

F I N A L

**HISTORICAL RECORDS REVIEW
DEVENS RESERVE FORCES
TRAINING AREA
DEVENS, MASSACHUSETTS
MILITARY MUNITIONS RESPONSE PROGRAM**



Prepared for

U.S. Army Corps of Engineers, Baltimore District
10 South Howard Street
Baltimore, Maryland 21203

April 2008



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Reviewed and Approved by:

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APRIL 2008

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Appendix C	Munitions Technical Data Sheets

TABLE OF ACRONYMS

Acronym	Definition
AEC	Army Environmental Command
AEDB-R	Army Environmental Database-Restoration
A/I	Active/inactive
AOC	Area of concern
A/P	Anti-Personnel
Army	United States Army
ARS	Advance Range Survey
ASP	Ammunition Storage Point
ASR	Archives Search Report
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm/sec	Centimeter per second
CSM	Conceptual Site Model
CTC	Cost to complete
CTT	Closed, transferring, and transferred
CWM	Chemical warfare materiel
DERP	Defense Environmental Restoration Program
DMM	Discarded military munitions
DoD	Department of Defense
DRFTA	Devens Reserve Forces Training Area
DSERTS	Defense Site Environmental Restoration Tracking System
EBS	Environmental baseline survey
EDR	Environmental Data Resources
EOD	Explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
ft ² /day	Square feet per day
FUDS	Formerly Used Defense Sites
FY	Fiscal year
gpm	Gallons per minute
HFA	Human Factors Applications, Inc.
HRR	Historical Records Review
IRP	Installation Restoration Program
ITRC	Interstate Technology & Regulatory Council
MAARNG	Massachusetts Army National Guard

Acronym	Definition
MC	Munitions constituents
MEC	Munitions and explosives of concern
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
NFA	No Further Action
NGVD	National Geodetic Vertical Datum
NPL	National Priorities List
NWR	National Wildlife Refuge
PA	Preliminary Assessment
POW	Prisoner of war
PRI	Preliminary Rifle Instruction
RAC	Risk Assessment Code
RDX	Cyclotrimethylenenitramine
RG	Record group
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendment and Reauthorization Act
SDZ	Surface Danger Zone
SI	Site Inspection
SOP	Standard Operating Procedure
TNT	Trinitrotoluene
U.S.	United States
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
UXO	Unexploded ordnance
WWI	World War I
WWII	World War II
°F	Degrees Fahrenheit

GLOSSARY OF TERMS

Closed Range – A military range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a Department of Defense (DoD) component.

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

Discarded Military Munitions (DMM) – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded explosive ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations.

Explosive Ordnance Disposal (EOD) – The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance by a military response unit. It may also include explosive ordnance that has become hazardous by damage or deterioration.

Explosives Safety – A condition where operational capability and readiness, personnel, property, and the environment are protected from unacceptable effects of an ammunition or explosives mishap.

Formerly Used Defense Site (FUDS) – A DoD program that focuses on compliance and cleanup efforts at sites that were formerly used by the DoD. A FUDS property is eligible for the Military Munitions Response Program if the release occurred prior to October 17, 1986; the property was transferred from DoD control prior to October 17, 1986; and the property or project meets other FUDS eligibility criteria.

Military Munitions – All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the DoD, the U.S. Coast Guard, the U.S. Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes and incendiaries, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition,

small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components of the above. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitation operations under the Atomic Energy Act of 1954 have been completed.

Munitions and Explosives of Concern (MEC) – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means unexploded ordnance, DMM, or munitions constituents (e.g., Trinitrotoluene [TNT] or Cyclotrimethylenetrinitramine [RDX]) present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC) – Any materials originating from unexploded ordnance, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris – Inert items that do not contain explosive material, and therefore, do not qualify as MEC.

Operational Range – A range that is under jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities or, although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to new use incompatible with range activities.

Other than Operational Range – Encompasses closed, transferred, and transferring ranges.

Range – A designated land or water area set aside, managed, and used for range activities of the DoD. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access and exclusionary areas, and airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration.

Transferred Range – A range that is no longer under military control and had been leased by the DoD, transferred, or returned from the DoD to another entity, including federal entities. This includes a military range that was used under the terms of an executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager. Additionally, property that was previously used by the military as a range, but did not have a formal use agreement, also qualifies as a transferred range.

Transferring Range – A range that is proposed to be leased, transferred, or returned from the DoD to another entity, including federal entities. This includes a military range that was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager or property owner. An active range will not be considered a transferring range until the transfer is imminent (generally defined as the transfer date is within 12 months and a receiving entity has been notified).

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

1. INTRODUCTION

Congress established the Military Munitions Response Program (MMRP) in 2002 under the Defense Environmental Restoration Program (DERP) to address Department of Defense (DoD) sites with unexploded ordnance (UXO), discarded military munitions (DMM), and munitions constituents (MC) located on current and former military installations. Sites that are not eligible for the MMRP include: sites that had releases after September 30, 2002, properties classified as operational military ranges, permitted disposal facilities, and operating munitions storage facilities. The United States (U.S.) Army's (Army) inventory of closed, transferring, and transferred (CTT) military ranges and defense sites with UXO, DMM, or MC identified sites eligible for action under the MMRP. At Devens Reserve Forces Training Area (DRFTA), 10 Munitions Response Sites (MRSs) were preliminarily identified in the *CTT Range Inventory Report* (Malcolm Pirnie, 2003). DRFTA is the portion of the former Fort Devens that remains in Army control after the 1991 Base Realignment and Closure (BRAC). This report presents the findings of the Historical Records Review (HRR) for DRFTA, which is being prepared to support the Site Inspection (SI) of MMRP eligible sites. During the course of performing the HRR, the findings of the *CTT Range Inventory Report* were refined, and changes to the MRS characteristics are detailed herein.

The DoD is currently establishing policy and guidance for munitions response actions under the MMRP. Key program drivers developed to date, direct that munitions response actions will be conducted under the process outlined in the National Contingency Plan (40 Code of Federal Regulations [CFR] 300) as authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 United States Code (U.S.C.) 9065, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99-499 (hereinafter CERCLA). The DoD objective is to address the MMRP sites in accordance with CERCLA.

The MRS inventory at the former Fort Devens had two components: one for the BRAC property, and one for DRFTA (i.e., non-BRAC). The former was reported in the *Fort Devens BRAC Property CTT Range Inventory Report* (URS, 2003). The DRFTA *CTT Range Inventory Report* (Malcolm Pirnie, 2003) marked the completion of the Preliminary Assessment (PA) phase of work under CERCLA, and the next phase of the MMRP is the execution of the SI.

1.1. PURPOSE/SCOPE

The purpose of the HRR is to perform a records search to document historical and other known information for DRFTA MMRP sites. Records will be searched for information on UXO, DMM, or MC at potentially explosive levels; collectively these are known as

Munitions and Explosives of Concern (MEC). This information will be used to supplement the *CTT Range Inventory* information, and to facilitate decisions on what information is needed to determine the next steps in the CERCLA process. The SI will be conducted following completion of the HRR report.

1.2. PROJECT DRIVERS

Federal, State, and Local laws, as well as DoD and Army regulations and guidance provide the regulatory structure for managing MMRP sites at DRFTA. The final structure of the MMRP is uncertain, as DoD and the U.S. Environmental Protection Agency (EPA) are still resolving key issues at the national level. However, key legislative and administrative precedents will influence the final regulatory framework for the MMRP, and these items include:

Defense Environmental Restoration Program (DERP) Management Guidance (September 2001)

The DERP Management Guidance establishes a MMRP component for MEC defense sites. DERP dates back to the SARA of 1986, and the scope of the DERP are defined in 10 U.S.C. §2701(b), which states that the:

Goals of the program shall include the following: ... (1) The identification, investigation, research and development, and cleanup of contamination from hazardous substances, pollutants, and contaminants. (2) Correction of other environmental damage (such as detection and disposal of unexploded ordinance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment.

National Defense Authorization Act (Fiscal Year [FY] 02) (Sections 311-312)

Sections 311-312 of the National Defense Authorization Act of FY02 tasked DoD to develop and maintain an inventory of defense sites that are known or suspected to have MEC or MC. Section 311 required DoD to develop a protocol for prioritizing defense sites for response activities in consultation with the states and Tribes. Section 312 requires the DoD to create a separate program element to ensure that the DoD can identify and track munitions response funding.

Munitions Response Site Prioritization Protocol (MRSP) (32 CFR Part 179)

The MRSP was promulgated in October 2005, in compliance with Section 311 of the National Defense Authorization Act of FY02. This protocol provides the method by which

DoD will assign a relative priority for munitions responses to each MRS in the inventory of defense sites known or suspected of containing MEC or MC.

The September 2001 Management Guidance for the DERP and the Defense Authorization Act FY02, described above, established the MMRP. The DERP and the MMRP provide guidance and methods for conducting a baseline inventory of defense sites containing, or potentially containing, MEC or MC, and the MRSPP provides the method for DoD to assign a relative priority for subsequent munitions response. Data collected during the SI will be used to prepare the MRSPP for each MRS.

1.3. BACKGROUND

The *CTT Range Inventory Report* (Malcolm Pirnie, 2003) serves as the CERCLA PA phase of work. The SI is the subsequent phase in the CERCLA process. Upon completion of the SI, the PA/SI requirements for the MMRP sites will be considered complete.

1.3.1. Inventory

The Army conducted its Range Inventory in three phases. The first phase (Phase 1) involved a data call issued through the Army Environmental Command (AEC) requesting general information about ranges on various installations under each U.S. Army Major Command. The Phase 1 Range Inventory was conducted using a questionnaire named the Advance Range Survey (ARS). The ARS allowed the Army to meet the short-term data goal of supporting the DoD preparation of Senate Report 106-50.

The ARS for former Fort Devens was begun in late 2000 and completed in 2001 as part of the support for BRAC. The ARS found evidence for ranges, training, storage, and demolition areas at the former Fort Devens. The former Fort Devens ARS data was submitted to AEC and compiled into a master database of U.S. Army installations.

The ARS met the Army's BRAC needs; however, the long-term needs required a more detailed inventory that could not be obtained from information in the ARS. The follow-on inventory was divided into two phases. The Phase 2 Inventory addressed operational ranges (formerly referred to as active/inactive [A/I] ranges); whereas, the Phase 3 Inventory covered CTT ranges and sites with MEC or MC.

The *CTT Range Inventory Report* was completed for DRFTA in October 2003. The Phase 3 Inventory identified four closed rifle ranges, one closed antitank range, one closed explosives ordnance disposal (EOD) range, one closed hand grenade range, one transferred former mock village, one closed former training area, and one transferred range complex totaling 5,511 acres. One of these sites is eligible for the SI; additional detailed information regarding the results of the *CTT Range Inventory Report* is discussed in Sections 2.2 and 2.3.

1.3.2. Site Inspection

The primary goal of the MMRP SI is to collect information necessary to make one or more of the following decisions: 1) determine whether a Remedial Investigation/Feasibility Study (RI/FS) is required at the site; 2) determine whether an immediate response is needed; or 3) determine whether the site qualifies for no further action. The MMRP SI at DRFTA will address: 1) MEC, which includes UXO, DMM, and MC in high enough concentrations to pose an explosive hazard; and 2) MC issues for the MMRP sites. The secondary goals of the SI include collecting data to prepare better Cost to Complete (CTC) estimates and completing the MRSPP for each MMRP site in draft.

1.4. REPORT ORGANIZATION

This HRR has the following sections:

- Section 1 – Introduction
- Section 2 – Summary of Preliminary Assessment
- Section 3 – Data Collection and Document Review Process
- Section 4 – Summary of Findings
- Section 5 – Conceptual Site Model (CSM)
- Section 6 – Conclusions

The following supporting information and analyses are included in the HRR appendices:

- Archives Searched/Data Resources (Appendix A)
- Archive Documents (Appendix B)
- Munitions Technical Data Sheets (Appendix C)

2. SUMMARY OF PRELIMINARY ASSESSMENT

2.1. IN DEPTH CHRONOLOGICAL HISTORY OF INSTALLATION

DRFTA is located in Worcester and Middlesex Counties, 32 miles northwest of Boston and 26 miles east of Worcester, Massachusetts. The town of Ayer is two miles to the north. It currently occupies 5,052 acres of operational range and cantonment areas; as the former Fort Devens, it covered a substantially larger area, divided into the North Post, Main Post, and South Post (Figure 2-1). The *CTT Range Inventory Report* (Malcolm Pirnie, 2003), and the *Archives Search Report* (ASR; USACE-St Louis, 1995) were the primary sources of the following history.

Camp Devens was established in 1917 when the U.S. leased 11,000 acres of previously-undeveloped land as a temporary training camp for New England Area soldiers in World War I (WWI). It was named in honor of Civil War General and former U.S. Attorney General Charles Devens. The post processed approximately 100,000 men during WWI. The 76th and 12th Divisions trained at Camp Devens from August 1917 to November 1919. At the end of WWI, Camp Devens became a demobilization center, handling the separation of about 115,000 troops.

Following WWI, the U.S. government purchased most of the previously leased property. Between 1919 and 1921, the installation was expanded with the purchase of an additional 4,800 acres. From 1922 to 1931, Camp Devens was designated a summer training camp for the Reserve Officers Training Corps, Citizen's Military Training Corps, the National Guard, and U.S. Army Reserves. The Chemical Warfare Reserve of the First Corps Area operated a training school at Devens during this time. In 1929, the War Department granted R.H. Goddard, a scientist and rocket pioneer, permission to use the post as a test site.

In 1931, Camp Devens became a permanent post and was renamed Fort Devens. From 1931 until 1940, Fort Devens served as a training installation. Prior to U.S. involvement in World War II (WWII), 5,200 acres were purchased to expand the installation boundaries. This was accompanied by significant building expansion, including 1200 temporary buildings, two hospital complexes, and the Fort Devens Army Airfield (later renamed Moore Army Airfield).

Between 1940 and 1946, Fort Devens was used as an induction center for an estimated 650,000 soldiers for WWII. The fort hosted the 1st, 32nd, and 45th Divisions, a Women's Army Corps unit, the 4th Engineer Amphibian Brigade, and 366th Infantry Regiment. Approximately 5,000 German prisoners-of-war were interned at Devens from 1944 to 1946. Between August 1944 and January 1946, jurisdiction of the airfield was temporarily

transferred to the U.S. Navy. At the end of WWII, Fort Devens served as a demobilization center and, in 1946, was placed in caretaker status.

Following WWII, Fort Devens was used by the Massachusetts State College as a university extension, offering college degrees to returning veterans. It was returned to active status in the summer of 1948. During the Korean and Vietnam Wars, it was used as reception and separation center and as a training center for the 7th Regimental Combat Team. In the late 1960s a portion of the South Post was transferred to the U.S. Fish and Wildlife Service. The area is called the Oxbow National Wildlife Refuge and occupies 662 acres. It is classified as a Formerly Used Defense Site (FUDS) property. During Desert Storm, Fort Devens prepared active, reserve, and National Guard units for deployment to the Gulf. The installation was placed on the 1991 BRAC list for realignment as an Army Reserves facility. Prior to realignment, Fort Devens included 20,338 acres divided into North Post, Main Post, and South Post. It also had two other properties associated with it: Sudbury Training Annex and Hingham Annex. Both of those properties were investigated under BRAC.

Fort Devens was listed on the National Priorities List (NPL) on November 21, 1989. As a Superfund site, many portions of the site were investigated for hazardous contamination under CERCLA. Of the 324 initially identified sites, most have either advanced to a No Further Action (NFA) decision or have Records of Decision (RODs) signed which memorialize the Army's selection, the EPA's approval, and the State's concurrence of a remediation strategy for a site.

Fort Devens was officially closed as an active duty installation in 1996. One-day after closure it was reactivated as Devens RFTA. Under the BRAC program, 15,286 acres were disposed of to federal, state and private parties. MMRP sites on BRAC properties were inventoried separately and are not included in this report. Currently, Devens RFTA supports 25 reserve and active units. The remainder of the former Fort Devens was turned over to the Commonwealth of Massachusetts and is being redeveloped by MassDevelopment as a planned business community with significant residential, open space, and recreational development as well.

In 2007, after HRR activities were initiated, DRFTA's Range Control Officer identified an error in the footprint of the operational range area. The error was that the safety zone around the Ammunition Storage Point (ASP) had been coded non-operational range when, in fact, that property has continuously (and without interruption) been used for training.

2.2. PHASE 3 CTT RANGE INVENTORY

The *CTT Range Inventory Report* was completed for DRFTA in October 2003 by Malcolm Pirnie (Malcolm Pirnie, 2003). This report marked the completion of the PA phase of work

under CERCLA. The purpose of the *CTT Range Inventory* was to identify CTT ranges at the portion of the installation that remains under Army control after the BRAC transfer of property. The specific requirements of this investigation included: mapping CTT ranges and sites with MEC or MC; collecting and preparing the data for inclusion into Army databases; conducting an assessment of explosive safety risk using the Risk Assessment Code (RAC) on each CTT range or site; and determining which sites potentially qualify for the MMRP.

The *CTT Range Inventory Report* identified 10 CTT ranges totaling 5,511 acres including areas outside the installation's boundaries. The inventory identified four closed rifle ranges, one closed antitank range, one closed EOD range, one closed hand grenade range, one transferred former mock village, one closed former training area, and one transferred range complex. The ranges brought forward into the SI and their associated acreages are discussed in greater detail in the following section.

2.3. MMRP SITE DESCRIPTIONS

Ten MRSs were identified at DRFTA in the October 2003 *CTT Range Inventory Report*. Of these, two were deemed to be duplicates of MMRP sites already captured under the FUDS Program: the Former Mock Village, and Range Complex #4. These sites will be investigated and responded to under the FUDS Program (MA0587 – FT DEVENS). As these sites are eligible for another DoD program, they are ineligible for the Active Army MMRP and will not be addressed under this SI. Another location, the Former Flamethrower Range, was never designated as an MRS in the CTT Range Inventory Report. It was determined to be ineligible for MMRP because it did not involve firing of munitions. The remaining eight sites are eligible for further consideration, and are addressed in this HRR (Figure 2–2). These are:

- Devens Rifle Range #1 (9.1 acres)
- Devens Rifle Range #2 (27.5 acres)
- Devens Rifle Range #3A (136.5 acres)
- Devens Rifle Range #3B (14.0 acres)
- Former Antitank Range (13.6 acres)
- Former Explosive Ordnance Disposal Range (2.0 acres)
- Former Hand Grenade Range (1.0 acre)
- Former Training Area 22 (33.1 acres)

A RAC score, Army Environmental Database-Restoration (AEDB-R) number, and other site information for the eight *CTT Range Inventory Report* sites included in this SI HRR are summarized in Table 2–1.

The following description of each of the above sites is taken verbatim from the *CTT Range Inventory Report*. The site history and data will be refined in this HRR, and the italicized text is the point of departure for the subsequent analysis provided in Section 4 of this document:

DEVENS RIFLE RANGE #1- The Devens Rifle Range #1, or Range 1A as it was also known, was constructed on the northeastern part of the North Post in 1917 and covers all nine acres of the Devens RFTA 3800 parcel. It was identified by URS during their BRAC CTT inventory. The range fan for the whole range falls outside the installation boundary into BRAC property and partly into Range Complex #4, and covers 1,039.85 acres. The range was used as a rifle and machine gun range from 1917 to 1920. While historical documents record only small arms use, Stokes mortars were found within the range boundaries on the BRAC part of the property during a 1995 UXO sampling project, but outside of the current installation boundaries. No documentation was found indicating a UXO investigation has been performed inside the Devens RFTA 3800 Parcel, yet development of this area has occurred since the range was closed and no UXO have been found so far. The Devens 3800 Parcel has office buildings on it now. There is one DSERTS site associated with this range, but the studies done only focused on chemical contaminants.

DEVENS RIFLE RANGE #2 [renamed in Section 4.1.2, “Barnum Road Area”] -The Devens Rifle Range #2, or Range 3 as it was also called, was partly located on the North Post and partly located on the Main Post. It was identified by URS during their BRAC CTT inventory and its whole range fan occupied 782.94 acres. Part of the range fan is included in Range Complex #4. The closed part occupies 28 acres. The range was used as a rifle and machine gun range from 1942 to 1965. While historical documents record only small arms use, smoke grenades were found within the range boundaries on the BRAC property during a 1995 UXO sampling project, but outside of the current installation boundaries. No documentation was found indicating a UXO investigation has been performed inside the Devens

Table 2-1: CTT Range Inventory and Site Summary

Range/ Site Name	AEDB-R Number	Status	Total Area (Acres)	Munitions Type(s)	RAC Score
Devens Rifle Range #1	FTDV-001-R-01	Closed	9.1	Mortars, High explosives (HE), Small arms	3
Devens Rifle Range #2, Barnum Road Area*	FTDV-002-R-01	Closed	27.5	Hand grenades, Small arms	4
Devens Rifle Range #3A	FTDV-003-R-01	Closed	136.5	Hand grenades, HE, Live land mines, Small arms, Anti-personnel (A/P) mortars	2
Devens Rifle Range #3B	FTDV-004-R-01	Closed	14.0	Hand grenades, HE, Live land mines, Small arms, A/P mortars	2
Former Antitank Range	FTDV-005-R-01	Closed	13.6	Ground rockets, Rifle grenades, Live hand grenades, Live landmines, Large caliber (37mm and larger), HE mortars, HE pyrotechnics, Small arms, Chemical munitions	1
Former EOD Range	FTDV-006-R-01	Closed	2.0	Blasting caps, Fuzes, Boosters/bursters, Detonators, Ground rockets, Rifle grenades, Live hand grenades, Practice landmines, Large caliber, HE, Mortars, Pyrotechnics, Practice ordnance, Less sensitive explosives (ammonium nitrate), Secondary explosives (PETN, CMP ABC, Teteryl, TNT, RDX, HMX, HBX, black powder), Small arms, Chemical munitions	2
Former Hand Grenade Range	FTDV-007-R-01	Closed	1.0	Live hand grenades, Smoke and practice grenades	3
Former Training Area 22	FTDV-009-R-01	Closed	33.1	Small arms (blanks), Pyrotechnics	3

*Based on HRR Findings in Section 4.1.2, Devens Rifle Range #2 is renamed the Barnum Road Area.

RFTA 3700 Parcel, yet development of this area has occurred since the range was closed and no UXO have been found so far. The range now occupies the Devens RFTA 3700 Parcel, which has maintenance facilities on it. There are four DSERTS sites (FTDV-038, FTDV-044, FTDV-052, FTDV-057) associated with this range, but the studies done only focused on chemical contaminants and did not address UXO. All required cleanups have been completed at all sites except FTDV- 057, where the remedial action construction and operation phases are currently underway.

DEVENS RIFLE RANGE #3A - The Devens Rifle Range #3A, or Range 11 as it was also known, was constructed on the Main Post in 1942 and it covers all 137 acres of the Main Cantonment. The whole range fan, identified by URS during their BRAC CTT inventory and partly included in Range Complex #4, occupied 698.31 acres. The range was used as a rifle and machine gun range from 1942 to 1953, and as a pistol range from 1954 to 1965. While historical documents record only small arms use, Stokes mortars, hand grenades, and anti-personnel (A/P) mines were found within the range boundaries on the BRAC property during a 1995 UXO sampling project, but outside of the current installation boundaries. No documentation was found indicating a UXO investigation has been performed inside the Devens Main Cantonment area, yet development of this area has occurred since the range was closed and no UXO have been found so far. The Main Cantonment area has office buildings and maintenance buildings on it. There are three DSERTS sites (FTDV- 075, FTDV-076, FTDV-077) associated with this range, but the studies done only focused on chemical contaminants and did not address UXO. All studies have been completed at all three sites, and cleanup has been completed at FTDV-076. Long term monitoring is currently underway at FDTV-077¹.

DEVENS RIFLE RANGE #3B - The Devens Rifle Range #3B, or Range 11 as it was also known, was constructed on the Main Post in 1942 and it covers all 14 acres of the Devens RFTA 1400 parcel. The whole range fan, identified by URS during their BRAC CTT inventory and partly included in Range Complex #4, occupied 698.31 acres. The

¹ According to DRFTA environmental personnel, FDTV-077 is also known at Area of Concern (AOC) 43G.

range was used as a rifle and machine gun range from 1942 to 1953, and as a pistol range from 1954 to 1965. While historical documents record only small arms use, Stokes mortars, hand grenades, and anti-personnel (A/P) mines were found within the range boundaries on the BRAC property during a 1995 UXO sampling project, but outside of the current installation boundaries. No documentation was found indicating a UXO investigation has been performed inside the Devens RFTA 1400 Parcel, yet development of this area has occurred since the range was closed and no UXO have been found so far. The Devens RFTA 1400 Parcel has office buildings on it. The range fan is based on the surface danger zone (SDZ) for the Machine Gun, Automatic Rifle, 1000-inch and Pistol Range, which was used by URS in their maps for the BRAC Fort Devens CTT inventory report.

FORMER ANTITANK RANGE - The Former Antitank Range, or Range 12 as it was also known, was constructed on the Main Post in 1942 and part of it covers all 14 acres of the Devens RFTA Motor Pool Annex area. The whole range fan, identified by URS during their BRAC CTT inventory, occupies 433.73 acres. The range was used as an antitank range from 1942 to 1956, and as a shotgun range from 1957 to 1960. While historical documents record only small arms use, Stokes mortars, 37mm and 75mm projectiles, hand grenades, rifle grenades, chemical mortars, various pyrotechnics, and A/P mines were found within the range boundaries on the BRAC property during a 1995 UXO sampling project, but outside of the current installation boundaries. No documentation was found indicating a UXO investigation has been performed inside the Devens RFTA Motor Pool Annex area. There is one DSERTS site associated with this range, but the studies done only focused on chemical contaminants.

FORMER EOD RANGE - This is an old explosive ordnance disposal (EOD) area located in the northern part of the South Post. The range occupied two acres. The area was used from 1940 to 1957 to destroy faulty and excess munitions. Munitions used on the range to destroy other munitions would have included blasting caps, detonators, TNT, and C3. It is assumed that any munitions types used or found in other ranges on this installation could potentially have been disposed of at this range. Therefore, munitions that may have been disposed of in this area are hand grenades, rifle grenades, landmines, pyrotechnics,

chemical mortars, small arms and large caliber. The area now has a field laser radar demonstration area on it. No documentation was found to indicate a UXO survey has been performed on the property.

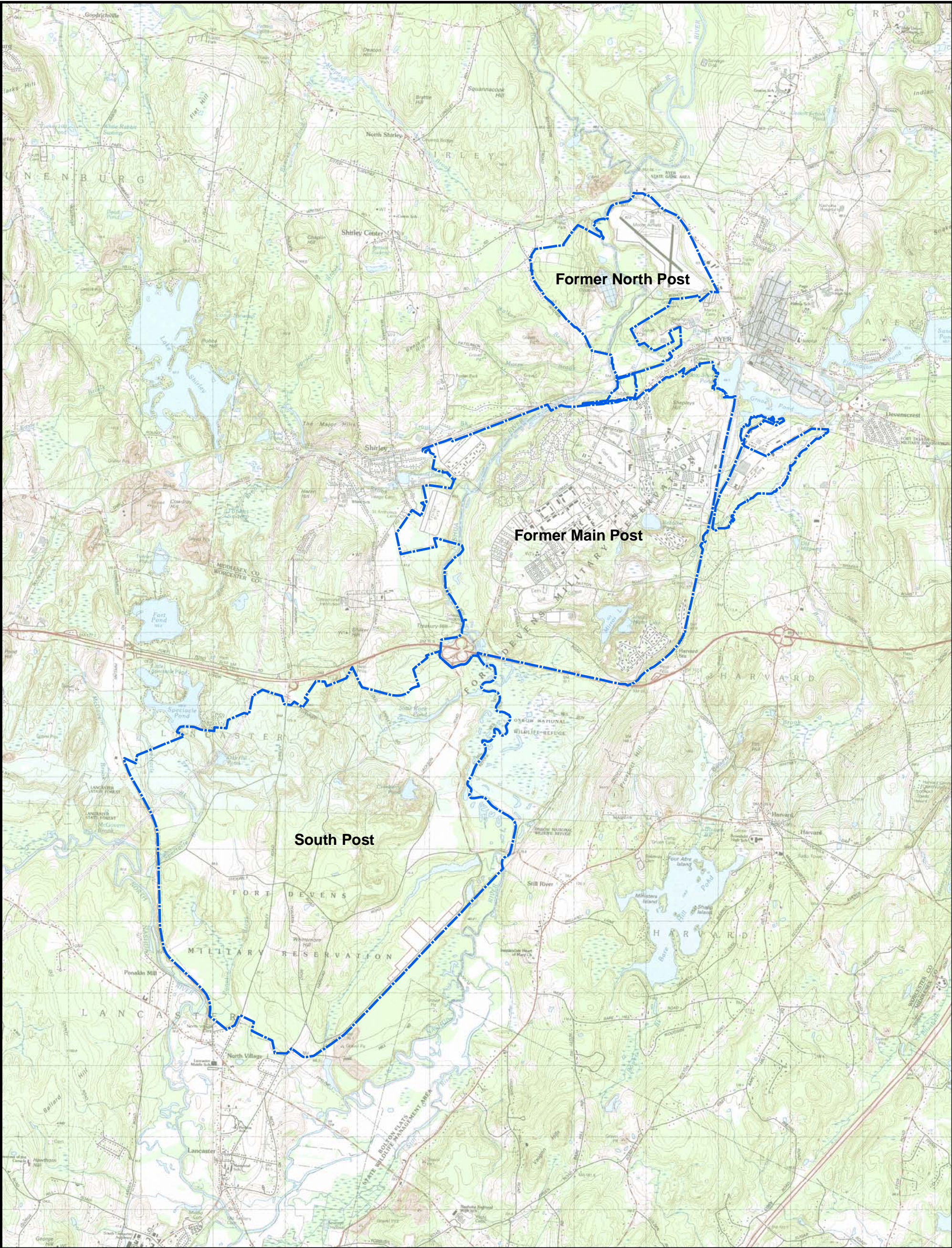
FORMER HAND GRENADE RANGE -This is an old hand grenade court that was located on the northwest area of the South Post, southwest of the Former EOD Range. The court occupied one acre and was used from 1940 to 1965. Munitions used on it were most likely live hand grenades, although smoke hand grenades and practice hand grenades could have also been used. A helipad and a jump tower are now located on the area of the former grenade court. Records indicate that a UXO clearance was done in a portion of the range in the 1970s for the purpose of converting it to a medical stretcher obstacle training course. This range is associated with DSERTS site FTDV-028. The preliminary assessment and site inspection phases have been completed at this DSERTS site. It was declared response complete in 1993 when all studies were completed and it was determined that no cleanup was required. Based on a review of the No Further Action Decision Document, it is evident that the studies done at FTDV-028 focused only on chemical contaminants from two waste explosive burn pits located in the A/I area adjacent to the grenade range. The only UXO clearance survey was conducted at the burn pits, to allow safe access to them for the purpose of taking soil samples. No UXO clearance was done in the area of the former hand grenade range. The studies done at this DSERTS site did not focus on UXO and did not address the grenade range area.

FORMER TRAINING AREA 22 -The Former Training Area 22 was located on what is now the Devens RFTA 3400 Parcel, on the western part of the former Main Post boundary. The training area occupied 33 acres and was in use from 1950 to 1965. Munitions used in this area were probably small arms blank ammunition and pyrotechnics. The Devens RFTA 3400 Parcel houses administration buildings, warehouses, and other installation facilities. No documentation was found to indicate a UXO survey has been performed on the property, and no munitions have been reported found on the property.

As part of the CTT Range Inventory Report, an assessment of explosive safety risk was conducted for each of the identified sites. The RAC process required the completion of a

worksheet that consisted of a series of questions regarding each CTT range or site. Based on the results of the worksheet, a relative score (RAC score) was assigned for each area. The RAC score is an estimate of the relative explosives safety risk, which was reported as a number from one (high explosives safety risk) to five (negligible explosives safety risk).

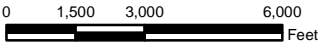
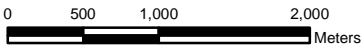
As identified in the *CTT Range Inventory Report*, these areas constitute most of the non-operational range acreage of DRFTA. As described in Section 4.1.2, “Devens Rifle Range #2” is a misnomer and the more properly descriptive title “Barnum Road Area” is recommended in this report. Also in Section 4, the site history and eligibility for MMRP is refined based on additional research in this HRR.



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200 Orchard Ridge Drive
Gaithersburg, MD 20878



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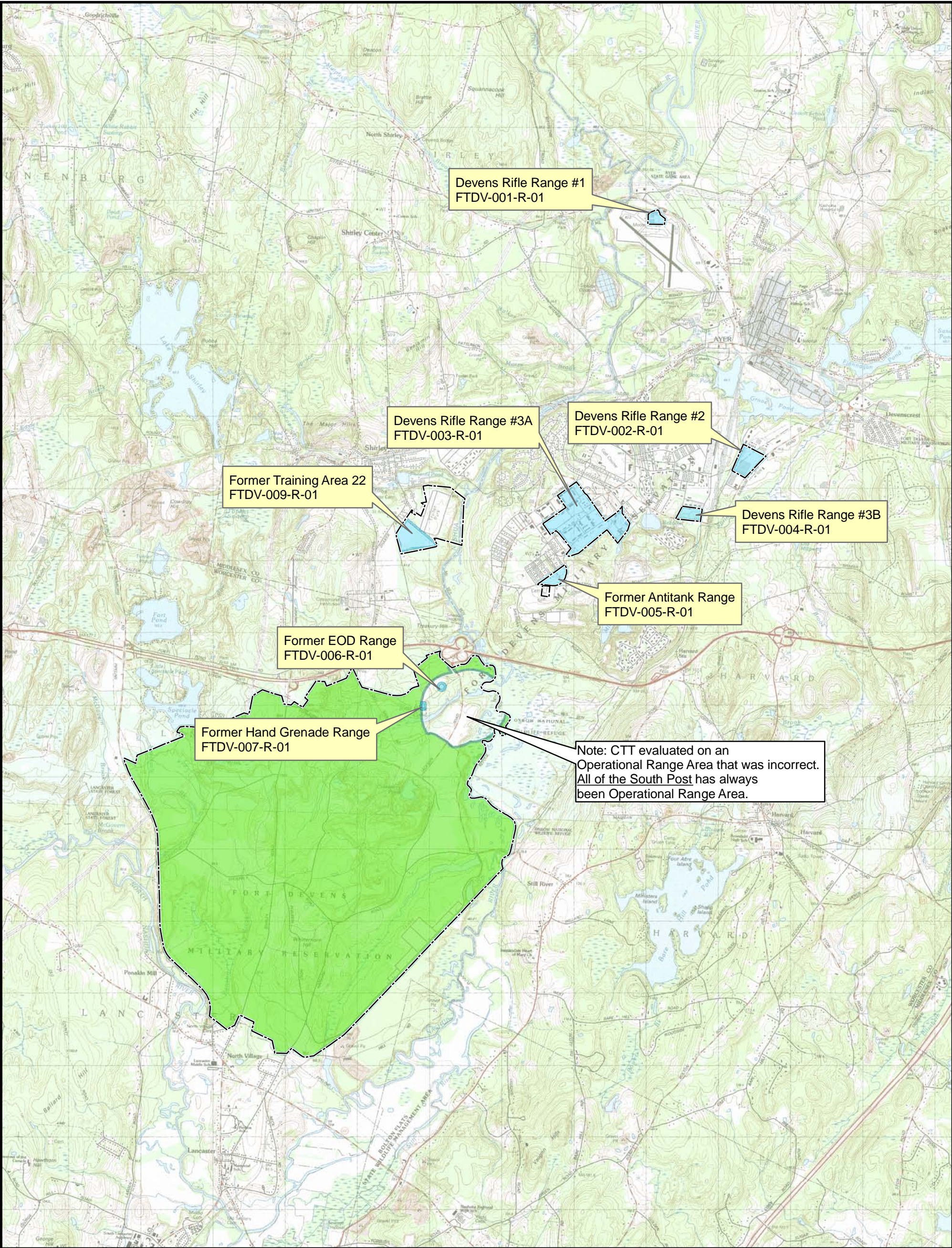


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Revised Final HRR\Fig_2-01_Pre_BRAC_20070208.mxd
Date: 01/29/08
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Revised: DJM
Checked: LS
Senior: LS

Legend

 Pre-BRAC Installation Boundary

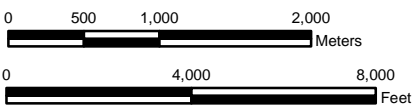
Figure 2-1
Pre-BRAC Installation Boundary
Devens RFTA, MA



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Gaithersburg, MD 20878



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Legend

- CTT Site - Closed
- Operational Range Area - as per CTT
- Installation Boundary

Figure 2-2
CTT Range Inventory Sites
Devens RFTA, MA

3. DATA COLLECTION AND DOCUMENT REVIEW PROCESS

Five primary sources of information were researched as part of the data collection effort for the HRR. The types of data included:

1. National and regional archives record group (RG) search;
2. Installation site visits;
3. Review of existing Archives Search Reports and administrative records for adjacent FUDS associated with DRFTA;
4. Interviews; and
5. Review of the *CTT Range Inventory Report* and backup data.

3.1. DATA COLLECTION METHODS

3.1.1. National and Regional Archives

Relevant archival record repositories and RGs were selected based on guidance set forth in the *Technical/Regulatory Guideline for Munitions Response Historical Records Review*, prepared by the Interstate Technology & Regulatory Council (ITRC) Unexploded Ordnance Team and based on the process developed by the U.S. Army Corps of Engineers (USACE) for performing Archives Search Reports (guidance provided at <http://www.mvs.usace.army.mil/engr/ed-p/asr.htm>). The archival repositories and RGs that were searched for this HRR are listed below. The search of archival repositories, national and local, produced many useful results concerning the former Fort Devens. Archival research services were provided by Heritage Research Center, Ltd. and the findings and sources consulted were summarized in a report dated September 2006. The report is presented in Appendix A.

- National Archives and Records Administration – College Park, MD

Textual Branch

- RG 51, Bureau of the Budget
- RG 77, Office of the Chief of Engineers
- RG 92, Office of the Quartermaster General
- RG 94, Records of the Adjutant General's Office, 1780s-1917
- RG 107, Office of the Secretary of War
- RG 111, Office of the Chief Signal Officer

- RG 156, Office of the Chief of Ordnance
- RG 159, Office of the Inspector General
- RG 160, Headquarters Army Service Forces
- RG 165, War Department General and Special Staffs
- RG 168, National Guard Bureau
- RG 175, Records of the Chemical Warfare Service
- RG 177, Chiefs of Arms
- RG 319, Army Staff
- RG 330, Records of the Department of Defense
- RG 334, Inter-Service Agencies
- RG 335, Office of the Secretary of the Army
- RG 337, Army Ground Forces HQ
- RG 338, U.S. Army Commands, 1942-
- RG 341, HQ, U.S. Air Force
- RG 393, U.S. Army Central Command, 1821-1920
- RG 394, U.S. Army Continental Commands, 1920-42
- RG 407, Adjutant General's Office
- RG 429, Organizations in the Executive Office of the President
- RG 546, U.S. Army Continental Command, 1945-

Cartographic Branch

- RG 30, Bureau of Public Roads
- RG 77, Office of the Chief of Engineers
- RG 92, Office of the Quartermaster General
- RG 394, U.S. Army Continental Commands, 1920-42

Still Picture Branch

- RG 77, Office of the Chief of Engineers
- RG 92, Office of the Quartermaster General

- RG 111, Chief Signal Officer of the U.S. Army
 - RG 319, Army Staff
- National Archives and Records Administration – New England Region, Waltham, MA
 - RG 121, Public Buildings Service
 - RG 269, General Services Administration
 - RG 270, War Assets Administration
 - RG 291, Federal Property Resource Service
- Military History Institute, Carlisle Barracks, PA

3.1.2. Web Search

In addition to the data sources listed above, research was conducted on the internet to supplement archival data and data obtained from the installation. Some of the internet sources that were searched for this HRR are those specified in the ITRC *Technical/Regulatory Guidelines for Munitions Response Historical Records Review*, November, 2003. Appendix B of the ITRC guidance document lists web sources of HRR information (DoD, other federal government, and local government) that should be considered for inclusion in the HRR. Each of the ITRC recommended sites was visited; in addition, URS performed an internet search of key terms. A complete list of all web sources that were reviewed and the type of information found is located in Appendix A.

Internet sources provided primarily general information about DRFTA, and specific information never contained historic details regarding training or firing at the ranges or sites. Site specific details from the internet search, where applicable, are provided in the detailed MRS descriptions in Section 4. Because the former Fort Devens is on the NPL, substantial information on the status of IRP investigations is available on line at http://yosemite.epa.gov/r1/npl_pad.nsf/f52fa5c31fa8f5c885256adc0050b631/DF7D910FF9A93FAB8525691F0063F6C9?OpenDocument.

3.1.3. Site Visits

Concurrent with the kick-off meeting, a site visit to DRFTA was conducted by URS to review available data for this SI HRR. URS and Scott Weber (AEC) were hosted by Bob Simeone on a site visit prior to the kick-off meeting on September 28, 2006. The site visit was primarily a windshield tour of sites. The site visit began at the South Post, part of which is still operational range. URS asked at the Range Control Office upon check-in whether

they had historical materials, such as operations manuals for ranges. The desk officer stated that they did not have such records, and wished that they did. Two of the sites are in the non-operational range area of the South Post: the Former Hand Grenade Range and an EOD Range. Both are reached by taking a right onto Attu Road after entering the South Post. The Former Hand Grenade Range was modified into a Medical Litter Obstacle Course; Scott Weber identified a grenade pin and a blank shell during the visit. Wooden structures and obstacle course signage remain at the site. The former EOD Range is across Attu Road and appears to be a series of shallow pits. The land surface is hummocky, and there are 15 to 20 year old pine trees here. The exact location of demolition activities was not certain at the time of the site visit. Back at the former Main Post, the Former Training Area 22 (3400 Parcel) was visited. It is not surrounded by a fence. The windshield survey did not determine the presence of any older structures at Former Training Area 22. The North Post by Moore Airfield was visited. The location of Devens Rifle Range #1 was viewed. No indications of a potential rifle or machine gun range were apparent. The former parachute washing building was viewed from the exterior.

The remaining sites were visited by Rosa Gwinn earlier in the day. Devens Rifle Range #2 (renamed Barnum Road Area) is an extended paved area for vehicle parking with some buildings at the north edge of the parking area. The railroad line lies to the west of the area beyond a narrow wooded area. The Former Antitank Range is now paved with some indication of construction. The ostensible location of Devens Rifle Range #3A is mostly paved with buildings associated with Army Reserve units. The current Main Cantonment was the supposed location of Devens Rifle Range #3B; it remains a central administrative area.

In addition to the windshield tour, the environmental resources library at DRFTA was visited to review relevant installation materials for completing the HRR and to develop the CSMs. While onsite, URS and AEC team members reviewed environmental reports, documents, aerial photographs and maps. A summary of the information collected during the site visit is presented in Sections 3.2.1 through 3.2.4.

3.2. ARCHIVAL/HISTORICAL AND OTHER RECORDS COLLECTED

The following subsections present the data collected from the sources outlined in Section 3.1. Although additional records may have been reviewed from the sources presented in the previous sections, the records listed in this section represent the data that were determined to be applicable to the HRR and the development of the CSMs for the DRFTA sites.

3.2.1. Documents/Reports

Table 3–1 lists documents that provided relevant information regarding former ranges and training areas within DRFTA. Although every document in the ASR and from the Archives Search was reviewed, each individual item is not listed in Table 3-1.

3.2.2. Archival Records

The Heritage Archives Search obtained 45 individual maps, letters, memoranda, and photographs regarding the former Fort Devens (Appendix A). In addition to the Heritage Archives Search, the ASR (USACE-St. Louis, 1995) contained a significant body of correspondence regarding the history of Fort Devens.

Archive documents and materials are included electronically as Appendix B.

Table 3-1: Summary of Documents and Relevant Information

Document Name	General History	General Installation Information	Munitions Use	MC
<i>Final Ordnance and Explosives Archives Search Report, USACE-St. Louis District, September 1995</i>	X	X	X	
<i>Preliminary Assessment Site Inspection/Supplemental Site Investigation Comprehensive Report Study Area – Grant, Locust, Cavite Housing Areas, Former Fort Devens Army Installation, Devens, Massachusetts, Weston 2006.</i>		X		
<i>Metals in Soil Investigation in Support of Arsenic Background Study, Nobis Engineering, Inc. January 2004</i>		X		
<i>Soil Arsenic Background Study at Former Fort Devens, Devens, Massachusetts, USACE-New England District, April 2005</i>	X	X		
<i>Installation Assessment Fort Devens Massachusetts, EPA May 1982</i>		X		
<i>Installation Assessment Fort Devens Massachusetts, UEPA May 1991</i>	X	X		
<i>Historic and Prehistoric Reconnaissance Survey Fort Devens (Main Post, North Post, South Post) Massachusetts, The Public Archaeology Laboratory, Inc. August 1989</i>	X	X		
<i>Standard Operating Procedures, All Ranges, Fort Devens, January 1954</i>	X	X	X	
<i>Military Police Reports of Found Munitions, November 1990-1994</i>	X	X	X	
<i>Ordnance & Explosives Removal for the Bureau of Prisons Parcel, Fort Devens, Massachusetts, HFA 1995</i>			X	
<i>No Further Action Decision Under CERCLA, Study Area 28, Waste Explosives Detonation Range (Training Area 14), Fort Devens, Massachusetts, Final Remedial Action Report, Areas of Contamination 44 & 52, Devens, Massachusetts, MACTEC September 2005,</i>				X

Document Name	General History	General Installation Information	Munitions Use	MC
ABB, 1994				
<i>Final Removal Action Report, Ordnance Ammunition & Explosives Removal Action, Devens RFTA, Fort Devens, Massachusetts, HFA 1996</i>			X	

3.2.3. Maps/Drawings

Maps and drawings were obtained from DRFTA and/or the National Archives. The ASR contained numerous maps and drawings. URS contracted with a regulatory database company, Environmental Data Resources, Inc. (EDR), which provided topographic maps dating back to 1893. A complete listing of maps reviewed for this HRR is provided in Table 3-2. All maps and drawings are including electronically in Appendix B.

Table 3-2: Summary of Maps and Drawings

Map Name, Date	Map ID	General Installation Information	Map Coverage Includes Range Areas	Ranges of Concern Shown
Main Post (Rifle and Machine Gun Ranges), 1917	ASR H-1	X	X	X
Camp Devens (Artillery Batteries), 1918	DRT00011	X	X	
North and Main Posts (Ordnance Storage Area), 1919	ASR H-2	X	X	
Camp Devens Reservation Map, 1919	DRT00330	X	X	X
Main Post (Hand Grenade Practice Range), 1934	ASR H-3	X	X	X
General Map of Reservation, 1941	None	X	X	
North, Main and South Posts (Target Range Areas), 1942	ASR H-4	X	X	X
North Post (Fort Devens Airfield), 1945	ASR H-5	X	X	X
North, Main and South Posts (Target Range Areas), 1948	ASR H-6	X	X	X
Main Post (Magazine Area), 1952	ASR H-7	X		
Main Post (Chemical Warfare Storage), 1952	ASR H-8	X		
Main Post (Skeet Shooting Range), 1952	ASR H-9	X		
Main Post (Storage Buildings-Ordnance), 1952	ASR H-10	X		
Main Post (Ammo Loading Shelter), 1952	ASR H-11	X		
Main Post (Ordnance Magazines, Pyrotechnic Magazine), 1952	ASR H-12	X		
Main Post (Igloo), 1952	ASR H-13	X		
North Post (Magazine), 1952	ASR H-14	X		
North Post, 1952	ASR H-15	X	X	X
North, Main and South Posts (Ranges and Training Areas), 1954	ASR H-16	X	X	X
North, Main and South Posts (Ranges and Training Areas), 1957	ASR H-17	X	X	X
North, Main and South Posts (Ranges and	ASR H-18	X	X	X

Map Name, Date	Map ID	General Installation Information	Map Coverage Includes Range Areas	Ranges of Concern Shown
Training Areas), 1961				
North Post (General Site Map), 1970	DRT000269	X	X	
South Post (Ranges), 1970	ASR H-19 DRT00263	X	X	X
Ranges and Training Facilities (Tracked Vehicle Access Roads), 1975	DRT00045	X	X	
South Post (Range Areas), 1985	DRT00024	X	X	
North and Main Posts, 1986	ASR H-20	X	X	X
USGS 7.5 minute quadrangle, Groton, 1893	EDR	X	X	X
USGS 7.5 minute quadrangle, Groton, 1936	EDR	X	X	X
USGS 7.5 minute quadrangle, Ayer, 1949	EDR	X	X	X
USGS 7.5 minute quadrangle, Ayer, 1966	EDR	X	X	X
USGS 7.5 minute quadrangle, Ayer, 1979	EDR	X	X	X
USGS 7.5 minute quadrangle, Ayer, 1986	EDR	X	X	X
USGS 7.5 minute quadrangle, Shirley, 1936	EDR	X	X	X
USGS 7.5 minute quadrangle, Shirley, 1965	EDR	X	X	X

3.2.4. Photographs/Aerial Photographs

A search of the Cartographic and Aerial Photography branch of the National Archives and Records Administration in College Park, Maryland, conducted by Heritage Research Center, Ltd. identified several Farm Service Agency photographs from 1952.

EDR provided aerial photographs from 1977, 1985, 1986, and 1995. Aerial photographs were found at the installation library, and the ASR contained photographs from 1922, 1943, 1951, 1965, 1980, and 1994.

In addition, two aerial photographic assessments of Fort Devens were performed for the U.S. Environmental Protection Agency (EPA, 1982 and 1991). Photographic coverage of sites of concern was available from 1922 to 1994; many of these images were used in the ASR. A listing of aerial photographs is provided in Table 3–3. All photographs are provided electronically in Appendix B.

Table 3-3: Summary of Aerial Photographs

Aerial Photograph, Date	Photo ID
Former Anti-tank Area	DRT00404
Devens Rifle Range #2 (Barnum Road Area)	DRT00406
Devens Rifle Range #1	DRT00408
Devens Range Complex #4	DRT00410
Former Flame Thrower Range	DRT00412 DRT00414
National Archives Aerial, 1947	No ID, from DRFTA Files
National Archives Aerial, 1943	No ID, from DRFTA Files
Fort Devens Ranges, June 1943	EPA, 1991 Fig. 32
Fort Devens Ranges, August 1952	EPA, 1991 Fig.33

Aerial Photograph, Date	Photo ID
Fort Devens Ranges, April 1965	EPA, 1991 Fig. 34
Fort Devens Ranges, May 1972	EPA , 1991 Fig. 35
Fort Devens Ranges, May 1980	EPA, 1991 Fig. 36
Fort Devens Ranges, March 1991	EPA, 1991 Fig. 37
Fort Devens Aerial, 1922	EPA 1982
Fort Devens Aerial, 1943	EPA 1982
Fort Devens Aerial, 1952	EPA 1982
Fort Devens Aerial, 1965	EDR 1965
Fort Devens Aerial, 1977	EDR 1977
Fort Devens Aerial, 1985	EDR 1985
Fort Devens Aerial, 1986	EDR 1986
Fort Devens Aerial, 1995	EDR 1995

3.2.5. Interviews

Ten interviews were conducted in 1995 for the *ASR*. These interview sheets are included as part of the *ASR* in Appendix B. The most valuable interviews were those with installation personnel addressing munitions finds. The *ASR* recorded the interview with Phil Morris, Public Affairs officer in 1994. He stated that in the past Stokes mortars had been found in Mirror Lake and that artillery shells were found at a playground; both of these are in the BRAC parcel. He also stated that the Gas Chamber on South Post used tear gas only. This is in the current operational range area. The *ASR* also reported the interview with Tom O'Donnell, 14th EOD retired. He noted numerous occurrences of ordnance having been found in the past. He stated that only two chemical rounds had been found since 1985: one in the golf course (BRAC area on Main Post), and one from within a training room. Pertinent to the DRFTA areas, Mr. O'Donnell stated that unfuzed and possibly sand-filled Stokes mortars had been found around Barnum Road. The *ASR* places these reported finds near Devens Rifle Range #2 (renamed Barnum Road Area) on the summary figure.

URS contacted the Fort Devens Museum and interviewed Executive Director Ian Meisner. Mr. Meisner was familiar with historical documents, and especially recommended "Forging the Sword." This book, available in excerpt in the *ASR*, is a contemporary journalist's description of WWI activities at Fort Devens. Mr. Meisner was able to confirm reports of WWI mortars found beyond the post boundaries. He had no direct information of ranges in any of the Main Post locations identified in the *CTT Range Inventory Report*. He was familiar with a report of ordnance retrieved from Mirror Lake. His areas of interest included the location of the WWII prisoner-of-war (POW) barracks. He did not believe that prisoners were housed in the vicinity of Lovell General Hospital (i.e., near Former Training Area 22), because it was too small to accommodate the 5,000 POWs. However, POWs did work at the Hospital and many other locations at the fort.

3.3. SUMMARY OF OTHER PREVIOUS INVESTIGATIONS

The *CTT Range Inventory Report* was completed for DRFTA in October 2003 by Malcolm Pirnie (Malcolm Pirnie, 2003). The *CTT Range Inventory* identified ten CTT ranges at DRFTA; eight of these were recommended for additional evaluation under the MMRP. The specific requirements of this investigation included mapping, preparing data for ARID, conducting RAC, and determining which sites potentially qualify for the MMRP. The *CTT Range Inventory Report* identified 10 CTT ranges, eight of which were found to be eligible for this HRR. The *CTT Range Inventory Report* is summarized in Section 2.2, with substantial detail provided in Section 2.3. This information will not be duplicated here.

In addition to the *CTT Range Inventory Report*, many environmental studies have been performed at the former Fort Devens. Contaminated sites were studied under the IRP, which focused primarily on hazardous waste and only secondarily on munitions.

Based on the data repositories reviewed for the HRR, the following previous investigations were identified which contained information pertaining to munitions use and/or relevant environmental data at DRFTA.

Ordnance and Explosives Archives Search Report, Fort Devens, MA (USACE-St. Louis, 1995)

The objective of the *ASR* was to detail ordnance, ammunition, explosives, suspected chemical warfare material, and any other warfare material. This document is a comprehensive and exhaustive compilation of archival information for the historic military operations at the former Fort Devens. The *ASR* includes as appendices copies of the original source documents, such as maps, correspondence, and installation records (e.g., planning documents). These materials have proven helpful in determining the history of DRFTA ranges.

Installation Assessment, Fort Devens, Massachusetts (EPA, 1982 and 1991)

This aerial photographic analysis report was conducted with the intention of identifying hazardous waste sites at Fort Devens. In addition to identifying areas that may be associated with hazardous materials (e.g., ground scarring or landfill activities), this report provides multiple aerial photographs with images of ranges. The aerial photographic coverage is not of the entire facility, but does cover many decades of history. The interpretation is largely in the form of annotations on historical aerial photographs, and several ranges of concern are identified in these images.

Sampling Action Report, Ordnance Ammunition and Explosives Sampling Action, Fort Devens, Massachusetts (HFA, 1995)

Human Factors Applications, Inc. (HFA) performed a UXO sampling action at 28 areas with the former Fort Devens. The report presents the locations, types, and quantities of munitions or debris found at each of these sites. The sampling activity included the area of the 3700 Parcel, and the results are presented in detail in Section 4.2 of this report. Although the Technical Escort Unit from Aberdeen Proving Ground, MD, initially mobilized to provide support for chemical warfare materiel (CWM) encounters, during the course of site work it was determined that the threat of CWM was low enough that they were no longer needed on site.

Ordnance Ammunition and Explosives Removal Action at the Bureau of Prisons Parcel at Fort Devens, Massachusetts (HFA, 1995)

HFA was contracted to conduct an Ordnance Ammunition and Explosive Removal Action at the Bureau of Prisons parcel at Fort Devens. HFA conducted a subsurface clearance to a depth of four feet between August 1995 and September 1995. MEC was found and destroyed or removed from the site. Thirty-six live munitions were destroyed, 211 inert ordnance items were removed, 498 rounds of small ammunition were found, and 6,033 pounds of scrap were recovered and turned over to the Defense Reutilization and Marketing Office. This document provides information in the location of the former antitank range at this location.

Final Removal Action Report Ordnance Ammunition and Explosive Removal Action (HFA, 1996)

In October 1996, an Ordnance Ammunition and Explosive Removal Action was finalized by HFA. The subject areas included three sites: Site 1- Nashua River south of the sewage treatment area, Site 11-west of the Main Cantonment area, and Site 12 - northeast of the Main Cantonment area. None of these are within DRFTA today. Eight fuzed Stokes mortars were found at Site 1 while 14 fuzed Stokes mortars were found at Site 11. Munitions at Site 12 included 43 37mm fuzed projectiles, one M8 practice A/P landmine with a live flare, and one M127 A1 flare (ground signal).

Preliminary Assessment Site Inspection/Supplemental Site Investigation Comprehensive Report Study Area – Grant, Locust, Cavite Housing Areas, Former Fort Devens Army Installation, Devens, Massachusetts. (Weston 2006)

Weston performed a study of the former Grant, Locust, and Cavite Housing areas located in the towns of Ayer, Shirley, Harvard, and Lancaster, Massachusetts. These housing areas are located on the northern portion of the former Fort Devens. This area was undeveloped until the late 1950s when multi-family housing was constructed through the 1960s. The scope of

investigation was to look for pesticides, polychlorinated biphenyls, and arsenic from pesticide application. It was subsequently expanded to include lead, explosives, and perchlorate. The PASI identified that the housing areas Grant, Oak, and Maple overlapped an anti-tank range. The following synopsis relates that ordnance items were found in a subsequent site study.

Site Specific Final Report, Digital Geophysical Mapping (DGM) & Unexploded Ordnance (UXO) Removal, Former Grant Road Housing Area (Ordnance & Explosives Remediation, Inc., March 2006)

This report indicated the presence of intact ordnance items in the former Grant Housing Area. Prior MEC identification activities, but not DGM removal, had occurred at the site. The Grant Housing Area is not part of DRFTA; munitions concerns here are addressed under BRAC.

Intensive Archaeological Survey – Forty Acres within Area 14A – Modified Site Examinations of Two Historic Sites – Main Training Area, Devens Reserve Forces Training Area. (PAL 1998)

PAL, Inc. conducted an intensive archaeological survey and modified site examination of two parcels totaling 40 acres in the vicinity of the Route 2/Jackson Road cloverleaf interchange at the northern edge of the Devens RFTA South Post. The PAL archaeological parcels are close to an MRS considered herein, the Former EOD Range. Prior work at these two parcels had uncovered MEC (WWI-era grenade parts, lead shot, bullet casings of varying vintage, and mortar round fragments). During the modified site examinations conducted by PAL 164 test pits were dug, and 178 cultural materials were found – of which only four were reported as relating to firearms and ammunition (2 bullets and 2 unspecified items). A figure of the study area (Appendix B-1) shows an area entitled, “WWI Munitions Dump” in the area of the Former EOD Range, and within the current South Post operational range boundary. No significant archaeological resources were found and the PAL report recommended that no additional archaeological investigations be done at the site.

No Further Action Decision under CERCLA, Study Area 28, Waste Explosives Detonation Range (Training Area 14), Fort Devens, Massachusetts. (ABB, 1994)

This No Further Action Decision Document presents the results of a soil and groundwater investigation at Study Area 28, which is the location of the sites identified as the Former EOD Range and the Former Hand Grenade Range in the *CTT Range Inventory Report*. Study Area 28 is specified in the Federal Facilities Agreement between EPA and DoD as a potentially contaminated site. Field activities performed at the site in 1992 included ordnance clearing, soil excavation, subsurface soil sampling, monitoring well installation, and

groundwater sampling. Based the low levels of metals at the site, and the absence of organic compounds (volatiles, semivolatiles, or explosives), a No Further Action decision was reached by EPA under CERCLA.

4. SUMMARY OF FINDINGS

4.1. MMRP SITE FINDINGS

Detailed descriptions of the sites based on the HRR findings are provided in the following subsections. The level of scrutiny of historical materials applied during the *CTT Range Inventory* was substantially less than that applied during this HRR. The *CTT Range Inventory* was intended to rapidly identify potential sites; the HRR effort is scoped to identify sites and through refined and improved data, detail their boundaries, and their history of use. In some cases, the conclusions from the *CTT Range Inventory Report* were inaccurate, and additional research from the HRR provides information that revises those previous findings.

Recalling that operational ranges and ASPs are not eligible for the Active Army MMRP, the recent correction to the operational range footprint will affect the eligibility of some of the properties on the South Post.

4.1.1. Devens Rifle Range #1

The *CTT Range Inventory Report* designated Devens Rifle Range #1 as the 9.1 acres that constitute the entire 3800 Parcel of DRFTA (Figure 4-1). This parcel is on the north edge of the North Post adjacent to Moore Army Airfield. At present, this area is a complex of small buildings. At one time, the parachute cleaning operations were located in this vicinity.

The *CTT Range Inventory Report* identified this as part of a former rifle and machine gun range that operated from 1917 to 1920. An alternative name provided for the range was “Range 1A.” According to the *CTT Range Inventory Report*, the 3800 Parcel identified as Devens Rifle Range #1 is part of the SDZ for the Known-Distance 300-Yard Rifle Range identified in the *BRAC CTT Inventory Report* (URS, 2003). However, the SDZ did not account for topography, as demonstrated in Figure 4-2.

Based on the HRR review of supporting data, no evidence was found for a range at the location of the 3800 Parcel. Both 1893 and 1936 topographic maps of the area (EDR, 2006) clearly show a hill in the area of the future airfield. The distance between the existing road and hill is narrow, suggesting that it would not be an adequate location for a machine gun range. A 1917 map (ASR H-1) titled “Camp Devens, Rifle & Machine Gun Ranges” is an illustration of such ranges in the early history of the installation. All of the ranges are to the west and south of the 3800 Parcel, near the bank of the Nashua River and beyond the top of the hill. No range is shown in the vicinity of the 3800 Parcel, and the airfield is not yet in existence (built in 1941). A machine gun range identified in both 1917 and 1919 range maps (ASR H-1 and ASR H-2) is the nearest range to the 3800 Parcel and is approximately ¼-mile to its west (Figure 4-2). This is the range whose SDZ ostensibly extended to the 3800 Parcel

(URS, 2003). However, upon closer inspection it is probable that firing of the range was directed east to west and away from the 3800 Parcel. An observation tower, normally placed behind shooters, is shown on the east side of the range in both WWI range maps (ASR H-1 and ASR H-2), confirming that the firing direction was not towards the 3800 Parcel, as assumed in the earlier inventory.

Chronologically, the next historical map covering the current 3800 Parcel is a 1942 map of “Target Range Areas” (ASR H-4), not as depicted by the SDZ shown in Figure 4-2. In this year, the airfield is evident, and the location of the 3800 Parcel shows a road not a range. Other range locations throughout the former Fort Devens are depicted on this map, but none is depicted at the supposed location of Rifle Range #1. A 1945 map detailing the Fort Devens Airfield (ASR H-5) (later known as the Moore Army Airfield) distinctly shows two buildings in the 3800 Parcel. The buildings are between the airfield and the road. There is no indication of any sort of firing range; the ASR did not locate a range here. It did locate an ammunition storage magazine in the airfield support buildings.

A map from Fort Devens Master Plan in 1952 shows the airfield and its environs, but there is no indication of a range anywhere on this map. There have been no reports of MEC in this parcel (ASR, 1995). A Stokes mortar reportedly was found across Great Road to the north (Meisner interview).

The historical map coverage of the 3800 Parcel never shows a rifle range in the area. It appears that the *CTT Range Inventory Report*, which based its recommendation on the *BRAC CTT Range Inventory Report*, did not reassess the 3800 Parcel in sufficient detail separately from a larger area that was identified as an SDZ in the *BRAC CTT Range Inventory Report*. Based on a review of the historic maps, the conclusion that this site was never a rifle range is considered to be of high quality with little uncertainty.



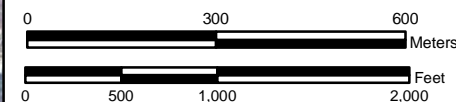
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- CTT Site - Closed
- Installation Boundary



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Figure 4-1
Devens Rifle Range #1
Devens RFTA, MA

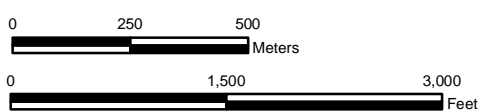




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-  Range Fan 1A (suggested in BRAC CTT)
 CTT Site - Closed
 Installation Boundary
 Estimated Direction of Fire
 Target Ranges as shown in 1917 Ranges Map (H-1)

Figure 4-2
Rifle Range #1
With Overlay of Historical References
Devens RFTA, MA

4.1.2. Barnum Road Area (formerly Devens Rifle Range #2)

The *CTT Range Inventory Report* identified the entire 27.5 acres of the 3700 Parcel as the former Devens Rifle Range #2 (Figure 4-3). As will become apparent in the following discussion, this site was not part of Devens Rifle Range #2; the *ASR* speculates this was the site of training around WWI. This parcel is in the eastern edge of the former Main Post. It is east of north-south rail lines and a rail yard, and west of Barnum Road. At present, this area contains maintenance facilities. As this area is definitely not a former rifle range, and its past munitions use is speculative, Barnum Road Area is recommended as a name for this site.

The *CTT Range Inventory Report* identified this as a former rifle and machine gun range that operated from 1942 to 1965. An alternative name provided for the range was “Range 3.” According to the *CTT Range Inventory Report*, the 3700 Parcel identified as Devens Rifle Range #2 is part of the SDZ for the Machine Gun, Automatic Rifle, 1000-inch and Pistol Range identified in the *BRAC CTT Inventory Report* (URS, 2003). Figure 4-4 shows the 1000-inch rifle range and the *BRAC CTT Range Inventory*-estimated range fan or SDZ. The estimated Range 3 fan and SDZs did not account for the presence of a railroad yard, a raised railroad grade, ordnance storage, and significant structures between the range and the 3700 Parcel. Moreover, the direction of fire from the 1000-inch rifle range was away from and not over these facilities; consequently, the SDZ in the *BRAC CTT Range Inventory Report* is not correct.

No evidence could be found in the reviewed resources for a machine gun or rifle range at the immediate location of the 3700 Parcel. However, the *ASR* interpreted features on a 1922 aerial photograph (*ASR M-3*) as possible craters east of the railroad yard. (This 1922 aerial photograph is also in EPA, 1991.) Figure 4-5 overlays the CTT range boundary and current roads over the *ASR* interpretations marked on the aerial photograph. There are about 30 more or less evenly spaced (i.e., not quite random) white areas; the *ASR* labeled these features with a ‘2’ meaning ‘craters’ (Figure 4-5). Between the craters and the railroad yard there is an open area with several concentric circles. The circles are not considered part of the site because they lack scarring. A road or scar runs northeast/southwest to the west of the ‘craters’ and parallel to the current location of Barnum Road. The *ASR* also identified possible ‘trenches’ to the north and east of the craters.

Training during WWI at Camp Devens is known to have included exposing soldiers to the sights and sounds of the battlefield by detonating small quantities of explosives (see “Forging the Sword” excerpt provided in HRR Appendix A). Although highly speculative, the *ASR* asserted that this area might be one of the locations of such training during WWI.

There is no evidence that so-called chemical training ever used anything other than smoke producing materials. Use of chemical warfare materials is highly unlikely given the proximity of the railway and the Town of Ayer, and is not established in the Archives Search Report; such an assertion is highly speculative. There is evidence in the *ASR* that no chemical warfare agents were ever used in training at Fort Devens, although smokes and candles were stored on site during WWI. Contemporary records indicate that CWM-filled mortars were never used in training at Fort Devens; on-site use of non-explosive munitions was limited to smokes and candles, based on inventory sheets (*ASR*, 1995).

A 1919 map of Camp Devens was identified, and this reveals a very different explanation of the 1922 aerial photograph features. On this map (Figure 4-6), there is evidence of a water supply well and a filter pond at the each of today's Grove Pond (labeled Tanner's Pond on the map). The filter pond has a kidney shape that matches identically the 'trenches' labeled on the *ASR* figure (compare Figures 4-5 and 4-6). In addition, the 1919 map shows the layout of water supply lines across the area of interest. In short, this map, which is considered highly reliable, suggests that during WWI the Barnum Road Area site disturbances were related to the construction and operation of a water supply system for the installation. The presence of 12-inch water lines is entirely inconsistent with the detonation of explosives in the 'craters.' Consequently, the determination in the *ASR* that this area was a WWI detonation area appears to be speculative and unsubstantiated.

Subsequent historical maps and photographs do not have evidence for continued training activities at the 3700 Parcel. The 1941 "General Plan of Reservation" and 1942 range map of Fort Devens (*ASR* H-4) identifies this area as 4th Echelon Group, which is an intermediate level maintenance unit. On this map other areas of Fort Devens are clearly identified as ranges, but this area is not labeled as such. In short, by WWII it appears that this location was no longer used for training, but for vehicle maintenance.

A 1947 aerial photograph of Fort Devens from DRFTA files (dated 4 SEP 47) shows this area covered with pavement and buildings (Appendix B). Subsequent aerial photographs, from 1951 and 1965 (*ASR* M-6 and M-9), show that the site is paved and virtually unchanged over this time period. A general site map of Fort Devens from 1954 (*ASR* H-16) labels much of the 3700 parcel as "Ordnance Area," although the aerial photographs referenced above do not indicate that this means this was a range, as the site is clearly laid out as a maintenance facility.

There is no photographic or cartographic evidence of a machine gun or rifle range at the 3700 Parcel as posited in the *CTT Range Inventory Report*. The area appears to have been disturbed when water supply was installed at Camp Devens, although some have speculated that this was used for training circa WWI. Because there is no evidence to support the name

“Devens Rifle Range #2”, the site name has been changed throughout this report to Barnum Road Area. It will be necessary for the site name to be changed in AEDB-R.

An ASR interviewee noted a report of Stokes mortars having been found east of Barnum Road in this area, but details were not provided. Recent activities provide additional information on the potential for MEC. In May and June 1995, HFA executed a UXO sampling action at and around the subject area (HFA, 1995). Thirty-six grids were sampled across the area. The results of the sampling, which identified no live ordnance, are summarized on Figure 4-7. In all, only nine grids contained munitions debris, and none of these was within the footprint of the Barnum Road Area craters. The report states:

The area is remarkable in that the amount of UXO material found was light and widely scattered. Most UXO Supervisors thought that the area may have been previously swept and cleared. There were indications that some of the motor pool areas may have been graded sometime in the past and the soil replaced. The significant finds in the area were two inert sand filled 3” Stokes Mortars, three partial unfuzed and inert practice hand grenades, one inert French VB2 rifle grenade, and one practice M2 AP [anti-personnel] mine.

Both the Stokes mortars and the VB grenade are WWI-era munitions; consistent with light site use during that time. The M2 dates back to 1940. In short, the site UXO survey and sampling found munitions debris with relatively light density in the vicinity of the WWI activities described above.

The HRR data led to a revision of the Barnum Road Area MMRP site. The craters in evidence in the 1922 aerial photograph extend north beyond the 3700 Parcel into Massachusetts Army National Guard (MAARNG) property. As this MAARNG property was once federalized, and because it is an efficient approach, the revised site boundary now comprises the entire cratered area both in the 3700 Parcel and the MAARNG property (Figure 4-8). The revised acreage is 15.29, with 5.84 acres in the 3700 Parcel, and 9.45 acres beyond the DRFTA boundary under the purview of the MAARNG.

The northern half of the 3700 Parcel—the former Barnum Road Maintenance Yards—was studied and remediated under the IRP. The IRP sites AOC 44 (the Cannibalization Yard) and AOC 52 (Table of Distribution and Allowances, Maintenance Yard) were addressed as a single operable unit. In 1995 and 1996, most of the area was excavated to 2 feet below grade to remove petroleum contamination, backfilled, and capped with asphalt to prevent any future exposure to soils. Three hot spots were over-excavated to depths up to 14 feet. During remedy implementation, a few unidentified practice rounds were uncovered but no fuzed or live munitions were reported. Three rounds over five years of groundwater sampling and analysis for petroleum related compounds and lead yielded no detections above

Massachusetts GW-1 standards. In summary, nearly all of the Barnum Road Area within the 3700 Parcel has been disturbed to depths of 2 feet or more, and has a cover in place. The remedy includes institutional controls that restrict any residential development and, as precautionary measure, minimize any disturbance to the capped area by requiring cap replacement and/or health and safety plan and sampling and analysis plans depending on the level of proposed commercial development. The extent of excavation and cap is depicted in Figure 4-9.

In summary, the Barnum Road Area is an MMRP eligible site. A low probability exists for finding MEC and associated MC in the northern half of the 3700 Parcel. Based on aerial photographic analysis, WWI activities in the area may have resulted in some cratering. The affected area lies both on DRFTA and MAARNG properties. Based on aerial photographs, the nature of munitions activities in this vicinity are not compatible with a rifle range. There is speculation that this area may have been a WWI training area, although map evidence appears to refute that use. The low density of munitions debris and lack of ordnance suggest that this was never a live firing range.



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Legend

- CTT Site - Closed
- MAARNG Boundary
- County Boundary
- Installation Boundary



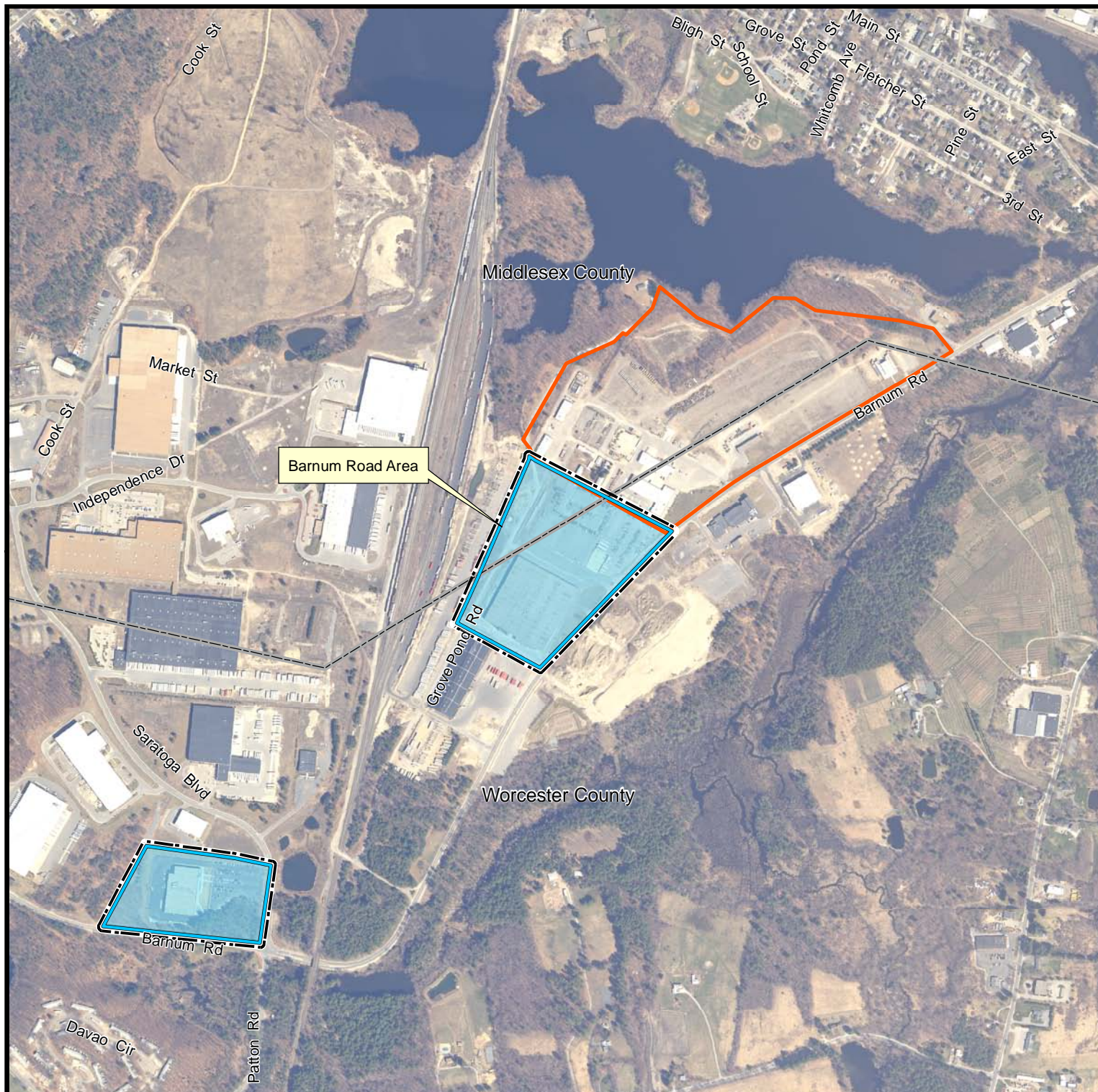
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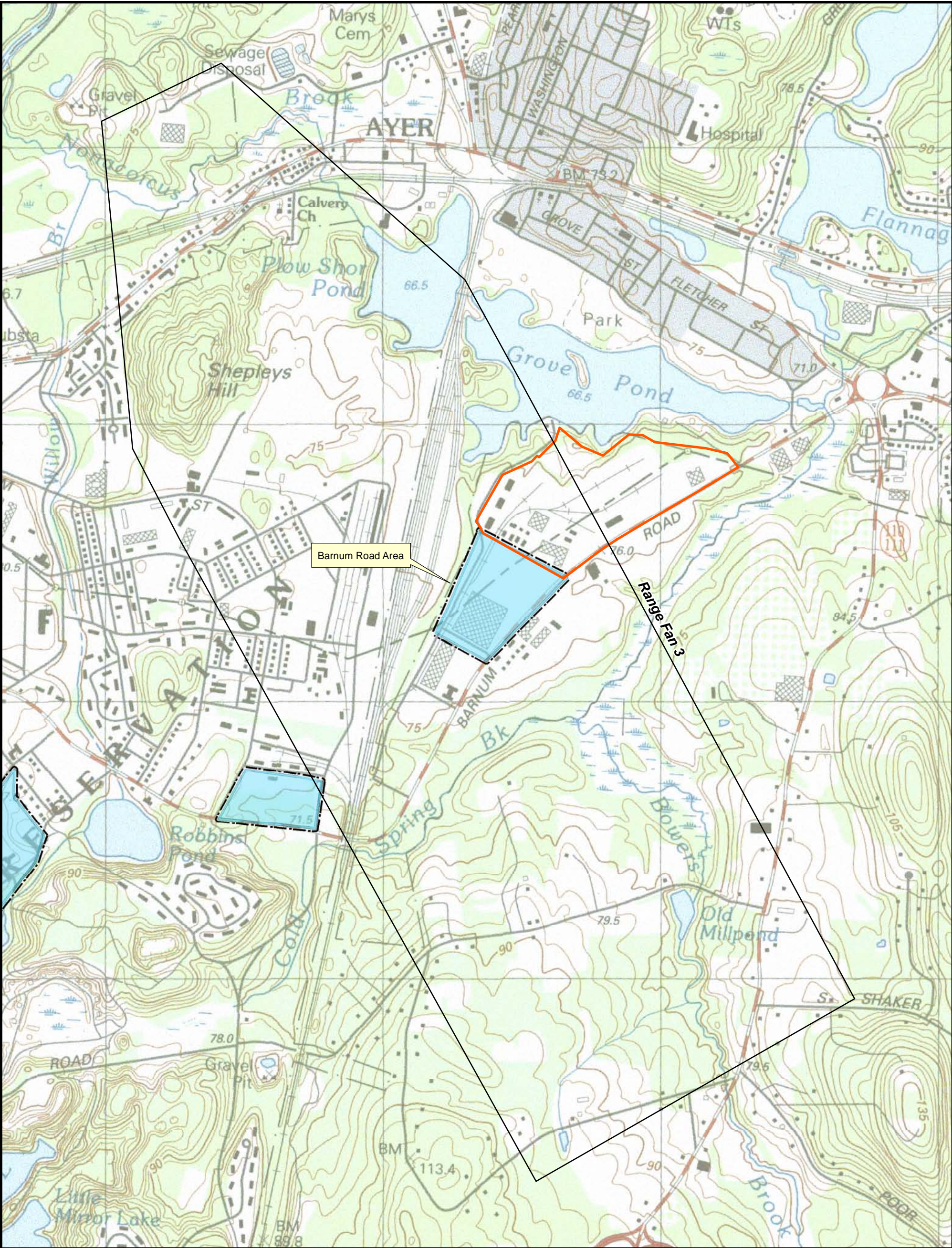
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Figure 4-3
Barnum Road Area
(formerly Rifle Range #2)
Devens RFTA, MA

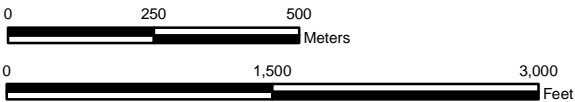




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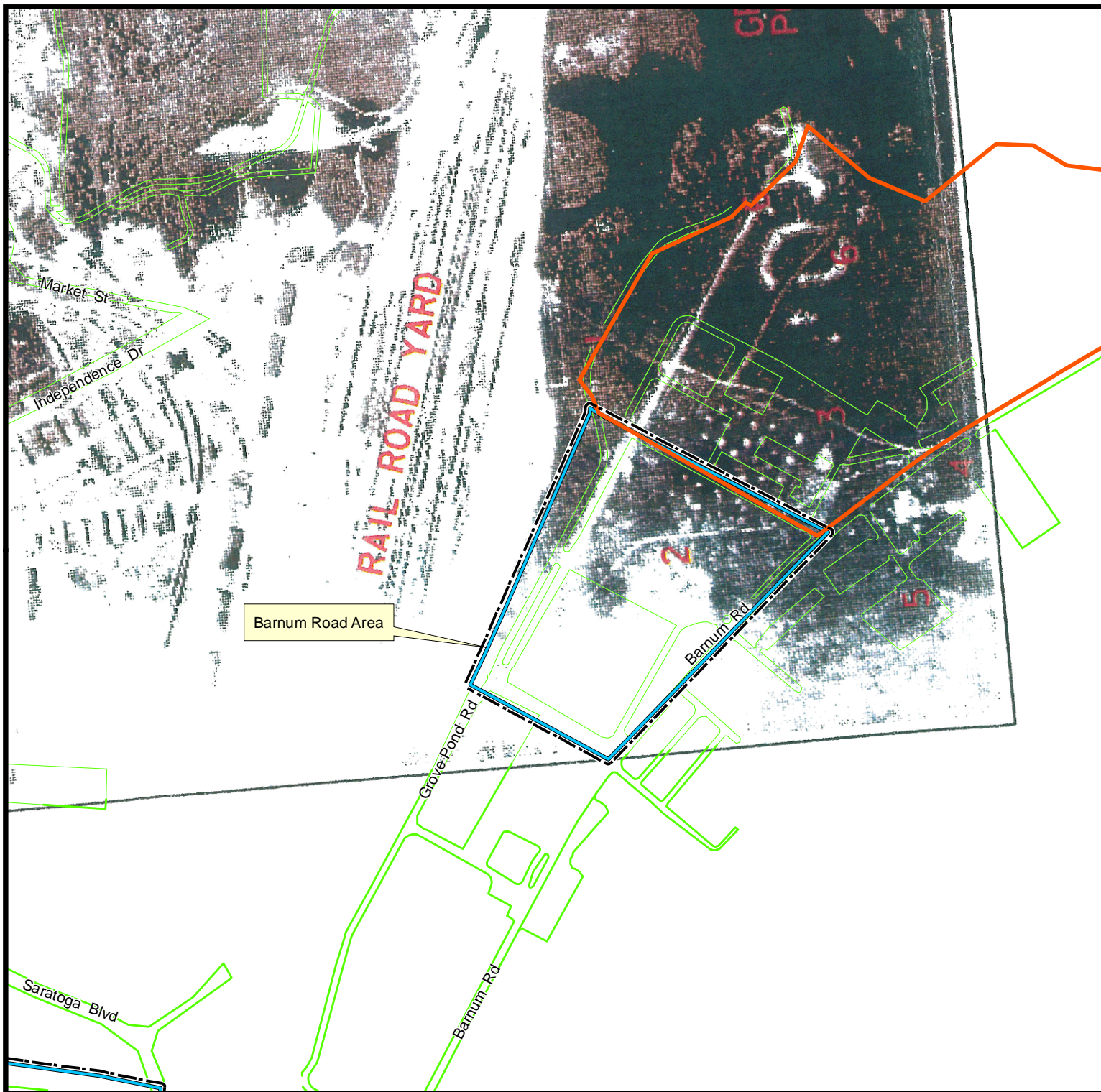


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- Installation Boundary
- CTT Site - Closed
- Range Fan 3
(suggested in BRAC CTT)
- MAARNG Boundary

Figure 4-4
Barnum Road Area
(formerly Rifle Range #2)
With Historical References
Devens RFTA, MA



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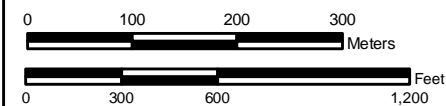
- CTT Site Boundary
- MAARNG Boundary
- Current Road
- Installation Boundary

ASR, M-3 Notations:

- 1** Concentric circles resembling a target
- 2** Craters
- 3** Trenches
- 4** Trenches
- 5** Circular series of craters
- 6** Possible circular series of trenches



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Figure 4-5
1922 Aerial Photograph
Barnum Road Area
Devens RFTA, MA

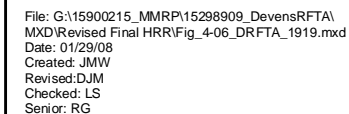
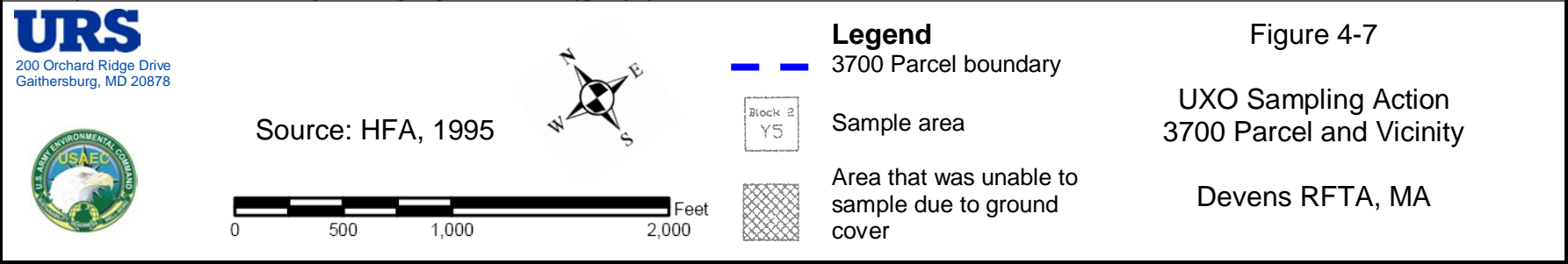
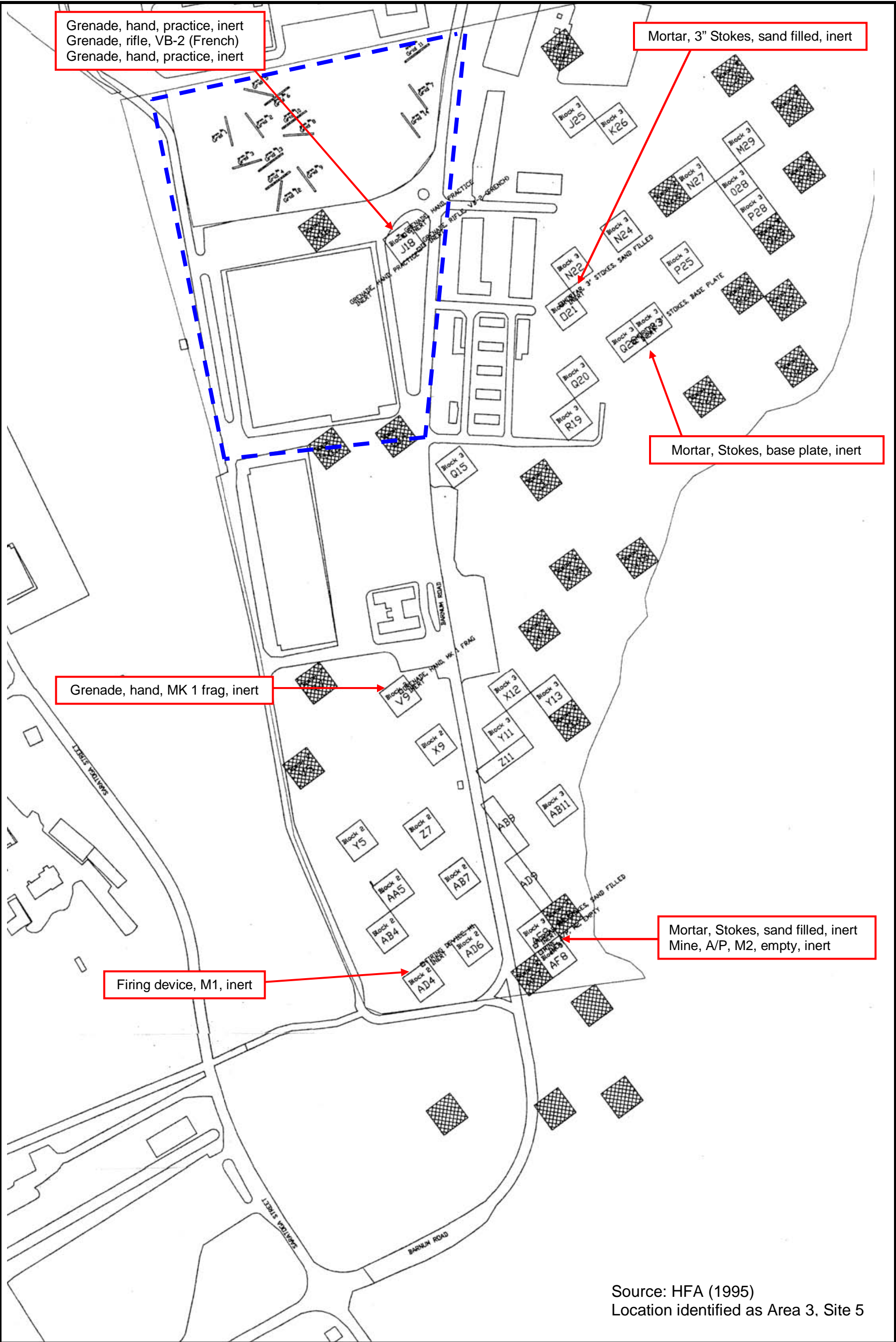


Figure 4-6
1919 Camp Devens Map
Barnum Road Area
Devens RFTA, MA





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Legend

- Historical Location of Crater
- Installation Boundary
- HRR MRS Boundary
- MAARNG Boundary
- County Boundary



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0 150 300 600 Meters

0 500 1,000 2,000 Feet

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Figure 4-8
Revised Boundary of
Barnum Road Area
Devens RFTA, MA



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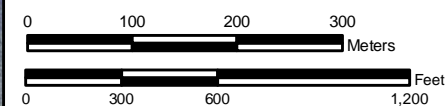
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- MAARNG Boundary
- HRR MRS Boundary
- AOC 44/52 Cover
- Current Road
- Installation Boundary

Cover area extent taken from
Figure 3 of Final Remedial Action Report
Areas of Contamination 44 & 52 (Sept 2005)



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Figure 4-9
Extent of AOC 44/52 Cover
Barnum Road Area
Devens RFTA, MA



4.1.3. Devens Rifle Range #3A

The Devens Rifle Range #3A covers 136.5 acres according to the *CTT Range Inventory Report*. This parcel is the entire Main Cantonment at DRFTA (Figure 4-10). At present, this area has office buildings, maintenance facilities, and a few barracks.

The *CTT Range Inventory Report* identified this as a former rifle and machine gun range that operated from 1942 to 1953, and as a pistol range from 1954 to 1965. An alternative name provided for the range was “Range 11.” According to the *CTT Range Inventory Report*, the 3700 parcel identified as Devens Rifle Range #3A is part of the SDZ for the Machine Gun, Automatic Rifle, 1000-inch and Pistol Range identified in the *BRAC CTT Inventory Report* (URS, 2003). It appears, however, that the BRAC SDZ did not account for the firing direction away from the Main Cantonment. Figure 4-11 shows the suggested Range 11 SDZ overlain on a map of the Devens RFTA features including the Main Cantonment. Historical maps (H-2) show that the Main Cantonment was already constructed in 1919. There is little chance that firing into the Main Cantonment would occur.

This location has constituted the Main Cantonment at the installation since inception. Maps and photographs from the WWI era establish that the area was developed with administrative buildings and barracks as part of the earliest development. Aerial photographs obtained at DRFTA for 1943 and 1947 cover the Main Cantonment, and no ranges are discernible, although there are large areas of ground disturbance surrounding many buildings. The ASR did not identify any ranges within the Main Cantonment, based on highly reliable aerial photograph (M-6).

The ASR does identify a machine gun (MG) square and a preliminary rifle instruction (PRI) circle in the open area between MacArthur Avenue and Quebec Street from a 1951 photograph (ASR M-9). Both the MG square and the PRI circle are distinctly visible in 1952 and 1965 aerial photographs (EPA, 1991). These areas are common across installations during WWII and are used for training soldiers in the fundamentals of rifle or gun handling and marksmanship prior to live fire exercises at a range (www.globalsecurity.org). Fort Deven’s range and training area maps of 1954, 1957 and 1961 (ASR H-16, H-17, and H-18) label the MG square and PRI circle as “Training Facilities” or “Facilities” and not as “Ranges”. They are in a relatively small (less than 1600-foot x 600-foot) open area which the ASR refers to as Edmunds Field between barracks or other buildings. Figure 4-12 shows the MG square and the PRI circle clearly visible in the 1952 aerial photograph of the cantonment area. The remaining portion of the Main Cantonment had no evidence of ranges.

The Fort Devens Range Standard Operating Procedures (SOPs) for 1954 was included in the ASR attachments (ASR Appendix C-1.47). These SOPs, which include all ranges listed on a

contemporary map, do not mention either the machine gun square or the PRI, which further supports the conclusion that neither were live firing locations.

In short, the historical aerial photographs and maps of the Main Cantonment show both a PRI and a machine gun square in Edmunds Field. This area is surrounded by administrative buildings throughout the period in which they appear. The *ASR* concludes that “these facilities are generally not used for training live or blank ammunition.” This is consistent with information from other installations (e.g., Fort Lewis, WA). The densely occupied space is incompatible with live fire. In the WWII era, these facilities were frequently placed near barracks, and outside of range areas, to provide preliminary instruction for novice personnel.

It appears that the *CTT Range Inventory Report* included training areas in the Main Cantonment that did not perform live fire. Based on a review of the historical maps, the conclusion that this site was never used for live fire training or as a range is considered to be of high quality with little uncertainty.



URS
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Legend

- CTT Site - Closed
- County Boundary
- Installation Boundary



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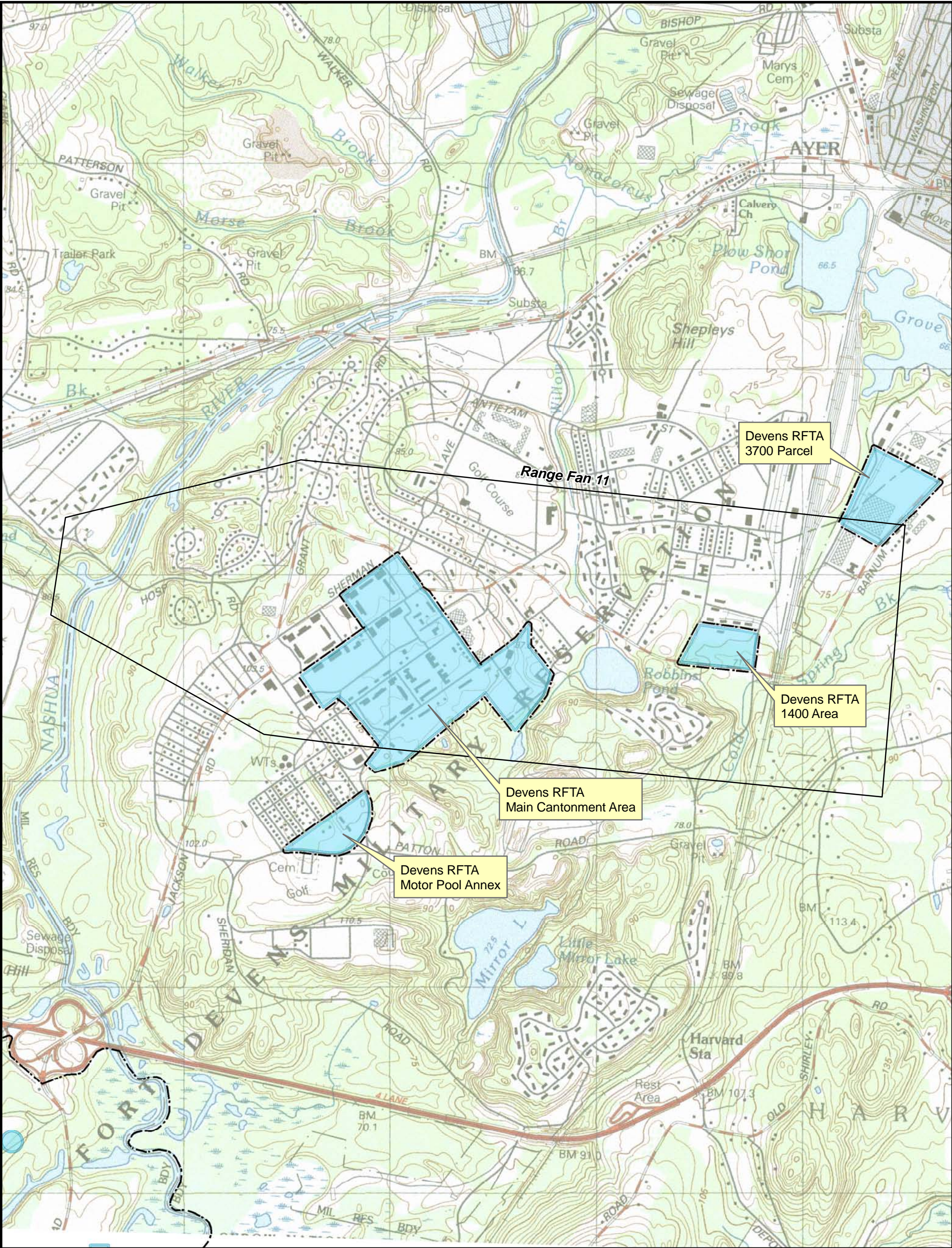
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Figure 4-10
Devens Rifle Range #3A
Devens RFTA, MA

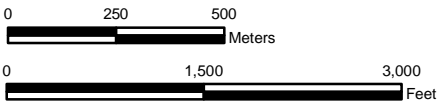




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- Installation Boundary
- CTT Site - Closed
- Range Fan 11
(as suggested in BRAC CTT)

Figure 4-11
Rifle Range Fan 11
from BRAC CTT Range Inventory
Devens RFTA, MA



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Legend

-  Main Cantonment Area
-  Machine Gun Square & Preliminary Rifle Instruction Circle
-  Installation Boundary



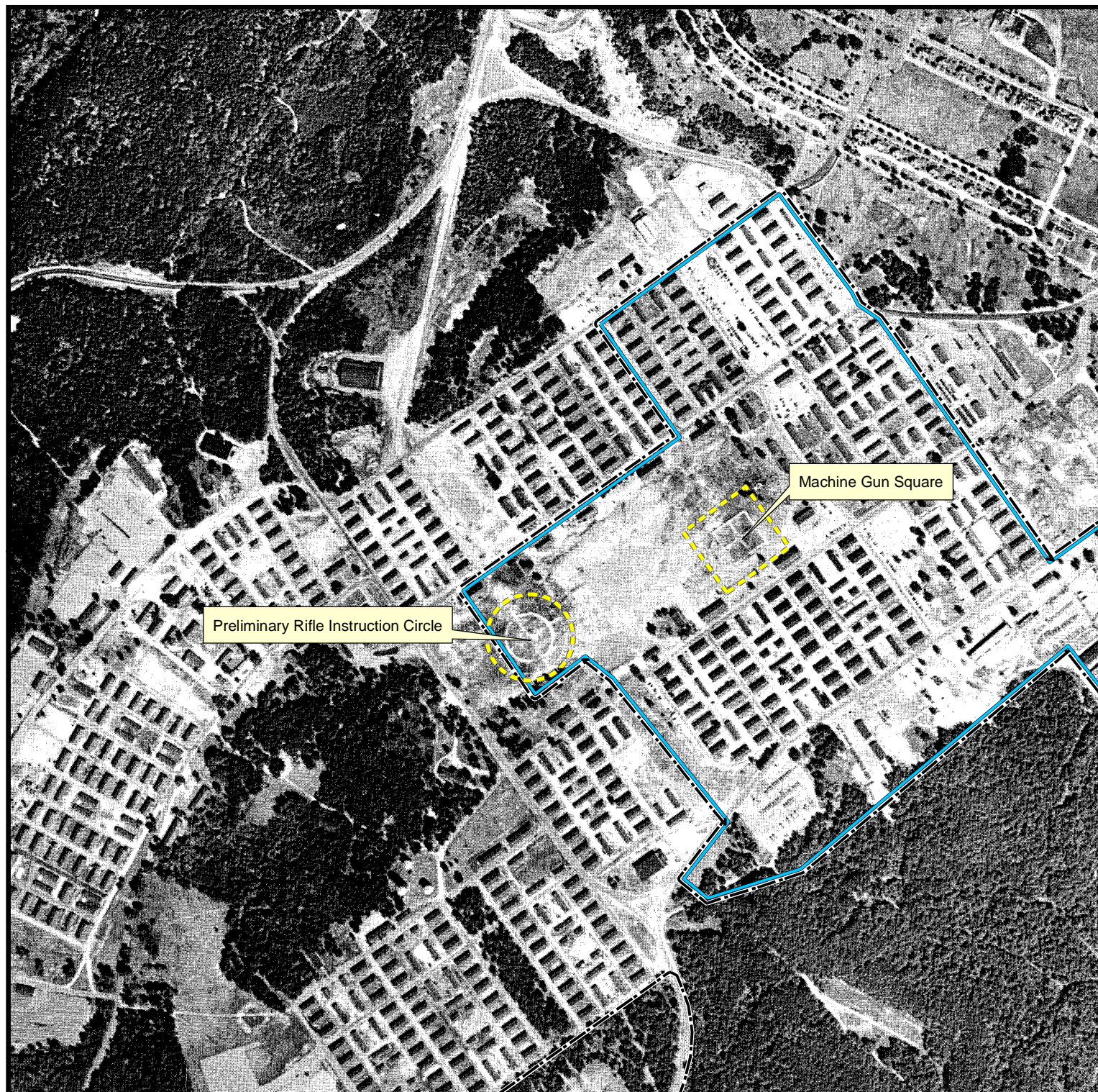
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Figure 4-12
Machine Gun Square & PRI Circle
Within Main Cantonment Area
Devens RFTA, MA



4.1.4. Devens Rifle Range #3B

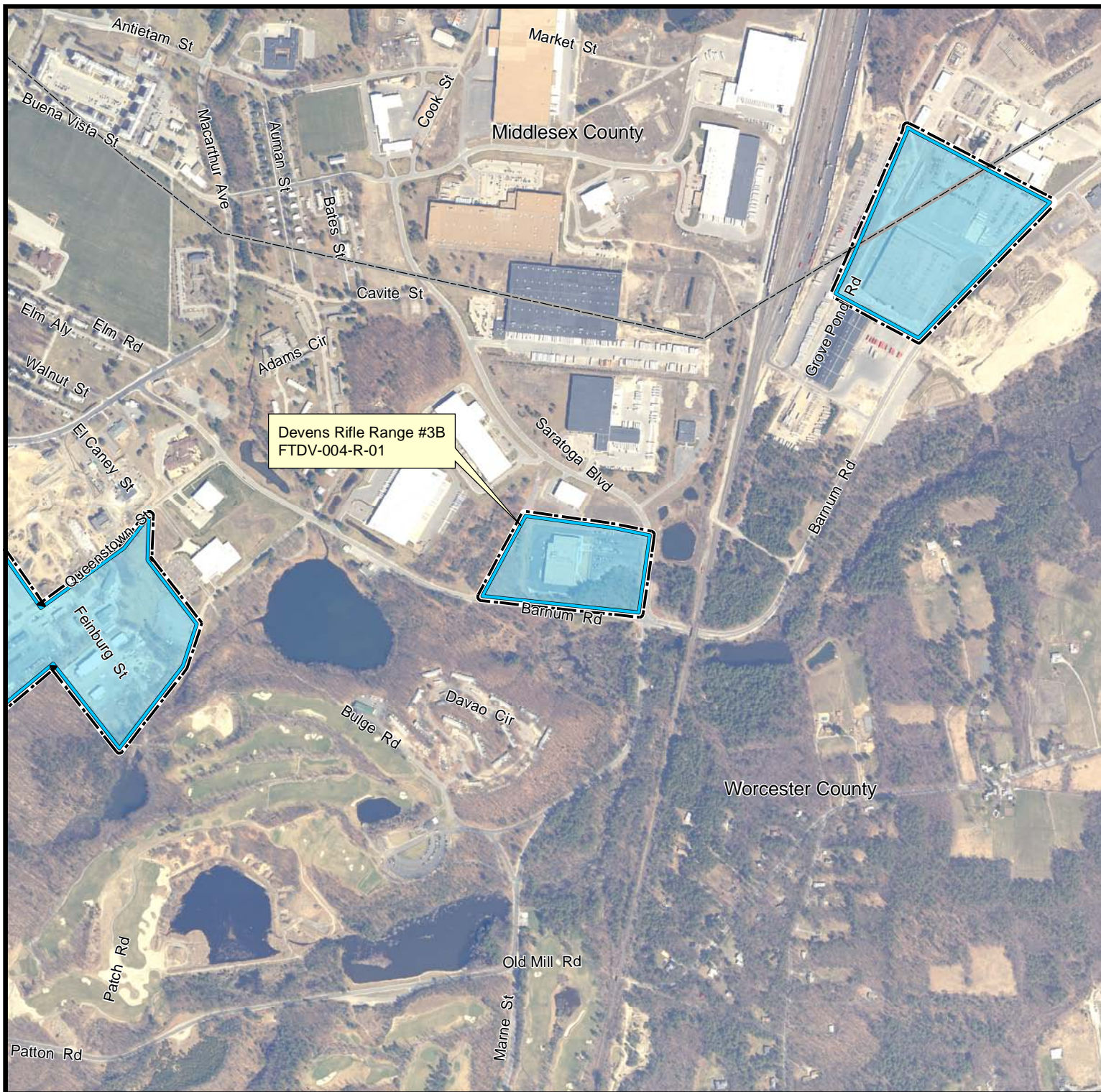
According to the *CTT Range Inventory Report*, Devens Rifle Range #3B operated as a former rifle and machine gun range from 1942 to 1953, and as a pistol range from 1954 to 1965. This range was defined as the entire 14.0 acres that comprise the 1400 Parcel at DRFTA (Figure 4-13). The 1400 Parcel is near the eastern edge of the former Main Post, and currently contains buildings used by tenant Army Reserve personnel.

According to the *CTT Range Inventory Report*, the 1400 Parcel identified as Devens Rifle Range #3B is part of the SDZ for the Machine Gun, Automatic Rifle, 1000-inch and Pistol Range identified in the *BRAC CTT Inventory Report* (URS, 2003). However, the SDZ did not account for the firing direction being away from the 1400 Parcel. In fact, it appears that determination of a range at the 1400 Parcel is based on the improper interpretation of a historical map (Figure 4-11 and discussion in Section 4.1.3).

The 1942 map “Target Range Areas” (ASR H-4) identifies all the ranges at the former Fort Devens. Although there is a numeral 6 at the location of the 1400 Parcel on this map, it has a small arrow pointing south across Barnum Road to a small area called “Markley Range,” labeled 1000-inch rifle and machine gun range. A 1943 composite aerial photograph of the entire post (ASR M-6) was reviewed for evidence of the correct range location. The aerial photograph agrees with the 1942 map location of the range across Barnum Road in the BRAC parcel, and not in the 1400 Parcel.

A 1948 map “Target Range Area” (ASR H-6) conforms to the 1942 map and 1943 aerial photograph, as do 1954 and 1957 historical range maps (ASR H-16 and H-17). A 1965 aerial photograph shows no disturbance of trees and ground cover in the 1400 Parcel. This is also consistent with the aerial photography coverage in the EPA aerial photographic analysis of the area (EPA, 1991).

The historical map coverage of the 1400 Parcel never shows a rifle or machine gun range at the location. It appears that the *CTT Range Inventory Report* inadvertently positioned the range at the location of the numeric label (the numeral 6) and not at the actual range location. The correct location is in the BRAC parcel, and is not evaluated in the MMRP SI for DRFTA. Based on a review of the historic maps, the conclusion that this site was never a rifle or machine gun range is considered to be of high quality with little uncertainty.



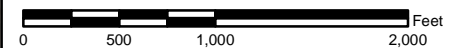
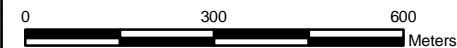
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Legend

- CTT Site - Closed
- County Boundary
- Installation Boundary



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Figure 4-13
Devens Rifle Range #3B
Devens RFTA, MA

4.1.5. Former Antitank Range

The *CTT Range Inventory Report* identified the 13.6 acres of the former Motor Pool Annex as a Former Antitank Range (Figure 4-14). The area is to the west of the curved portion of Queenstown Street, and north of Patton Road. According to the inventory, an antitank range operated here from 1942 to 1956, and a shotgun range was here from 1957 to 1960. At present, the area is undergoing development for commercial purposes.

According to the *CTT Range Inventory Report*, the Motor Pool Annex was identified as the SDZ for the Former Antitank Range in the *BRAC CTT Inventory Report* (URS, 2003). However, the SDZ did not account for the firing direction away from the Motor Pool Annex. Figure 4-14 provides the underlying base map for 1942, which indicates the tank range (ASR H-4), overlain with the CTT-identified Range 12 fan and the Former Antitank Range.

Beginning with WWI-era resources, no range is identified in this parcel of the former Fort Devens. A 1922 historical photograph (ASR M-2) depicts an area of linear ground scarring in the vicinity of the future motor pool. Concurrent range maps do not identify the area as a range.

The 1942 map “Target Range Areas” (ASR H-4, used in Figure 4-15) identifies all the ranges at the former Fort Devens. An antitank range is noted nearby on this map, but it is not at the location of the former Motor Pool. The antitank range (designated with the numeral 12) is about 1,200 feet south of the Patton Road and Sheridan Road at the present location of the Federal Prison hospital. Firing fans for the antitank range do not cover the former Motor Pool Area. A 1000-inch rifle and machine gun range is shown to the east of the former Motor Pool Area in the 1942 map, and designated with the numeral 8. A 1943 composite aerial photograph of the entire post (ASR M-6) was reviewed for evidence of the correct range location. The aerial photograph agrees with the map location of the ranges, neither of which is at the former Motor Pool Annex.

In both the 1942 map (ASR H-4) and 1943 aerial photograph (ASR M-6) the location of former Motor Pool Area appears to be partly paved with a few small buildings. Vehicles appear to be parked on the paved area.

A 1951 aerial photograph (ASR M-9) conforms to the earlier identification of an antitank range to the south and a 1000-inch rifle and machine gun range to the east of the former Motor Pool Area. The 1954 and 1957 historical range maps (ASR H-16 and H-17) only show a 1000-inch rifle and machine gun range; the antitank range is no longer designated. The former Motor Pool Annex appears paved with parked vehicles in photographs from 1943, 1954, and 1965 as presented in the aerial photographic analysis of the area (EPA, 1991).

The historical map coverage of the former Motor Pool Annex never shows an antitank range (or any other range) at the location. It appears that the *CTT Range Inventory Report*, which based its recommendation on the *BRAC CTT Range Inventory Report*, did not reassess the former Motor Pool Area in sufficient detail separately from a larger area that was identified as the antitank range in the *BRAC CTT Range Inventory Report*. Based on a review of the historic maps, the conclusion that this site was never a range is considered to be of high quality with little uncertainty.



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Legend

- CTT Site - Closed
- Operational Range Area
- County Boundary
- Installation Boundary



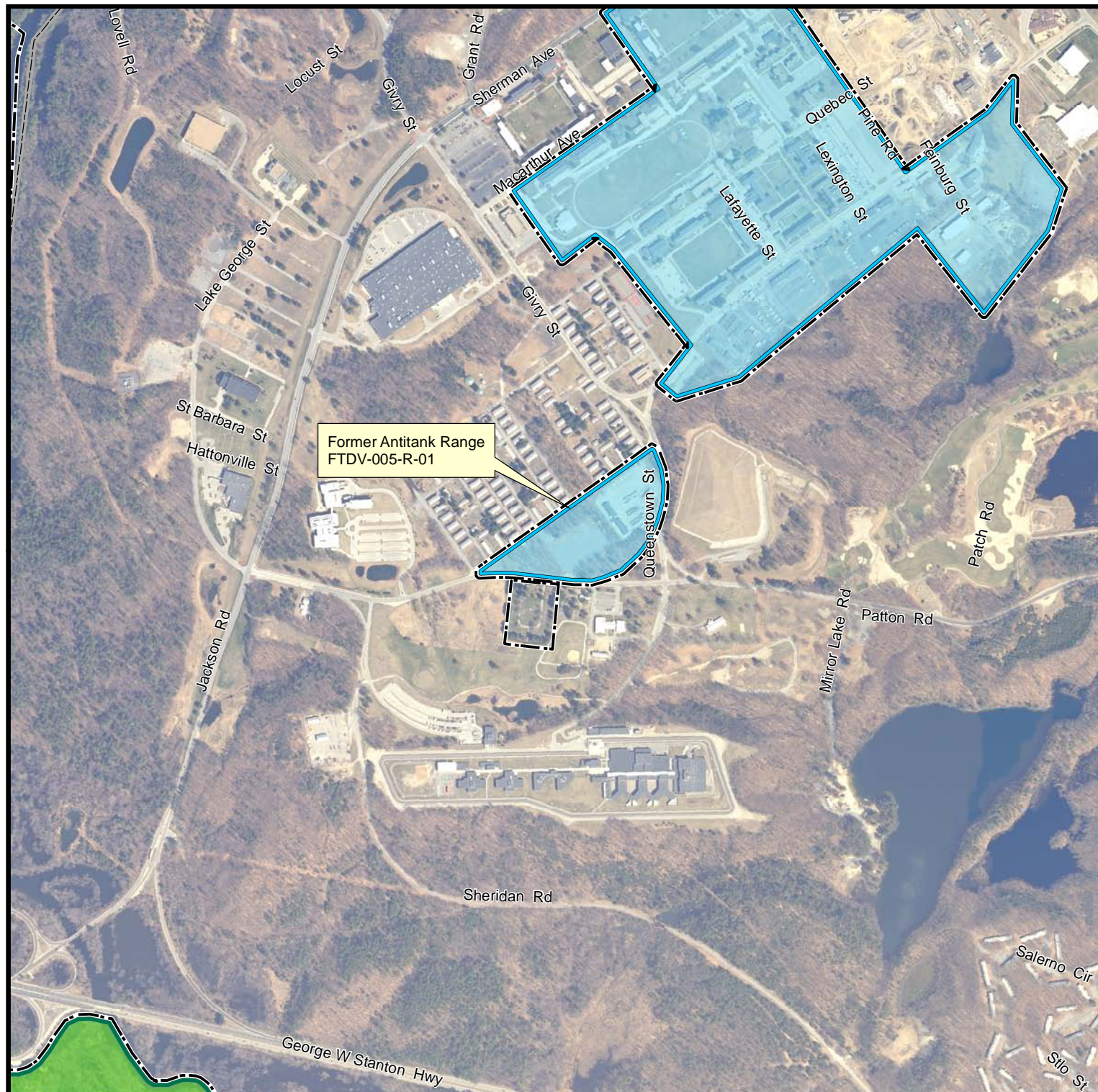
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Figure 4-14
Former Antitank Range
Devens RFTA, MA





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Legend

- CTT Site - Closed
- Installation Boundary
- Historical Antitank Range
(as shown in 1942 Base Map H-4)



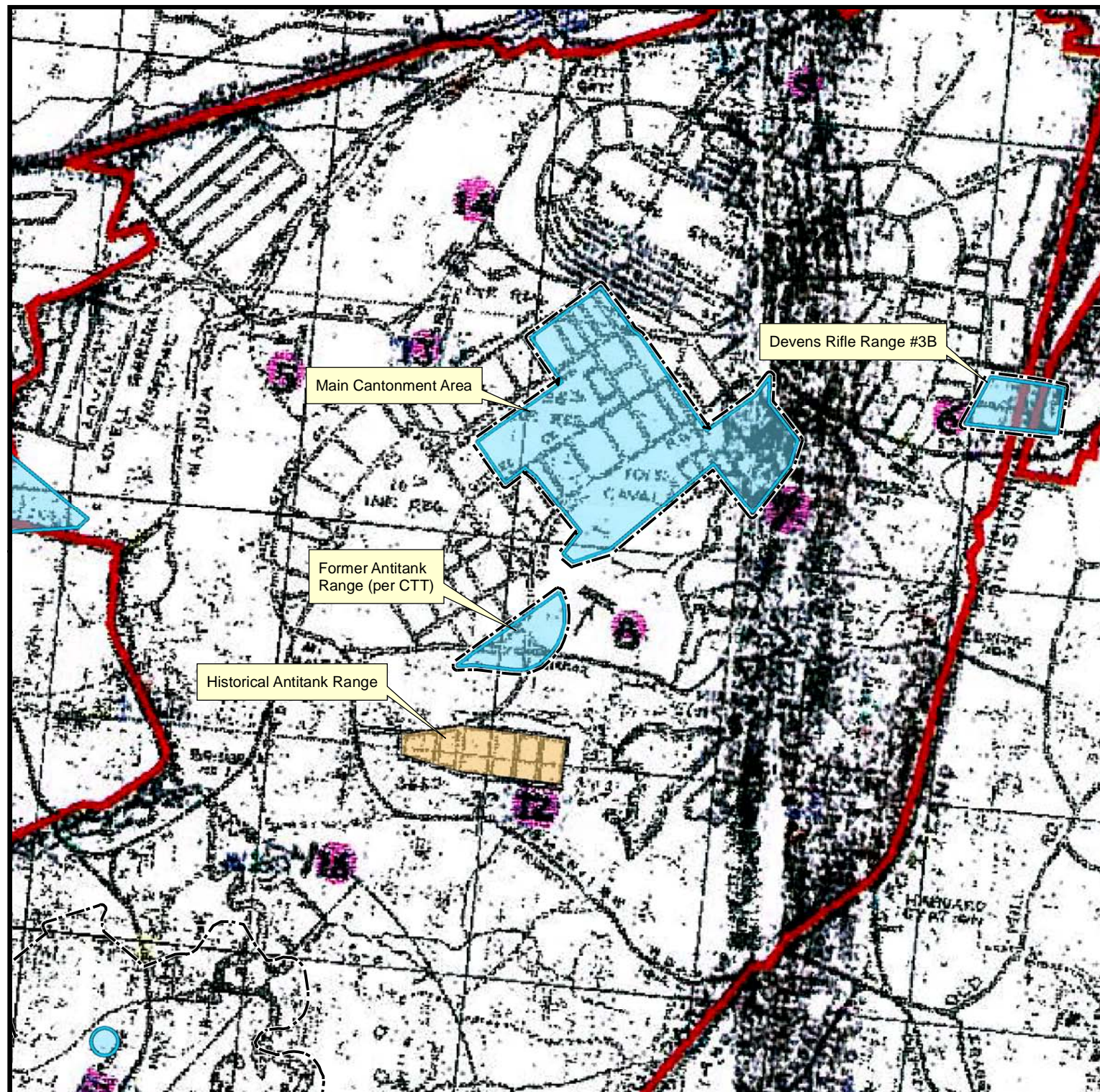
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Figure 4-15
Historical Antitank Range
Devens RFTA, MA



4.1.6. Former EOD Range

The *CTT Range Inventory Report* identified the Former EOD Range in the South Post as a 2.0-acre area where disposal of munitions occurred from 1940 to 1957 (Figure 4-16). This feature appears on numerous historical maps of the former Fort Devens. During the site visit, an area with little vegetation to the north of Attu Road was visited, but no immediate evidence of prior EOD activities was noted.

After HRR activities were initiated, DRFTA's operational range area was corrected to include the entire South Post. This change makes the EOD Range no longer eligible for MMRP; however, research results for this site are retained in the HRR Report for the record.

The EOD Range appears to be a post-WWI feature; it is not shown on WWI-era maps. A 1942 map of target ranges (ASR H-4) does not show the EOD range; however, it is on a 1948 map (ASR H-6). Aerial photographs from 1943 and 1952 (EPA, 1991) display cratering and lack of trees in the area, which are consistent with demolition activities. Figure 4-17 shows the historic range footprint on the 1943 aerial photograph (labeled 28 Range); the location, according to the aerial photograph, is to the west and larger than the site boundary depicted in the CTT effort.

The CTT site boundary, which is also shown in Figure 4-17, is not in the correct location based on the aerial photograph. As stated above, the former EOD range is in the current operational range area. The ASR first identifies this area on a 1951 aerial photograph (ASR M-10). Also in EPA 1991, a 1965 aerial photograph was interpreted as "Range w/ Pits." Subsequent aerial photographs from 1972 and 1980 show the same area as relatively devoid of large trees, but the pits from the 1940s and 1950s are no longer apparent.

The Environmental Library at DRFTA contained a 1970 oversize map of range areas (ASR H-19) that depicts the EOD area as "I" Range north of Attu Road. A latrine (L-4287) is noted on the north side of the area, near the installation boundary. A set of range SOPs from 1954 (ASR Appendix C-1.47) identify the latrine location as Guard Post 26, "*at junction of dirt roads just North of Demolition Area.*" Also from 1954, a training memorandum (ASR Appendix C-1.48) states that "*no charge in excess of 10 lbs*" may be used at the "I" Range. A 1975 training regulation (DRT00026) describes the existence of a "Demo Engineer Range" consistent with the EOD Range. This provides a Range Data Sheet for "I" Range, including that the range capacity was "*ten men preparing charges at one time. Total of charges not to exceed 10 lbs at one time.*" Also the Range Data Sheet states that ammunition was "*Restricted to TNT – Comp. C 3-4-5 Tetrytol.*" A 1979 regulation (DRT00047) identifies the I Range and an outdoor classroom, and no longer an active range. The regulations and procedures cited above are for a limited time period and do not negate the likelihood that the

array of MCs and MECs cited in the *CTT Range Inventory Report* may be disposed at the site.

The specific citation for 1975 operations restricting munitions to explosive charge may only apply to a relatively limited modern period of the site's operations. EOD activities from the 1940s and 1950s may not have been so limited. Consequently, in evaluating this site, the broad range of munitions in use throughout Fort Devens are considered potentially present at the Former EOD Range.

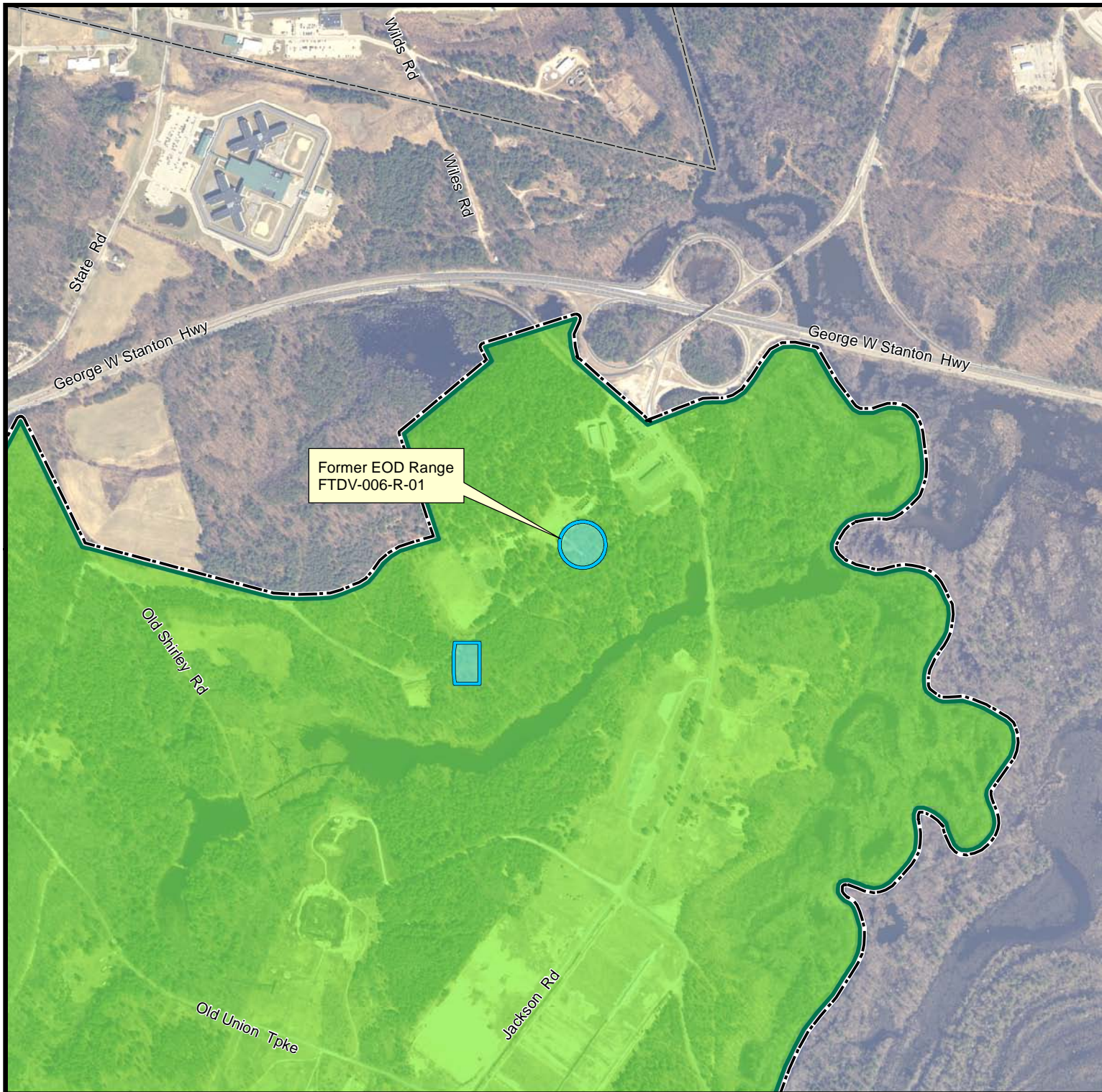
During a site visit, Tom Poole (DRFTA DPW) described how annual field exercises in the 1990s and 2000s for field fueling simulations occurred in this area. These exercises include excavating large portions on the eastern edge of the Former EOD range. He can recollect no reports of munitions during these exercises. PAL (1998) reports finding bullets in this area during archeological studies of the South Post. PAL (1998) is not specific with regard to munitions findings, but the record suggests bullets/small arms fragments but no large caliber munitions finds at this site.

An environmental investigation at the Former EOD Range, which is known as Study Area 28 under Fort Devens IRP, led to a No Further Action (NFA) Decision in January 1994. The details of the investigation which led to the NFA determination are presented in No Further Action Decision Under CERCLA, Study Area 28, Waste Explosives Detonation Range (ABB, 1994). Soil and groundwater investigations began in 1992 and included:

- UXO clearance
- soil excavation
- subsurface soil sampling
- groundwater monitoring well installation, and
- groundwater sampling.

The study concluded that “there is no evidence or reason to conclude that possible hazardous waste contamination due to past site activities has caused significant environmental contamination or poses a threat to human health or the environment.” The NFA decision document is included in Appendix B.

The Former EOD Range lies entirely within the area currently designated as operational range. As such, the site is not MMRP eligible. These conclusions are based on reliable resources, and are considered to be of high quality.



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Legend

- CTT Site - Closed
- Operational Range Area
- County Boundary
- Installation Boundary



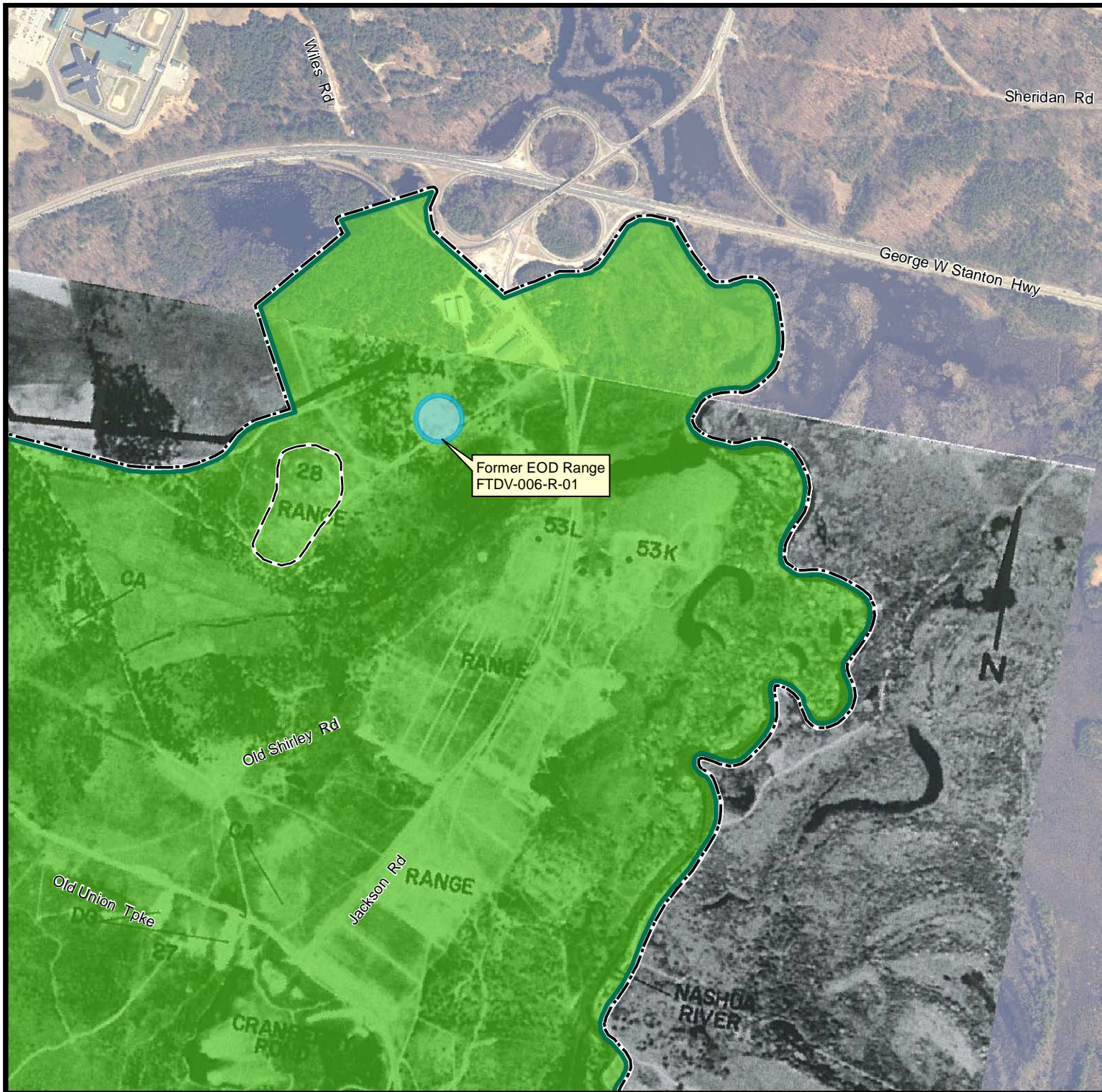
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Figure 4-16
Former EOD Range
Devens RFTA, MA



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Legend

- [] Historic Location (approximate)
- Operational Range Area
- CTT Site - Closed
- Installation Boundary

1943 Aerial Photograph Underlies
Lower Section of Figure



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Figure 4-17
Former EOD Range:
Historical Location
Devens RFTA, MA

4.1.7. Former Hand Grenade Range

The *CTT Range Inventory Report* identified the Former Hand Grenade Range in the South Post as a 1.0-acre area where personnel were trained in use of grenades from 1940 to 1965 (Figure 4-18). The area is generally undeveloped. Sometime after being used for hand grenade training the Medical Litter Obstacle Course was built and used at the site. That course is now abandoned, although some wooden signage, ramps, and poles remain in the area. The *CTT Range Inventory Report* erroneously states that the site is now the location of a helipad, which was not verified in the site visit.

After HRR activities were initiated, the operational range area was corrected to encompass all of the South Post, which has been continuously in use for training. As a consequence, the Former Hand Grenade Range is no longer eligible for MMRP; however, research results are retained in this HRR Report for the record.

The earliest map identification of a hand grenade range at this location is 1948 (ASR H-6). This is also sometimes labeled “J Range” and some maps demarcate small squares along Attu Road, presumably areas from which grenades were tossed toward the south into the pits.

Aerial photographic coverage for the Former Hand Grenade Range is the same as for the EOD Range. There is no evidence of site disturbance in a 1943 photograph, but there is a structure at the site in 1952 and 1965 photographs (EPA, 1991). The small scale of these photographs makes detailed analysis difficult, but there does appear to be two parallel rows of scarred spots, as might be consistent with pads for tossing, and pits into which grenades were tossed. There is insufficient detail to determine when the Medical Litter Obstacle Course was constructed, but wooden structures and signage for that course are still apparent at the location.

The ASR contained some relevant correspondence. A set of range SOPs from 1954 (ASR Appendix C-1.47) identify guard posts 8 and 9 for the “Live Hand Grenade Court.” These are along the “dirt road” to the north and west of the site. Also from 1954, a training memorandum addresses the grenade range (ASR Appendix C-1.48). It states:

“Only live hand grenades will be used. Unit range officer will record number of duds in each bay, and prior to completion of firing, will report location of all duds to the Post Range Officer...This Range will not be cleared until it has been inspected personally by the Post Range Officer or his commissioned representative.”

A 1975 training regulation (DRT 00026) describes the existence of a hand grenade range. It specifies that only live grenades were to be used, and that there were six throwing bays. Safety procedures for duds states that

“EOD Team must be notified when a grenade fails to function properly five minutes after having been armed and released. EOD Team will insure that thirty (30) minutes have elapsed before going down range.”





A 1979 memorandum (ASR Appendix C-1.22) stated that the Hand Grenade Range was “obsolete and poor state of repair.” A subsequent regulation also from 1979 (DRT 00047) describes this range as having six throwing bays, and used for M26 grenades only.

The history of use for this range appears to be well-documented. Several aerial photographs from the period of actual use of the Former Grenade were reviewed to determine its actual location, as the *CTT Range Inventory* does not appear to have the range properly located. Aerial photographs from 1943 (EPA, 1991) were reviewed, and fit to the current site map for DRFTA. The location of the grenade range, as also identified in the site visit, is where Attu Road bends to the northwest while heading away from Jackson Road. The site visited at the bend in the road conforms to historic aerial photographs and maps as the current location of the Former Hand Grenade Range. This location is inside the operational range area of the South Post (Figure 4-19), and consequently it is not eligible for MMRP.



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Legend

-  CTT Site - Closed
-  Operational Range Area
-  County Boundary
-  Installation Boundary



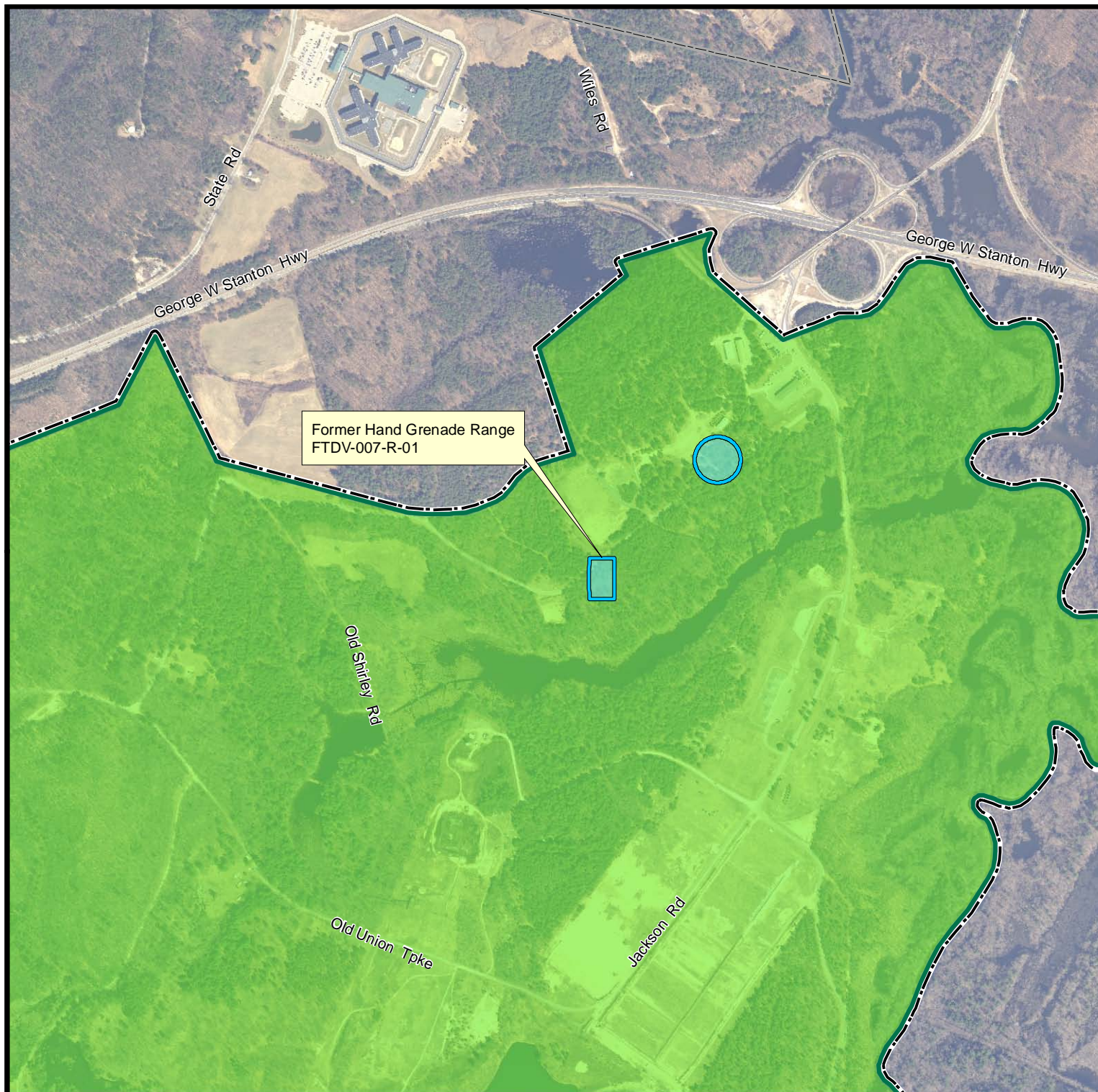
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Figure 4-18
Former Hand Grenade Range
Devens RFTA, MA





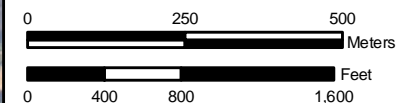
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Gaithersburg, MD 20878

Legend

- Historical Location (approximate)
- Operational Range Area
- CTT Site - Closed
- Installation Boundary

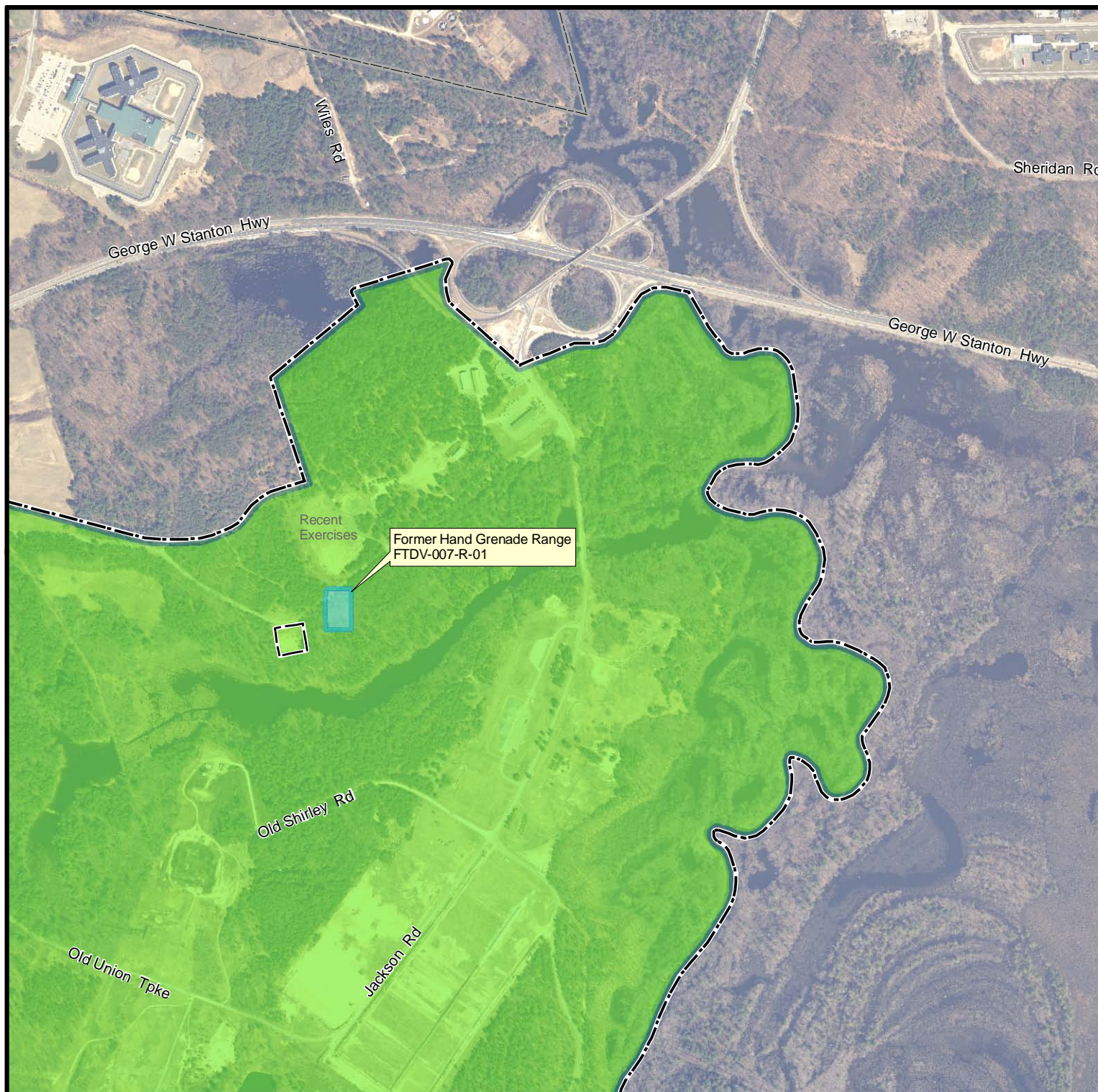


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Figure 4-19
Former Hand Grenade Range:
Historical Location
Devens RFTA, MA



4.1.8. Former Training Area 22

The *CTT Range Inventory Report* identified Former Training Area 22 as a 33.1-acre area that covers the entire 3400 Parcel (Figure 4-20). According to the inventory, it was used from 1940 to 1965 for training with small arms (blanks) and pyrotechnics. This is currently an undeveloped area to the south of a location of military administrative buildings, warehouses, and vehicle storage facilities.

Review of archive documents indicates that the *CTT Range Inventory Report* identified this site on the basis of two similar range and training areas maps from 1957 and 1961 (ASR H-17 and H-18). Another range and training area map from 1952 does not designate such an area at this location. The “training area” designation is distinct from “ranges”, which are numbered separately and identified by name on the maps. Every area of the former Fort Devens outside the Main Cantonment was categorized as a numbered “training area,” but only a few contained actual ranges. On the basis of the 1957 and 1961 maps, the *ASR* identified this location as TA15. No descriptions of the training areas were found by the *ASR* team or in the subsequent archives search.

The 1941 “General Plan of Reservation” clearly identifies a developed area to the north of the 3400 Parcel as Lovell General Hospital. The region to the south of Lovell General Hospital corresponds to Former Training Area 22, but nothing suggestive of a range or munitions training area is designated in this portion of the 1941 map.

Aerial photographs were reviewed for information relating to site use. A 1943 aerial photograph (EPA, 1991) shows the south half of the area has rows of parallel dark buildings surrounded by roadways. These buildings are a little smaller than the Lovell General Hospital buildings seen to the north. There are ball fields and an orchard to the west/northwest of the buildings. A lightly forested area lies to the east toward the Nashua River. No apparent vehicle tracks are visible in the forested areas. In a 1952 aerial photograph, the buildings are gone, and the area appears to be grass covered. In a 1965 aerial photograph (EPA, 1991 and ASR M-11), the area of concern appears to be scarred and lacks the trees visible on the north half of the area; the scarring is likely due to removal of the buildings noted in the earlier photographs.

There is no historical evidence of range or munitions training activities in the area designated as Former Training Area 22. The location appears to have been associated with the Lovell General Hospital during WWII, but was abandoned by the early 1950s. The location was allowed to become reforested, and not maintained for training.

The Army performed evaluations of other designated historical training areas as part of the PA/SI for former Fort Devens Housing Areas Grant, Locust, and Cavite (Weston, 2005). In

these efforts, training areas contained no evidence of MEC, although associated designated ranges within these areas did contain some MEC items. Based on this very detailed effort elsewhere at the former Fort Devens, training areas that do not contain specific ranges have a low probability of containing MEC.

The weight of evidence suggests that Former Training Area 22 was not part of live firing operations. There is no contemporary historical evidence of vehicle tracks in the forested areas, so it is unlikely to have been used for vehicle training either. Based on high quality aerial photograph and historical map data, it appears that Former Training Area 22 is not associated with munitions related activities.



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Legend

- CTT Site Boundary
- CTT Site - Closed
- County Boundary
- Installation Boundary



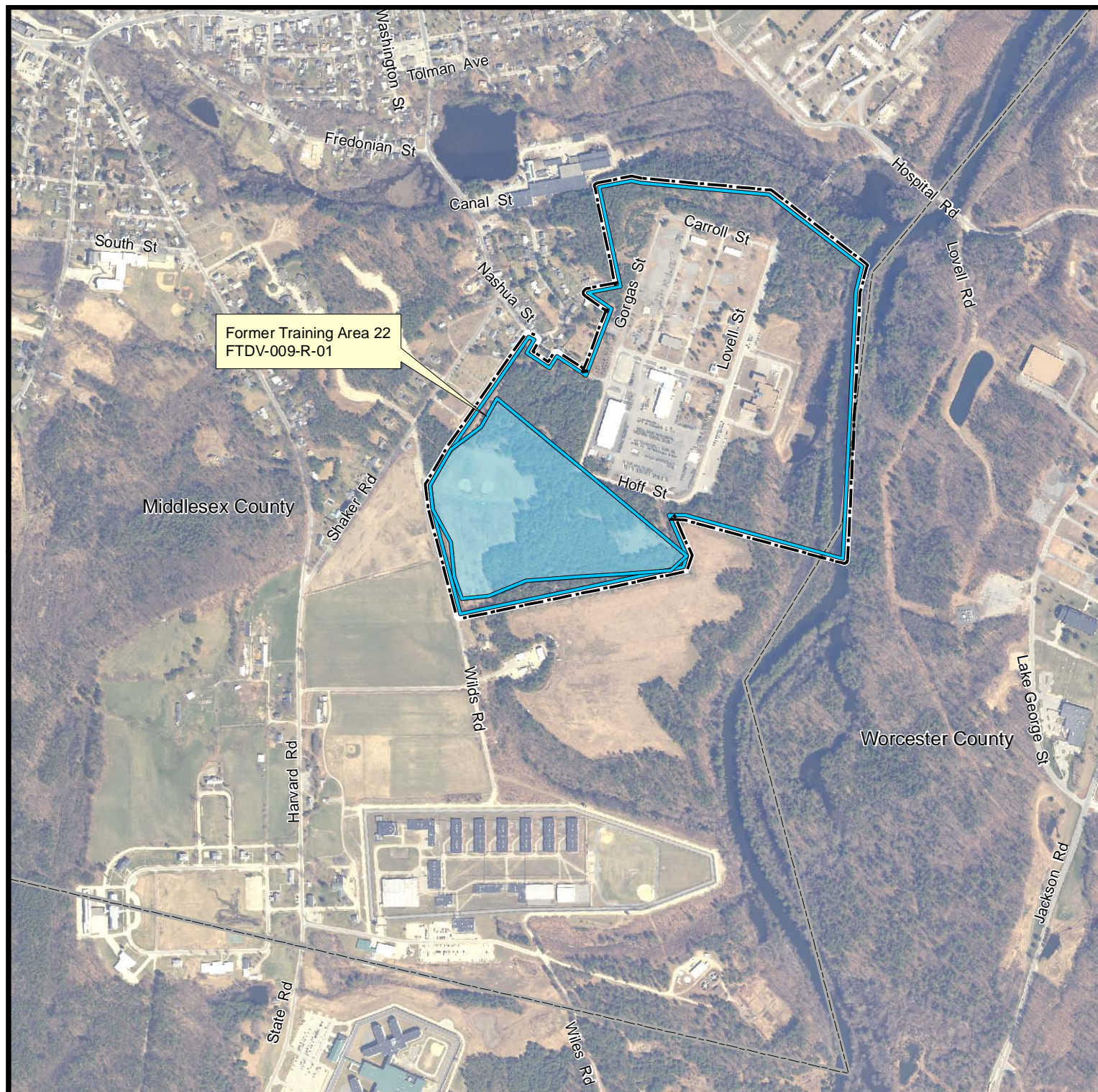
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Figure 4-20
Former Training Area 22
Devens RFTA, MA



4.2. POTENTIAL MEC AND MC

The following eight potential sites were analyzed in this report:

- Devens Rifle Range #1
- Barnum Road Area (originally named Devens Rifle Range #2)
- Devens Rifle Range #3A
- Devens Rifle Range #3B
- Former Antitank Range
- Former Explosive Ordnance Disposal Range
- Former Hand Grenade Range
- Former Training Area 22

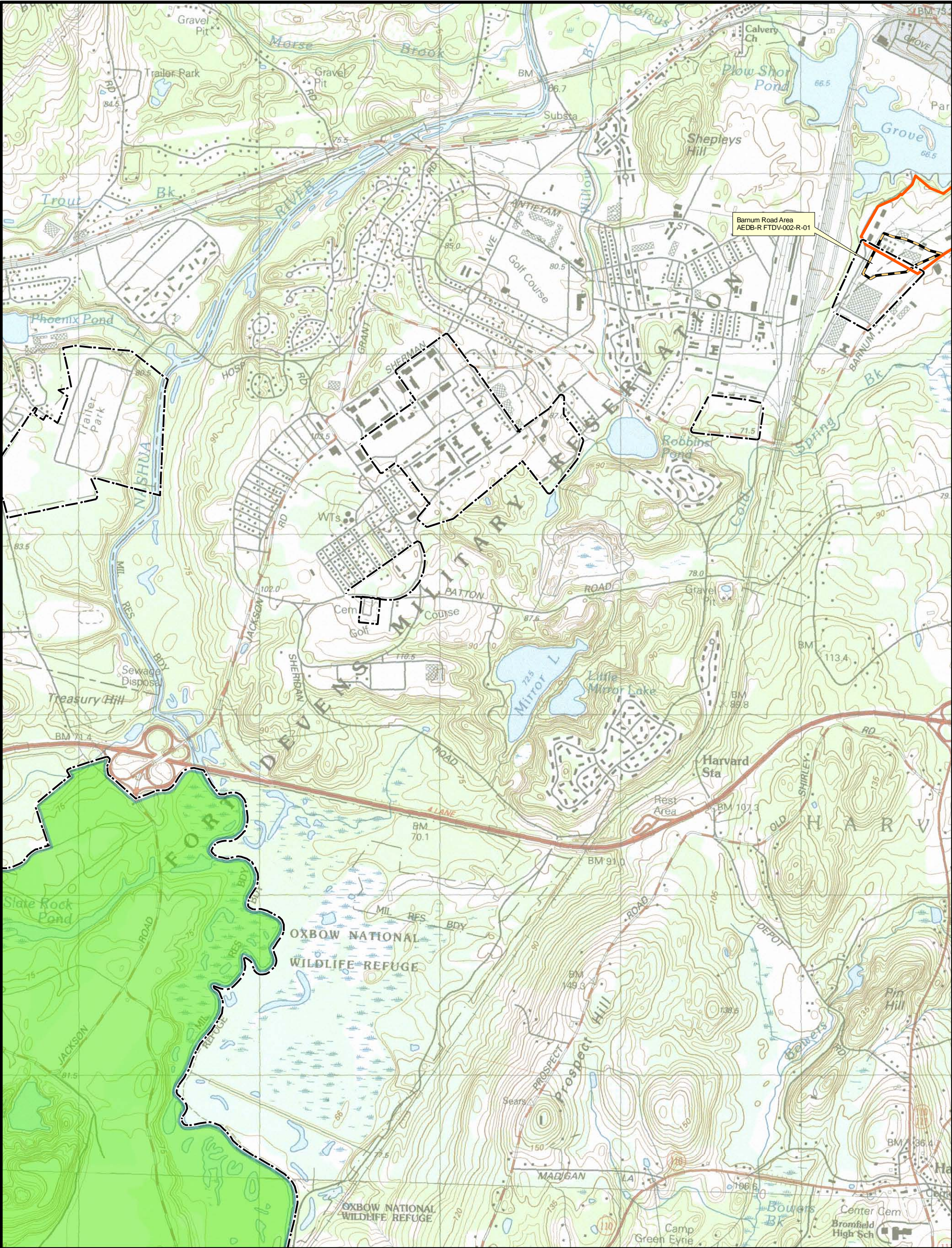
These sites were identified in the *DRFTA CTT Inventory Report* and carried forward for additional evaluation. In the analysis contained herein, one of these sites is determined to be eligible and merits further consideration in the MMRP. Five sites are excluded because there was no corroborating evidence to support the likelihood of them containing MC or MEC. Two sites were excluded because they are within an operational range area of DRFTA South Post and, therefore, ineligible for the MMRP.

One MMRP-eligible site was identified on the basis of this HRR: the Barnum Road Area (formerly the Devens Rifle Range #2). It is located on the former Fort Devens Main Post area near Barnum Road (Figure 4-21).

Table 4–1 presents the potential MEC and the associated MC that are expected to be found on the subject MMRP site. The information is based on the findings of the research conducted for this HRR.

Table 4-1: Summary of Potential MEC and MC

MRS	Potential Munitions	Primary Release Mechanism	Potential MEC	Potential MC
Barnum Road Area	Blasting caps, Fuzes, Detonators, Explosives (TNT, black powder)	Bare TNT charge ignition	Stokes mortars, WWI grenades, AP mine	Black powder (potassium nitrate, sulfur, and charcoal), TNT, smokeless powder



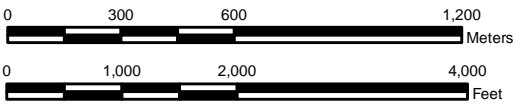
Barnum Road Area
AEDB-R FTDV-002-R-01



URS
200 Orchard Ridge Drive
Gaithersburg, MD 20878



1:20,000



File: G:\15900215_MMRP\15298909_DevensRFTA\MXD\
Revised Final HRR\Fig.4-21_DRFTA_HRR.mxd
Date: 01/29/08
Created: JMW
Revised: DJM
Checked: RG
Senior: SM

Legend

- Installation Boundary
- Operational Range Area
- MAARNG Boundary
- HRR MRS Boundary

Figure 4-21
MMRP Site Boundaries
Devens RFTA, MA

5. CONCEPTUAL SITE MODEL

This section is separated into two parts. The first part provides a discussion of the physical characteristics (climate, geology, etc.) and land use components that are descriptive of DRFTA as a whole. The second part of the section presents the site-specific CSM developed for each MRS, including MEC and MC occurrence and potential for exposure.

5.1. INSTALLATION PHYSICAL PROFILE

5.1.1. Climate

The following information summarizes the temperature and rainfall data for nearby Leominster, Massachusetts. Temperatures are reported in degrees Fahrenheit (°F). Leominster is approximately 13 miles to the west of DRFTA. In general, precipitation rates are nearly uniform throughout the seasons. The total annual precipitation is 46.3 inches.

Table 5-1: Climatological Data for Leominster, MA

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Avg. Temp (°F)	25	28	38	48	60	68	73	70	61	52	43	30
Avg. High Temp (°F)	32	36	46	57	70	78	80	83	72	61	50	37
Avg. Low Temp (°F)	17	19	29	39	46	50	58	63	51	42	35	23
Avg. Precipitation (Inches)	3.8	3.1	3.8	4.2	3.3	3.9	3.6	3.9	3.9	4.5	4.4	3.9

Source: as reported by www.weatherbase.com.

5.1.2. Geology

The area of the former Fort Devens is underlain by low-grade metasedimentary rocks, gneisses, and granites. The rocks range in age from Late Ordovician to Early Devonian (approximately 450 million to 370 million years old). The installation is situated approximately 2 miles west of the Clinton-Newbury and Bloody-bluff fault zones. Bedrock is typically unweathered to only slightly weathered.

Unconsolidated surficial deposits of glacial and postglacial origin comprise nearly all of the exposed geologic materials at DRFTA. The glacial units consist of till, deltaic deposits of glacial Lake Nashua, and deposits of glacial meltwater streams.

The till ranges from unstratified gravel to silt, and it is characteristically bouldery. Till is exposed in ground-moraine areas of the Main Post and on the South Post. It also underlies

some of the water-laid deposits (Jahns, 1953). Till averages approximately 10 feet in thickness but reaches 60 feet in drumlin areas (Koteff, 1966).

Most of the surficial glacial units in the Nashua Valley are associated with deposition in glacial Lake Nashua. The glacial lake deposits consists chiefly of sand and gravelly sand. Coarser materials are found in topset beds of deltas built out into the lakes and in glacial stream beds graded to the lakes. Delta foreset beds are typically composed of medium to fine sand, silt, and clay. Lake-bottom deposits, which consist of fine sand, silt, and clay, are mostly covered by delta deposits and are seldom observed in glacial Lake Nashua deposits (ABB, 1993).

5.1.3. Topography

The Nashua River runs through the former North Post, on the western edge of the former Main Post, and continues on toward the eastern edge of the South Post. Relief in the area varies up to 140 feet. The topography is hilly, flattening out in the area of the Main Cantonment. The hills are glacially-formed drumlins. Small streams flow through the area. Other features in the area include swamps, orchards, and numerous small lakes. The area is fairly urban, with many small towns spread throughout the countryside.

Numerous ponds and swampy areas dot the southern and western portion of the site area. The eastern portion of the area consists of various hill ranges. The elevation of the site area ranges between a low of about 200 feet National Geodetic Vertical Datum (NGVD) along the Nashua River floodplain and a high of about 450 feet NGVD in the hills (USACE, 1995).

5.1.4. Soil

Soils are very deep, gently sloping, and excessively drained. The most abundant type of soil is typically found on terraces, eskers, and outwash plains. The permeability of the soil is moderately rapid and the available water capacity is very low. Runoff is proportional to the slope of the soil which ranges from 3 to 25 percent. The seasonal high water table is at a depth greater than 6 feet.

The next most abundant type of soil is very deep, gently sloping, and well drained. This soil is found on drumlins and similar areas. Characteristically, the permeability of this soil is moderate to slow, the available water capacity is high, and runoff is proportional to the slope which ranges from 3 to 8 percent. In some areas the soil is extremely stony. The seasonal high water table is at a depth of 1 to 3 feet (Taylor and Hotz, 1985).

5.1.5. Hydrogeology

Glacial meltwater deposits constitute the primary aquifer in the area. In aquifer tests measured hydraulic conductivities in meltwater deposits were comparatively high—typically 10^{-3} to 10^{-2} centimeters per second (cm/sec). In till and in clayey lake-bottom sediments, measured hydraulic conductivities were lower and ranged generally from 10^{-6} to 10^{-4} cm/sec. Groundwater also occurs in the underlying bedrock; however, flow is limited because the rocks have no primary porosity and water moves only in fractures and dissolution voids.

Transmissivities in the meltwater deposits range from 10 square feet per day (ft^2/day) to more than 4,000 ft^2/day . Aquifer transmissivities between 10 and 1,350 ft^2/day correspond to potential well yields generally between 10 and 100 gallons per minute (gpm); transmissivities from 1,350 to 4,000 ft^2/day typically yield from 100 to 300 gpm; and where transmissivities exceed 4,000 ft^2/day , well yields greater than 300 gpm can be expected. (Most domestic wells in the area are drilled 100 to 200 ft into bedrock and yield less than 10 gpm. Higher yields are associated with deeper bedrock wells.)

The zones of highest transmissivity are found in area of thick glacial meltwater deposits on the former North and Main Posts, and these encompass the Sheboken, Patton, and McPherson production wells and the largely inactive Grove Pond well-field. The zones of lowest transmissivity are associated with exposed till and bedrock and are located on the Main Post surrounding Shepley's Hill and between Jackson Gate and the parade ground, and on the South Post at Whittemore Hill and isolated areas to the north and west.

In the absence of pumping or other disturbances, groundwater recharge occurs in upland areas. The groundwater flows generally from the topographic highs to topographic lows. It discharges in wetlands, ponds, streams, and directly into the Nashua River. Groundwater discharge maintains the dry-weather flow of the rivers and streams (ABB, 1993).

5.1.6. Hydrology

The area is drained by numerous tributaries of the Nashua River. The Nashua River flows north through the area. The floodplain in the southern portion of the area, where the North Nashua River meets the Nashua River, is relatively wide.

The floodplain along the river narrows significantly and stays narrow as it runs past the former Main and North Posts. The Nashua River empties into the Merrimack River at Nashua, New Hampshire. The Merrimack River flows south and then east, eventually emptying into the Atlantic Ocean at Newburyport, Massachusetts.

5.1.7. Vegetation

The former Main and North Posts are primarily characterized by urban and developed cover types. Approximately 56 percent of that area is covered by developed lands, the golf course, the airfield, and the wastewater infiltration beds. Early successional forest cover types (primarily black cherry-aspen hardwoods) encompass approximately 2 percent of the area, mixed oak-red maple hardwoods approximately 20 percent, and white pine-hardwood mixes approximately 11 percent. The rest of the former North and Main Posts are characterized by various coniferous species, shrub habitat, and herbaceous cover types.

Much of the South Post is undeveloped forested land. The area includes approximately 8 percent early successional forest (black cherry, red birch, grey birch, quaking aspen, red maples); 26 percent mixed oak hardwoods; and 9 percent coniferous forest (white pine, pitch pine, red pine). Four percent of the area comprises a mixed shrub community. The 200-acre Turner Drop Zone is maintained as grassland that represents a “prairie” habitat. Vegetative cover in the large “impact area” of the central South Post has not been mapped in detail. It is dominated by fire-tolerant species such as pitch pine and scrub oak.

Extensive sandy glaciofluvial soils are found in the Nashua River Valley, particularly in the South and North Post areas of the former Fort Devens. Extensive accumulations of these soils are unusual in Massachusetts outside of Cape Cod and adjacent areas of southeastern Massachusetts, and they account for some of the floral and faunal diversity at the installation.

5.1.8. Ecology

The former Fort Devens encompasses numerous terrestrial, wetland, and aquatic habitats in various successional states. Floral and faunal diversity is strengthened by the installation’s close proximity to the Nashua River; the amount, distribution, and nature of wetlands; and the undeveloped state and size of the South Post. Much of the original Fort Devens was formerly agricultural land and included pastures, woodlots, orchards, and cropped fields. Existing habitat types reflect this agrarian history, ranging from abandoned agricultural land to secondary growth forested regions. With the changes in use, the property is generally reverting back to a forested state.

Wetlands are common at the former Fort Devens. The wetlands are primarily palustrine, although riverine and lacustrine types are also found. Forested palustrine floodplain wetlands associated with the Nashua River and its tributary Nonacoicus Brook are located at the former Main and North Posts. These include flooded areas, emergent marsh, and shrub wetlands. Also present are isolated regions of palustrine wetlands and lacustrine systems. On the South Post, there are 877 acres of wetlands, consisting of deciduous forested wetlands,

deciduous shrub swamps, emergent marsh, open lacustrine waters in ponds, and open riverine waters.

Approximately half of Fort Devens' land area abuts the northern boundary of the Oxbow National Wildlife Refuge (NWR), a federal resource administered as part of the Great Meadows NWR (<http://www.fws.gov/refuges/profiles/index.cfm?id=53512>).

5.1.9. Physiography

The predominant physiographic (and hydrologic) feature in the DRFTA area is the Nashua River. It forms the eastern installation boundary on the South Post and the western boundary of much of the former Main Post and flows through the former North Post. Terrain falls into three types: bedrock, till, and glaciofluvial or glaciolacustrine deposits.

5.2. INSTALLATION LAND USE AND EXPOSURE PROFILE

5.2.1. Current Land Use/Activities

DRFTA is located in the towns of Ayer and Shirley (Middlesex County) and Harvard and Lancaster (Worcester County), approximately 35 miles northwest of Boston, Massachusetts. It lies within the Ayer, Shirley, and Clinton map quadrangles (7½-minute series).

The former Main Post and North Post contain primarily developed lands, including recreational areas (e.g., a golf course and lakes) and administrative areas. An airfield dominates the former North Post. The surrounding areas are developed for high-technology research and manufacturing, housing, buildings, and other facilities.

The South Post is located south of Massachusetts Route 2 and is largely undeveloped because of its use as a range training area. Most of the South Post is still used for training and military maneuvers, although portions of it are non-operational range areas and contain permanent administrative military buildings and ammunition storage facilities.

5.2.2. Current Human Receptors

Within DRFTA, human receptors are limited to authorized installation personnel, contractors, and visitors. Residential housing for military personnel and is located on post, but none of these house long-term residents.

The Main Cantonment and South Post are accessible only to authorized personnel. The remaining portions of DRFTA are fenced and require permission to access most of the areas. The exception is some of the property west of the Nashua River in the 3400 Parcel that is presently used as ballfields; there are secure portions of the 3400 Parcel.

5.2.3. Potential Future Land Use

The reuse plan for the former Fort Devens included many changes designed to benefit the area around the site. Redevelopment includes areas designated as open space, emphasizing environmental preservation and recreation. The plan for the areas surrounding DRFTA is to encourage business growth, new or improved products or service, educational/academic links, and research and development. Areas of the BRAC parcels are designated for rail, industrial, and trade-related uses. Areas of the post are slated for office and retail space of various sizes, environmental businesses, housing and community facilities, a correctional center, a US Army Reserve enclave, a job training center, and aviation (USACE, 1995).

5.2.4. Potential Future Human Receptors

Potential future human receptors are the same as the current human receptors, i.e., military and civilian personnel and contractors.

5.2.5. Zoning/Land Use Restrictions

The parcels retained as DRFTA are zoned for military land use.

5.2.6. Beneficial Resources

Substantial wildlife habitat is available in the areas surrounding DRFTA. Portions of the former Fort Devens lie along the Nashua River. The Oxbow NWR is adjacent to the South Post near the intersection of the Nashua River and Route 2.

In addition to abundant wildlife habitat, the BRAC parcel is being aggressively developed for light industrial and research uses. Residential areas and parklands are also a beneficial resource.

The non-BRAC areas retained for DRFTA in the former North and Main Posts do not provide substantial wildlife habitat. The training areas retained in the South Post, however, do have abundant wildlife.

5.2.7. Demographics

The former Fort Devens is located 35 miles west of Boston in north-central Massachusetts within the towns of Ayer and Shirley in Middlesex County, and the towns of Harvard and Lancaster in Worcester County. As of the 2000 Census, populations in Middlesex county towns Ayer and Shirley were 7,287, and 6,373, respectively, whereas populations in Worcester county towns Harvard and Lancaster were 5,981 and 7,380, respectively. Harvard, Lancaster and Shirley are populated by greater than 55 percent male, while Ayer is 49.2 percent male. Racially, all four towns are greater than 83 percent white, and vary between 4.5

to 10.6 percent black, 1.2 to 2.9 percent Asian, and 0.5 to 5.1 percent other races. Family size varies from approximately 2.9 (Ayer) to 3.22 (Lancaster). Average family incomes in 1999 dollars were \$61,968 (Ayer), \$66,250 (Shirley), \$66,490 (Lancaster), and \$119,352 (Harvard). Individuals below poverty levels varied from 2.0 (Harvard) to 10.8 percent (Ayer) (<http://factfinder.census.gov/>).

5.2.8. Habitat Type

Oxbow NWR refuge lies within the towns of Ayer and Shirley in Middlesex County and the towns of Harvard and Lancaster in Worcester County. The refuge consists of approximately 1,667 acres of upland, southern New England flood-plain forest, and wetland communities along nearly 8 miles of the Nashua River corridor.

Oxbow NWR was formed by three land transfers from the former Fort Devens, and a recent purchase of private land in Harvard. Two of the transfers from the U.S. Army (May 1974 and February 1988) formed the original 711-acre portion of the Refuge located south of Massachusetts Route 2. The third Army transfer occurred as part of BRAC in May of 1999, and added the 836-acre portion of the Refuge that is located north of Route 2. Finally, approximately 120 acres were added to the Refuge in April, 2001, with the acquisition of the former Watt Farm property along Still River Depot Road in Harvard. (<http://www.fws.gov/refuges/profiles/index.cfm?id=53512>).

Former installation lands support breeding activity for at least six state-listed rare species, and provide migration, feeding, and resting habitats for two federally listed endangered species and at least 16 species of concern at both the state and federal government levels (<https://www.denix.osd.mil/denix/Public/Policy/BRAC/Nov96/ftdevns.html>).

5.2.9. Degree of Disturbance

Since creation as a temporary cantonment for soldier training in 1917, major ground disturbing activities on the Main Post, North Post, and South Post have been associated with the construction, and in many cases, demolition of military-related buildings, structures, and features. The majority of the areas exhibit extensive disturbance due to prior land use and modification associated with military-related activities.

5.2.10. Ecological Receptors

The former Fort Devens supports an abundance and diversity of wildlife, primarily in the relatively less developed former South Post. Identified taxa include 771 vascular plant species, 538 species of butterflies and moths, eight tiger beetle species, 30 vernal pool invertebrates, 15 amphibian species (six salamanders, two toads, seven frogs), 19 reptile

species (seven turtles, 12 snakes), 152 birds species, and 42 mammal species. The status of fish populations in the former Fort Devens aquatic systems has not been fully defined.

Rare and endangered species include the federally listed (endangered) bald eagle and peregrine falcon (both occasional transients); the state-listed (endangered) upland sandpiper, ovoid spike rush, and Houghton's flatsedge; the state-listed (threatened) Blanding's turtle, cattail sedge, pied-billed grebe, and northern harrier; and the state-listed (special concern) blue-spotted salamander, grasshopper sparrow, spotted turtle, wood turtle, water shrew, blackpoll warbler, American bittern, Cooper's hawk, sharp-shinned hawk, and Mystic Valley amphipod. Also state listed as rare or endangered are three Lepidoptera (butterfly and moth) species.

The Massachusetts Natural Heritage Program has developed Watch Lists of unprotected species that are uncommon or rare in Massachusetts. From the Watch Lists 14 plant species, two amphibian species, and 15 bird species have been observed at the former Fort Devens (ABB, 1993).

5.3. MUNITIONS/RELEASE PROFILE

Table 5-2 presents a summary of the types of munitions that would be expected based on information collected for this HRR. The mechanisms by which the munitions may be released into the environment are also presented in this table. Details of the maximum probable penetration depth, MEC density, and occurrence of MEC fragments are discussed on a site-by-site basis in Section 5.4.

Table 5-2: Summary of Potential Munitions Types

MRS	Potential Munitions	Primary Release Mechanism
Barnum Road Area (Formerly Devens Rifle Range #2)	Blasting caps, Fuzes, Detonators, Pyrotechnics, Explosives (TNT, black powder)	Bare TNT charge ignition

5.4. BARNUM ROAD AREA

5.4.1. Area and Layout

An area of 15.29 acres at the north end of the 3700 Parcel overlaps a WWI-era range/munitions related activity. This area is now flat and mostly paved with an asphalt cover and other paved vehicle parking areas.

5.4.2. Structures

Buildings and asphalt are present throughout the Barnum Road Area site. The area of the former craters that is not beneath building is paved and used for motor vehicle parking. A fence surrounds the asphalt cover in the 3700 Parcel, and the entire MAARNG property is fenced.

5.4.3. Utilities

Underground utilities are present to support the MAARNG buildings with water and sewer. Overhead lines are present nearby to carry power to the structures and for lighting.

5.4.4. Boundaries

The site is bounded by Barnum Road on the east and by an unnamed road to the west. Within the fencing surrounding the entire DRFTA and MAARNG properties, there is no additional barrier to the site.

5.4.5. Security

This area is accessible from Barnum Road; however, the paved area is surrounded by locked fences. Military and contractor personnel may access the area.

5.4.6. Current Land Use/Activities

Current land use is as a vehicle storage area and maintenance area. Most of the site is paved with asphalt for parking. Some administrative buildings are present on the MAARNG property.

5.4.7. Current Human Receptors

Current human receptors include DRFTA and MAARNG personnel. The general public may access portions of the 3700 Parcel.

5.4.8. Potential Future Land Use

Potential future land use is expected to be consistent with current military land use.

5.4.9. Potential Future Human Receptors

Potential future human receptors include current human receptors, i.e., military personnel and contractors.

5.4.10. Zoning/Land Use Restrictions

Barnum Road Area is located within an area of DRFTA and MAARNG properties reserved as a maintenance area. An asphalt cover is maintained across the site, and, on DRFTA, institutional controls are in place to assure that the cap is repaired if digging occurs.

5.4.11. Beneficial Resources

There are no ecological resources at this site.

5.4.12. Habitat Type

There is no expanse of habitat at this site.

5.4.13. Degree of Disturbance

The site, Barnum Road Area, has been subject to a high degree of disturbance. Construction activities during shop and road building and subsequent IRP remediation activities at AOC 44/52 involved significant excavation and soil movement.

5.4.14. Munitions Types and Release Mechanisms

The typical release mechanism for the site is intentional detonation of explosives and materials in craters during the WWI era. There is no record of specific munitions used at this site, but the presence of craters suggests that explosive charges (e.g., TNT) and detonators or bursters may have been used. The presence of inert Stokes mortars nearby suggests that such munitions may be present as well.

5.4.15. Maximum Probable Penetration Depth

The expected munitions are likely to have exploded in place in the craters. The depth of the craters is unknown, but likely to be less than 4 feet for ease of access.

5.4.16. MEC Density

A UXO sampling report found inert items nearby, but noted the general lack of UXO as suggestive of a prior site removal. The UXO report remarked on the paucity of MEC and MEC debris in this area.

5.4.17. MEC Scrap/Fragments

According to 1995 site UXO sampling (see Section 4.1.2) munitions debris was found with relatively light density. The only significant finds at the Barnum Road Area were limited to two sand-filled mortars, four inert grenades, and one practice AP mine although none of these was within the footprint of the craters. Additionally the ASR reported a sand-filled

Stokes mortar retrieved across Barnum Road to the east of the area. This latter event was based on an interview with a retired EOD officer, and the location is not known with certainty.

5.4.18. Associated Munitions Constituents

As noted in Table 4–1, the MC associated with the site includes the following: black powder (potassium nitrate, sulfur, and charcoal), TNT, and smokeless powder. There is no evidence that chemical warfare agent-filled mortars were used in training at this site and no chemical weapons were expended at Fort Devens (ASR, 1995). In addition, WWI predates the use of perchlorate by the U.S. Army.

5.4.19. Transport Mechanisms/Migration Routes

The primary transport mechanisms identified for this site include the following:

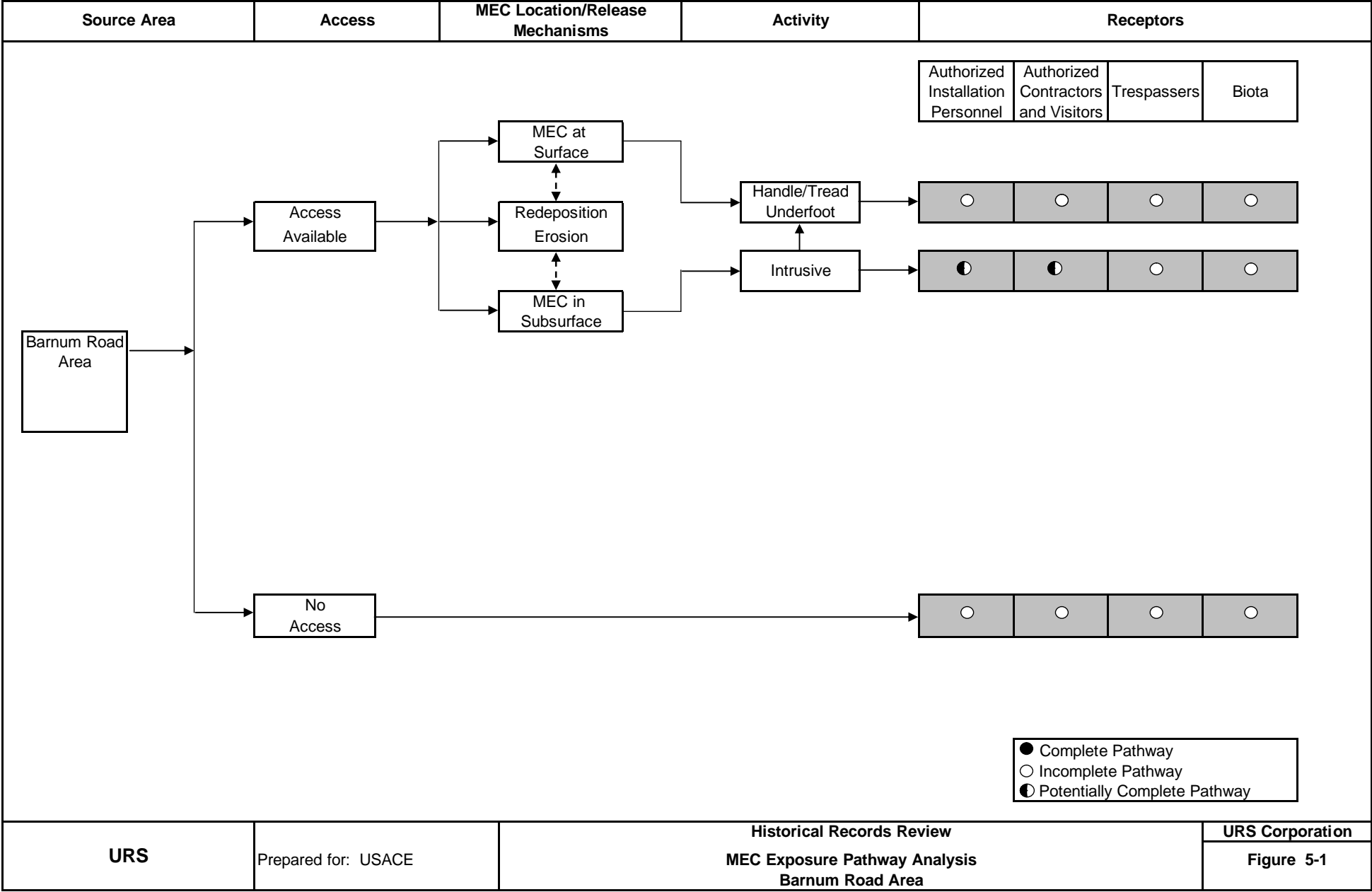
***Infiltration:** Based on the soil types present at the site, the potential for MC to migrate from subsurface soil to groundwater via infiltration existed in the past. However, infiltration is likely to have been retarded by the paving over the historical crater features; only unpaved portions of the site are likely to have any significant level of precipitation infiltration.*

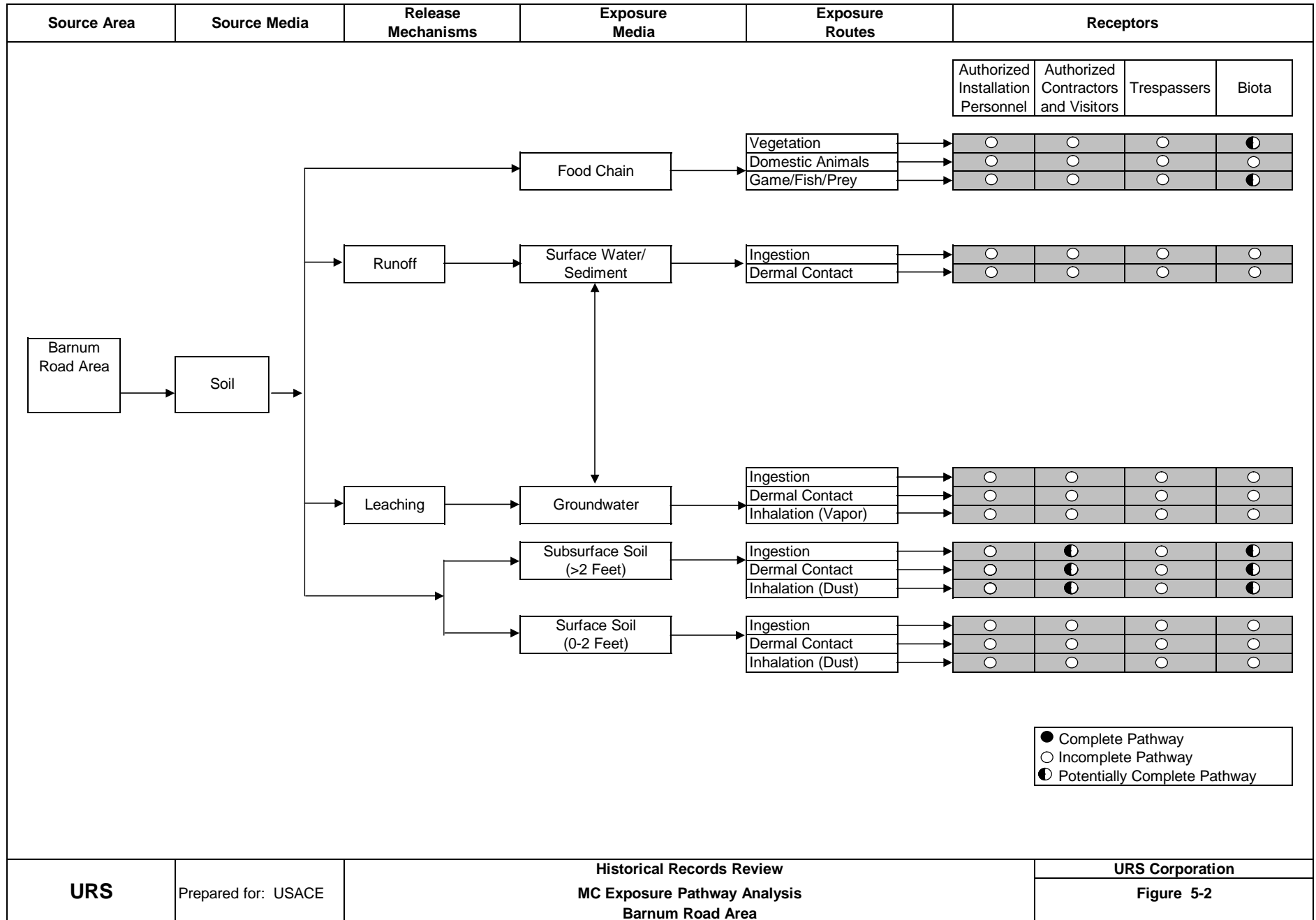
5.4.20. MEC Pathway Analysis

A MEC pathway analysis was prepared for the site (Figure 5–1). Site history from aerial photographs suggests a very low probability that munitions may have been used at the site. Most of the site is paved and was excavated to a minimum of 2 feet. Therefore, exposure to MEC is very limited and likely to occur only if construction occurs at the site.

5.4.21. MC Pathway Analysis

An MC pathway analysis was prepared for the Barnum Road Area (Figure 5–2). MC would most likely be present in subsurface soil beneath paved areas on the MAARNG property. Burrowing biota may encounter these materials, although this area is a very unappealing habitat compared to areas to the immediate north. Likewise, human contact will likely only occur for installation personnel or contractors performing construction at the site.





URS

Prepared for: USACE

Historical Records Review
 MC Exposure Pathway Analysis
 Barnum Road Area

URS Corporation

Figure 5-2

6. CONCLUSIONS

The *CTT Range Inventory* identified 10 MMRP sites at DRFTA. Two of the 10 were not carried forward into this HRR (the Former Mock Village, and Range Complex #4) because they are MMRP sites in the FUDS Program. The following eight sites analyzed in this HRR are:

- Devens Rifle Range #1
- Barnum Road Area (originally named Devens Rifle Range #2)
- Devens Rifle Range #3A
- Devens Rifle Range #3B
- Former Antitank Range
- Former Explosive Ordnance Disposal Range
- Former Hand Grenade Range
- Former Training Area 22

The HRR findings and recommendations for each are provided in the following sections for each MMRP site. Table 6-1 summarizes the MRSs, their AEDB-R numbers, acreage (CTT and HRR), and any special comments. Figure 6-1 provides a map of the CTT sites, and the MRS boundaries as revised by this HRR.

6.1. DEVENS RIFLE RANGE #1

Devens Rifle Range #1 (AEDB-R FTDV-001-R-01) was identified as a potential MMRP site in the *CTT Range Inventory Report*. In that report, the site covered the entire 3800 Parcel of DRFTA. This parcel is on the north edge of the former North Post adjacent to Moore Army Airfield. At present, this area is a complex of small buildings.

The historical resources never show a range in the area. It appears that the *CTT Range Inventory Report*, which based its recommendation on the *BRAC CTT Range Inventory Report*, did not reassess the 3800 Parcel in sufficient detail separately from a larger area that was identified as range in the *BRAC CTT Range Inventory Report*. Based on a review of the historic maps, the conclusion that this site was never a rifle range is considered to be of high quality with little uncertainty.

Because the site was never used as a range and no MEC or MC is known or suspected at this location, the site is not eligible for the MMRP.

6.2. BARNUM ROAD AREA

The *CTT Range Inventory Report* identified the entire 3700 Parcel as the former Devens Rifle Range #2 (AEDB-R FTDV-001-R-01). This parcel is in the eastern edge of the former Main Post. It is east of north-south rail lines and a rail yard. At present, this area contains maintenance facilities. MAARNG property is north of the 3700 Parcel.

There is no evidence that the site was ever a rifle range, consequently, this report has incorporated a site name change to Barnum Road Area.

There is scant evidence for historical use of this area as a training area, possibly in support of WWI warfare simulation. Some sort of detonation appears to have occurred in regularly-spaced craters during WWI. Such use is not corroborated with other contemporary evidence.

This area has a very low probability of containing MEC. A UXO sampling in 1995 at and around the site detected only inert items. Based on a review of the historical maps, the conclusion that this site was never a rifle range is considered to be of high quality with little uncertainty.

The revised site covers 15.29 acres of the north end of DRFTA's 3700 Parcel and part of the adjoining MAARNG property to the north.

The site name change made herein – from Devens Rifle Range #2 to Barnum Road Area – should be made to the AEDB-R to reflect that this site's actual history.

6.3. DEVENS RIFLE RANGE #3A

Devens Rifle Range #3A (AEDB-R FTDV-003-R-01) was identified as a potential MMRP site in the *CTT Range Inventory Report*. In that report, the site covered the entire Main Cantonment of DRFTA. At present, this area has office buildings, maintenance facilities, and a few barracks.

The historical resources never show a range in the area. It appears that the *CTT Range Inventory Report*, which based its recommendation on the *BRAC CTT Range Inventory Report*, did not reassess the Main Cantonment Parcel in sufficient detail separately from a larger area that was identified as range in the *BRAC CTT Range Inventory Report*. Based on a review of the historic maps, the conclusion that this site was never a rifle range is considered to be of high quality with little uncertainty.

Because the site was never used as a range and no MEC or MC is known or suspected at this location, the site is not eligible for the MMRP.

6.4. DEVENS RIFLE RANGE #3B

Devens Rifle Range #3B (AEDB-R FTDV-004-R-01) was identified as a potential MMRP site in the *CTT Range Inventory Report*. In that report, the site covered the entire 1400 Parcel at DRFTA. The 1400 Parcel is at the eastern edge of the former Main Post, and currently contains buildings used by tenant Army Reserve personnel.

The historical resources never show a range in the area. It appears that the *CTT Range Inventory Report*, which based its recommendation on the *BRAC CTT Range Inventory Report*, did not reassess the 1400 Parcel in sufficient detail separately from a larger area that was identified as range in the *BRAC CTT Range Inventory Report*. Based on a review of the historic maps, the conclusion that this site was never a rifle range is considered to be of high quality with little uncertainty.

Because the site was never used as a range and no MEC or MC is known or suspected at this location, the site is not eligible for the MMRP.

6.5. FORMER ANTITANK RANGE

The Former Antitank Range (AEDB-R FTDV-005-R-01) was identified as a potential MMRP site in the *CTT Range Inventory Report*. In that report, the site covered the entire former Motor Pool Area of DRFTA. The area is to the west of Queenstown Street, and north of Patton Road. At present, the area is undergoing development for commercial purposes.

The historical resources never show a range in the area. It appears that the *CTT Range Inventory Report*, which based its recommendation on the *BRAC CTT Range Inventory Report*, did not reassess the former Motor Pool Area in sufficient detail separately from a larger area that was identified as range in the *BRAC CTT Range Inventory Report*. Based on a review of the historic maps, the conclusion that this site was never an antitank range is considered to be of high quality with little uncertainty.

Because the site was never used as a range and no MEC or MC is known or suspected at this location, the site is not eligible for the MMRP.

6.6. FORMER EOD RANGE

The Former EOD Range (AEDB-R FTDV-006-R-01) is in the former South Post of DRFTA. The historical footprint of the site covers 4.61 acres, all of which falls within the operational range area of DRFTA, although it is no longer being used as an EOD Range.

Because this site is within the operational range area of DRFTA, it is not eligible for the MMRP.

6.7. FORMER HAND GRENADE RANGE

The Former Hand Grenade Range (AEDB-R FTDV-007-R-01) is in the former South Post of DRFTA. The historic footprint of the site falls entirely within the operational range area. There are substantial historical resources regarding the use of this area in the past. The area is no longer being used for range or training activities.

Because this site is within the operational range area of DRFTA, it is not eligible for the MMRP.

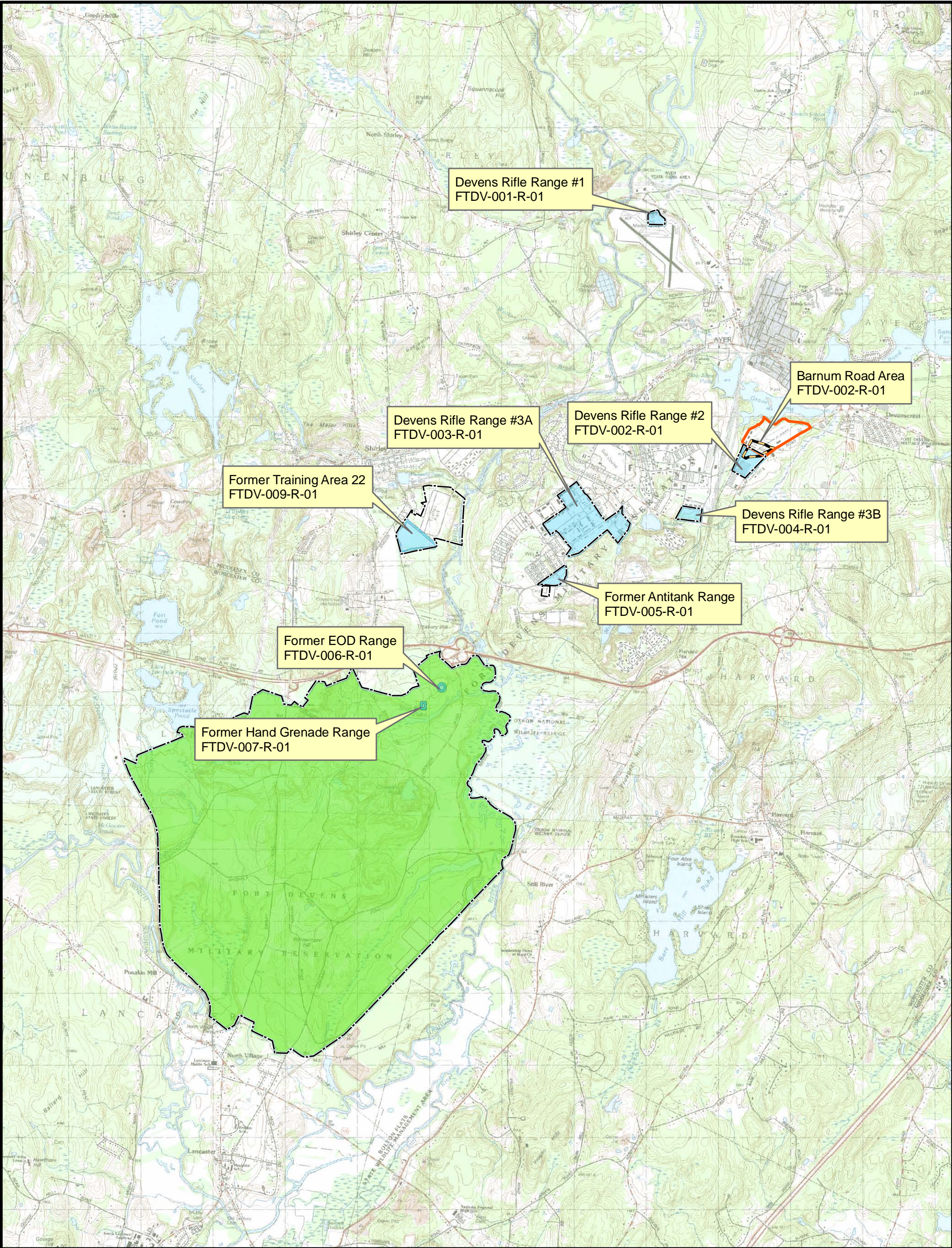
6.8. FORMER TRAINING AREA 22

The *CTT Range Inventory Report* identified Former Training Area 22 (AEDB-R FTDV-009-R-01) as a 33.1-acre area covering the entire 3400 Parcel, which is on the west side of DRFTA near the former Lovell Hospital. The historical resources never show a range in the area. Based on a review of the historic maps, the conclusion that this site was never a munitions training is considered to be of high quality with little uncertainty.

Because the site was never used as a range and no MEC or MC is known or suspected at this location, the site is not eligible for the MMRP.

Table 6-1: Summary of HRR Findings

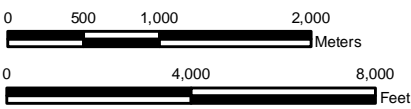
Site Name	AEDB-R Number	CTT vs. HRR Acreage	Comments
Devens Rifle Range #1	FTDV-001-R-01	9.1/0	Not eligible for the MMRP because there is no evidence of historical munitions use or firing and no known or suspected MEC or MC exists at the site.
Barnum Road Area (formerly Devens Rifle Range #2)	FTDV-002-R-01	27.5/15.29	This site, while not a rifle range as originally determined, does appear to have been used for WWI training. A portion of this site lies outside DRFTA on MAARNG property.
Devens Rifle Range #3A	FTDV-003-R-01	136.5/0	Not eligible for the MMRP because there is no evidence of historical munitions use or firing and no known or suspected MEC or MC exists at the site.
Devens Rifle Range #3B	FTDV-004-R-01	14.0/0	Not eligible for the MMRP because there is no evidence of historical munitions use or firing and no known or suspected MEC or MC exists at the site.
Former Antitank Range	FTDV-005-R-01	13.6/0	Not eligible for the MMRP because there is no evidence of historical munitions use or firing and no known or suspected MEC or MC exists at the site.
Former EOD Range	FTDV-006-R-01	2.0/*	This site falls within the operational range area and is ineligible for the MMRP.
Former Hand Grenade Range	FTDV-007-R-01	1.0/*	This site falls entirely within the operational range area, and is not eligible for the MMRP.
Former Training Area 22	FTDV-009-R-01	33.1/0	Not eligible for the MMRP because there is no evidence of historical munitions use or firing and no known or suspected MEC or MC exists at the site.
*Revised HRR acreages were not developed for these sites because they are within the operational range area and, therefore, ineligible for the Active Army MMRP.			



URS
200 Orchard Ridge Drive
Gaithersburg, MD 20878



1:50,000



File: G:\15900215_MM\RP\15298909_DevensRFTA\MXD\
Revised Final HRR\Fig6-1_HRR.mxd
Date: 01/29/08
Created: DJM
Checked: LS
Senior: RG

Legend

- CTT Site - Closed
- HRR MRS Boundary
- MAARNG Boundary
- Installation Boundary

Figure 6-1
HRR MRS Boundary
Devens RFTA, MA

7. REFERENCES

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Appendix A: Archives Searched/Data Sources

Devens Reserve Training Facility
Archival Search Report
September 13, 2006

Heritage Research Center, Ltd. conducted archival research related to this installation. The following lists the repositories visited and sources reviewed in that effort. The list reflects the entries/collections and boxes we actually reviewed. It should be noted that Heritage reviewed finding aids and catalogs extensively for each repository, entry and collection to identify potentially relevant materials for review. The time spent in each repository is noted in bold.

National Archives and Records Administration – College Park, MD – 101.25 hours

Textual Branch

RG 51, Bureau of the Budget

- Entry 127-A, Records of Property and Supply Management Branch; 1953-60R
 - Boxes 1-24, Acc. 78-1 – Nothing relevant; records concerned other governmental agencies.
- Entry 149-A, General Files, War Projects, 1940-45
 - Boxes 1-41 - Nothing relevant, records contained diaries, administrative reports and information regarding other installations.

RG 77, Office of the Chief of Engineers

- Entry 106B, General Correspondence, 1918-1945
 - Boxes 775-776, 803-820 and 823 – Nothing relevant; pertained to general administrative matters of the Corps of Engineers.
- Entry 171, Land Papers, 1794-1916
 - Boxes 35-37 – Nothing relevant; pertained to other installations in Massachusetts.
- Entry 391, Construction Completion Reports
 - Box 79 – COPIED map of Devens facility.
 - Box 80 – COPIED materials describing facilities at Devens.
 - Boxes 81-84 – Contained materials for Devens, but nothing relevant to range areas.
- Entry 393, Historical Records of Buildings
 - Boxes 53-54 – Contained materials for Devens, but nothing relevant to range areas.
- Entry 1013, Correspondence with Districts
 - Boxes 25-33 – Contained materials of the Boston District Office, but nothing relevant to range areas at Devens.
- Entry 1014, Correspondence with Divisions
 - Boxes 42-50 – Contained materials for the New England Division, but nothing for Devens.
 - Boxes 51-58 – Contained materials for the North Atlantic Division, but nothing relevant to Devens.

- Entry 1023, General Correspondence relating to Airfields and related Facilities, 1940-1945
 - Boxes 1-6 - Nothing relevant; contained information on gasoline supplies and aircraft assembly plants.

RG 92, Office of the Quartermaster General

- Unnamed Entry
 - Boxes 3-5, 7, 14 – Nothing relevant; pertained to other installations.

RG 94, Records of the Adjutant General's Office, 1780s-1917

- Entry 464, Records of Divisions, Military Reservation Division, Early 1800s-1916
 - Box 37, 49, 53, 61, 72 – Nothing relevant; contained information related to other installations.

RG 107, Office of the Secretary of War

- Entry 100, Cross-Reference Sheets to General Correspondence, 1943-46
 - Box 1-2 – Nothing relevant; contained information related to other installations.
- Entry 102, Administration Assistant to the Secretary of War, 1943-46
 - Boxes 101, 112-114, 117-120, 127-133 – Nothing relevant; contained materials related to other installations.
- Entry 108, Secretary of War (Patterson), Army and Navy Munitions Board, 1946-47
 - Boxes 1-10 – Nothing relevant; contained information related to other installations.
- Entry 158, Under Secretary of War, Special Assistant for Construction, M. J. Madigan, General Correspondence, 1940-45
 - Boxes 893-905 – Nothing relevant; contained materials regarding other installations.
- Entry 159, Under Secretary of War, Special Assistant for Construction, M. J. Madigan, General Correspondence, 1940-45
 - Box 905 – Contained material for Devens, but nothing related to range areas.
- Entry 168, Office of Under Secretary of War, Purchase and Contract Branch Construction Section, Subject Files, 1940-42
 - Boxes 1205-1210 – Nothing relevant; contained materials regarding ordnance plants, housing and progress reports.
- Entry 216, Under Secretary of War, Special Assistant for Construction, M. J. Madigan, General Correspondence, 1940-45
 - Boxes 178-186 - Nothing relevant; contained materials related to other installations.

RG 111, Office of the Chief Signal Officer

- Entry 7, Unclassified Central Decimal Files, 1941-1957 – Archives staff could not locate.

RG 156, Office of the Chief of Ordnance

- Entry 46, Reports of Target Firings by Artillery Units, 1895-1924
 - Boxes 1-9, 12-18, 20-22, 24 and 26-49 – Nothing relevant; information concerned other installations.

RG 159, Office of the Inspector General

- Entry 26A, General Correspondence
 - Boxes 1-24 – Nothing relevant; pertained to administrative matters at other installations.
- Entry 26B, General Correspondence
 - Boxes 1-39 – Nothing relevant; pertained to administrative matters, National Guard units and investigations at other installations.
- Entry 26C, General Correspondence
 - Boxes 1-24 – Nothing relevant; materials concerned other installations.
 - Boxes 25-35 – Nothing relevant; materials concerned other installations.
 - Box 36 – Contained information for Devens, but nothing relevant to range use.
 - Boxes 37-48 – Nothing relevant; materials concerned personnel matters, allotments and administrative matters.
- Entry 26D, General Correspondence
 - Boxes 400, 411 and 522 – Contained materials for Devens, but nothing relevant to range areas.
- Entry 26E, General Correspondence
 - Boxes 1-23 – Nothing relevant; materials concerned insurance, contracts and administrative matters at other installations.
 - Box 178 – Contained materials for Devens, but nothing relevant to range areas.

RG 160, Headquarters Army Service Forces

- Entry 25, Directory of Plans and Operations, 1942-44
 - Boxes 1-18 – Nothing relevant; concerned administrative matters.

RG 165, War Department General and Special Staffs

- Entry 258, Reports and Correspondence Relating to Construction, Utilization and Disposal of Army Installations, 1944-147
 - Boxes 149-152 – Contained materials on construction in the Pacific region, but nothing related to Devens.
- Entry 484, Legislative and Liaison Division, Legislative Branch, Correspondence and other Papers Relating to Pending Legislation Affecting the War Department, January 1843–August 1946
 - Boxes 244-265 – Nothing relevant; concerned administrative matters.
- Entry 484C, Card File of approved WPA National Defense Projects, 1942-48
 - Box 2 – COPIED material related to range development at Ft. Devens.
 - Boxes 3-5 – Nothing relevant, contained materials for other installations.

- Entry 484D, Reports and Correspondence Relating to Construction, Utilization and Disposal of Army Installations, 1944-47
 - Boxes 45, 46, 69 – Nothing relevant, contained administrative files.

RG 168, National Guard Bureau

- Entry 344, State Decimal File, 1922-45
 - Boxes 567-573 – Contained materials for Massachusetts Guard units, but nothing relevant to range areas at this installation.
- Entry 348
 - Boxes 104-126 – Nothing relevant; materials concerned administrative matters.

RG 175, Records of the Chemical Warfare Service

- Entry 1
 - Boxes 22, 220, 245-255, 541 – Nothing relevant; contained decimal files for other installations.
- Entry 1A
 - Boxes 13, 23, 382, 286-388, 390, 391, 292, 295, 298, 400, 401 - Nothing relevant; contained decimal files for other installations.
- Entry 2A
 - Boxes 1-14 – Nothing relevant; contained material for other installations.
- Entry 4
 - Boxes 1-45 - Nothing relevant; contained material for other installations.
- Entry 4A
 - Boxes 134-163 - Nothing relevant; contained material for other installations.

RG 177, Chiefs of Arms

- Entry 5, Records of the Office of the Chief of Coast Artillery, Charts, tables and Other Records pertaining to Target Practice, 1904-35
 - Box 1 - Nothing relevant; contained information regarding other installations.
- Entry 7, Records of the Office of Chief of Coast Artillery, Drill Regulations, Coastal Artillery, n.d.
 - Box 1 - Nothing relevant; contained an operations manual
- Entry 10, Station Books for Artillery Officers, 1878-1900
 - Box 1 - Nothing relevant, contained information regarding personnel.
- Entry 11, Intelligence File, 1928-1930
 - Box 1 - Nothing relevant; contained information regarding other installations.
- Entry 13, Records of Coastal Artillery Board, Working Drawings and Charts for Use in Preparing Land Defense Plans, n.d.
 - Boxes 1-3 – Nothing relevant; contained information regarding other installations.
- Entry 14, Field Artillery Board, Decimal File, 1931-1942
 - Boxes 1-5 - Nothing relevant; materials concerned administrative matters.

- Entry 22, Outline History and Organization Data Pertaining to the Coast Artillery Corps, 1901-20
 - Box 1 - Nothing relevant; contained information regarding other installations.
- Entry 32, Coast Artillery Training Camps, 1917-19
 - Boxes 1-17 - Nothing relevant; contained information regarding personnel.

RG 319, Army Staff

- Entry 47C, Project Decimal File, 1941-45
 - Boxes 1-30 – Nothing relevant; materials concerned administrative matters.
- Entry 1670 – Nothing relevant; concerned construction and maintenance activities at Army Reserve facilities.

RG 330, Records of the Department of Defense

- Entry 179
 - Boxes 1-2 – Nothing relevant; contained information for other installations.

RG 334, Inter-Service Agencies

- Entry 15, Armed Service Explosives Safety Board
 - Boxes 1-19 – Nothing relevant; pertained to reports on explosions at other installations.

RG 335, Office of the Secretary of the Army

- Entry 60, Assistant Secretary of the Army (Installations and Logistics), General Correspondence, 1963-64
 - Boxes 1-137 - Nothing relevant; contained materials for other installations.
- Entry 116, Army Installation Board, Decimal File, 1951-52
 - Boxes 1-8 - Nothing relevant; contained materials for other installations.
- Entry 118, UIC Wo4WAA, White Sands MR, 1978—81
 - Boxes 10-11 – Nothing relevant, contained materials for other installations.

RG 337, Army Ground Forces HQ

- Entry 1, Inspection Reports, 1948-1950
 - Box 6 – Nothing relevant; contained materials for other installations.
- Entry 1B, Inspection Reports, 1951-53
 - Box 28, 49, 72, 75 – Contained materials for Devens, but nothing relevant to range areas.
- Entry 30, Troop Training Division, Replacement Training Branch Inspection Reports 1942-44
 - Box 178 – Contained materials for Devens, but nothing relevant for range areas.

- Entry 30A, Training Reports, 1943-1947
 - Box 183 – Alphabetical organization covering Devens, but found nothing for that installation.
- Entry 55, General Correspondence, 1942-1948
 - Box 506 – COPIED materials concerning training exercises at Devens.
 - Boxes 677-684 – Nothing relevant; contained general information on training and target ranges and information for those activities at other installations.
 - Boxes 722-724 - Nothing relevant; contained general information on target practice and small arms ranges.
 - Boxes 1024-1046 – Nothing relevant; contained general information on various ordnance and munitions.
- Entry 55B, Classified Central Files, 1942-1954
 - Box 38 – Contained materials for Devens, but nothing relevant to range areas.
 - Boxes 60-64 – Nothing relevant; contained general information on training exercises.
- Entry 91, Special Staff Ordnance Section – Classified Decimal Files, 1945-1948
 - Boxes 1-10 – Nothing relevant; contained information concerning budgets, strength and training status, National Guard training and ammunition types.

RG 338, U.S. Army Commands, 1942-

- No named entry
 - Box 1, Acc. 81-0051 - Nothing relevant; concerned other installations.
- Entry A1 189
 - Boxes 1495-97, 1500-01, 1584-86, 1642-44 - Nothing relevant; concerned other installations.
- Entry A1 242
 - Box 2165-66 - Nothing relevant; concerned other installations.
- Entry 71
 - Boxes 1-5 - Nothing relevant; concerned other installations.
- Entry 78-L
 - Boxes 1-2, Acc. 95-0485 - Nothing relevant; concerned other installations.
- Entry 93-118
 - Box 1, Acc. 79-0079 - Nothing relevant; concerned other installations.
- Entry 109
 - Box 1 – COPIED a Fort Devens map with ranges.
 - Box 3 – COPIED materials related to ranges at Fort Devens.
 - Boxes 2, 4-6 - Nothing relevant; concerned other installations.
- Entry 118, Acc. 86-0559
 - Box 1-9 - Nothing relevant; concerned other installations.
- Entry 119, Acc. 91-400
 - Boxes 1-2 - Nothing relevant; concerned other installations.
- Entry 145
 - Box 1092 - Nothing relevant; concerned other installations.

- Entry 240
 - Boxes 2145-2155 - Nothing relevant; concerned other installations.
- Entry 241
 - Boxes 2156-64 - Nothing relevant; concerned other installations.
- Entry 330
 - Box 198 - Nothing relevant; concerned other installations.
- Entry 331
 - Box 199 - Nothing relevant; concerned other installations.
- Entry 401-25
 - Acc. 68-A-6509 - Nothing relevant; concerned other installations.
- Entry 401-46
 - Acc. 73-A-0125 - Nothing relevant; concerned other installations.
- Entry 401-53
 - Boxes 1-3, Acc. 69-A-0561 - Nothing relevant; concerned other installations.
- Entry 401-118
 - Box 1, 2, Acc. 69-B-5761 - Nothing relevant; concerned other installations.
- Entry 401-243
 - Box 1, Acc. 83-0591 - Nothing relevant; concerned other installations.
- Entry 401-297
 - Box 1, Acc. 78-0986 - Nothing relevant; concerned other installations.
- Entry 401-345
 - Boxes 2-23, Acc. 68-C-3891 - Nothing relevant; concerned other installations.
- Entry 401-366
 - Acc. 92-0567 - Nothing relevant; concerned other installations.
- Entry 401-400
 - Boxes 38-39, Acc. 74-F-0740 - Nothing relevant; concerned other installations.
- Entry 401-423
 - Box 1, Acc. 80-0573 - Nothing relevant; concerned other installations.
- Entry 410-143
 - Box 1-2, Acc. 69-B-0691 - Nothing relevant; concerned other installations.
- Entry 410-144
 - Boxes 5-6, Acc. 69-O-0691 - Nothing relevant; concerned other installations.
- Entry 410-145
 - Boxes 8-9, Acc. 69-F-0691 - Nothing relevant; concerned other installations.
- Entry 410-150
 - Acc. 69-A-0692 - Nothing relevant; concerned other installations.
- Entry 410-218, Acc. 81-0044
 - Box 1-2 - Nothing relevant; concerned other installations.

- Entry 410-219
 - Box 1, Acc. 81-0047 - Nothing relevant; concerned other installations.
- Entry 410-220
 - Acc. 81-0049 - Nothing relevant; concerned other installations.
- Entry 410-221
 - Box 3, 5 (4 missing), Acc. 81-0045 - Nothing relevant; concerned other installations.
- Entry 410-223
 - UAcc. 81-0053 - Nothing relevant; concerned other installations.
- Entry 410-224
 - Acc. 81-0051 - Nothing relevant; concerned other installations.
- Entry 410-225
 - Box 1, Acc. 81-0052 - Nothing relevant; concerned other installations.
- Entry 410-338
 - Boxes 1-4, Acc. 74-A-A740 - Nothing relevant; concerned other installations.
- Entry 410-338
 - Box 1, Acc. 70-A-0667 - Nothing relevant; concerned other installations.
- Entry 410-527
 - Boxes 1-2, Acc. 81-0034 - Nothing relevant; concerned other installations.
- Entry 412
 - Box 503 - Nothing relevant; concerned other installations.
- Entry 1038
 - Box 23 - Nothing relevant; concerned other installations.
- Entry 34173
 - Boxes 1-2 - Nothing relevant; concerned other installations.
- Entry 35226
 - Boxes 1-10 - Nothing relevant; concerned other installations.
- Entry 42851
 - Boxes 1-4 - Nothing relevant; concerned other installations.
- Entry 42852
 - Box 1 - Nothing relevant; concerned other installations.

RG 341, HQ, U.S. Air Force

- Entry 19, Directorate of Installations
 - Boxes 1-11 – Nothing relevant; concerned management studies, contracts, construction programs, real estate supplies and equipment, personnel and publications of a general nature.
 - Box 13 – Alphabetical organization including Massachusetts, but found nothing for Devens.
 - Box 21 - Alphabetical organization including Massachusetts, but found nothing for Devens.
 - Boxes 57-63 – Nothing relevant; concerned construction, publications, appropriations, real estate, housing and airport operations of a general nature.

- Entry 126 Real Property Files 1941-1964
 - Boxes 1-22 – Nothing relevant for this installation.

RG 393, U.S. Army Central Command, 821-1920

- Reviewed finding aid, but identified nothing relevant to Devens.

RG 394, U.S. Army Continental Commands, 1920-42

- Entry 1
 - Box 177, 206, 222-234 – Nothing relevant; contained guidelines, plans and procedures for training.
- Entry 2
 - Box 12 – Nothing relevant; contained general correspondence.
- Entry 3
 - Box 45 – Nothing relevant; contained personnel ROTC files.
- Entry 4 – Nothing relevant; contained materials related to Squantum Airport.
- Entry 5
 - Box 420 – Nothing relevant; contained materials related to the training curricula.
- Entry 6
 - Boxes 1, 2 – Nothing relevant; concerned maneuver operations.
- Entry 8
 - Boxes 1-3 – Nothing relevant; concerned maneuver operations.
- Entry 19
 - Boxes 1-3 - Nothing relevant; concerned maneuver operations.
- Entry 20
 - Box 1-7 – Nothing relevant; concerned leases and general correspondence.
- Entry 21 – Nothing relevant; concerned ROTC training.
- Entry 24
 - Box 188 – Nothing relevant; concerned classroom training.
- Entry 25
 - Boxes 11, 12 – Nothing relevant; concerned other installations.
- Entry 29
 - Boxes 1-7 – Nothing relevant; concerned other installations.
- Entries 53, 54 – Nothing relevant; concerned personnel.
- Entry 78
 - Box 172 – Nothing relevant; concerned lectures and procedures.
- Entry 79
 - Box 300 – Nothing relevant; concerned lectures and training at foreign posts.
- Entry 80
 - Box 407 – Nothing relevant; contained a correspondence index.
- Entry 81
 - Box 3 – Nothing relevant; concerned investigations of insubordination.
- Entry 82 - Nothing relevant; concerned mobilization plans.
- Entry 83

- Box 335 – Nothing relevant; concerned other installations.
- Entry 84
 - Box 424 – Nothing relevant; concerned other installations.
- Entry 88
 - Box 1-11 – Nothing relevant; concerned manuals, training, and use of installation correspondence.
- Entry 89
 - Boxes 1, 2 – Nothing relevant; concerned training.
- Entry 111
 - Box 1310, 1452 – Nothing relevant; contained general orders and correspondence.
- Entry 284 - Nothing relevant, concerned Courts Martial, correspondence logs and administrative correspondence.
- Entry 269
 - Boxes 435, 436, 451-458 – Nothing relevant; concerned materials related to training.
- Entry 276 – Nothing relevant; concerned maneuvers.
- Entry 298
 - Box 1A&B, 5C, 10, 13A, 22, 23, 26, 27, 42, 52 – Nothing relevant; concerned other installations.
- Entry 301 – Nothing relevant; concerned the Infantry Division and training directives.
- Entry 448 – Nothing relevant; concerned other installations.
- Entry 449 – Nothing relevant; contained special orders.
- Entry 450 – Nothing relevant; concerned notes on personnel and competitions.
- Entry 469 – Nothing relevant; concerned other installations.
- Entry 520 – Nothing relevant; concerned other installations.
- Entry 521
 - Boxes 1-3 – Nothing relevant, concerned general and special orders.

RG 407, Adjutant General's Office

- Entry 360, Project Decimal File, 1940-54
 - Boxes 414, 500-513, 957-958, 961 and 995 – Nothing relevant; materials concerned training and ranges, but for other installations.
- Entry 363A, Project Decimal File, 1940-45
 - Boxes 2468-9 – Nothing relevant; materials concerned inspections at other installations
 - Boxes 2650-71 – Nothing relevant; materials concerned training, generally.
 - Box 3965 – Nothing relevant; materials concerned ranges at other installations.
 - Box 3985 – Nothing relevant; materials concerned other installations.
 - Box 4047 – Nothing relevant; materials concerned ranges at other installations.
- Entry 363B, Project Decimal File, 1946-48

- Boxes 1132, 1223-33 and 1506 – Nothing relevant; materials concerned inspections and training exercises at other installations.
- Entry 363C, Project Decimal File, 1949-50
 - Boxes 596, 655-75, 956, 959 and 974 – Nothing relevant; materials concerned ranges at other installations.
- Entry 363D, Project Decimal File, 1951-52
 - Boxes 505, 569-88, 941, 944 and 956 - Nothing relevant; materials concerned inspections, training and ranges at other installations.
- Entry 363E, Project Decimal File, 1953-54
 - Boxes 194-98, 229-243, 356-57 and 931-32 – Nothing relevant; materials concerned investigations, training, construction and administrative matters at other installations.

RG 429, Organizations in the Executive Office of the President

- Entry 12, Central Real Property Surveys
 - Box 34 – COPIED information for Devens.
 - Boxes 37, 42 and 88 – Nothing relevant; materials concerned other installations.
- Entry 17, Records of the Property Review Board
 - Box 32 – COPIED materials for Devens.

RG 546, U.S. Army Continental Command, 1945-

- Reviewed finding aid, but identified nothing relevant to this installation.

Cartographic Branch

RG 30, Bureau of Public Roads

- Series 25 – Contained material for Devens, but nothing relevant to ranges.

RG 77, Office of the Chief of Engineers

- AMS Map Collection
 - Series V-603 – Contained material for Devens, but nothing relevant to range areas
 - Series V-714-S - COPIED relevant maps for Devens.
 - Series V-814-S – COPIED relevant maps for Devens.
- ERP Collection - COPIED relevant materials concerning Devens.
- War Department Map Collection – Contained materials concerning Devens, but nothing relevant to range areas.

RG 92, Office of the Quartermaster General

- Blueprint File – COPIED relevant material for Devens.

RG 394, U.S. Army Continental Commands, 1920-42

- Miscellaneous materials – Contained materials for Devens, but nothing relevant to ranges.

Still Picture Branch

RG 77, Office of the Chief of Engineers

- Reviewed finding aids for the following series, but identified nothing relevant to this installation: A, AB, CE, F, OT, SD, X

RG 92, Office of the Quartermaster General

- Reviewed finding aids for the following series, but identified nothing relevant to this installation: CD, FL, M, MA, PS, S, UF, WC.

RG 111, Chief Signal Officer of the U.S. Army

- Series SC – Searched the following boxes, but found nothing relevant to this installation: 16, 269, 275, 284, 291, 305, 307, 310, 313-4, 361, 367, 379, 386, 390, 393, 396, 407.
- Series CC - Searched the following boxes, but found nothing relevant to this installation: 35-40, 44, 59, 98-99, 104, 110.

RG 319, Army Staff

- Series CF - Searched the following boxes, but found nothing relevant to this installation: 1-2, 9, 11-14.

National Archives and Records Administration – New England Region, Waltham, MA –
18.5 hours

RG 121, Public Buildings Service

- Real Property Disposal Records, 1975-76
 - Box 3 – COPIED related correspondence, maps and a schematic drawing showing location of ranges for Devens.
- Real Property Files
 - Box 15 – Nothing relevant; contained information related to another installation.
 - Box 42 – Nothing relevant; contained information on the sale of a house and associated 1 acre lot.

RG 269, General Services Administration

- Acc. 69A276
 - Box 40051 – Contained information on Devens, but nothing relevant to range areas.
- Acc. 69A656
 - Box 33017 – Contained information on Devens, but nothing relevant to range areas.
- Acc. 67A120
 - Box 87538 – Contained information on Devens, but nothing relevant to range areas.
- Real Property Files

- Box 6 – Contained information on Devens, but nothing relevant to range areas.
- Box 26 – Contained information on Devens, but nothing relevant to range areas.

RG 270, War Assets Administration

- Property Disposal Files
 - Box 17 –COPIED 1945 map of the Devens Airfield showing magazine and ordnance repair areas.
 - Box 18 – Nothing relevant; contained information concerning transfer of the airfield runways to the Town of Ayer.

RG 291, Federal Property Resource Service

- Real Property Disposal, 1948-49
 - Box 7 – Nothing relevant; contained information on the public sale of buildings at Devens in 1956.
- Real Property Files
 - Box 4 – COPIED descriptions of property and related information for Devens.
- Unnamed accession (provided by the archivist, Gearin, not titled or numbered)
 - Box 2 – Nothing relevant; contained information on the public sale of buildings at Devens in 1956.

Military History Institute, Carlisle Barracks, PA – 11 hours

The following concern only materials in the Institute's library. Heritage reviewed the catalog extensively for other materials, also.

- Batchelder, Roger. "Camp Devens." – COPIED information concerning troop training during World War I.
- "Camp Devens National Army Cantonment" – Nothing relevant; general information on initial construction of the camp.
- Canfield, Edward. "Completion Report of Camp Devens, Ayer, Mass." – COPIED information on original structures built at Devens.
- "Citizens' Military Training Camp, Company A" – Nothing relevant; concerned anecdotal remembrances of Devens.
- "History of Ft. Devens, Mass. 1917-1954" – COPIED general information on activities at Devens.
- Stebbins, George B. Papers
 - Box 1 – Nothing relevant; concerned activities at other installations.
 - Box 2 – COPIED information on the ammunition range at Devens.

In addition to the archival research, URS performed internet searches. Using ITRC guidance, recommended web sources were searched for information regarding Devens RFTA. In addition, a general search on key terms was performed. The following table summarizes the results of these searches.

Source	Web address
Search maxwell.af.mil domain	http://aupress.au.af.mil/SAAS_Theses/SAASS_Out/Cox/cox.pdf “Beyond the Battle Line” by Gary C. Cox. p. 35 of 54 mentions “tank and mechanized units at Fort Devens”;
Defense Environmental Network & Information Exchange	https://www.denix.osd.mil/denix/Public/Policy/BRAC/Nov96/ftdevns.html https://www.denix.osd.mil/denix/Public/Policy/BRAC/BCP/Jun97/note39.html BRAC Cleanup Plan Abstracts 1996, 1997 https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/arc/Reports/FY1994/fortdev2.html Fort Devens-Sudbury Annex, clean up https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/arc/Reports/FY1995/vol_2/nara065.html Fort Devens-Sudbury Training Annex, clean up https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/arc/Reports/FY1994/fortdevn.html Fort Devens Cleanup, BRAC, closed 1991 https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/arc/Reports/FY1998/app_a/deven_68.pdf Fort Devens Cleanup, 1998 https://www.denix.osd.mil/denix/Public/Policy/BRAC/Nov98/fortdevens98.html Fort Devens Cleanup, 1998
Defense Environmental Restoration Program – Formerly Used Defense Sites (DERP – FUDS)	http://www.lrb.usace.army.mil/derpfuds/ No relevant information for Fort Devens
Defense Supply Center Richmond, Richmond, VA	http://www.dscr.dla.mil/ No relevant information for Fort Devens
Defense Technical Information Center	http://www.devens.army.mil/History_of_Devens.htm History of Fort Devens http://www.devens.army.mil/Devens_Staff/BRAC/History.htm Devens BRAC Environmental Office Background Tenants at Fort Devens: http://www.devens.army.mil/tenents/98th_Division_Units_at_Devens.htm http://www.devens.army.mil/tenents/USARC.htm http://www.devens.army.mil/tenents/Ordnance_Contact_Team.htm http://www.pentagon.mil/afd/photos/1960s/index.html 1961 photo of 2 nd infantry tank brigade at Fort Devens http://www.cpms.osd.mil/wage/scheds/naf/area_138.html Biological chemical command mentioned at Fort Devens http://www.carlisle.army.mil/usamhi/Bibliographies/FortPostInstallationBibliographies/DevensMA.doc

Source	Web address
	<p>Bibliography of MHI sources for Fort Devens</p> <p>Viewed approximately 30 sites under www.dtic.mil search engine for Fort Devens – only relevant sites are listed above</p>
Defense Visual Information Center	<p>http://www.dodmedia.osd.mil/DVIC_View/Still_Search.cfm</p> <p>Still Photos. Found several that show tactical training exercises from the 1980s that shows weapons used.</p>
Department of Defense Publications Archive	<p>www.defenselink.mil/pubs/archive.html</p> <p>The search engine was not working 7/31/06 and 8/3/06.</p>
DoD Explosives Safety Board (DDESB)	<p>http://www.ddesb.pentagon.mil</p> <p>http://www.army.mil/usapa/epubs/pdf/r385_64.pdf U.S. Army Explosives Safety Program document. Feb 1, 2000. No information about Fort Devens</p> <p>http://www.dtic.mil/whs/directives/corres/pdf/d60559_081905/d60559p.pdf DoD Directive. No information about Fort Devens</p> <p>http://www.army.mil/usapa/epubs/pdf/p385_64.pdf Ammunition and Explosives Safety Standards. Problems displaying this document. Unable to search for the 4 sites.</p> <p>http://www.ddesb.pentagon.mil/DoD6055.9-STD%20%20Oct%202004.pdf DoD Ammunitions and Explosive Standards. 264 page document. No information about Fort Devens</p> <p>https://intranet.nossa.navsea.navy.mil/security/logon/logon.asp?ToPage=../default.asp Unable to view site/document because it required a password.</p> <p>http://www.e-publishing.af.mil/pubfiles/af/91/afman91-201/afman91-201.pdf Explosives Safety Standards, Oct 18, 2001. 335 page document. No information about Fort Devens</p> <p>http://www.ddesb.pentagon.mil/documents.html: http://www.ddesb.pentagon.mil/fed%20reg%20Notice%2023%20Mar%2098.pdf Federal Register Notices of Change for DoD 6055.9-STD. DoD Explosives Safety Standards applicable to waste military munitions. No information about Fort Devens</p> <p>http://www.dtic.mil/whs/directives/corres/pdf/i414526_040905/i414526p.pdf DoD Instruction. DoD Contractor's Safety Requirements for Ammunition and Explosives. April 9, 2005. No information about Fort Devens</p> <p>http://www.ddesb.pentagon.mil/guidanceForclearancePlans27Jan(Feb)98.pdf Explosives Safety Submissions for Removal of Ordnance and Explosives from Real Property. Jan (Feb) 1998. No information about Fort Devens</p> <p>http://www.ddesb.pentagon.mil/Questionnaire%20for%20Developers%20of%20Explosio n%20Effects%20Software.pdf http://www.ddesb.pentagon.mil/EXPLOSION%20EFFECTS%20SOFTWARE%20QUESTIONNAIRE.doc http://www.ddesb.pentagon.mil/EES%20User%20Survey_July%202004.doc</p>

Source	Web address
	<p>The 3 links are for questionnaires for explosion effects software. No information about Fort Devens</p> <p>http://www.ddesb.pentagon.mil/TM%205-1300,%20November%201990.pdf</p> <p>Structures to Resist the Effects of Accidental Explosions. Nov 1990. 1796-page document. No information about Fort Devens.</p> <p>Word searches appeared to produce inaccurate results; document looked very dated.</p> <p>Searched 7/31/06</p> <p>http://www.ddesb.pentagon.mil/HazardClass/hazclass.htm</p> <p>DDESB Hazard Classification Webpage.</p> <p>http://www.ddesb.pentagon.mil/HazardClass/TB700%20Review%20Draft.pdf</p> <p>Department of Defense Ammunition and Explosives Hazard Classification Procedures. Jun 15, 2005. 109 page document. Did not print. No information about Fort Devens</p> <p>Searched 8/1/06</p> <p>http://www.ddesb.pentagon.mil/HazardClass/hcprocedures.htm</p> <p>Other links for Hazard Classification Procedures:</p> <p>http://www.ddesb.pentagon.mil/HazardClass/HCSShippingName.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/coalition.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/Competent.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/technical_name.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/rocketmotoralternatetests.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/ChgstoSeries6.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/HCchgs.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/25Jan00.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/Criteria.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/Analogy.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/28Jan99.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/27Jan99.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/26Jan99.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/20Jul98.pdf</p> <p>http://www.ddesb.pentagon.mil/HazardClass/27Jun98.pdf</p> <p>None of the above links contained site specific information for Fort Devens</p> <p>http://www.ddesb.pentagon.mil/HazardClass/interimhc.htm</p> <p>Interim Hazard Classification. No site specific information for Fort Devens</p> <p>https://www3.dac.army.mil/esidb/login/</p> <p>Defense Ammunition Center (DAC) Web Users. Need password to access. Therefore, could not search.</p> <p>http://www.ddesb.pentagon.mil/techpapers.html</p> <p>DDESB Technical Papers:</p> <p>https://secureweb.hqda.pentagon.mil/ddesb/</p> <p>TP 12 – Fragments and Debris Hazard. Not Authorized to view.</p> <p>http://www.ddesb.pentagon.mil/tp13.pdf</p> <p>TP-13 Prediction of Building Debris for Quantity-Distance Siting. 106 page document. Did not print. No information about Fort Devens Word searches appeared to produce inaccurate results; document looked very dated.</p> <p>http://www.ddesb.pentagon.mil/TP14.pdf</p> <p>TP-14 Methods and Algorithms Used in the SAFER Model September 2003. 138 page document. Did not print. No site specific information for Fort Devens</p> <p>http://www.ddesb.pentagon.mil/TP%2015/TP%2015.htm</p>

Source	Web address
	<p>TP-15 Approved Protective Construction. Very long document. Unlikely to contain site specific information. https://secureweb.hqda.pentagon.mil/ddesb/</p> <p>TP-16 Methodologies for Calculation Primary Fragment Characteristics. Not Authorized to view. https://secureweb.hqda.pentagon.mil/ddesb/</p> <p>TP-17 DDESB Blast Effects Computer Version 6 User's Manual and Documentation. Not Authorized to view. http://www.ddesb.pentagon.mil/TP18_122004.pdf</p> <p>TP-18 Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel. No site specific information for Fort Devens</p> <p>Searched 8/2/06</p>
Explosive ordnance disposal detachments at nearby military facilities	<p>Googled: "Explosive ordnance disposal detachment devens" http://www.hackworth.com/links.html</p> <p>David H. Hackworth's links – for lead you back to Deven's homepage. No Relevant information. http://www.army.mil/cmh-pg/books/Vietnam/logistic/chapter4.htm</p> <p>Ammunition Logistics – appears to be an excerpt from a book. No relevant information. http://www.army.mil/cmh/books/DAHSUM/1973/chII.htm</p> <p>Appears to be an excerpt from a book. No relevant information. http://navyreserve.navy.mil/NR/rdonlyres/03F079BF-D545-42C6-A335-577B42BE2D5D/133147/TNRFeb06.pdf</p> <p>The Navy Reservist. Feb 2006. Had a contact number for Devens RFTA. http://www.freerepublic.com/focus/f-news/1667480/posts</p> <p>Operation Phantom Fury. Appears to be an excerpt from a book or journal. Mentioned personnel from Devens RFTA. No relevant information. http://www.fdrlo.org/archives/newsletters/Oct2003.pdf</p> <p>The Liason, a publication. Mentioned that the 2nd Brigade – 78th Division is located at Devens RFTA. No relevant information. https://www.denix.osd.mil/denix/Public/Library/Cleanup/CleanupOfc/arc/Reports/FY1997/fit-fri.pdf</p> <p>Some type of fact sheet of environmental cleanup plans at Devens for FY1997. Mentioned that an explosive ordnance survey was completed.</p>
National Imagery and Mapping Agency, Bethesda, MD	<p>http://www.nima.mil/</p> <p>Products and services available to the public – provided links to other organizations' websites. It appeared you need a user name and password to access the site.</p> <p>Searched 8/2/06</p>
Naval Construction Battalion Centers, Port Hueneme, CA	<p>http://www.ncbc.navfac.navy.mil/</p> <p>This site could not be found on the internet. Searched 8/2/06</p>
Naval Facilities Historian's Office, Port Hueneme, CA	<p>http://www.ncbc.navfac.navy.mil/cecmuseum/historian.htm</p> <p>This site could not be found on the internet. Searched 8/2/06</p>
Naval Historical Center, Washington, DC	<p>http://www.history.navy.mil</p> <p>http://www.history.navy.mil/library/online/readingroom.htm</p> <p>Online Reading Room: Publications, Documents, and Subject Presentations: http://www.history.navy.mil/cannons/cannons.html</p>

Source	Web address
	<p>Bronze Guns of Leutze Park, Washington Navy Yard. No site specific information for Fort Devens</p> <p>http://www.history.navy.mil/library/online/bombing_tool.htm</p> <p>Bombing As a Policy Tool In Vietnam: Effectiveness. Oct 12, 1972. No site specific information for Fort Devens</p> <p>http://www.history.navy.mil/library/online/onipubno14.htm</p> <p>Antisubmarine Information. Nov 1, 1918. No site specific information for Fort Devens</p> <p>Searched 8/2/06</p> <p>.</p> <p>http://www.history.navy.mil/search/</p> <p>Navy Historical Center search engine:</p> <p>http://www.history.navy.mil/cgi-bin/htsearch</p> <p>Searched by site name – no information.</p> <p>Searched “UXO”:</p> <p>http://www.history.navy.mil/ar/alfa/asnie.htm</p> <p>Records of the Assistant Secretary of the Navy (Installations and Environment) 1961-2003. No site specific information for Fort Devens</p> <p>http://www.history.navy.mil/branches/org12-7k.htm</p> <p>Archaeological Remote Sensing Survey of Operation Neptune: The D-Day Landings at Omaha and Utah Beaches, Normandy, France. No site specific information for Fort Devens</p> <p>Searched 8/3/06</p>
U.S. Air Force Safety Center, Kirtland AFB, NM	<p>http://afsafety.af.mil/ also tried http://www.afsafety.af.mil</p> <p>This site could not be found on the internet / access denied</p> <p>Searched 8/3/06</p>
Agency for Toxic Substances and Disease Registry	<p>http://www.atsdr.cdc.gov/hac/PHA/ftdevenssudbury/sta_p3.html</p> <p>Types of activities on base</p>
The Devens Historical Museum	<p>http://www.devenshistoricalmuseum.org</p> <p>Timeline and tenants</p>
Devens Reserve Forces Training Area	<p>http://www.devens.army.mil/For_the_Soldier/Installation_Overview.htm</p> <p>Overview of the installation</p>
City Data.com	<p>http://www.city-data.com/city/Fort-Devens-Massachusetts.html</p> <p>No relevant information</p>
US EPA NPL	<p>http://yosemite.epa.gov/r1/npl_pad.nsf/f52fa5c31fa8f5c885256adc0050b631/DF7D910F-F9A93FAB8525691F0063F6C9?OpenDocument</p> <p>Info on the contamination on site</p>
Center for Land Use Interpretation	<p>http://ludb.clui.org/ex/i/MA3139</p> <p>Site information</p>
Wikipedia	<p>http://en.wikipedia.org/wiki/Fort_Devens,_Massachusetts</p> <p>Site history</p>
Weitz & Luxenburg	<p>http://www.weitzlux.com/environmentallawsuit/massachusetts/fordevens_145901.html</p> <p>Info on the contamination on site</p>
The Korean War.com	<p>http://www.korean-war.com/3rdInfantry.html</p> <p>Confirmation on 3rd Infantry stationed at the Fort</p>
29 th Field Artillery Regimental	<p>http://msg_fisher.tripod.com/index-3.html</p> <p>Confirmation on 1st Bn, 29th Field Artillery Regiment stationed at the Fort</p>

**HISTORICAL RECORDS REVIEW
DEVENS RESERVE FORCES TRAINING AREA**

APRIL 2008

Source	Web address
Home Page	
History of the 1 st Calvary Division	http://www.first-team.us/journals/div_arty/82_ndx03.html Confirmation on 1 st Bn, 82nd Field Artillery Regiment stationed at the Fort
Department of the Army Historical Summary: FY 1996	http://www.army.mil/CMH/books/DAHSUM/1996/ch01.htm 10 th Special Forces Group form Fort Devens
Scorecard Pollution Information Site	http://www.scorecard.org/env-releases/land/site.tcl?epa_id=MA7210025154 Fort Devens as a Superfund Site
US Naval War College Archives	http://www.nwc.navy.mil/defaultf.htm No relevant information for Fort Devens
US Navy Safety Center	http://www.safetycenter.navy.mil/ No relevant information for Fort Devens
US Naval War College Archives	http://www.nwc.navy.mil No relevant information for Fort Devens
US Navy Safety Center	http://www.safetycenter.navy.mil No relevant information for Fort Devens
Department of the Interior	http://www.devens.army.mil/History_of_Devens.htm History and list of tenants
Dept. of the Interior	http://www.blm.gov No relevant information for Fort Devens
Dept. of the Interior, USGS	http://www.usgs.gov No relevant information for Fort Devens
Federal Geographic Data Committee	http://www.fgdc.gov No relevant information for Fort Devens
General Services Administration	http://www.gsa.gov No relevant information for Fort Devens
Library of Congress, Geography and Map, and Prints and Photographs Divisions	http://ww.loc.gov No relevant information for Fort Devens
US EPA Environmental Photographic Interpretation Center	http://www.epa.gov/nerlesd1/land-sci/epic/default.htm No relevant information for Fort Devens
US National Archives and Records Administration	http://www.archives.gov/ No relevant information for Fort Devens

**Appendix B: Archive Documents
(Provided on Enclosed Compact Disk)**

Appendix C: Munitions Technical Data Sheets

**Table of Contents
Devens Reserve Forces Training Area**

FLARES, SIGNALS, SIMULATORS, OR SCREENING SMOKE.....	1
DEMOLITION MATERIALS	2
MORTARS (WP, INCENDIARY, ILLUMINATION, SMOKE) OR PRACTICE	3
BOOSTER EXPLOSIVES	4

Ordnance Technical Data Sheet
Flares, Signals, Simulators, or Screening Smoke

Multiple uses listed below

COUNTERMEASURES

Decoy Flares
Flare Blocks

ILLUMINATION

38mm & 51mm Illuminating Rocket
Helicopter Flare
Trip Flare
Flare Ground Illuminating

SIGNALLING

Miniflare Packs
26.5mm and 38mm Signal Cartridges (Very)
Signal Pistols
Handflare
Smoke Signals
Radaflare/Radasound

SEARCH AND RESCUE

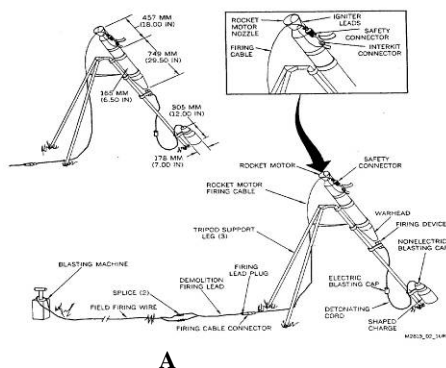
Day and Night Signals
Flares & Smoke signals
Parachute Rocket Red
Line-throwing device (Speedline 250)
Buoyant Orange Smoke
Manoverboard/Lifebuoy Markers

SMOKES

Coloured Smoke Grenades
Screening Smoke Grenades
Vehicle Discharged Grenades (VDG)
Low Toxic Screening Smokes
Parachutist Smoke
Aviation Smoke Generator
Area Smoke Screen
Multi-Band Screening (MBS)

Reference: <http://www.painswessex.com.au/Military/military.htm>

Ordnance Technical Data Sheet Demolition Materials



A



B

Description:

This is a demolition kit (photo A) designed to produce a large crater in compact soil or road surface. A number of demolition kits, normally not more than five, may be interconnected and fired together to produce a larger crater or to produce a trenching effect. The kits are used by combat engineers and other troops in both forward area obstacle work and rear area barrier operations. The rocket motor, warhead, and shaped charge are olive drab with yellow markings. The tripod is olive drab with no markings. The M270 training demolition kit is blue with white markings.

Diameter:	178mm	Explosive:	H-6
Length:	749mm	Disposal:	Do not detonate. Seek technical assistance
Weight:	45.40kg		

These are rocket-projected explosive line charges (photo B) used to breach antitank and/or antipersonnel minefields or other obstacles to provide a path for tanks, vehicles, and personnel. The service line charges use the M1134-series fuzes. The rocket motors and line charges are electrically initiated. The Mk 22-series rocket motors are painted gray and have a brown band around the forward end. Markings are stenciled in black. The inert versions (M68A1, M68A2, M69, and EX 42 Mod 0) which use the M1147 (inert) fuze, are used for training. They are the same as the service counterparts except that the line charge is inert (molded rubber blocks in place of high-explosive (HE) unit charge blocks). However, the inert versions do have live rocket motor(s) for deploying the inert line charge. The EX 42 Mod 0 consists of an inert line charge (plastic rope) and a much smaller rocket motor. The EX 42 Mod 0 container is unpainted aluminum and has black stenciled markings. The M1134-series fuzes are unpainted aluminum and have black and red markings. The M1147 fuze is unpainted aluminum and is stenciled FUZE DEMOLITION KIT TRAINING M1147. The Mk 22-series rocket motors are painted gray and have a brown band around the forward end. Markings are stenciled in black. The EX 127 Mod 0 rocket motor is blue and has a brown band around the forward end of the motor body; markings are stenciled in black. The demolition line charge and its accessories are white and have yellow markings. Each inert unit charge (for the M68A1, M68A2, and M69 inert versions) is stenciled INERT. The container and cover for the explosive line charges (M58A1, M58A2, M58A3, M58A4, M59, and M59A1) are painted green. The training demolition charge containers and covers (M68A1, M68A2, and M69) are painted blue and have white markings. The EX 42 Mod 0 container is unpainted aluminum and has black stenciled markings. The M1134-series fuzes are unpainted aluminum and have black and red markings. The M1147 fuze is unpainted aluminum and is stenciled FUZE DEMOLITION KIT TRAINING M1147.

Diameter:	127-857mm	Explosive:	Propellant, rocket, double-based or Composition C-4
Length:	1.93-2.40m	Disposal:	Detonation
Weight:	52kg-1,293kg		

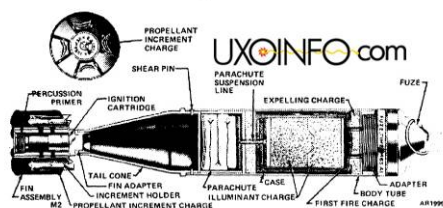
Reference: ORDATA online

Ordnance Technical Data Sheet

Mortars (WP, Incendiary, Illumination, Smoke) or practice



A



B



C (practice)

http://www.strategypage.com/gallery/articles/military_photos_2005111523.asp

Description:

WP (photo A): The cartridge has a point detonating (PD) fuze, a 2inch extension, WP filler, a thin walled shell, fin assembly, an ignition cartridge, and a percussion primer. The body is internally threaded to accept the fuze and designed to hold the casing of the burster assembly. One of 2 types of burster assemblies can be used, differing only in construction of the steel burster casing. On impact the fuze ignites the burster charge which ruptures the chell and disperses the WP filler. The WP burns producing heavy white smoke in the air.

Diameter/Length: Unknown
Weight: 4.10lbs.

Illumination (photo B): The complete round consists of a body tube, a tail cone assembly, an illuminant charge, a parachute assembly, a time fuze, a fin assembly, 4 propellant increments, an ignition cartridge and a percussion primer. The illuminant assembly consists of a first-fire charge and an illuminant charge is contained in a boxboard casing which is attached to a parachute with a suspension line. An expelling charge directly below the fuze, ejects the illuminant and parachute assembly.

Diameter/Length: Unknown
Weight: 4.15lbs.

Reference: www.uxoinfo.com

Ordnance Technical Data Sheet Booster Explosives

Booster explosives are those components of the explosive train that function to transmit and augment the force and flame from the initiating explosive. They ensure the reliable detonation or burning of the main burster charge or propellant charge. Propelling charges use a black powder booster, while high-explosive boosters use one of the following: Tetryl, CH-6, or Composition A-5.

Tetryl (2,4,6-trinitrophenyl-methylnitramine)

Tetryl is a nitramine booster explosive, though the use has been largely superseded by RDX. Tetryl is sensitive secondary high explosive used as a booster, a small charge placed next to the detonator in order to propagate the detonation into the main charge. While it is commonly known as Tetryl it is in fact Trinitrophenylmethylnitramine (derivative of Benzene). This is a standard booster explosive. Tetryl is a fine yellow crystalline material. When tetryl is heated, it first melts, then decomposes and explodes. It burns readily and is more easily detonated than explosive D.

It is a yellow crystalline solid powder material, practically insoluble in water but soluble in Acetone, Benzene and other solvents. It burns readily and is more easily detonated than TNT or Ammonium Picrate (Explosive D), being about as sensitive as Picric Acid. It is detonated by friction, shock, or spark . It remains stable at all temperatures which may be encountered in storage. It is generally used in the form of pressed pellets, and has been approved as the standard bursting charge for small-caliber projectiles, since it gives much better fragmentation than TNT. It also has greater shattering ability than any other military high explosive, and must be properly protected from bullet fire. Its rate of detonation is 23,600-23,900 feet per second. Tetryl is the basis for the service Tetryl blasting caps necessary for positive detonation of TNT. A mixture of Fulminate of Mercury and Potassium Chlorate is included in the cap to insure detonation of Tetryl.

The most toxic ordnance compounds, tetryl and 1,3,5-TNB, are also the most degradable. Therefore these chemicals are expected to be short-lived in nature, and environmental impacts would not be expected in areas that are not currently subject to chronic inputs of these chemicals.

CH-6

CH-6 is a mixture of 97.5% RDX (described in the next section), 1.5% calcium stearate, 0.5% polyisobutylene, and 0.5% graphite. It is a finely divided gray powder that is less toxic and more available than tetryl.

Composition A-5

Composition A-5 is a mixture of 98.5% RDX and 1.5% stearic acid.

NQ [Nitroguanidine / Picrate]

Ammonium Picrate (Yellow D / Explosive D), or Picric Acid or 2,4,6-trinitrophenol, $C_6H_2(NO_2)_3OH$, a toxic yellow crystalline solid that melts at 122°C and is soluble in most organic solvents. Picric acid is a derivative of phenol. It reacts with metals to form metal picrates, which like picric acid itself are highly sensitive explosives that can be detonated by heat, flame, shock, or friction.

The high explosives lyddite and melinite are composed mostly of compressed or fused picric acid. Picric acid is often used as a booster to detonate another, less sensitive explosive, such as TNT (trinitrotoluene). Although picric acid, a nitramine explosive, can be synthesized by nitration of phenol, higher yields are obtained if chlorobenzene is used as a starting material; the latter method involves several steps and the formation of several intermediate

products. In addition to its use in explosives, picric acid has been used as a yellow dye, as an antiseptic, and in the synthesis of chloropicrin, or nitrotrichloromethane, CCl_3NO_2 , a powerful insecticide.

A UXO item without a fuze is relatively safe (crystallized bulk explosives, picrate salts, chemical, and white phosphorous rounds excepted).

Resource: <http://www.globalsecurity.org/military/systems/munitions/explosives-booster.htm>