and compliance with the LUCIP."
GL	14.	Revise the title of the MEC HA to "Interim" rather than "Draft."	1.4.3	1-14	The document reference has been corrected to indicate the *Interim Munitions and Explosives of Concern Hazard Assessment Methodology*.

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)

Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
GL	15.	The report presents a definition of each of the hazard levels from the MEC HA. For the descriptions of Hazard Levels 2, 3 and 4, the definition should indicate these represent high, moderate, and low hazards. It is also recommended that the definitions be revised to be consistent with the hazard level definitions provided in Section 5 of the MEC HA.	1.4.3	1-14	Section 1.4.3 has been revised to indicate that Hazard Levels 2, 3, and 4 represent high, moderate, and low potential explosive hazards, respectively. In addition, the definitions of each hazard level have been revised to be consistent with the *Interim Munitions and Explosives of Concern Hazard Assessment Methodology* (EPA, 2008).
GL	16.	Provide additional details on the findings of the ecological risk assessment and clarify that they are applicable to Oak and Maple.	1.5	1-15	Section 1.5 revised to add more detail on the ecological risk assessment and clarify its applicability to Oak and Maple Housing Areas.
GL	17.	On page 2-3, for the two Federal regulatory entries in the "Action Specific" table, delete the first sentence in the "Action to be Taken" column. The likelihood or unlikelihood of discovery of MEC or UXO and on-site treatment does not belong in this section. On page 2-5, delete the same sentence in the State regulatory entry, in the "Action to be Taken" column. This sounds more like conclusion/argument, rather than an "action to be taken."	2	Table 2-1	Table 2-1 revisions made to commented areas.
GL	18.	The "Action Specific" table should include the U.S. Army Corps of Engineers' August 2004 Engineering Pamphlet (EP) 75-1-1, *Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities* as a TBC ARAR, as this provides the specification for MEC construction support.	2	Table 2-1	The table was updated as indicated in comment #4.

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA Version: Draft – December 21, 2012 Reviewers: David Chaffin (DC), Massachusetts Department of Environmental Protection (MassDEP); Ginny Lombardo (GL), U.S. Environmental Protection Agency (USEPA)					
Reviewer	**Cmt. #**	**Comment**	**Location**		**Comment Response**
			Sec.	**Page**	
GL	19.	Clarify that subsurface clearance is retained for further evaluation. In addition, the text indicates "additional hazard reduction in the commercial area" for the 3 to 8 foot soil layer "is not needed based upon not finding stokes mortars during the 2012 RI." This reasoning is unclear and does not appear to be a finding of the 2012 RI. Page 4-2, Section 4.1.3, states that the 2012 RI did not find evidence of Stokes mortars, and therefore the Army assumed that "none are present within the subsurface." The text indicates that stokes could be located at greater depths than 37-mm and the potential depth of utilities is up to 8 feet. However, the text does not explain that, since it is assumed that stokes are not present, the subsurface clearance alternative only evaluated clearance to 3 feet, not to 8 feet. Revise to clarify.	3.2.2.3	3-5	Section 3.2.2.3 has been revised to directly state that subsurface clearance is retained for further evaluation. The last paragraph of this section has been revised to read: "37-mm projectiles could be located at depths 3 feet below grade. Deeper MEC items are not expected as the shallow angle of flight would likely have limited the depth of penetration. Additionally, deeper depths are not evaluated in this alternative, because there was no evidence, based on the results of the 2012 RI that munitions with a deeper penetration depth (such as Stokes mortars, as identified in the Grant Housing Area) were used in the former Oak and Maple Housing Areas. Assuming future commercial redevelopment in the former Oak and Maple Housing Areas, excavations to 8 feet for the placement of utilities and building foundations could occur. The subsurface clearance alternative only evaluates clearance to a depth of 3 feet, adequate for the penetration depth of munitions identified in the 2012 RI (HGL, 2012).
GL	20.	Since subsurface clearance is retained and would require treatment/disposal if selected, it is unclear why treatment/disposal is not retained. The role of the local State Police as a basis for not retaining the alternative is also unclear. Revise to clarify.	3.2.2.4	3-5	The last two sentences of Section 3.2.2.4 have been revised to read: "This technology is proven effective and implementable and is included in conjunction with the MEC subsurface clearance technology. If MEC is identified during subsurface clearance, it will be disposed via detonation by the local State Police Authorities."

Document Title: Focused Feasibility Study Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, MA
Version: Draft – December 21, 2012
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Reviewer	Cmt. #	Comment	Location		Comment Response
			Sec.	Page	
GL	21.	Overall Protectiveness of Human Health and the Environment: This section states, "Based on the MEC HA score, the Munitions Response Site would be considered safe for the current land use without further munitions responses" and "Level 3 areas generally have restricted access and low number of contact hours and typically MEC only in the subsurface." Provide the basis for these statements.	4.1	4-1	In Section 5.2.1.1 (Alternative OM-1-No Action), this statement has been removed and the paragraph has been revised to read: "MEC HA scoring of Alternative OM-1 resulted in Hazard Level 3 for current and future land use at the former Oak and Maple Housing Areas Munitions Response Site. The MEC HA presents only a qualitative analysis of explosive risks remaining at the site, and based on the determined low probability of encountering additional MEC, there is some likelihood that MEC may be encountered if no further actions are performed."
GL	22.	This section references Table 5-4. However, the table is not included in the document.	5.3	5-8	Table 5-4 was not included. Text will be revised to reference and include Table 5-3.
GL	23.	Overall Protectiveness of Human Health and the Environment: This section states, "The MEC HA indicates that Alternative OM-3 lowers the explosive hazard on site from Hazard Category 3 to 4." Provide the basis for this statement.	5.3.1	5-8	The statement has been revised to read: "The MEC HA indicates that Alternative OM-3 lowers the explosive hazard onsite from Hazard Category 3 (for current use) to 4 (for future use), because the depth of future intrusive activities (3 feet) will not overlap with the depth that MEC might be encountered following subsurface clearance (see Appendix A).