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DRAFT MILITARY MUNITIONS RESPONSE PROGRAM HISTORICAL RECORDS REVIEW  
FORT SHERIDAN IL (DRAFT ACTING AS FINAL)  
6/4/2005  
USAEC



Stakeholder Draft of the

# Military Munitions Response Program Historical Records Review

Fort Sheridan Army Reserve Complex  
Illinois



June 2005



**Stakeholder Draft  
of the  
Military Munitions Response Program  
Historical Records Review  
Fort Sheridan, Illinois**

***Submitted To:***

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**June 2005**

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of the  
Military Munitions Response Program  
Historical Records Review  
Fort Sheridan, Illinois**

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<b>Abbreviations and Acronyms</b>	
Acronym	Definition
AAA	Anti-Aircraft Artillery
AAFES	Army & Air Force Exchange Service
AEDB-R	Army Environmental Database Restoration
AR	Administrative Record
ARID	Army Range Inventory Database
ARS	Advanced Range Survey
ASR	Archive Search Report
AT	Anti-Tank
bgs	Below ground surface
BIP	Blown in Place
BM	Background Metals
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CM	Confirmed Metals
CSM	Conceptual Site Model
CTC	Cost to Complete
CTT	Closed, Transferring, and Transferred
DERP	Defense Environmental Restoration Program
DMM	Discarded Military Munitions
DoD	Department of Defense
e <sup>2</sup> M	engineering-environmental Management
EBS	Environmental Baseline Survey
EM	Electromagnetic
EOD	Explosive Ordnance Disposal
ERIS	Environmental Restoration Information System
°F	Degrees Fahrenheit
ft	feet
ft <sup>2</sup>	Square feet
FUDS	Formerly Used Defense Site
FY	Fiscal Year
HFA	Human Factors Applications, Inc.
HHRA	Human Health Risk Assessment
HMX	High Melting Explosive; octahydro-1,3,5,7-tetranitro-1,3,5,7 tetrazocine
HRR	Historical Records Review
IEPA	Illinois Environmental Protection Agency

<b>Abbreviations and Acronyms</b>	
<b>Acronym</b>	<b>Definition</b>
IRP	Installation Restoration Program
MACOM	US Army Major Command
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
MG	Machine Gun
mm	Millimeter
MMRP	Military Munitions Response Program
MOU	Memorandum of Understanding
MR	Munitions Response
MRA	Munitions Response Area
MRS	Munitions Response Site
NCO	Non-Commissioned Officer
NCP	National Contingency Plan
NDAA	National Defense Authorization Act
NFA	No Further Action
OE	Ordnance and Explosives
OSD	Office of Secretary of Defense
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PETN	Pentaerythrite Tetranitrate
PRG	Preliminary Remediation Goal
RAC	Risk Assessment Code
RCRA	Resource Conservation and Recovery Act
RDX	Royal or Research Department Explosive; hexahydro-1,3,5-trinitro-1,3,5 triazine, which is also known as cyclonite
RG	Remediation Goal
RI/BRA	Remedial Investigation/Baseline Risk Assessment
RI/FS	Remedial Investigation/Feasibility Study
RRC	Regional Readiness Center
SARA	Superfund Amendments and Reauthorization Act
SAV	Submerged Aquatic Vegetation
SI	Site Inspection
SVOC	Semi-Volatile Organic Compound
TNT	Tri-Nitro-Toluene
TPP	Technical Project Planning
ug/g	Microgram per Gram

<b>Abbreviations and Acronyms</b>	
<b>Acronym</b>	<b>Definition</b>
ug/L	Microgram per Liter
US	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Center
USARC	United States Army Reserve Command
U.S.C.	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit
UXO	Unexploded Ordnance
VES	Vehicle and Equipment Storage
VOC	Volatile Organic Compound
WWI	World War I
WWII	World War II

## 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 Sites** – Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating, storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions. (10 U.S.C. 2710(e)(1))

**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 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. (10 U.S.C. 2710(e)(2))

**Explosive Ordnance Disposal (EOD)** – The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded explosive ordnance. 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 the unacceptable effects or risks of potential mishaps involving military munitions.

**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 (MMRP) 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.

## **Glossary of Terms (continued)**

**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 Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof.

The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, except that the term does include non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 2710(e)(3)(A))

**Munitions Constituents (MC)** – Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710(e)(4))

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

**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 (UXO), as defined in 10 U.S.C. 2710(e)(9); Discarded military munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or Munitions Constituents (MC) present in high enough concentrations to pose an explosive hazard.

## **Glossary of Terms (continued)**

**Munitions Response (MR)**- Response actions, including investigation, removal and remedial actions to address the explosives safety, human health, or environmental risks presented by unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC), or to support a determination that no removal or remedial action is required.

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

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

**Operational Range** – A range that is under the 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 a new use that is incompatible with range activities (10 U.S.C. 101 (e)(3)). Also includes “military range,” “active range,” and “inactive range” as those terms are defined in 40 CFR 266.201.

**Range** – A designated land or water area that is set aside, managed, and used for range activities of the Department of Defense. The term includes 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. The term also includes airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration. (10 U.S.C. 101 (e)(1)(A) and (B))

**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 is no longer under military control, but 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.

## Glossary of Terms (continued)

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

## 1.0 INTRODUCTION

### 1.1 Authority

The Department of Defense (DoD) established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program (DERP) to identify and address defense sites known or suspected to contain unexploded ordnance (UXO), discarded military munitions (DMM) or munitions constituents (MC). Sites eligible for action under the MMRP include other than operational ranges and sites with known or suspected UXO, DMM or MC (Munitions Response Sites [MRSs]) where the release occurred prior to 30 September 2002. Properties classified as operational ranges, permitted munitions disposal facilities and operating munitions storage facilities are not eligible and, therefore, are excluded from the MMRP. This report presents the result of the MMRP Historical Records Review (HRR) conducted at Fort Sheridan, Illinois which is located in Lake County, Illinois approximately 30 miles north of Chicago. This HRR was prepared as part of the MMRP Site Inspection (SI) at Fort Sheridan.

The DoD is currently establishing policy and guidance for munitions response actions under the MMRP. However, key program drivers developed to date conclude munitions response actions will be conducted under the process outlined in the National Contingency Plan (NCP) (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.) 9605, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99-499, (hereinafter CERCLA).

### 1.2 Purpose/Scope

The intent of the HRR is to perform a records search to document historical and other known information for the MRSs identified at Fort Sheridan, to supplement the United States (US) Army Closed, Transferring, and Transferred (CTT) Range/Site Inventory Report information, and to support the Technical Project Planning (TPP) process designed to facilitate decisions on those areas where more information is needed to determine the next step(s) in the CERCLA process.

### 1.3 Project Drivers

The regulatory structure for managing MRSs at Fort Sheridan is guided by a mixture of federal, state, and local laws, as well as DoD and US Army regulations and guidance. Key legislative and administrative

1 precedents to date will undoubtedly influence the final regulatory framework for the MMRP. The key  
2 legislative and administrative precedents include the following:

- 3 • The Office of the Secretary of Defense (OSD) DERP Guidance (September 2001) established an  
4 MMRP element for defense sites with known or potential UXO, DMM, or MC. The history of  
5 DERP dates back to the SARA of 1986 and is defined in 10 U.S.C. §2701(b), which states the  
6 goals of the program shall include the following:
  - 7 ➤ The identification, investigation, research and development, and cleanup of contamination  
8 from hazardous substances, and pollutants and contaminants; and
  - 9 ➤ Correction of other environmental damage (such as detection and disposal of unexploded  
10 ordnance) which creates an imminent and substantial endangerment to the public health or  
11 welfare, or to the environment.
- 12 • Sections 311-312 of the National Defense Authorization Act (NDAA) of Fiscal Year (FY) 02  
13 reinforced the OSD 2001 DERP Guidance by tasking the DoD to develop and maintain an  
14 inventory of defense sites that are known or suspected to contain UXO, DMM or MC.
  - 15 ➤ Section 311 requires the DoD to develop a protocol for prioritizing defense sites for  
16 response activities in consultation with state regulators and Tribal members.
  - 17 ➤ Section 312 requires the DoD to create a separate program element to ensure the DoD  
18 can identify and track MMRP funding.

19 The OSD 2001 DERP Guidance and the National Defense Authorization Act 2002, described above,  
20 established the MMRP. The DERP and the MMRP provide guidance and methods for conducting a  
21 baseline inventory of defense sites known or suspected to contain UXO, DMM or MC.

## 22 **1.4 Background**

23 To meet the programmatic goals of the baseline inventory, the US Army developed a three-phase  
24 approach. The initial phase, or Advance Range Survey (ARS), involved a data call issued through the US  
25 Army Environmental Center (USAEC) to each of the US Army Major Commands (MACOM) requesting  
26 general information about ranges located on their installations. The intent of the ARS was to meet the  
27 US Army's immediate need of supporting DoD efforts to prepare Senate Report 106-50, which required  
28 an initial survey of the US Army's ranges. Once obtained, this data was submitted to USAEC and  
29 compiled into a master database of US Army installations.  
30

1 Phase 2 involved a survey and inventory of all operational (formerly Active/Inactive) ranges. The intent  
2 of the inventory was to collect detailed site specific information in the field from all installations, which  
3 delineated among other things, the operational range boundaries. As part of the operational inventory  
4 effort, the data were electronically uploaded to the Army Range Inventory Database (ARID) maintained  
5 by USAEC. No Phase 2 Inventory was conducted at Fort Sheridan because no operational military  
6 ranges are reported to exist at the facility (e<sup>2</sup>M, 2002).

7  
8 Initially, Phase 3 began as an inventory of US Army CTT ranges; however, due to congressional  
9 requirements stipulated in the NDAA, FY 2002; and consequent changes to the DERP, the US Army  
10 CTT Range/Site Inventory evolved into a comprehensive inventory of other than operational ranges and  
11 sites with known or suspected UXO, DMM or MC. The Fort Sheridan US Army CTT Range/Site  
12 Inventory was completed in December 2002 and only included the property retained by the Army after  
13 the 1988 round of Base Realignment and Closure (BRAC). One MRS was identified during the  
14 inventory, the Trench Warfare Range (Army Environmental Database Restoration [AEDB-R]  
15 identification number FTSH-001-R-01). This site qualified for inclusion in the MMRP because of the  
16 potential presence of UXO, DMM, or MC. Greater detail of the findings discussed in the US Army CTT  
17 Range/Site Inventory Report is provided in **Sections 2.2** and **3.1.4**. During the Navy's MMRP  
18 Preliminary Assessment (PA) investigation, three additional areas were discovered: 1) Anti-Aircraft  
19 Artillery Area, 2) Grenade Course, and 3) Five Small Arms, Pistol, and Machine Gun Ranges.

20  
21 Following CERCLA guidance, completion of the US Army CTT Range/Site Inventory Report satisfies the  
22 PA phase for US Army MRSs. The SI is the next phase in the CERCLA process and will complete the  
23 PA/SI requirement for the MRSs. This HRR will be included in the SI. The following paragraphs present  
24 the primary objectives for performing the SI.

#### 25 **1.4.1 Site Inspection**

26 The primary objective of the MMRP SI is to collect the appropriate amount of information necessary to  
27 make one or more of the following decisions:

- 28 • Whether or not further characterization is required at a site.
- 29 • Whether or not an immediate response is needed.
- 30 • Whether or not the site qualifies for no further action (NFA).

31 The SI at Fort Sheridan will address UXO, DMM, or MC at all of the MRSs or Munitions Response  
32 Areas (MRAs). An MRA is comprised of one or more munitions response sites. The secondary

1 objective of the SI is to collect information to refine the MMRP cost to complete (CTC) estimates and  
2 to populate the Environmental Restoration Information System (ERIS) and a portion of the MRS  
3 Prioritization Protocols (MRS-PPs) to aid in prioritizing the sites for any further possible  
4 characterization. The HRR is the initial step in the MMRP SI phase; whereby, more extensive data  
5 research is performed to identify data gaps and develop Conceptual Site Models (CSMs) for these sites.

## 6 **1.5 Report Organization**

7 This report consists of the following sections: **Section 1** provides an introduction including the  
8 authority, purpose and scope of the project, project drivers, and background. **Section 2** provides a  
9 general description of the Fort Sheridan facility, the Trench Warfare Range MRS, the Anti-Aircraft  
10 Artillery (AAA) Complex MRA, the AAA Complex – Transferred MRS, the Grenade Course MRS, and  
11 the Small Arms Range Complex MRA, as well as pertinent historical details. **Section 3** outlines the data  
12 collection and document review process. **Section 4** discusses the findings of the HRR research and  
13 review activities. **Section 5** provides details of the CSM. **Section 6** provides an analysis of data gaps.  
14 Supporting information is appended.

## 2.0 GENERAL SITE DESCRIPTION

### 2.1 Installation Description

Fort Sheridan (Federal Facility Identification number: IL2104IL131) is located along the southwestern shore of Lake Michigan in the State of Illinois and encompasses approximately 712 acres of land. A site location map is provided in **Figure 2-1**. The parcel is roughly rectangular in shape and measures approximately 1.7 miles north to south and 0.7 miles east to west. To the north, the installation is bordered by the City of Lake Forest, to the west by Sheridan Road and the City of Highwood, to the east by Lake Michigan, and to the south by the City of Highland Park. Many buildings extend across the majority of the relatively flat, gently sloping terrain.

Fort Sheridan was established in 1887 to serve as an infantry post to help stabilize the City of Chicago following the Chicago Fire in 1871 and rioting by its citizens associated with labor problems (e<sup>2</sup>M, 2002; US Army Corp of Engineers [USACE], 1996). Fort Sheridan was operational between 1887 and 1993 and "provided training facilities for US Army troops participating in the Spanish-American War (1898), the Mexican Intervention of 1913, World War I (1917), World War II (1940), and was established as a Nike missile launch site in the 1950s" (SAIC, 1999).

"Between 1967 and 1993, operations at Fort Sheridan were primarily administrative, with the Post serving alternately as headquarters for the Fifth Army, the US Army Recruiting Command, the Fourth Army, and also providing administrative and logistical support to 74 US Army Reserve centers located in Midwestern states from Minnesota to Michigan" (SAIC, 1999).

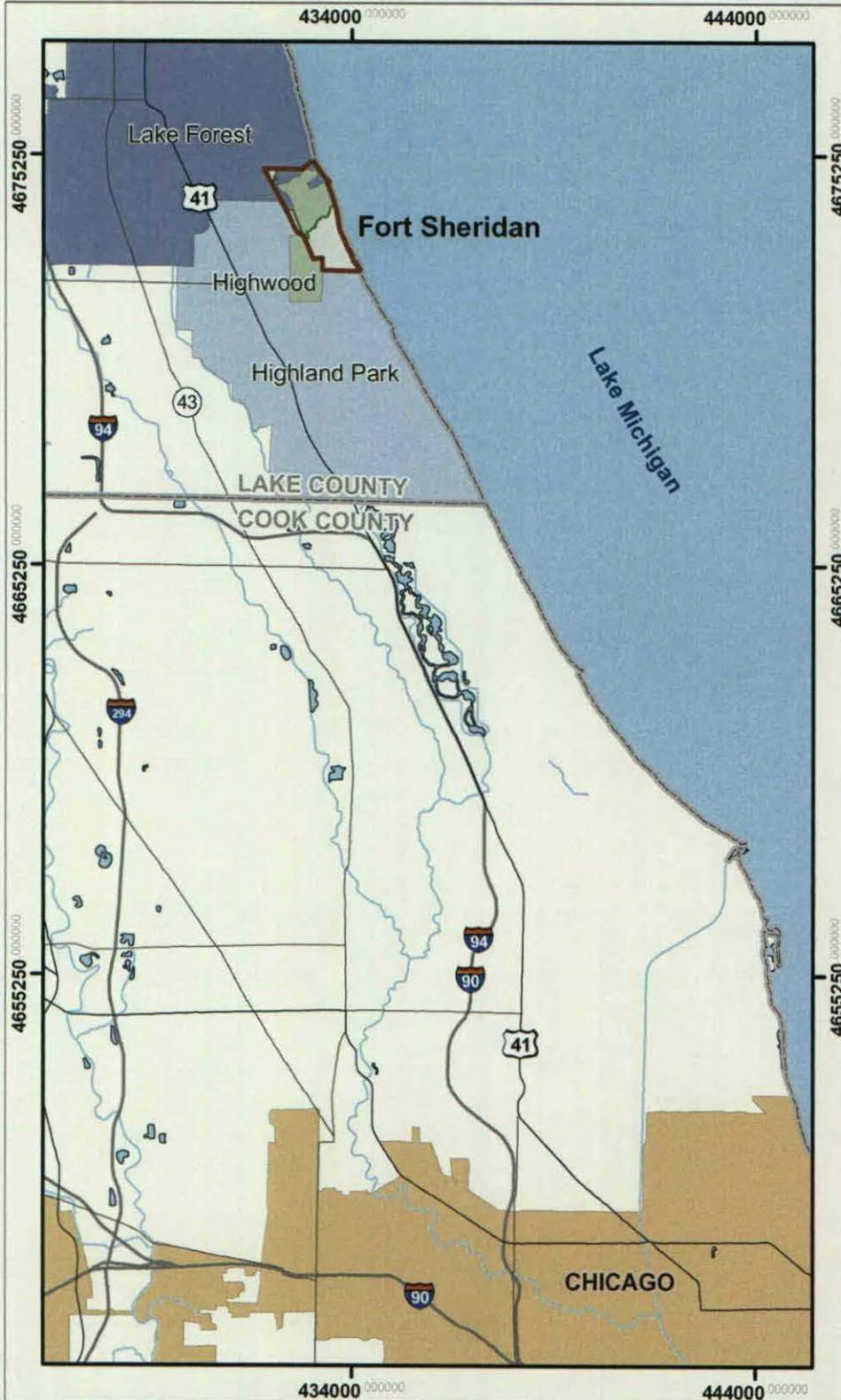
In 1988, Fort Sheridan was recommended for closure under BRAC. The site officially closed in May 1993. "The southwest quadrant and the northwest corner (approximately 100 acres) of the Post were realigned to the US Army Reserve Command. In January 1994, the southeast quadrant and a small area on the central west side of Fort Sheridan (approximately 206 acres) were realigned to the US Navy for housing and administrative offices" (SAIC, 1999). The combined US Army Reserve Command (USARC) and US Navy properties are also known as the DoD Operable Unit (OU) (approximately 306 acres). **Figure 2-2** provides the boundaries of the parcels of land as they were transferred under BRAC and shows the Lake County Forest Preserve. The remainder of the property at Fort Sheridan (neither owned by the Army or Navy) has been transferred out of DoD ownership under BRAC and is known as the Surplus OU. The majority of this property was transferred in March 1998 to the cities of Highland



# INSTALLATION LOCATION Fort Sheridan, IL

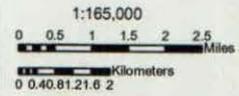


Figure 2-1



- County Boundary
  - Interstate Highway
  - Major Highway
  - Stream
  - Water
  - Pre-BRAC Boundary
  - Installation
- Municipality**
- Highland Park
  - Highwood
  - Lake Forest
  - Chicago Area

Projection: UTM Zone 16  
Datum : NAD 83  
Units: Meters  
Grid: 10,000 Meter



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# FORT SHERIDAN DoD PROPERTY BOUNDARY

## Fort Sheridan, IL

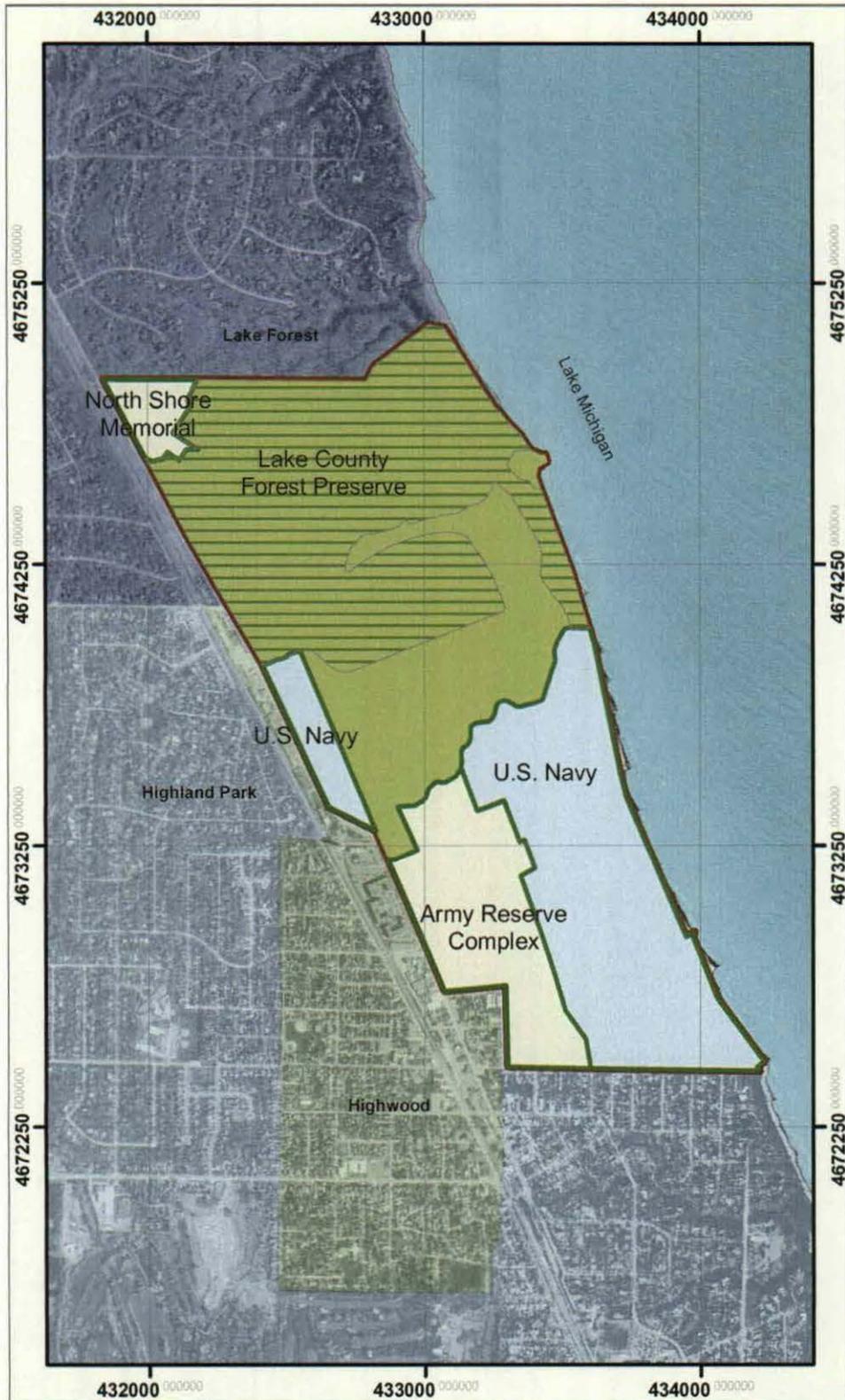


Figure 2-2



- Forest Preserve
- Water
- Pre-BRAC Boundary

**Area Status**

- Surplus OU
- U.S. Army Reserve
- U.S. Navy

**Municipality**

- Highland Park
- Highwood
- Lake Forest

**Data Sources:**  
 - CTT Range Inventory, Fort Sheridan Army Reserve Complex, IL, December 2002.  
 - Phase III R/BRA 2000.

**Projection: UTM Zone 16**  
**Datum: NAD 83**  
**Units: Meters**  
**Grid: 1,000 Meter**

1:24,000



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1 Park and Highwood and to the Lake County Forest Preserve District (Ceres, 2004). Additional historic  
2 information about the installation can be found in **Section 4.1.2**.

### 3 **2.2 MRA and MRS Descriptions**

4 One MRS was identified during the US Army's Phase 3 Inventory at Fort Sheridan: the Trench Warfare  
5 Range (FTSH-001-R-01). Due to historical site activities and the potential for MC and munitions and  
6 explosives of concern (MEC) (which includes UXO, DMM, or MC) to be present, this site qualified for  
7 the MMRP. During the US Navy MMRP Preliminary Assessment, the following sites were identified at  
8 Fort Sheridan: 1) Anti-Aircraft Artillery (AAA) Area (this also includes the AAA impact areas extending  
9 over Lake Michigan which are considered transferred); 2) Grenade Course; 3) Five Small Arms, Pistol,  
10 and Machine Gun Ranges; and 4) Trench Training System. The Trench Warfare Range identified by the  
11 Army and the Trench Training System identified by the Navy are the same site. This document will  
12 refer to this site as the Trench Warfare Range MRS.

13  
14 Due to site locations, the northern Pistol Range MRS and northern Machine Gun Range MRS (two of  
15 the Five Small Arms, Pistol, and Machine Gun Ranges) will be complexed together into a MRA called the  
16 Small Arms Range Complex. The southern Small Arms Range MRS, southern Machine Gun Range MRS,  
17 and southern Pistol Range MRS (the remaining three of the Five Small Arms, Pistol, and Machine Gun  
18 Ranges); and firing points A and B from the AAA Area will be complexed into an MRA named the AAA  
19 Complex MRA. Site activities and descriptions are provided in the following sections.

20  
21 **Figure 2-3** provides the location of the following MRSs and **Figure 2-4** illustrates the locations of the  
22 following MRAs at Fort Sheridan:

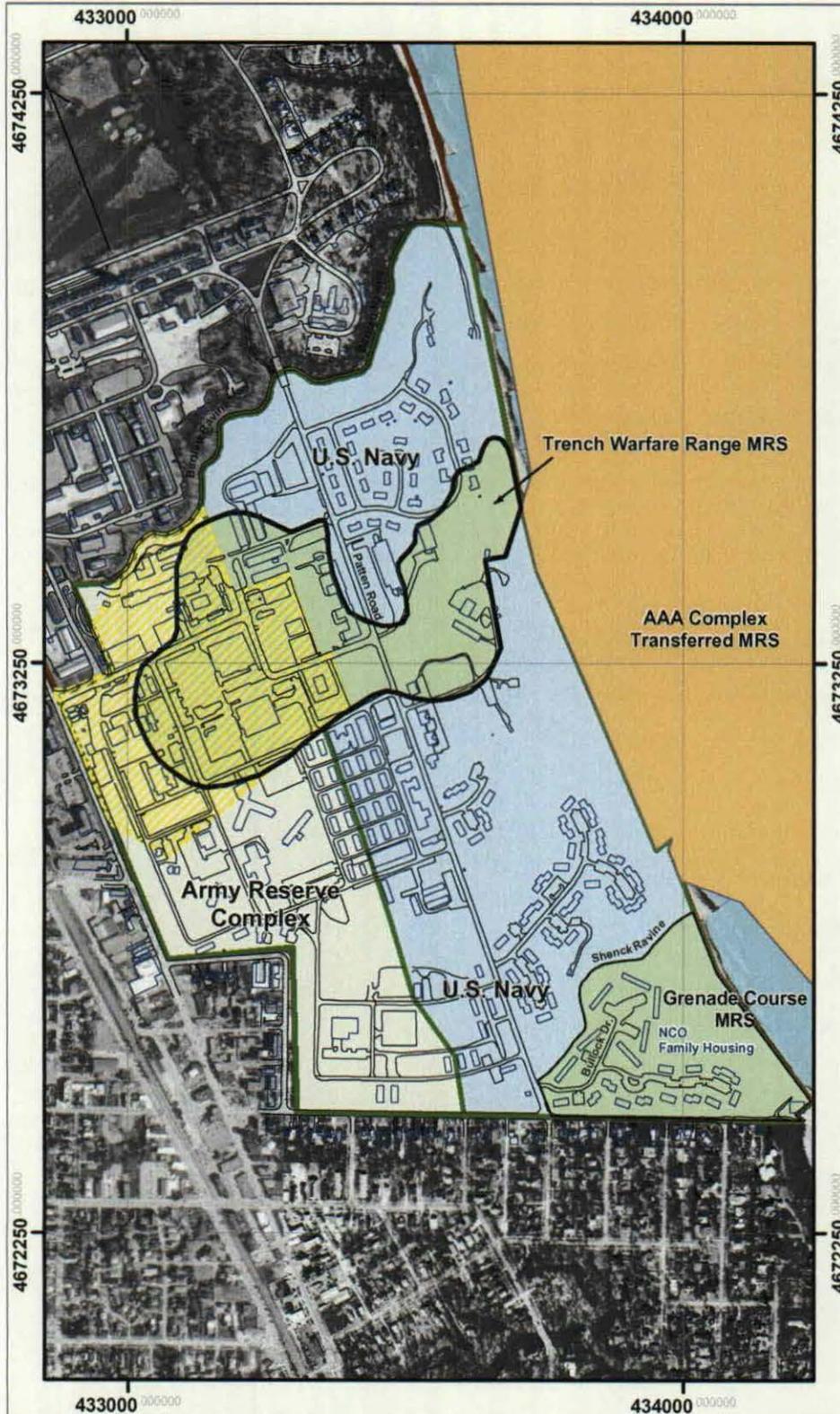
- 23 • Trench Warfare Range MRS
- 24 • AAA Complex MRA
- 25 • AAA Complex-Transferred MRS
- 26 • Grenade Course MRS
- 27 • Small Arms Range Complex MRA



# MUNITIONS RESPONSE SITE (MRS) LOCATIONS Fort Sheridan, IL



Figure 2-3

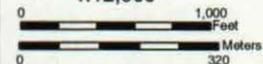


- Road
- Water
- Pre-BRAC Boundary
- U.S. Army Reserve
- U.S. Navy
- Building Outline
- Area Status**
- MRS
- AAA Complex Transferred MRS
- Trench Warfare Range MRS**
- CTT Range Boundary
- Current Boundary

**Data Sources:**  
 - CTT Range Inventory, Fort Sheridan Army Reserve Complex, IL, December 2002.  
 - Fort Sheridan Archive Search Report, Photo Maps 2 and 3, Map 3, Map 9, Site Visit Map, March 1996.  
 - War Department, United States Engineer Office, Post Map of Fort Sheridan, Illinois.

**Projection: UTM Zone 16**  
**Datum : NAD 83**  
**Units: Meters**  
**Grid: 1,000 Meter**

1:12,000



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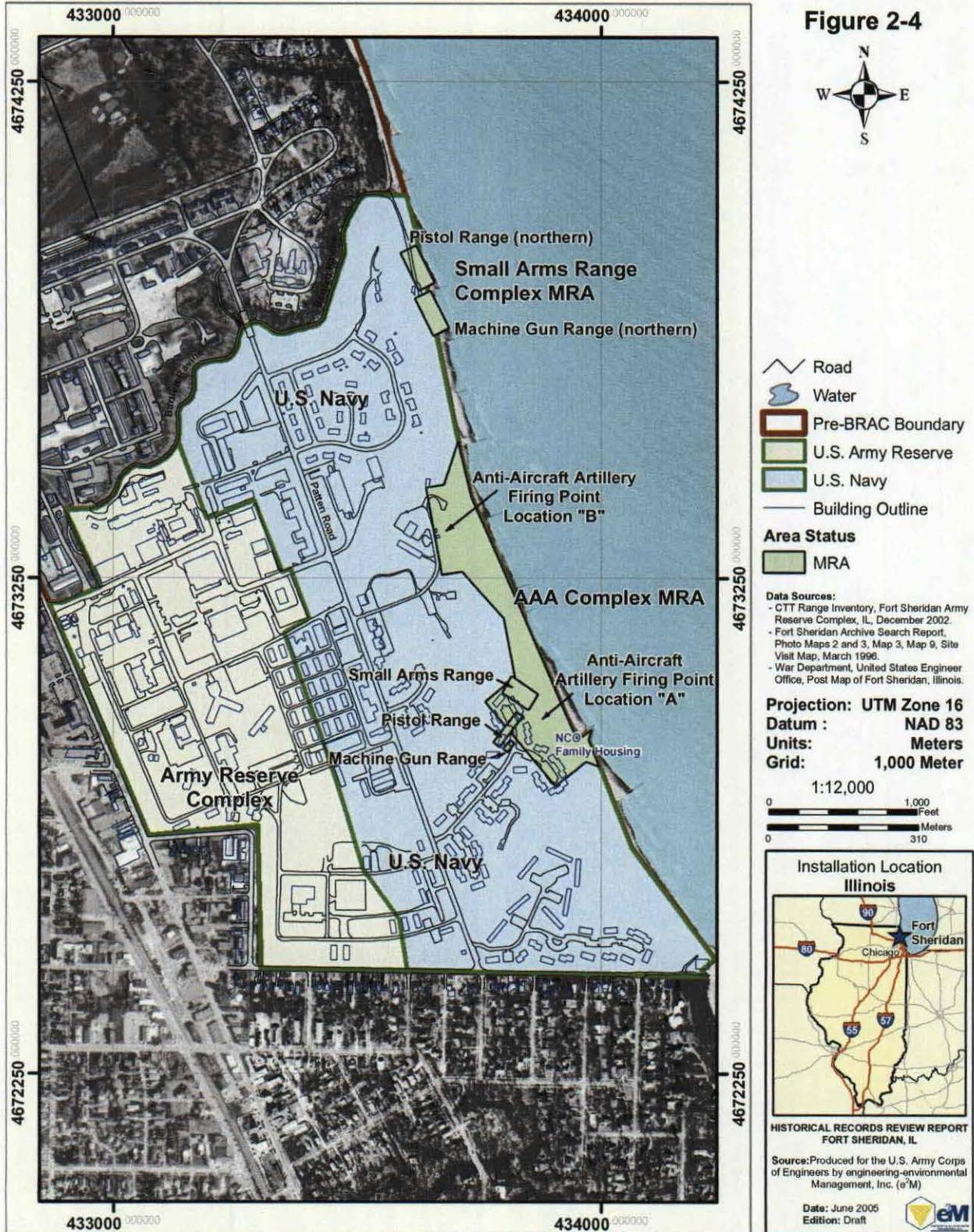




# MUNITIONS RESPONSE AREA (MRA) LOCATIONS Fort Sheridan, IL



Figure 2-4



- 1 A Memorandum of Understanding (MOU) Between the Department of the Army and the Department
- 2 of the Navy dated 8 August, 1991 (attached in **Appendix A**) was discovered by Malcolm Pirnie during
- 3 the records review for the US Navy MMRP PA. The memorandum documents the Army's remediation
- 4 responsibility for the realigned Navy-owned portion of Fort Sheridan; therefore, this SI will include
- 5 MMRP-eligible sites on both the USARC and US Navy properties. The boundaries of these sites were
- 6 derived from the March 1996 *Archive Search Report, Fort Sheridan* by USACE, St. Louis (ASR).
- 7
- 8 The following sections provide descriptions of each MRS and MRA.

### 2.2.1 Trench Warfare Range MRS (FTSH-001-R-01)

The Trench Warfare Range MRS (FTSH-001-R-01) is located in the southern portion of Fort Sheridan south of Bartlett Ravine Road and surrounds Van Horne Ravine. The 53.1 acre MRS was used between 1917 and 1919 to train military personnel for trench warfare during World War I (WWI). The trenches were dug in and around Van Horne Ravine; however, all of the former trenches have since been filled in. The trenches were filled in sometime after WWI, but the exact date is unknown (USACE, 1996). For the purposes of this report, the area of concern is the entire Trench Warfare Range footprint, including both the US Army and US Navy properties. This includes the trench areas both east and west of Patten Road. (See **Figure 2-5** for the layout of the Trench Warfare Range MRS). The outline for the Trench Warfare Range used in the 2002 US Army CTT Range/Site Inventory Report has been updated to reflect the most accurate historical drawings of the trenches found in the 1996 ASR (see **Appendix B**). Discussions with personnel from the USACE indicated that the updated outline for the Trench Warfare Range is more accurate. The acreage of the MRS was designated in the 2002 US Army CTT Range/Site Inventory Report as 42.5 acres; however, since the MRS was expanded to include the US Navy property, the boundary of the MRS has changed and the MRS now comprises 53.1 acres.

According to the *Conclusions and Recommendations* section of the 1996 ASR, training munitions (including smoke grenades, flares, and blank ammunition) were used in the trenches. "At least one exercise involved the firing of three-inch mortars." The area suspected to contain MEC residue falls on the US Navy property (to the east of Patten Road) (USACE, 1996). "The portion of the trench system located on either side of the Van Horne Ravine east of Patten Road appears to be the portion of the trench system most likely to have been used in training exercises involving opposing forces. It is assumed that the ravine itself would represent the "no man's land" between the two forces. This area, the ravine and trenches north and south of it, are the areas most likely to have ordnance and explosives (OE) residue" (USACE, 1996). The 1996 ASR *Conclusions and Recommendations* section recommends sampling a portion of Van Horne Ravine, specifically the portion to the east of Patten Road, now owned by the US Navy. The 1996 ASR *Conclusions and Recommendations* section does **not** recommend sampling on the Army property because "extensive construction over this area would have uncovered any OE near the surface" (USACE, 1996). The sampling of Van Horne Ravine is recommended for the following reasons: "(1) it is the portion of the trench system most likely to have OE remaining; (2) this area had little or no construction and erosion would tend to collect OE in the area" (USACE, 1996).

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# TRENCH WARFARE RANGE MRS Fort Sheridan, IL

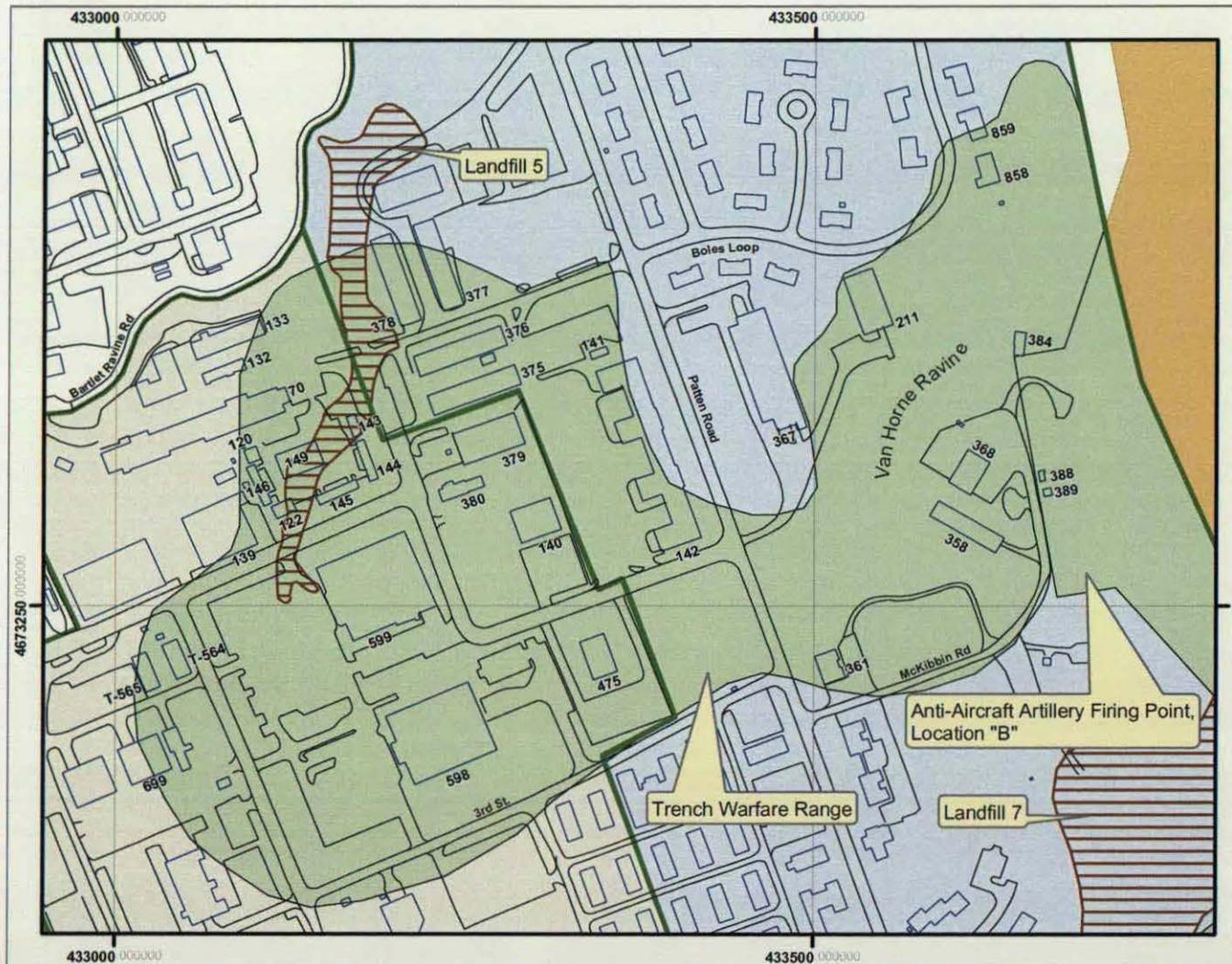


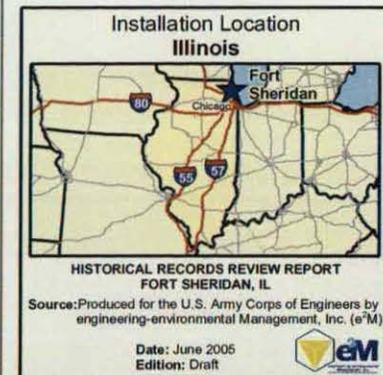
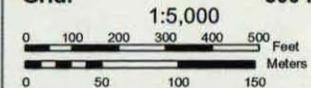
Figure 2-5



- Road
- U.S. Army Reserve
- U.S. Navy
- Building Outline
- Landfill
- Area Status**
- MRS
- AAA Complex Transferred MRS

**Data Sources:**  
 - Fort Sheridan Archive Search Report, Map 3, Site Visit Map, March 1996.  
 - Feasibility Study, May 2002.  
 - Sampling and Analysis Plan, Revision 5.0, March 2003.

**Projection:** UTM Zone 16  
**Datum :** NAD 83  
**Units:** Meters  
**Grid:** 500 Meter



1 **Photographs 1 and 2** were obtained during the data collection effort for the Trench Warfare Range  
2 MRS and they show soldiers in and around the trenches at Fort Sheridan. The photographs come from  
3 the Lake County Discovery Museum in Wauconda, Illinois.

4 **Photograph 1: "In the Trenches" at Fort Sheridan in 1917**

---



5  
6 **Photograph 2: The Trenches at Fort Sheridan**

---



7  
8 According to the ASR, it is believed the trenches were approximately six feet deep and any buried MEC  
9 would be beyond the limits of current technology for UXO detection. After the trenches were filled in,

1 they were built upon and the ground surface was raised leaving the bottom of the trenches more than  
2 six feet below the ground surface (bgs). There are currently office buildings, parking lots, and  
3 maintenance facilities at the site (see **Figure 2-5**). Some of the land is also used for recreational  
4 purposes.

5  
6 Landfill 5 now covers 1.4 acres of the MRS and was used from approximately 1900 through the 1960s.  
7 "This former landfill is located in a light industrial area in Fort Sheridan and is surrounded by warehouse  
8 facilities" (Kemron, 2003). The landfill contained "construction debris with large concrete blocks, rebar,  
9 metallic debris, slag, bricks, ash, glass, bottles, copper pipes and wires, automotive parts, asphalt, wood,  
10 wire, nails, and coal fragments" (SAIC, 1999). The landfill is currently used for vehicle and equipment  
11 storage and shop activities. Most of the landfill is fenced and overlain by concrete, asphalt, and grass  
12 (Kemron, 2003).

13  
14 Human Factors Applications, Inc. (HFA) conducted an OE Removal & Sampling Action in various  
15 locations on Fort Sheridan in 1996 and MEC was discovered on the Trench Warfare Range MRS  
16 footprint. See **Section 4.2** for details of the findings of this survey.

### 17 **2.2.2 AAA Complex MRA (AEDB-R Number TBD)**

18 This MRA has five separate MRSs. The MRSs include the AAA Firing Points "A" and "B"; and the Small  
19 Arms Range, the Pistol Range, and the Machine Gun Range (the ranges that overlap with Firing Point "A"  
20 in the southern portion of the installation [see **Figure 2-6**]). The AAA Firing Points "A" and "B"  
21 comprise 13.7 acres. The Small Arms Range covers 0.6 acres, the Pistol Range covers 0.3 acres, and the  
22 Machine Gun Range covers 0.1 acres. The total MRA covers 14.7 acres. See **Figure 2-4** for the  
23 location of AAA Complex MRA. The boundaries for the AAA Firing Points "A" and "B" are based on  
24 the boundaries of those firing points as presented in "Photo Map 2 (1949)" from the ASR (presented as  
25 **Appendix C**). Based on conversations with George Sloan of the USACE, the boundaries presented in  
26 "Photo Map 2" from 1949 are the most accurate for the firing points. The following paragraphs present  
27 a brief history of the AAA Complex MRA.

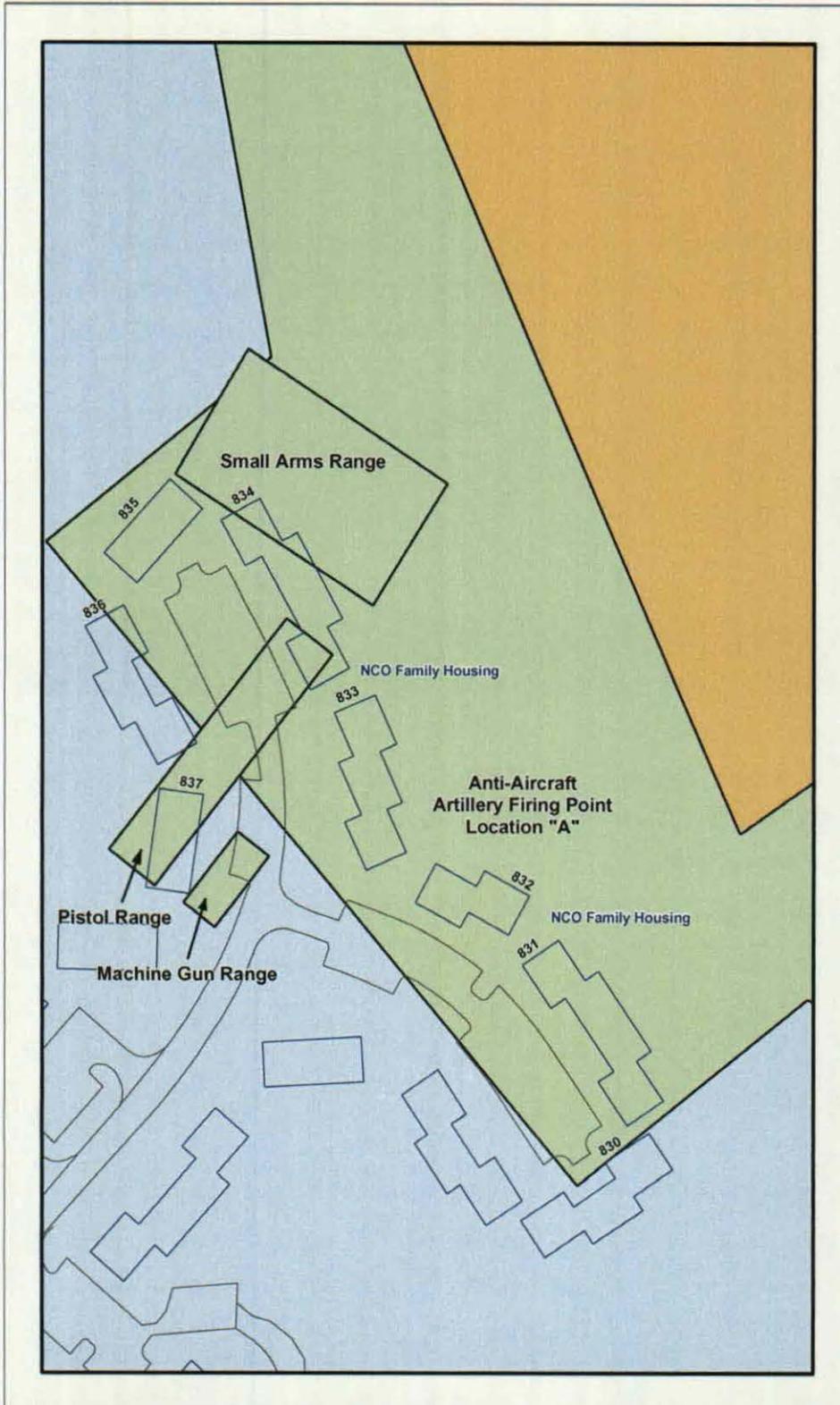
28  
29 From 1930 to 1944, Fort Sheridan hosted several battalions for anti-aircraft activity. The 61<sup>st</sup> Coast  
30 Artillery was transferred from Fort Monroe to Fort Sheridan in 1930. The 61<sup>st</sup> Coast Artillery had two  
31 gun battalions and an automatic weapons battalion. Personnel from the 61<sup>st</sup> Coast Artillery also



## AAA Firing Point "A" Fort Sheridan, IL



Figure 2-6



- Road
  - Water
  - U.S. Navy
  - Building Outline
- Area Status**
- MRS
  - AAA Complex Transferred MRS

**Data Sources:**

- CTT Range Inventory, Fort Sheridan Army Reserve Complex, IL, December 2002.
- Fort Sheridan Archive Search Report, Photo Maps 2 and 3, Map 3, Map 9, Site Visit Map, March 1996.
- War Department, United States Engineer Office, Post Map of Fort Sheridan, Illinois.

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**Datum :** NAD 83  
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**Grid:** 1,000 Meter

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1 instructed reserve troops at Fort Sheridan. During World War II (WWII), 90millimeter (mm) and  
2 40mm guns replaced 3-inch and 37mm guns. A US Army Air Defense Artillery school operated at Fort  
3 Sheridan between 1942 and 1944. This school had 8 automatic weapons battalions and 2 gun battalions  
4 in training in July of 1943. On 1 November 1944, Fort Sheridan was discontinued as a school (USACE,  
5 1996).

6  
7 Site reconnaissance conducted by Malcolm Pirnie in 2003 around both firing points did not reveal any  
8 visible evidence of UXO, DMM or munitions related debris. The 1996 ASR indicates "OE has been  
9 found in the vicinity of the site", (Firing Point "B") including a 105mm cartridge case. **Figure 2-7** is a  
10 historical map collected from the National Archives showing the two firing points ("A" and "B"). The  
11 date on the map is illegible, but the map is thought to have been created between 1940 and 1955.

12  
13 The northwestern corner of the former AAA Firing Point "A" overlaps with a small portion of Landfill 7  
14 (see **Figure 2-8**). Landfill 7 was constructed within the former Wells Ravine and its tributaries and is  
15 one of the primary points of historical accumulation of municipal waste on the DoD OU. It is reported  
16 to have been used in the 1940s, 1960s, and 1970s, with all disposal operations ending in 1979 (SAIC,  
17 1999). Landfill 7 was capped in 1980-1982 (Kemron, 2003b). Environmental investigations at Landfill 7  
18 are described in **Section 4.2.2**.

19  
20 **Photograph 3** shows a 40mm Anti-Aircraft gun shooting at aerial targets over Lake Michigan in 1942.  
21 There is a .50-caliber machine gun in the background. This photograph was collected from the National  
22 Archives.

23 **Photograph 3: 40mm Anti-Aircraft Gun, 1942**



24

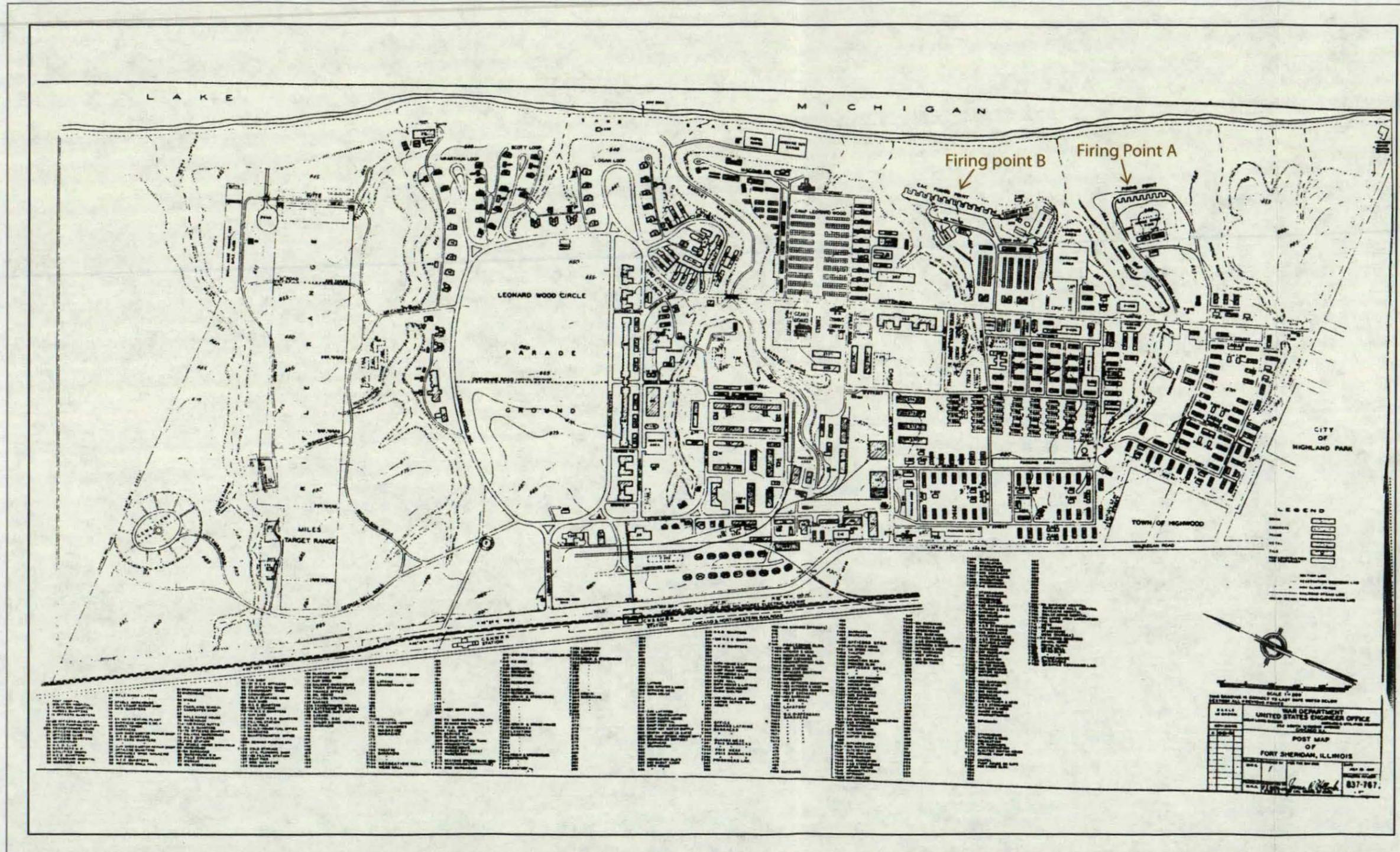
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# HISTORIC POST MAP Fort Sheridan, IL



Figure 2-7



Data Source: Declassified map reproduced at the National Archives, Box 293.





# TOPOGRAPHY Fort Sheridan, IL

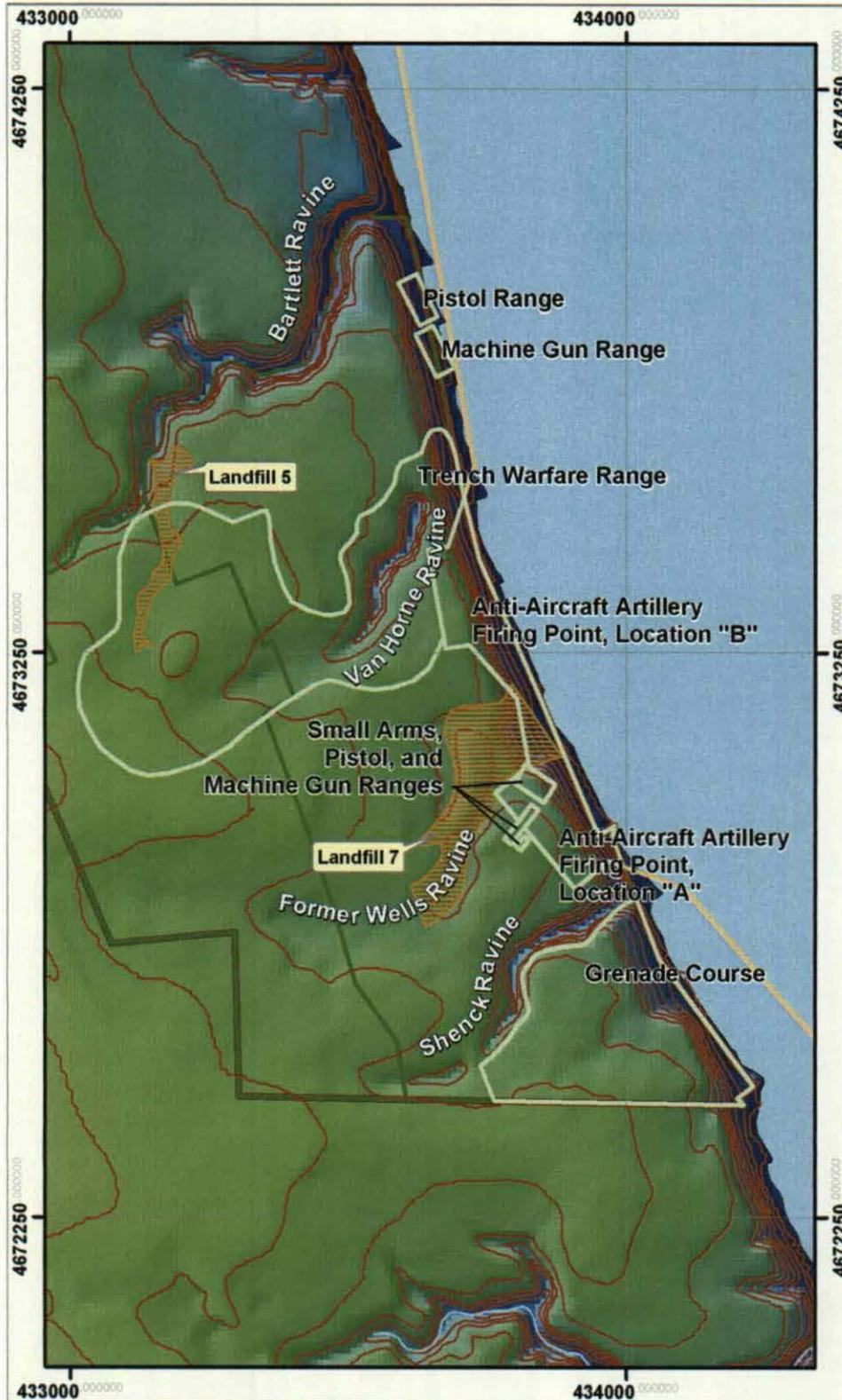


Figure 2-8



- Contour
- Stream
- Water
- Pre-BRAC Boundary
- Installation Boundary
- Landfill Area

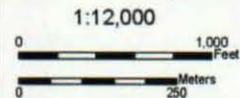


- Area Status**
- MRS
  - AAA Complex Transferred MRS

**Data Sources:**

- Sampling and Analysis Plan, Revision 5.0, March 2003.
- CTT Range Inventory, Fort Sheridan Army Reserve Complex, IL, December 2002.
- Feasibility Study, May 2002.
- Fort Sheridan Archive Research Report, Map 3, March 1996.

**Projection: UTM Zone 16**  
**Datum : NAD 83**  
**Units: Meters**  
**Grid: 1,000 Meter**



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1 The AAA Area at Fort Sheridan had five firing points, labeled "A" through "E". Only firing points "A"  
2 and "B" were located on the current Navy property and qualified for the MMRP (See **Figure 2-4**).  
3 "Location A was the original firing point, but, because of complaints from local residents, location B  
4 became the primary firing location" (Harding ESE, 2001). A portion of Firing Point "B" overlaps with a  
5 portion of the Trench Warfare Range MRS, so the potential exits for munitions that were used in the  
6 trenches to be present at Firing Point "B".

7  
8 Firing Points "A" and "B" make up approximately 13.7 acres and were located on the bluff and in the  
9 ridges of the southeastern portion of Fort Sheridan and were used from around 1930 to approximately  
10 1950. Targets for this range were located both on the bluff and in Lake Michigan; therefore part of this  
11 range fan is a water range (see **Figure 2-9**). The range fans that extend over Lake Michigan have been  
12 transferred out of DoD ownership and they are discussed as a separate site (AAA Complex –  
13 Transferred MRS) in **Section 2.2.3**.

14  
15 The Small Arms, Pistol, and Machine Gun Ranges are three separate ranges comprising approximately  
16 one acre (see **Figure 2-6**). The ranges were used from approximately 1891 to 1950. Only small arms  
17 of 0.50 caliber or less were used at the ranges (Malcolm Pirnie, 2003). During site reconnaissance, no  
18 evidence of small arms ammunition was found at the sites (USACE, 1996 and Malcolm Pirnie, 2003).

### 19 **2.2.3 AAA Complex – Transferred MRS (AEDB-R Number TBD)**

20 See **Section 2.2.2** for the history of the AAA Firing Points. **Figure 2-9** shows the range safety fans  
21 from the AAA Firing Points. This MRS was used by the 61st Coast Artillery as a fly-over target range  
22 for projectiles including: 37mm, 40mm, 90mm, 120mm, and Rocket Launcher 2.36 Anti-Tank (AT).  
23 Targets were usually towed over Lake Michigan (USACE, 1996). There was the possibility of projectiles  
24 being fired up to 15 miles from shore. The portion of the range over Lake Michigan has been  
25 transferred out of DoD ownership. **Section 4.2.3** provides information on previous investigations at  
26 the AAA Complex-Transferred MRS.

### 27 **2.2.4 Grenade Course MRS (AEDB-R Number TBD)**

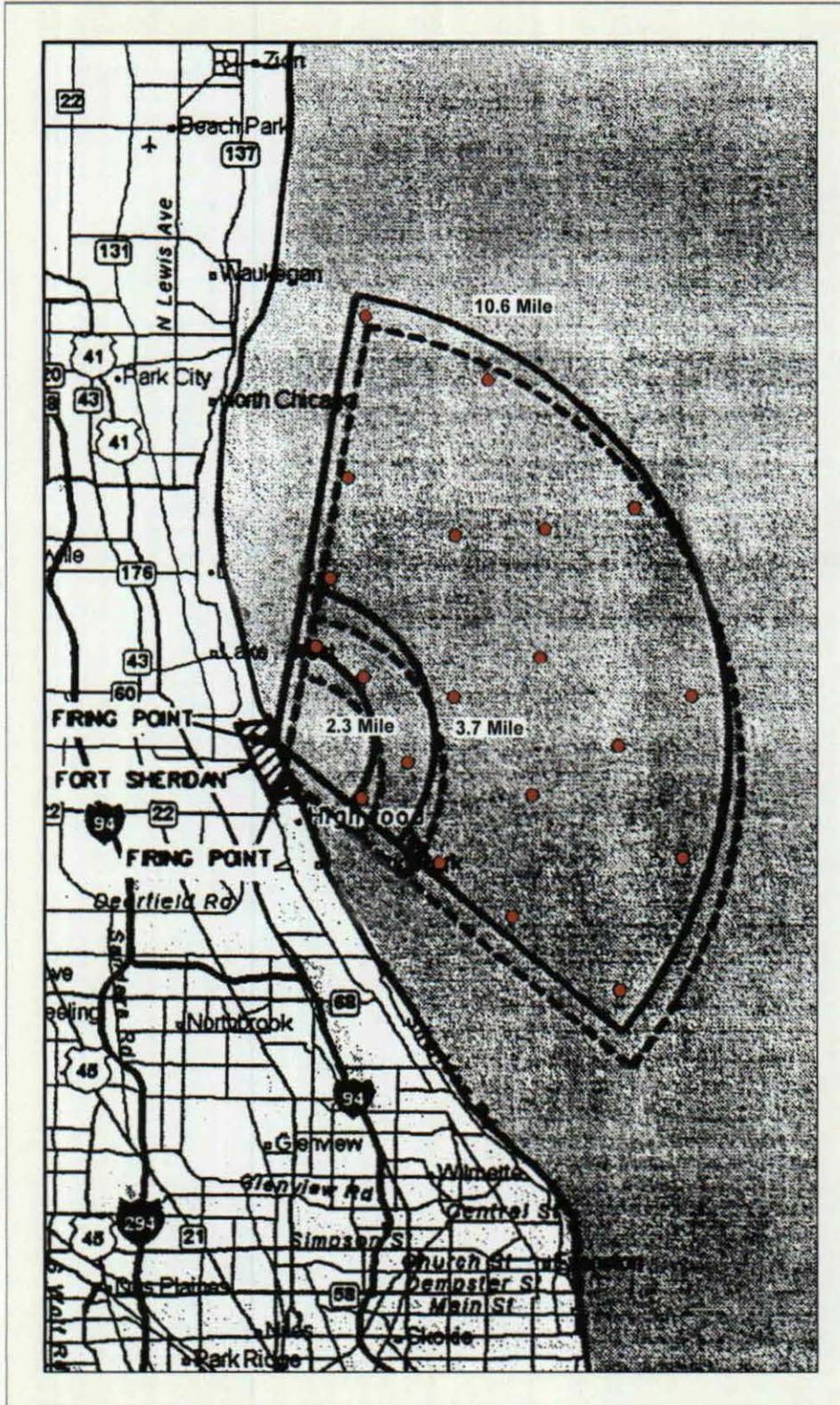
28 The Grenade Course MRS at Fort Sheridan is thought to have been located to the south of Shenck  
29 Ravine in the area currently occupied by non-commissioned officer (NCO) housing (See **Figure 2-3**).  
30 The Grenade Course is mentioned in the May-June 1943 issue of the Coast Artillery Journal. At that  
31 time, it was nearing completion. The site was closed in December 1948; therefore, use dates are  
32 assured to be from late 1943 to 1948. "This course was to be used for training with rifle and hand



# AAA COMPLEX-TRANSFERRED MRS RANGE SAFETY FANS AND SEDIMENT SAMPLE LOCATIONS Fort Sheridan, IL



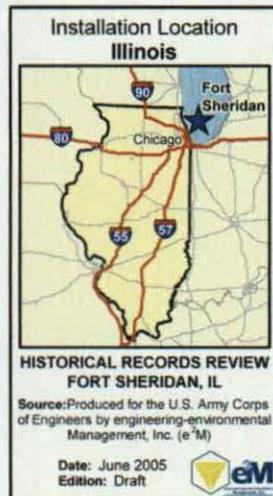
Figure 2-9



● SEDIMENT SAMPLE LOCATION

Data Source:  
Figure 5-4, Final Anti-Aircraft Artillery  
Ranges Sampling and Analysis Plan,  
Fort Sheridan Illinois, August 27, 1999,  
Environmental Science and  
Engineering (ESE).

Approximate Scale:



1 grenades against fixed and moving targets" (USACE, 1996). Site reconnaissance in the area did not  
2 reveal any visible evidence of UXO, DMM or munitions related debris (Malcolm Pirnie, 2003).

3  
4 Human Factors Applications, Inc. conducted an OE Removal & Sampling Action in various locations on  
5 Fort Sheridan in 1996 (HFA, 1996) and MEC was discovered on the Grenade Course MRS footprint.  
6 See **Section 4.2** for details of the findings of this survey.

#### 7 **2.2.5 Small Arms Range Complex MRA (AEDB-R Number TBD)**

8 The northern Pistol and Machine Gun Ranges along the beach of Lake Michigan were two separate  
9 ranges comprising approximately 1.5 acres within Fort Sheridan (**See Figure 2-4**). The ranges are non-  
10 contiguous but were classified together by Malcolm Pirnie and the Navy during the PA and the US Navy  
11 MMRP. For the purposes of this HRR, the ranges are being complexed together into a MRA known as  
12 the Small Arms Range Complex. The ranges were used from approximately 1891 to 1950. Only small  
13 arms of 0.50 caliber or less were used at the ranges (Malcolm Pirnie, 2003). During site reconnaissance,  
14 no evidence of small arms ammunition was found at the ranges (USACE, 1996 and Malcolm Pirnie,  
15 2003). See **Figures 2-4 and 2-10** for the Small Arms Range Complex MRA boundaries.

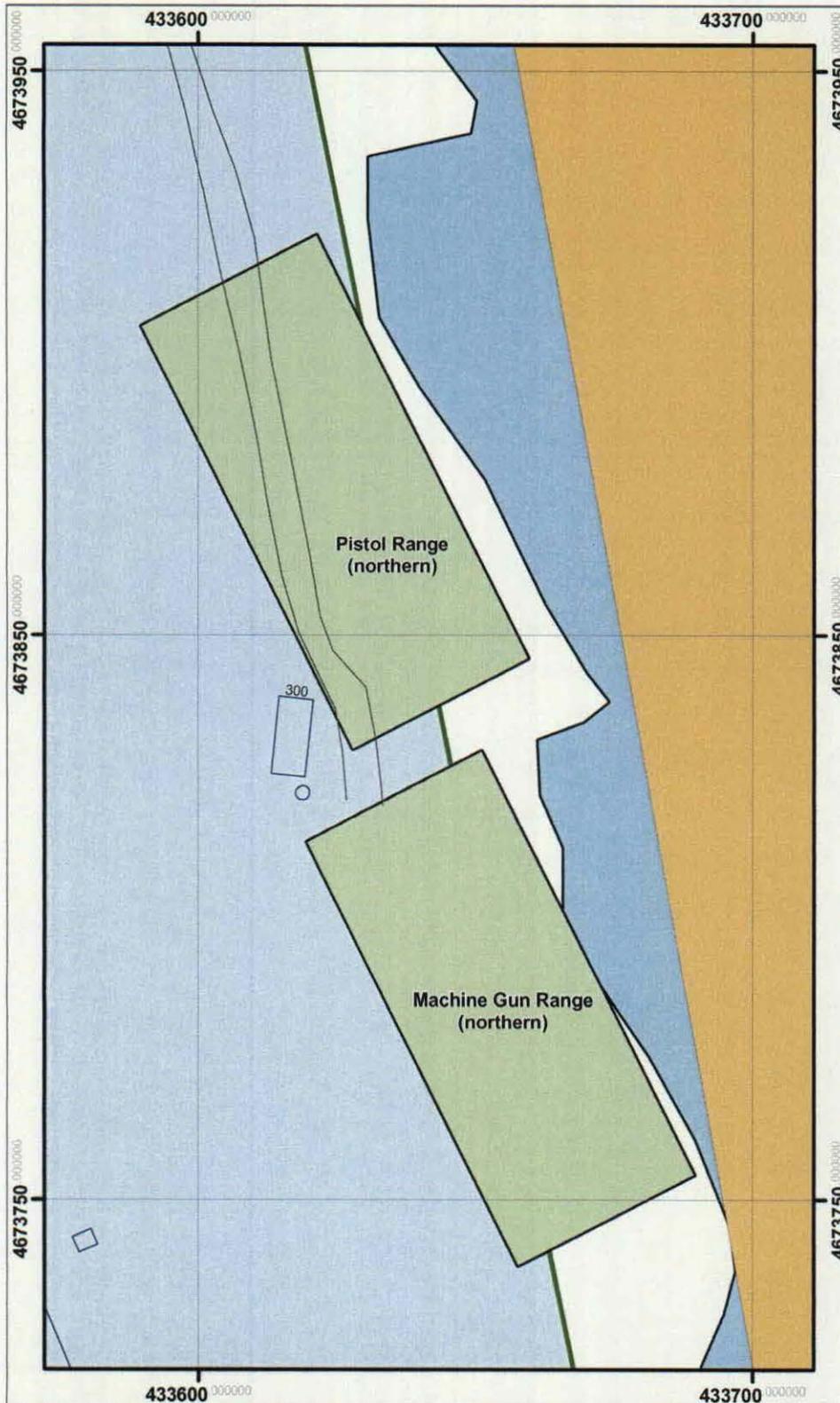
16



## SMALL ARMS RANGE COMPLEX MRA Fort Sheridan, IL



Figure 2-10



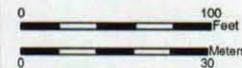
- Road
  - Water
  - U.S. Navy
  - Building Outline
- Area Status**
- MRA
  - AAA Complex
  - Transferred MRS

**Data Sources:**

- CTT Range Inventory, Fort Sheridan Army Reserve Complex, IL, December 2002.
- Fort Sheridan Archive Search Report, Photo Maps 2 and 3, Map 3, Map 9, Site Visit Map, March 1996.
- War Department, United States Engineer Office, Post Map of Fort Sheridan, Illinois.

**Projection:** UTM Zone 16  
**Datum :** NAD 83  
**Units:** Meters  
**Grid:** 100 Meter

1:1,200



HISTORICAL RECORDS REVIEW REPORT  
FORT SHERIDAN, IL

Source: Produced for the U.S. Army Corps of Engineers by engineering-environmental Management, Inc. (eM)

Date: June 2005  
Edition: Draft



## 3.0 DATA COLLECTION AND DOCUMENT REVIEW PROCESS

Five primary sources of information were researched as part of the data collection effort for this HRR report, which included:

- Fort Sheridan Administrative Record;
- Existing Working Knowledge of the Fort Sheridan Installation (i.e., performance of an installation site visit and conducting interviews of installation personnel);
- Fort Sheridan Environmental Baseline Survey (EBS);
- National Archives Search;
- Information provided by Malcolm Pirnie;
- US Army CTT Range/Site Inventory Report for Fort Sheridan Army Reserve Complex; and
- ASR Findings, and Conclusions and Recommendations for Fort Sheridan.

### 3.1 Data Collection Methods

#### 3.1.1 Fort Sheridan Administrative Record

The Fort Sheridan Administrative Record (AR) was reviewed to identify existing documents that contained information specific to the facility itself, MRAs/MRSs, and potential types of MEC and MC that could reasonably be expected to be found at each site. The AR provided the following information:

- Site-specific information on the history of the installation.
- Site-specific information on the physical conditions (climate, geology/hydrogeology, topography, hydrology, soil, and vegetation) existing at the MRAs/MRSs.
- Area-specific land use and human receptor information.
- Area-specific ecological setting and receptor information.
- Area-specific environmental contamination information.
- Area-specific OE removal and sampling actions.
- Remedial Investigation/Baseline Risk Assessment (RI/BRA).
- Feasibility Study (FS).

### 3.1.2 Fort Sheridan Site Visit and Interviews with Installation Personnel

engineering-environmental Management, Inc. (e<sup>2</sup>M) performed a records review site visit at Fort Sheridan, IL on 20-24 September 2004. The intent of the visit was to gather any on-site records pertaining to the MRS (Trench Warfare Range) and determine if there was any evidence that the North Shore Memorial Area (former Nike Missile Area) may contain MEC or MC. Also, the goal was to interview on-site personnel from the BRAC office, 88th Regional Readiness Command (RRC) and on-site contractors (e<sup>2</sup>M, 2004).

e<sup>2</sup>M reviewed environmental documents and performed interviews of site personnel to determine the environmental status and risk associated with specific portions of Fort Sheridan.

The interviews of site personnel are described in the following paragraphs:

Mr. Eric Johnson, State Environmental Manager, Northern Illinois 88<sup>th</sup> RRC, stated during the construction of a landfill cap for Landfill 5, MEC was not discovered. He also indicated two new buildings were constructed in the area around Landfill 5 and their foundations were very deep, but MEC was not discovered during construction. Also, a road was built over a part of Landfill 5 and during the road construction there was no discovery of MEC.

Mr. Bill Walters, Fort Sheridan Facilities Management Specialist, stated to the best of his knowledge (dating back to 1976), the only ordnance discovered at Fort Sheridan was a .45 caliber shell. Mr. Walters also indicated the extensive construction of roads and buildings over the former trench warfare area would have revealed any MEC in that area. There were no MEC reports during construction.

### 3.1.3 Additional Data Collection Effort

As described in **Section 2.2**, a MOU between the Department of the Army and the Department of the Navy dated 8 August, 1991 (attached in **Appendix A**) was uncovered by Malcolm Pirnie during the US Navy PA MMRP records review. It documents the Army's remediation responsibility for the Navy-owned portion of the installation. This memo led to the addition of the AAA Firing Points "A" and "B"; the Grenade Course; and the Small Arms, Pistol, and Machine Gun Ranges to the scope of this HRR. Therefore, a second data collection effort took place to gather information from the AR on these Navy-owned sites as well. Kemron Environmental Services, the manager of the AR for Fort Sheridan, assisted e<sup>2</sup>M with the data collection effort from 18 April-18 May 2005.

### 3.1.4 US Army CTT Range/Site Inventory Report

The focus of the Phase 3 inventory was on other than operational ranges and sites within the Fort Sheridan installation that may have been used in the past for ordnance-related testing and/or training. The objectives were to map all other than operational ranges and sites, collect and upload data into ARID, prepare an assessment of the explosives safety risk using the USACE Risk Assessment Code (RAC) worksheets, and determine which sites qualify for the MMRP. The data collection portion of the Phase 3 Inventory consisted of a site visit, historical records review, and interviews with installation personnel.

The Phase 3 Inventory, as previously stated, identified one closed range (the Trench Warfare Range) with an acreage of 42.5 acres. A summary of the site is provided in **Section 2.2**.

Based on data collected during the Phase 3 Inventory, the Trench Warfare Range received a RAC score of 2 (critical). RAC is a pre-response priority sequencing tool that does not take into account cleanup actions. The RAC score was based on historical activities conducted, namely the training with medium/large caliber weapons and the use of pyrotechnics. The RAC Hazard Severity was categorized as "critical". Evidence indicates the presence of pyrotechnics, but no evidence of bulk high explosives, bulk propellants or chemical/radiological warfare materials. The potential also exists for MEC to be buried on site since the trenches were filled in and possibly used as disposal areas. The RAC Hazard Probability was categorized as "probable", which was based on the short distance to the nearest inhabited structure likely to be at risk from the MEC hazard, the high number of buildings within a 2-mile radius of the site, and the lack of a barrier/security system.

### 3.1.5 Internet Searches

An Internet search was conducted to supplement existing data collected for the site description of Fort Sheridan and the surrounding area. The following is a list of sites visited where information was obtained.

- National Wetland Inventory (<http://nationalmap.gov>)
- US Fish and Wildlife Service (<http://wetland.fws.gov/>)
- US Census Bureau (<http://www.census.gov/>)
- Plants Database 2004 (<http://plants.usda.gov/>)

## 1 **4.0 SUMMARY OF FINDINGS**

### 2 **4.1 Installation**

#### 3 **4.1.1 Fort Sheridan's Geographic Location**

4 Fort Sheridan is located on the southwestern shore of Lake Michigan approximately 30 miles north of  
5 Chicago. To the north, the installation is bordered by the City of Lake Forest, to the west by Sheridan  
6 Road and the City of Highwood, to the east by Lake Michigan, and to the south by the City of Highland  
7 Park.

8  
9 The surrounding area is generally suburban. Highwood, population 4,143, lies immediately adjacent to  
10 the southwest corner of Fort Sheridan. The urban center encompasses 0.6 square miles. Highland  
11 Park, population 31,365, covers 12.5 square miles and the City of Lake Forest, population 20,059, covers  
12 17.1 square miles. These cities are relatively small and are comprised of mostly residential housing with  
13 some small shops and restaurants (www.census.gov; SAIC, 2002a).

#### 14 **4.1.2 History**

15 Between the 1840s and 1860s, before military development of the land, the property historically known  
16 as Fort Sheridan was operated as a manufacturing center and lake shipping port. In the mid-1840s, the  
17 town of St. Johns was developed with logging, lumbering, quarrying, and shipping among other industries.  
18 Much of Fort Sheridan "was harvested for oak trees that were in demand for framing houses and barns,  
19 building ships and wagons, firewood, and other uses. Bartlett Ravine Road was developed during this  
20 period of industrial development as an access route to an extensive pier on Lake Michigan that was used  
21 to ship products from the area" (SAIC, 2002a). The town of St. Johns operated until 1865.

22  
23 Fort Sheridan was established in 1887 to serve as an infantry post to help stabilize the City of Chicago  
24 following rioting by its citizens associated with labor problems in 1886 and the Chicago Fire in 1871  
25 (e2M, 2002; USACE, 1996). "The deed for the property that was to become Fort Sheridan was  
26 recorded on 6 October, 1887" (SAIC, 2002a). In November 1887, the first troops arrived at the site  
27 formerly known as Camp Highwood. In February 1888, the site was renamed Fort Sheridan. In 1889,  
28 the first permanent construction began at the facility (SAIC, 1999).

29  
30 Fort Sheridan was operational between 1887 and 1993 and "provided training facilities for US Army  
31 troops participating in the Spanish-American War (1898), the Mexican Intervention of 1913, WWI

1 (1917), WWII (1940), and was established as a Nike missile launch site in the 1950s. Training activities  
2 in preparation for WWI included extensive construction of mock combat trenches over a large area of  
3 the southern portion of Fort Sheridan" (SAIC, 2002). The largest WWI Army hospital (Lovell General  
4 Hospital) existed at Fort Sheridan to treat wounded soldiers. Lovell General Hospital closed in 1920.  
5 "Before and during World War II, Fort Sheridan was a center of anti-aircraft and coastal artillery  
6 training and served as a recruit reception center" (SAIC, 2002).

7  
8 Fort Sheridan functioned as a Nike missile launch area from the 1950s to 1974 as well as a Nike  
9 operations maintenance and service center for several areas in the Midwest. "Between 1967 and 1993,  
10 operations at Fort Sheridan were primarily administrative, with the Post serving alternately as  
11 headquarters for the Fifth Army, the US Army Recruiting Command, the Fourth Army, and also  
12 providing administrative and logistical support to 74 US Army Reserve Centers located in Midwestern  
13 states from Minnesota to Michigan" (SAIC, 1999).

14  
15 In 1988, Fort Sheridan was recommended for closure under BRAC. The site officially closed in May  
16 1993. "The southwest quadrant and the northwest corner (approximately 100 acres) of the Post were  
17 realigned to the US Army Reserve Command. In January 1994, the southeast quadrant and a small area  
18 on the central west side of Fort Sheridan (approximately 206 acres) were realigned to the US Navy for  
19 housing and administrative offices" (SAIC, 1999). The combined US Army Reserve and US Navy  
20 properties (approximately 306 acres) are also known as the DoD OU.

21  
22 The remaining 400 acres were transferred out of DoD ownership. That property is now under local  
23 municipality control and is known as the Surplus OU (See **Figure 2-2**). The majority of this property  
24 was transferred in March 1998 to the cities of Highland Park and Highwood and to the Lake County  
25 Forest Preserve District (Ceres, 2004).

## 26 **4.2 MRA/MRS Previous Investigations**

27 A number of environmental investigations have been conducted at the Fort Sheridan MRAs/MRSs to  
28 assess contamination from chemical, biological, and radiological contaminants of concern (COCs). Initial  
29 investigations were conducted to determine if on-site environmental contamination had resulted from  
30 historic operations involving storage, testing, and/or disposal activities, and to assess whether or not  
31 contamination had migrated off site.

1 Investigations at the MRAs/MRSs include an OE Removal and Sampling Action, Final RI/BRA, FS,  
2 *Enhanced Preliminary Assessment Report* written by the Environmental Research Division of Argonne  
3 National Laboratory in 1989, Environmental Science and Engineering (ESE) 2000 Investigation, and  
4 various site walks.

5  
6 The results of these investigations showed metals and explosives have been detected at some of the  
7 MRAs/MRSs in various media. In addition, MEC has been documented at two MRSs: the Trench  
8 Warfare Range and the Grenade Course. Specific details of the investigations into the presence of  
9 metals, explosives, and MEC at the MRAs/MRSs are outlined in the following sections.

#### 10 **4.2.1 Trench Warfare Range MRS (FTSH-001-R-01)**

##### 11 **Final Removal Report, Volume II, OE Removal and Sampling Action- HFA, 1996**

12 Six grids were surveyed for MEC from May through July 1996 in the Trench Warfare Range MRS. See  
13 **Figure 4-1** for the locations of the grids (6E1, 6E2, 6E5, and 6E6). Each grid was 100 square feet (ft<sup>2</sup>)  
14 and was surveyed using a magnetometer resulting in 100% coverage of each grid. Grids 6E1 and 6E5  
15 contained inert munitions (munitions debris), and grid 6E6 contained MEC. One inert 3-inch Stokes  
16 mortar (munitions debris) was found in survey grid 6E1, one inert 3-inch Stokes mortar and one inert  
17 Stokes fuze were found in survey grid 6E5, and two inert 3-inch Stokes mortars and one live 37mm  
18 projectile fuze were found in survey grid 6E6. All MEC items were blown in place (BIP) in April 1997.

19  
20 Two soil samples were collected from the bottom of the hole at the detonation location of the 37mm  
21 projectile fuze at grid 6E6 in the Trench Warfare Range MRS. One sample was analyzed for 8 Resource  
22 Conservation and Recovery Act (RCRA) metals and the other for explosives. The results of the soil  
23 analysis indicated metals detected exceeded Fort Sheridan upper tolerance limits (UTLs); however, only  
24 arsenic (5.68 milligrams/kilogram (mg/kg)) was detected at a greater concentration than the Illinois  
25 Environmental Protection Agency (IEPA) Tier I residential remediation objectives. Explosives were not  
26 detected in any samples collected from survey grid 6E6. Results of the metals analysis can be found in  
27 **Table 4-1.**



# OE REMOVAL and SAMPLING ACTION GRID LOCATIONS Fort Sheridan, IL

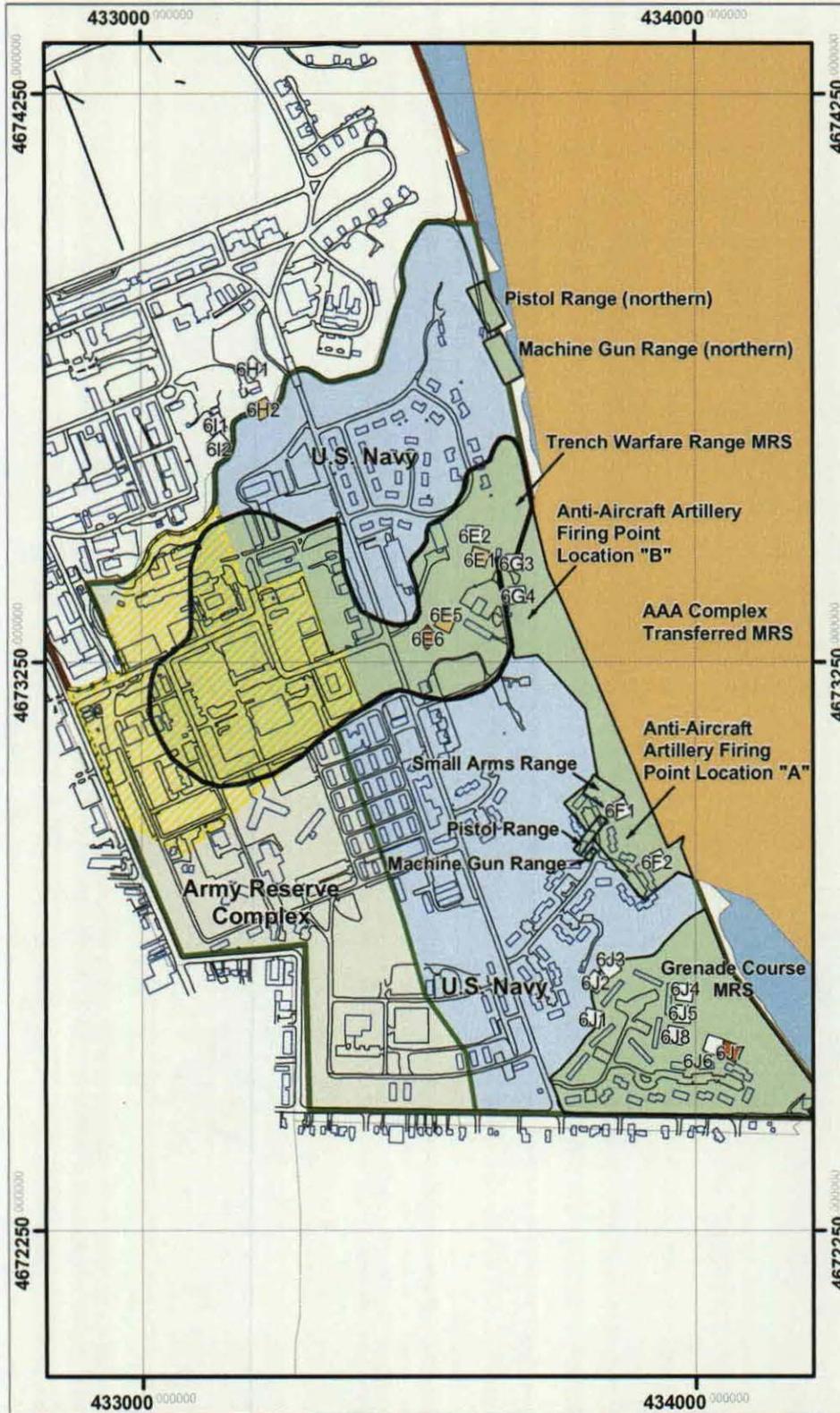


Figure 4-1



- Road
- Water
- Pre-BRAC Boundary
- U.S. Army Reserve
- U.S. Navy
- Building Outline
- Area Status**
- MRS
- AAA Complex Transferred MRS
- Trench Warfare Range MRS**
- CTT Range Boundary
- Current Boundary
- Survey Grids**
- No Finds
- Munitions Debris Found
- MEC Found

**Data Sources:**  
 - CTT Range Inventory, Fort Sheridan Army Reserve Complex, IL, December 2002.  
 - Fort Sheridan Archive Search Report, Photo Maps 2 and 3, Map 3, Map 9, Site Visit Map, March 1996.  
 - War Department, United States Engineer Office, Post Map of Fort Sheridan, Illinois.

**Projection: UTM Zone 16**  
**Datum: NAD 83**  
**Units: Meters**  
**Grid: 1,000 Meter**

1:12,000



HISTORICAL RECORDS REVIEW REPORT  
FORT SHERIDAN, IL

Source: Produced for the U.S. Army Corps of Engineers by engineering-environmental Management, Inc. (e7M)

Date: June 2005  
Edition: Draft



**Table 4-1: Results of 8 RCRA Metals analysis at the Trench Warfare Range and Grenade Course MRSs**

Constituent	Fort Sheridan UTL (0-1 ft.)	IEPA Tier I Residential Remediation Objective	Sample Results (mg/kg)			
			6E6 BM Trench Warfare	6E6 CM Trench Warfare	6J6 BM Grenade Course	6J6 CM Grenade Course
Arsenic	.00896	0.4	0.418	5.68	4.49	5.7
Lead	.0567	400	4.85	28.8	34.1	19.1
Mercury	.0015	10	59.6	0.057	0.070	ND
Selenium	.0015	3.3	ND	0.675	0.445	ND
Silver	.0005	39	0.566	ND	ND	ND
Barium	1.231	1800	131	66.1	63.8	81
Cadmium	.001	78	1.53	0.505	0.356	0.517
Chromium	.0225	32	14.2	17.9	13.4	16.2

3 ND - non detect

4 BM- Background metals, pre-detonation

5 CM- Confirmatory metals, post-detonation

7 **Final RI/BRA DoD Operable Unit- SAIC, 1999**

8 The following analytical results are taken from the RI/BRA conducted for Fort Sheridan by SAIC in 1999.

9 **Figure 2-5** depicts the locations of each of the buildings, and **Figures 4-2 and 4-3** depict the sampling  
10 locations listed below. Surface soil, subsurface soil, groundwater, sediment, surface water, and leachate  
11 samples were collected around various buildings and locations within the Trench Warfare Range to  
12 detect COCs and explosives. Lead, arsenic, and explosives have been detected at various locations  
13 throughout the MRS. According to Table ES-3 of the 2002 FS, the Preliminary Remediation Goal (PRG)  
14 for lead is 400 micrograms/gram (ug/g). This PRG is exceeded at Buildings 122, 143, 368 and in the  
15 subsurface soil at Buildings 564/565 (all on the Trench Warfare Range MRS footprint on the Army  
16 property) (**Figure 2-5**).

18 Explosives were detected in groundwater leachate from Landfill 5 within the Trench Warfare Range  
19 MRS. The compounds are as follows:

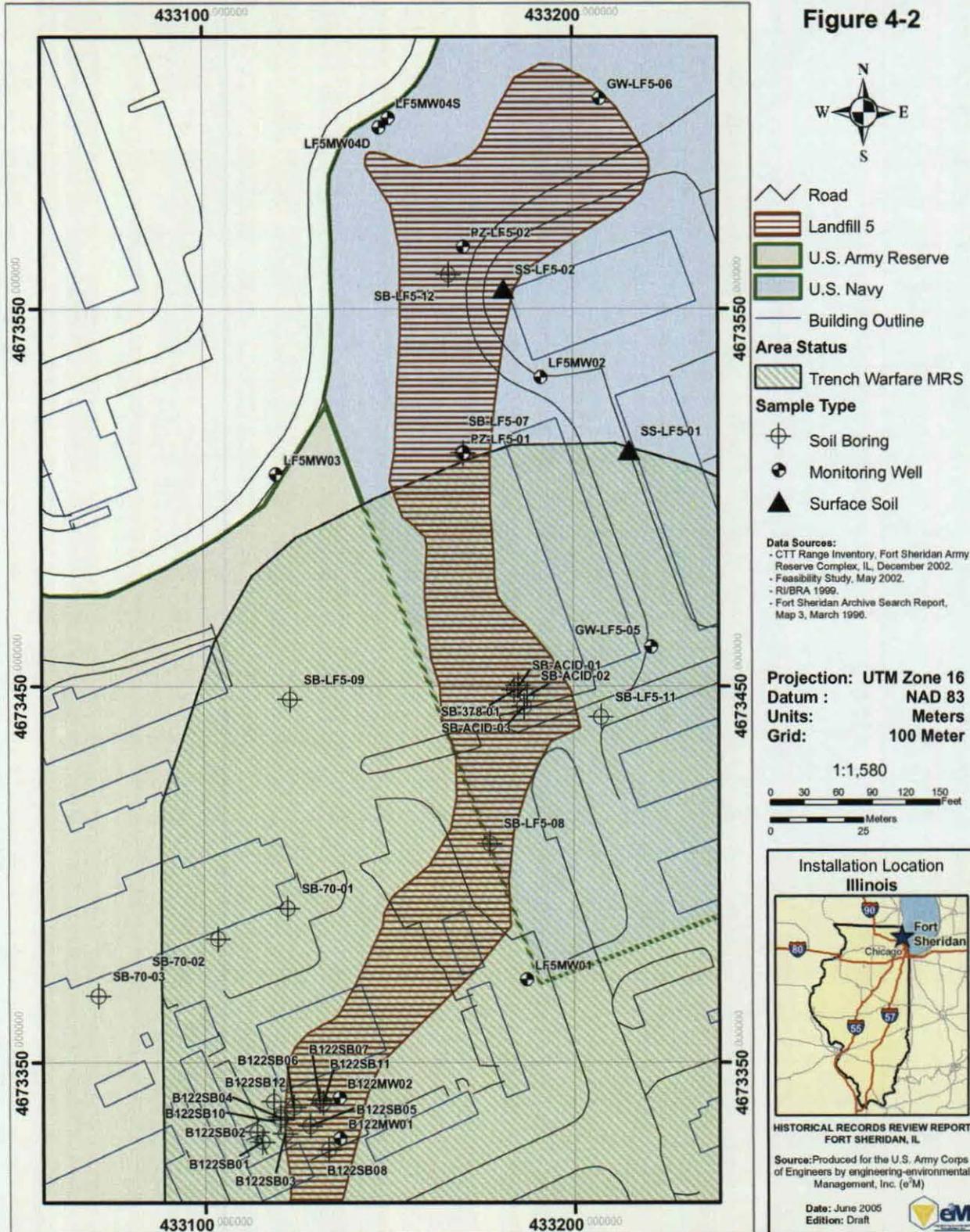
- 20 • 1,3,5-trinitrobenzene (.115 micrograms per liter [ug/L])
- 21 • 1,3-dinitrobenzene (.125 ug/L)
- 22 • 4-amino-2,6-dinitrotoluene (.166 ug/L)



# LANDFILL 5 SAMPLE LOCATIONS Fort Sheridan, IL



Figure 4-2





## TRENCH WARFARE RANGE MRS SAMPLE LOCATIONS Fort Sheridan, IL

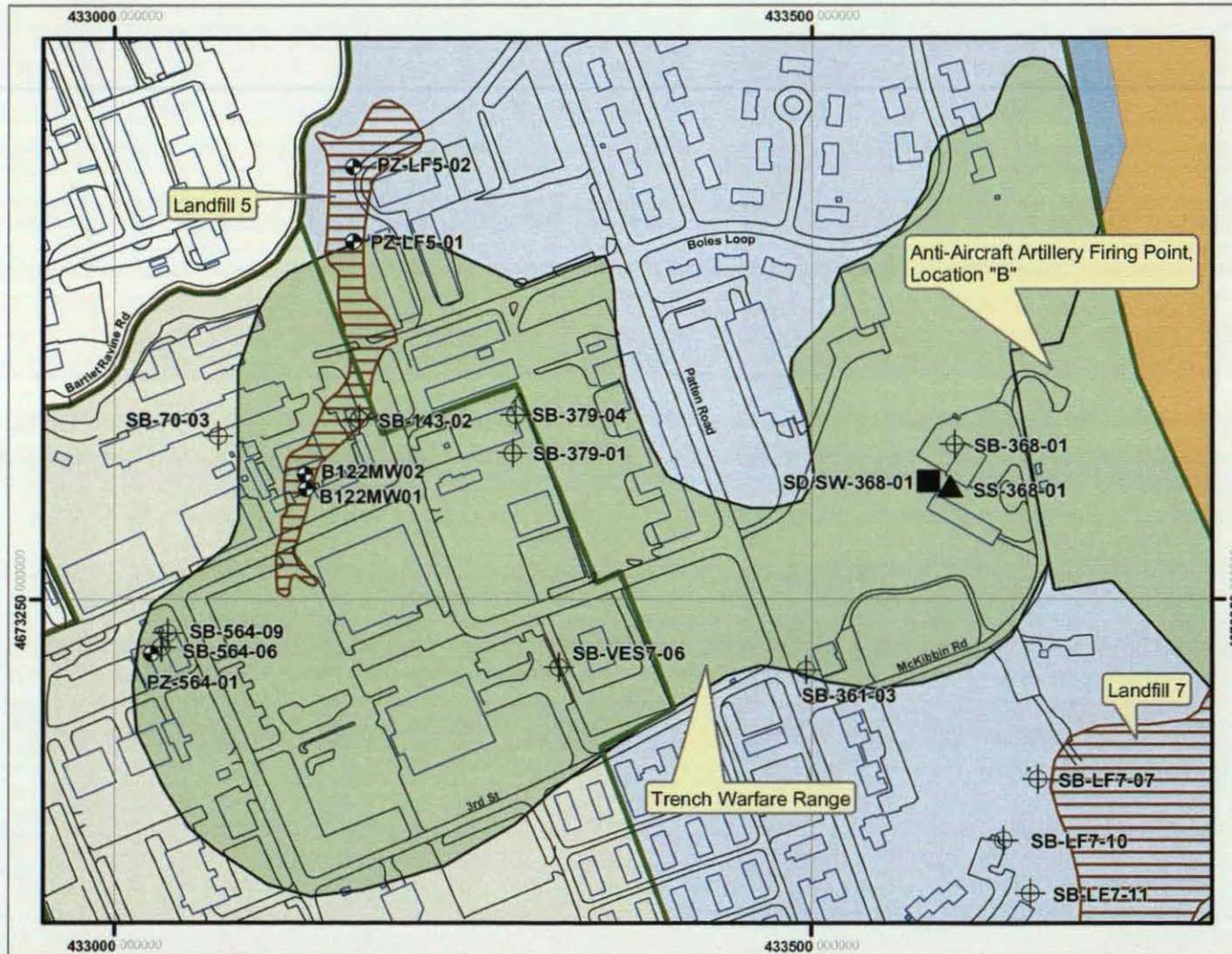


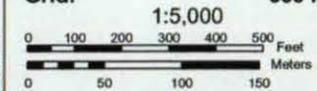
Figure 4-3



- |  |                   |  |                             |
|--|-------------------|--|-----------------------------|
|  | Road              |  | MR Site                     |
|  | Water             |  | AAA Complex Transferred MRS |
|  | Pre-BRAC Boundary |  | U.S. Army Reserve           |
|  | U.S. Navy         |  | Soil Boring                 |
|  | Building Outline  |  | Sediment                    |
|  | Landfill          |  | Surface Soil                |
|  |                   |  | Monitoring Well             |

**Data Sources:**  
 - Fort Sheridan Archive Search Report, Map 3, Site Visit Map, March 1996.  
 - Feasibility Study, May 2002.  
 - Sampling and Analysis Plan, Revision 5.0, March 2003.

**Projection:** UTM Zone 16  
**Datum:** NAD 83  
**Units:** Meters  
**Grid:** 500 Meter



1 These explosives compounds were detected in wells PZ-LF5-02 and B122MW01 (Figure 4-2). All  
2 explosives compounds were detected below IEPA Tier I residential remediation objectives.

3  
4 Surface soil investigations at Landfill 5 detected concentrations of metals which exceeded background  
5 levels, including lead (1,400 ug/g) detected at sampling location SB-LF5-07 (Figure 4-2). The source of  
6 the metals contamination is unknown.

7  
8 Six metals, including lead (60 ug/g at sampling location SB-VES7-06), exceeded background  
9 concentrations in surface soil at the Vehicle and Equipment Storage Area #7 (VES #7). Metals  
10 concentrations in subsurface soil samples exceeded background levels, including lead (84 ug/g) detected  
11 at sampling location SB-VES7-06 at a depth of 4 feet (Figure 4-3).

12  
13 Soil samples at Building 70 were not analyzed for explosives (Figure 2-5). Lead levels in the surface soil  
14 (180 ug/g) exceeded background at sampling location SB-70-03 (Figure 4-3).

15  
16 At Building 122 (Figure 2-5), 1,3-dinitrobenzene, an explosives compound, was found in the  
17 groundwater at a concentration of 0.125 ug/L in well B122MW01 (Figures 4-2 and 4-3). The lead  
18 concentration (450 ug/L) exceeded the background level in groundwater in well B122MW02 (Figures  
19 4-2 and 4-3). Metals (including lead at a concentration of 181 ug/g) exceeded the background level in  
20 surface soil.

21  
22 At Building 143 (Figure 2-5), shallow soil samples included metals concentrations that exceeded  
23 background including lead (480 ug/g) detected at sampling location SB-143-02 (Figure 4-3).

24  
25 At Building 361 (Figure 2-5), ten metals were detected in the surface soil which exceeded background  
26 concentrations, including lead (110 ug/g) detected at sampling location SB-361-03 (Figure 4-3). In  
27 addition, ten metals exceeded background concentrations in subsurface soils including aluminum, boron,  
28 cadmium, chromium, copper, iron, molybdenum, silver, tin, and vanadium.

29  
30 At Building 368 (Figure 2-5), barium and zinc exceeded background concentrations in groundwater.  
31 Ten metals exceeded background in the surface soil, including lead at a concentration of 510 ug/g  
32 detected at sampling location SS-368-01 (Figure 4-3). Eleven metals exceeded background in the  
33 sediment, including lead at a concentration of 1,100 ug/g detected at sampling location SD-368-01

1 (Figure 4-3). Lead also exceeded background (173 ug/L) in surface water in well SW-368-01 (Figure  
2 4-3), along with arsenic, boron, chromium, copper, nickel, vanadium, and zinc.

3  
4 At Building 379 (Figure 2-5), lead exceeded background levels in surface soil (320 ug/g) at sampling  
5 location SB-379-01 and subsurface soil (30 ug/g) at sampling location SB-379-04 (Figure 4-3).

6  
7 The explosives compound octahydro-1,3,5,7-tetranitro-1,3,5,7 tetrazocine: High Melting Explosive  
8 (HMX) (1.09 ug/L) and lead (39.9 ug/L) were detected in groundwater around buildings 564/565 (Figure  
9 2-5) in well PZ-564-01 (Figure 4-3). Lead was detected in surface soil (230 ug/g) exceeding background  
10 concentrations at sampling location SB-564-06 (Figure 4-3). Lead was also detected in subsurface soil  
11 (750 ug/g) exceeding background at sampling location SB-564-09 at a depth of 4 feet (Figure 4-3).

12  
13 **Phase III Technical Plan Addendum to the RI/BRA DoD Operable Unit- SAIC, 2000**

14 Soil samples were collected beneath outfalls in Bartlett Ravine between Buildings 123 and 133 (Figure  
15 2-5). These buildings are located in the northwest portion of the Trench Warfare Range MRS. Metals  
16 including lead were found to exceed background concentrations in the ravine soil. Beach sediments  
17 collected between the mouth of Bartlett Ravine and Lake Michigan contained metals, including lead, that  
18 exceeded background concentrations (Figure 2-8).

19  
20 Sediment samples from Van Horne Ravine contained metals that exceeded background including  
21 aluminum, barium, beryllium, boron, cadmium, chromium, copper, iron, molybdenum, silver, and zinc  
22 (Figure 2-8).

23  
24 **Final Fort Sheridan Feasibility Study DoD Operable Unit, Volume II- SAIC, 2002 (b)**

25 The RI/FS survey concluded subsurface soils and waste at Landfill #5 are contaminated with polycyclic  
26 aromatic hydrocarbons (PAHs) and lead. The contamination presents unacceptable risk to potential  
27 future land users (SAIC, 2002b). "The Human Health Risk Assessment" (HHRA) indicates that risks  
28 for the current land-use scenarios exceed the US Environmental Protection Agency's (USEPA) standards  
29 for public health protection" (Kemron, 2003a). The RI concluded the contents of the landfill are not  
30 degrading the groundwater beneath it and there are no ecological risks associated with current or  
31 future land-use scenarios.

32  
33 "Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides, and  
34 explosives-related organic compounds were detected in the groundwater samples collected at the study

1 area. The results were compared to Illinois groundwater quality standards for Class II groundwater.  
2 Iron was the only constituent detected in wells outside Landfill 5 exceeding the criteria and was  
3 detected above background concentrations. In wells and piezometers located within Landfill #5  
4 (screened within waste material to monitor leachate), barium, cadmium, copper, iron, lead, and zinc  
5 exceeded the Class II groundwater criteria and were detected above background concentrations for the  
6 study area" (SAIC, 2002a).

1 **4.2.2 AAA Complex MRA**

2 **US DoD Program BRAC, Ammunition and Explosives ASR Conclusions and**  
3 **Recommendations- USACE, 1996**

4 The *ASR Conclusions and Recommendations* indicates that since AAA Firing Point "A" was used during the  
5 1930's, "the possibility exists that misfired ammunition and ammunition residue were disposed of on the  
6 site" (USACE, 1996). During the USACE site visit in October 1995, no OE was observed. In the 1996  
7 ASR written by USACE, there is a supposition that a dud pit would have been built at each firing point  
8 and a central collection pit would also exist. At the time the ASR was written (March 1996), Firing  
9 Point "B" was fenced and the site visit did not include a survey of the area inside the fence. The ASR  
10 indicates that "OE has been found on the surface in the vicinity of the site but outside of the current  
11 fence" including a 105mm cartridge case (USACE, 1996).

12  
13 In the 1996 ASR written by USACE, it states "Various rifle, pistol, and machine gun ranges were located  
14 on Fort Sheridan. Ranges such as these are not normally associated with the generation of ordnance  
15 and explosive residue...(USACE, 1996)" The *ASR Conclusions and Recommendations* suggests that there  
16 is no potential for OE associated with these ranges based upon their usage. Only small arms are known  
17 to have been used at these sites. Site walks in the area did not reveal the presence of any MEC.

18  
19 **Final Removal Report, Volume II, OE Removal and Sampling Action- HFA, 1996**

20 Two OE grids were surveyed at the AAA Firing Point B (6G3 and 6G4) and two OE grids were  
21 surveyed at AAA Firing Point A (6F1 and 6F2). The locations of the grids are depicted in **Figure 4-1**.  
22 MEC and munitions debris were not detected at the survey grid areas.

23  
24 One sampling grid, 6F1, was surveyed directly adjacent to the Small Arms and Pistol Ranges in the AAA  
25 Complex MRA. The grid location is depicted in **Figure 4-1**. The grid was 100 ft<sup>2</sup> and was surveyed  
26 using a magnetometer which resulted in 100% coverage of the grid. No MEC was found within grid 6F1.

27  
28 **Final RI/BRA DoD Operable Unit- SAIC, 1999**

29 Investigations at Landfill 7 have shown lead levels (240 ug/L) in groundwater detected at well LF7-MW03  
30 that exceeded the Illinois Class II groundwater criteria (see **Figure 4-4** for sample location). In  
31 addition, background concentrations of lead were exceeded in the following: surface soil (110 ug/g) at  
32 sampling locations SB-LF7-10, SB-LF7-11, and SB-LF7-12; subsurface soil (15,500 ug/g) detected at bore  
33 SB-LF7-07 at a depth of 14 feet; and beach sediments (350 ug/g) detected at SD-WELL-01 (see **Figures**

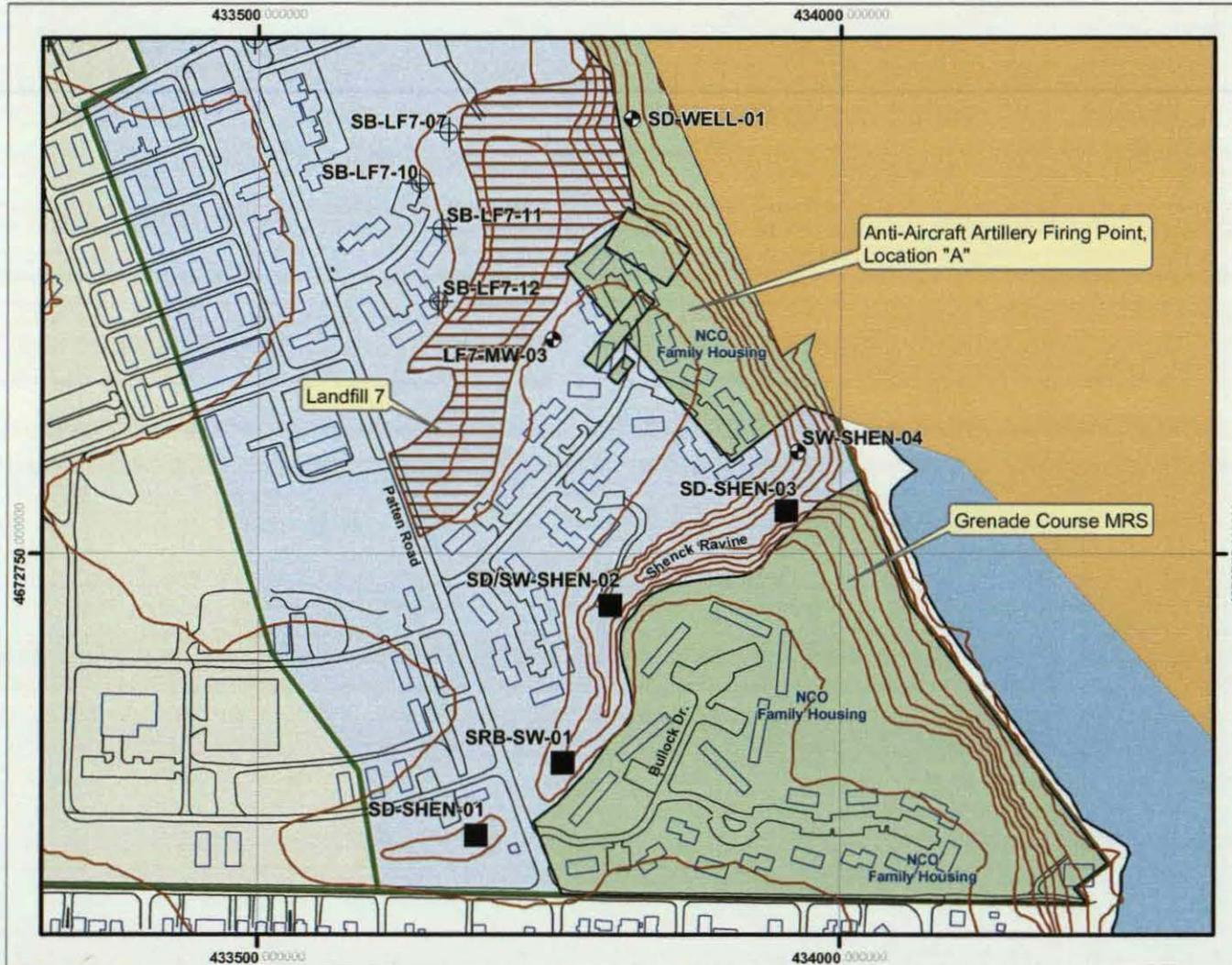
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# GRENADe COURSE MRS SAMPLE LOCATIONS Fort Sheridan, IL



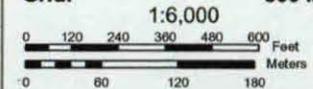
Figure 4-4



- |  |                   |  |                             |
|--|-------------------|--|-----------------------------|
|  | Contour           |  | MRS                         |
|  | Road              |  | AAA Complex Transferred MRS |
|  | Water             |  | Soil Boring                 |
|  | U.S. Army Reserve |  | Sediment                    |
|  | U.S. Navy         |  | Monitoring Well             |
|  | Building Outline  |  |                             |
|  | Landfill 7        |  |                             |

**Data Sources:**  
 - Fort Sheridan Archive Search Report, Map 3, Site Visit Map, March 1996.  
 - Feasibility Study, May 2002.  
 - Sampling and Analysis Plan, Revision 5.0, March 2003.

**Projection:** UTM Zone 16  
**Datum :** NAD 83  
**Units:** Meters  
**Grid:** 500 Meter



1 4-3 and 4-4). However, the EBS states "there is no definitive evidence that the waste in Landfill 7 is  
2 contributing to the degradation of the surrounding groundwater at the study area" (Ceres, 2004).  
3 Groundwater analyses from the regional aquifer wells identified isolated concentrations of explosives-  
4 related compounds that were not consistently detected between sampling events. HMX, Royal or  
5 Research Department Explosive; hexahydro-1,3,5-trinitro-1,3,5 triazine, which is also known as cyclonite  
6 (RDX), and the breakdown product 4-amino-2,6-dinitrotoluene were not confirmed by re-analysis  
7 (second column confirmation) in the laboratory. Isolated nitrobenzene and 2,6-dinitrotoluene  
8 concentrations were not consistently detected between sampling events (SAIC, 1999).  
9 At Building 368 (Figure 2-5), located to the west of Firing Point "B", lead was detected at levels  
10 exceeding background concentrations in the following media: surface soil at a concentration of 510 ug/g  
11 at sampling location SS-368-01; sediment (1100 ug/g) at sampling location SD-368-01; and surface water  
12 (173 ug/L) at sampling location SW-368-01 (Figure 4-3).

13  
14 **Preliminary Assessment, Site Visit, Data/Collection Summary Report- Malcolm Pirnie,**  
15 **2003**

16 Site reconnaissance in the area of these former ranges and firing points has not revealed any MEC at the  
17 MRA.

1 **4.2.3 AAA Complex – Transferred MRS**

2 **Final Anti-Aircraft Artillery Ranges Site Investigation Report, Surplus Operable Unit-**  
3 **Harding ESE, 2001**

4 Sampling was conducted in areas in close proximity to the AAA Firing Points. Sediment samples were  
5 collected offshore near Landfill 7, offshore south of Shenck Ravine, and offshore near Bartlett and Van  
6 Horne Ravines (See Figures 2-8 and 2-9). No explosives were detected in any of the sediment  
7 samples. Three surface water samples were also collected during the offshore sediment sampling. Two  
8 of them were in proximity to Firing Points "A" and "B". At one location, the southern boundary of the  
9 installation, HMX was detected below the method detection limit (MDL).

10  
11 **Figure 2-9** shows the AAA Impact Zone Sediment Sample Locations. No explosive constituents were  
12 detected in any of the sediment samples collected.

13  
14 According to the *Enhanced Preliminary Assessment Report* written by the Environmental Research Division  
15 of Argonne National Laboratory in 1989, many artillery shells were deposited into Lake Michigan  
16 because of all the training activity along the beach. The 1996 ASR contains Appendix C-32 which  
17 provides an "Analysis of Ammunition Contamination in Lake Michigan due to Anti-Aircraft Artillery Fire  
18 from Fort Sheridan". This analysis concludes that "the majority of unexploded rounds would be from  
19 3.7 miles to 10.6 miles from shore with a decreasing potential of rounds out to 15.4 miles...It must be  
20 assumed that a potential exists for unexploded ordnance to extend from the shore line out to the  
21 maximum range because of the potential for short rounds and the possibility of firing against a surface  
22 target floated on Lake Michigan" (USACE, 1996).

23  
24 In the spring of 2000, ESE contracted with UXB International to provide unexploded ordnance diving  
25 support for investigative work they were performing in Lake Michigan. There was no evidence of UXO  
26 discovered during the investigation (Harding ESE, 2001).

1 **4.2.4 Grenade Course MRS**

2 **US DoD Program BRAC, Ammunition and Explosives ASR Conclusions and**  
3 **Recommendations- USACE, 1996**

4 There were two Explosive Ordnance Disposal (EOD) response incidents in recent years regarding  
5 grenades in the suspected Grenade Course MRS area. The suspected area is now occupied by Navy  
6 family housing. According to the 1996 USACE ASR, an interview with Master Sergeant (MSG) George  
7 Foy who was stationed at Fort Sheridan from 1980-1981 and 1984-1989 with the 51st EOD, revealed  
8 that "One particular incident took place on Bullock Drive (1st set of housing units on the right as you  
9 enter the housing area) (See Figure 2-3). He stated that several live hand grenade fuzes were dug up  
10 in the backyard." He also stated two live WWII hand grenades were found in the wall of the old  
11 barracks on the south end of the post.

12  
13 **Final Removal Report, Volume II, OE Removal and Sampling Action- HFA, 1996**

14 Surface surveys were conducted at 8 grids within the Grenade Course MRS (6J1-6J8). Each grid was  
15 100 ft<sup>2</sup> and a magnetometer survey was conducted at each grid resulting in 100% coverage of the grid.  
16 One live rifle grenade was found at survey site area 6J7 within the Grenade Course MRS in May 1996.  
17 See Figure 4-1 for grid locations. The grenade was BIP in April 1997.

18  
19 Two soil samples were collected at the bottom of the hole at the detonation location of the rifle  
20 grenade at survey site 6J7. One sample was analyzed for 8 RCRA metals and one sample was analyzed  
21 for explosives. The results of the soil analysis indicated the metals detected exceeded Fort Sheridan  
22 UTL's; only arsenic (5.7 mg/kg) was detected at a greater concentration than the IEPA Tier I residential  
23 remediation objective. Explosives were not detected. Results of the analysis are shown in Table 4-1.

24  
25 **Final RI/BRA DoD Operable Unit- SAIC, 1999**

26 During a Phase I RI/BRA, surface water samples were collected from Shenck Ravine and were analyzed  
27 for metals and explosives. See Figure 4-4 for sample locations. Five metals detected in the surface  
28 water samples exceeded background concentrations, including arsenic (3.8 ug/L) and lead (5.3 ug/L) at  
29 sampling location SRB-SW-01. Sediments were collected from Shenck Ravine during the Phase I and  
30 Phase II investigations. Sediment samples contained 14 metals that exceeded background concentrations  
31 including lead (55 ug/g) detected in sampling location SD-SHEN-01. The explosives compound 4-  
32 amino-2,6-Dinitrotoluene was detected in ravine sediment samples collected at sampling locations SD-  
33 SHEN-01, SD-SHEN-02, and SD-SHEN-03 at a concentration of 0.200ug/g; however, the concentrations

1 detected were less than the reporting limit. More sediment sampling was planned for Phase III (including  
2 analysis for metals and explosives), but is unknown if this sampling was conducted.

### 3 **4.2.5 Small Arms Range Complex MRA**

#### 4 **US DoD Program BRAC, Ammunition and Explosives ASR Conclusions and** 5 **Recommendations- USACE, 1996**

6 As stated previously in **Section 4.2.2**, the 1996 ASR written by USACE suggests that MEC and  
7 munitions debris are not normally generated at these types of ranges. Based upon their usage the ASR  
8 *Conclusions and Recommendations* suggests that there is no potential for OE (MEC) associated with these  
9 ranges. Only small arms are known to have been used at these sites. Site walks in the area did not  
10 reveal the presence of any MEC.

11

#### 12 **Preliminary Assessment, Site Visit, Data/Collection Summary Report- Malcolm Pirnie,** 13 **2003**

14 Site reconnaissance in the area of these former ranges has not revealed any MEC at the MRA.

## 5.0 CONCEPTUAL SITE MODEL

### 5.1 Trench Warfare Range MRS (FTSH-001-R-01)

#### 5.1.1 MRS Profile

##### 5.1.1.1 Area and Layout

The Trench Warfare Range MRS encompasses approximately 53.1 acres. Bartlett Ravine, which is filled with trees, is located north of the MRS (see **Figure 2-8**). The boundaries of the USARC property are fenced and a fence will be reinstalled around Landfill 5 (the fence was temporarily removed for the installation of the landfill cap). The Trench Warfare Range MRS is bounded mostly by buildings. The detailed layout of the site is presented in **Figure 2-5**.

##### 5.1.1.2 Structures

The remaining structures at the Trench Warfare Range MRS include many buildings used by the US Army Reserve and the US Navy. Building 70 was previously used for pesticide storage. Buildings 122 and 143 served as storage areas for hazardous materials but were recently demolished (SAIC, 2002). Building 379 serves as an electronic equipment repair shop. Building 564 is a former thrift shop and Building 565 is a former Army & Air Force Exchange Service (AAFES) service station (SAIC, 1999) (see **Figure 2-5**).

##### 5.1.1.3 Utilities

Utilities located within the confines of the Trench Warfare Range MRS include electricity, telephone, and water lines.

##### 5.1.1.4 Boundaries

The Trench Warfare Range MRS is surrounded mostly by buildings. Bartlett Ravine and Bartlett Ravine Road lie to the north of the site. The southern edge of the site follows 3<sup>rd</sup> Street on the USARC property and McKibbin Road on the US Navy property.

##### 5.1.1.5 Security

Fort Sheridan is surrounded by a perimeter fence. The Fort is patrolled regularly by Great Lakes Security. Access to the installation is gained by passing through an unguarded entrance. Anyone can access the installation. Once on site, individual movement is not restricted. There are no barriers or security system around the Trench Warfare Range MRS (e<sup>2</sup>M, 2002), but there is fencing around the USARC property and the fencing around Landfill 5 is being re-installed.

1 **5.1.2 Physical Profile**

2 **5.1.2.1 Climate**

3 The climate at Fort Sheridan is continental characterized by cold winters, warm summers, and moderate  
4 amounts of rainfall. Frequent changes in conditions such as temperature, humidity and wind direction  
5 occur due to fronts and cyclonic weather systems. The movement of these systems is generally from  
6 west to east. Based on meteorological data from Chicago-O'Hare International Airport between 1964  
7 and 1993, the average summer temperature was 83.6 degrees Fahrenheit (°F) (July) and the average  
8 winter temperature was 13.5°F (January) with an average annual temperature of 49°F (SAIC, 1999).

9  
10 Annual precipitation at Chicago-O'Hare International Airport was 35.5 inches between 1964 and 1993  
11 with monthly averages between 1.37 inches in February and 4.12 inches in August. Snowfall amounts at  
12 O'Hare averaged 38.2 inches (1964-1993) with the highest monthly average in January with 10.7 inches.  
13 The greatest snowfall occurs between December and March (SAIC, 1999).

14  
15 Prevailing wind speed and direction in northeastern Illinois is south-southwest at about 10 miles per  
16 hour (mph) annually. Two distinct climatological patterns are evident throughout the year. From  
17 November through April the wind is predominantly from the west at speeds of 11-12 miles per hour.  
18 From June through October the wind is predominantly from the south-southwest at speeds of 8-9 miles  
19 per hour (ERD, 1989).

20  
21 Changes in weather patterns at Fort Sheridan are subject to the "lake effect" caused by Lake Michigan.  
22 Snowfall is common in winter due to cold air masses moving over the warmer lake establishing moisture  
23 gradients that result in precipitation when the air is lifted over land. The contrast between  
24 temperatures over water versus land also significantly affects local wind speed and direction. Lake  
25 breezes are common in summer, when winds are often light and variable and can extend several miles  
26 inland (ERD, 1989).

27 **5.1.2.2 Geology**

28 The surficial geology in northern Illinois is predominantly the result of the Wisconsinan glaciation that  
29 occurred during the Pleistocene Age. Fort Sheridan is located within the Lake Border Morainic System  
30 of the Central Lowland Physiographic Province and is on the easternmost Highland Park Moraine in  
31 southern Lake County. This moraine trends from north-northwest to south-southeast for 30 miles  
32 between the Lake Chicago Plain and the Lake Michigan beach to Cook County (ERD, 1989; Ceres,  
33 2004). The moraine is generally 50 to 100 feet thick and runs parallel to the lake shore (USACE, 1996).

1 The glacial material deposited in the Fort Sheridan region is representative of the Wadsworth Till  
2 Formation of the Wedron Group. The Wadsworth till consists predominantly of illitic, calcareous, gray,  
3 fine textured clay matrix with lenses of sorted and stratified sand, gravel, or silt within the clay matrix.  
4 The Wadsworth Formation is interpreted to represent till and sediment that underwent re-deposition  
5 in an ice-marginal and possibly subaqueous environment and deposition probably occurred as a result of  
6 fluctuations of the glacial ice margin 15,500 to 13,800 years ago (SAIC, 1999). The Wadsworth  
7 Formation till underlying Fort Sheridan has a generally low permeability (SAIC, 2002a).

### 8 **5.1.2.3 Topography**

9 The topography of Fort Sheridan is relatively flat with a gentle slope of 2 to 4 degrees to the east  
10 terminating at a bluff line that runs along the lakeshore. Elevations at Fort Sheridan range from 650 feet  
11 (ft) above sea level at the bluff line up to 695 ft above sea level at the western boundary. The  
12 topography of Fort Sheridan is depicted in **Figure 2-8**.

13  
14 There are six deep ravines that run west to east within the installation perpendicular to the Lake  
15 Michigan shoreline. The topography of the ravines has been altered from their initial configurations  
16 because some were used as waste disposal sites. The southern branch of Bartlett Ravine now supports  
17 a road.

18  
19 Erosion is a continuous problem along the beaches and bluffs due to high lake levels. Groins and  
20 revetments have been installed and rip rap has been placed along areas of the beach and bluff. Erosion  
21 abatement efforts will continue at Fort Sheridan (ERD, 1989).

### 22 **5.1.2.4 Soil**

23 Fort Sheridan is included in the Morley-Beecher-Hennepin Soil Association according to the Soil  
24 Conservation Service of the US Department of Agriculture (USDA). This soil association occurs in a  
25 long narrow belt that extends from the southeastern corner of Lake County north to Waukegan,  
26 Illinois. Three major and two minor surface soil series have been identified at Fort Sheridan. The major  
27 series are the Morley Silt Loam, the Hennepin Loam, and beach sand. The Morley Series is the  
28 predominant soil type and covers most of the land at Fort Sheridan. The beach sand series is found  
29 along the shoreline of Lake Michigan. The Hennepin Series is located in parts of the northwest,  
30 northeast, and southeast areas and is found along the bluff overlooking Lake Michigan and in the deep  
31 ravines. The minor soil series which have been identified near the western boundary of Fort Sheridan  
32 include the Markham and Beecher Silty Clay Loams. The permeability of each soil series has qualitatively  
33 been described as moderately low due to the high clay content (USACE, 1996; ERD, 1989).

1 **5.1.2.5 Hydrogeology**

2 Fort Sheridan lies within the Wadsworth Formation which has a predominantly fine-grained texture and  
3 comprises a leaky aquitard for more permeable formations (buried sand aquifers, bedrock) underlying or  
4 overlying the till in a regional setting. The movement of groundwater within the till is through hydraulic  
5 conductivity variations caused by the presence of coarser deposits of silt, sand, and gravel with variable  
6 lateral and vertical continuity. Groundwater seepage through the till would be predominantly  
7 downward-directed except in the presence of more permeable and laterally connected lenses or  
8 geological discontinuities (fractures, joints). Groundwater movement through permeable units within  
9 and underlying the till (buried sand aquifers, bedrock) is expected to be predominantly lateral (SAIC,  
10 1999).

11  
12 The geological materials underlying Fort Sheridan consist of clay to silty clay with occurrences of  
13 laterally discontinuous silt, sand, or gravel lenses that are generally 1 to 8 feet thick. The overall  
14 movement of groundwater beneath Fort Sheridan was investigated by Zimmer Howell Engineering, Ltd.,  
15 in November 1984 using a network of 45 piezometers regularly distributed across the installation. The  
16 interpreted groundwater flow direction based on the observed water levels in the piezometers is east  
17 northeast toward Lake Michigan. Interpretive groundwater elevation mapping completed in 1997  
18 confirmed the 1984 groundwater flow direction towards Lake Michigan. Groundwater elevations in the  
19 Zimmer Howell Engineering, Ltd. piezometer network ranged between 683.97 feet above mean sea  
20 level (msl) near the main truck gate and 581.38 feet above msl near the beach on the Surplus OU. The  
21 average horizontal hydraulic gradient calculated from the interpreted contours in the Phase I RI report is  
22 0.008 ft/ft. These data indicate that local groundwater flow is influenced by the ravines and that shallow  
23 groundwater flow across the installation is toward Lake Michigan. Static water levels varied from 2 to  
24 15 feet below land surface (SAIC, 1999).

25  
26 The bedrock unit immediately underlying the glacial deposits is dolomite of Silurian age consisting of the  
27 following formations: Racine, Sugar Run, Joliet, Kankakee, Elwood, and Wilhelmi. Together these  
28 formations comprise the "shallow dolomite aquifer". The Maquoketa Group (Ordovician age) underlies  
29 the Silurian dolomites and consists primarily of nonwater-bearing shales that separate the Silurian aquifer  
30 from deeper underlying water-bearing units. However, appreciable downward leakage through the  
31 Maquoketa shales to the deep bedrock aquifer system has been reported. Near Fort Sheridan, the  
32 Maquoketa shales are found at a depth of approximately 400 feet and are about 100 feet thick (ERD,  
33 1989).

1 The Cambrian-Ordovician aquifer system underlies the Maquoketa shales in Lake County. This aquifer  
2 consists of a thick sequence of hydrologically connected rock formations whose ages range from middle  
3 Ordovician (Galena, Platteville, Glenwood, and St. Peter formations) to middle Cambrian (Eminence,  
4 Potosi, Franconia, Ironton, and Galesville formations). The major aquifers are the Glenwood-St. Peter  
5 and Ironton-Galesville aquifers, both consisting of fine- to coarse-grained sandstones. The Ironton-  
6 Galesville Sandstone is the most consistently permeable and productive formation of the Cambrian-  
7 Ordovician aquifer system in northeastern Illinois, producing approximately 50 percent of the total  
8 system yield. In southeastern Lake County, the Cambrian-Ordovician aquifer system extends in depth  
9 from approximately 500 feet to 1,500 feet (ERD, 1989).

10  
11 The Eau Claire Formation, consisting of shales and siltstone, lies beneath the Ironton-Galesville aquifer.  
12 The upper part of the Eau Claire Formation hydrologically separates that aquifer from the deeper  
13 Elmhurst-Mt. Simon aquifer, which consists of the Elmhurst member of the Eau Claire Formation and  
14 the underlying Mt. Simon Formation. The Elmhurst-Mt. Simon aquifer consists of sandstones of early  
15 Cambrian age, and is the deepest fresh water aquifer in northeastern Illinois, extending in depth from  
16 about 1,700 to 3,700 feet in southeastern Lake County. Water is only acceptable for drinking from the  
17 uppermost few hundred feet due to water being highly mineralized at greater depths. This Elmhurst-Mt.  
18 Simon aquifer lies unconformably on top of pre-Cambrian granitic crystalline rocks (ERD, 1989).  
19 Fort Sheridan obtains drinking water from Lake Michigan. The city of Highland Park currently provides  
20 water to the DoD OU (SAIC, 2002). Only one groundwater well is in use at Fort Sheridan and it is  
21 non-potable. The depth of this well is unknown (ERD, 1989). Local ordinances in the vicinity of Fort  
22 Sheridan prohibit the usage of groundwater for drinking (Kemron, 2003a).

### 23 **5.1.2.6 Hydrology**

24 Fort Sheridan is located in the Upper Illinois River Basin and has no perennial streams. The eastern  
25 boundary is the western shore of Lake Michigan. The shoreline is characterized by high (up to 80 feet)  
26 steep faced bluffs, exposing glacial deposits consisting predominantly of till. At the base of the bluffs,  
27 there is a sandy lake shore of variable width dependent on wind and wave action. The lake shoreline  
28 has been engineered with groins to reduce the erosive impact of longshore drift which degrades  
29 available beach area. The elevation of Lake Michigan is approximately 580 feet above msl. One  
30 unnamed pond is located at the north end of the installation in the Surplus OU and formerly was  
31 stocked for sport fishing for residents (SAIC, 2002a).

1 Surface water runoff flows either into the nearest ravine or into the storm sewer system discharging to  
2 Lake Michigan via direct pipeline to culverts at the lake shore, or through outfalls into one of the  
3 ravines. There are two main storm drains which run along the branches of Bartlett Ravine. The drain in  
4 the northern Ravine was installed prior to Landfill 3 and 4 filling this branch. The drain in the southern  
5 branch lies beneath the road in the bottom of the ravine. Numerous outfalls also exist along Bartlett  
6 Ravine, including the storm drain underneath Landfill 5 that drains into the ravine at the northern end of  
7 the Landfill. This drainage system also receives storm drainage from the town of Highwood. Surface  
8 ditches along roadways and branch storm sewers channel water into the main storm sewers (SAIC,  
9 2002a).

10  
11 Lake Michigan is a source of potable water, water for fire protection and general usage to the DoD OU  
12 and the surrounding municipalities. Water treatment facilities on site have been discontinued since  
13 storm sewer discharges, open ravine discharges, and surface runoff make the lake a potential receptor  
14 for chemical discharges from the facility and surrounding municipalities (SAIC, 2002a).

15  
16 Fort Sheridan was connected to the North Shore Sanitary District in 1978. Prior to the connection, the  
17 installation operated a sewage treatment plant and was granted a National Pollutant Discharge  
18 Elimination System (NPDES) permit for discharging effluent into Lake Michigan. A former sludge bed  
19 associated with the plant is located on the beach. The plant's average daily capacity was 600,000 gallons  
20 per day (SAIC, 2002a).

### 21 **5.1.2.7 Vegetation**

22 Fort Sheridan lies within the Eastern Broadleaf Forest Province but due to continuing development in  
23 the area the historical forest of oak-hickory is limited. The forest produced a mosaic pattern with  
24 prairies grading between the oak-hickory-bluestem parkland. Formerly forested, Fort Sheridan has been  
25 developed for other uses. The remaining vegetation that dominates the Fort includes lawn among  
26 buildings and a golf course and mature shade trees of the oak species (*Quercus spp.*) (USACE, 1999).

27  
28 Due to the unique location of Fort Sheridan there are a number of important vegetative species that are  
29 within its boundaries. Fort Sheridan Bluff has an area of very high quality eroding bluff with a relict  
30 assemblage of plants and is of state-wide ecological significance (ERD, 1989; USACE, 1996). The  
31 southern arm of Janes Ravine along its north facing slope and the bluff between Bartlett and Van Horne  
32 Ravine contains several state endangered or threatened plants (SAIC, 1996). These include the state  
33 threatened Ground Juniper (*Juniperus communis*), Pale Vetchling (*Lathyrus ochroleucus*), Black-seeded Rice

1 Grass (*Oryopsis racemosa*), Arbor Vitae (*Thuja occidentalis*), Star Flower (*Trientalis borealis*), and Dog Violet  
2 (*Viola conspersa*). State endangered species at Fort Sheridan include the Buffalo Berry (*Shepherdia*  
3 *canadensis*), Small Solomon's Seal (*Polygonatum pubescens*), Grove Blue Grass (*Poa alsodes*), Eastern  
4 Prairie Fringed Orchid (*Platanthera psychoides*), Woodland Blue Grass (*Poa languida*) and Purple  
5 Flowering Raspberry (*Rubus odoratus*) (USACE, 1999; ERD, 1989, SAIC, 1996; Plants Database, 2004).

### 6 **5.1.3 Exposure Profile**

#### 7 **5.1.3.1 Current Land Use**

8 The Trench Warfare Range MRS is believed to have been filled in sometime after WWI. Landfill 5 was  
9 used from approximately 1900 to the 1960s. The USARC and the US Navy now own the former  
10 Trench Warfare Range MRS property and they maintain buildings at the MRS. The current land use  
11 scenario includes current employees, recreational visitors to areas that are not fenced, trespassers into  
12 the fenced areas, and maintenance workers. Activities that could change the potential of exposure  
13 include excavation, construction, and development (SAIC, 2002a).

#### 14 **5.1.3.2 Current Human Receptors**

15 "Just before its closure, Fort Sheridan employed 4,525 military personnel and 1,650 civilian personnel.  
16 US Census data for 1990, before closure, indicated a resident population on the Fort of 2,405 persons.  
17 The Navy maintains 329 single and multiple-person housing units on the DoD OU" (SAIC, 2002). There  
18 are currently maintenance workers, US Army and Navy employees, trespassers, and recreational users  
19 who can access the MRS.

#### 20 **5.1.3.3 Potential Future Land Use**

21 The DoD maintains ownership of the approximately 306 acres of the USARC and US Navy property at  
22 Fort Sheridan. The 2002 FS evaluated both recreational and residential future land use. Because of  
23 contamination at Landfill 5, the FS determined there were unacceptable human health risks associated  
24 with recreational and residential use of a portion of the Trench Warfare Range MRS area, partially  
25 because of elevated lead levels (SAIC, 2002). The Final Phase III Technical Plan of the DoD OU RI states  
26 "Current engineering controls (e.g., pavement) cannot be entirely relied upon to prevent the excavation  
27 of contaminated soils, and construction and reworking of the land surface is possible" (SAIC, 2000).

#### 28 **5.1.3.4 Potential Future Human Receptors**

29 The future land use at Fort Sheridan is uncertain. Since the land use changes planned for Fort Sheridan  
30 in the foreseeable future are unknown, human receptors would be limited to current use receptors; that  
31 is current employees at both USARC and US Navy sites, maintenance workers, trespassers, and  
32 recreational users.

1 **5.1.3.5 Zoning/Land Use Restrictions**

2 It is unknown whether there are formal zoning or deed restrictions at the Trench Warfare Range MRS.

3 **5.1.3.6 Beneficial Resources**

4 Four wetlands have been identified at Fort Sheridan by the US Fish and Wildlife Service (SAIC, 2002).

5 These wetlands are predominantly along the beach of Lake Michigan and none of the wetlands are  
6 located within the Trench Warfare Range MRS area. See **Section 5.1.4.1** for more detail.

7  
8 It is unknown whether Fort Sheridan implemented a Cultural Resources Management Plan.

9  
10 Groundwater is not considered to be an important source of potable water at Fort Sheridan because  
11 local ordinances prohibit its usage for drinking (SAIC, 1999). Shallow groundwater has been  
12 contaminated as a result of historic site operations, but there is uncertainty as to whether any training in  
13 the trenches led to this contamination (see **Section 4.2.1**).

14 **5.1.3.7 Demographics/Zoning**

15 Fort Sheridan is located in Lake County, Illinois approximately 30 miles north of Chicago, Illinois, and 18  
16 miles south of the Wisconsin state line along the southwestern shore of Lake Michigan. The post is  
17 bordered by the City of Highwood to the west, Highland Park to the south and Lake Forest to the  
18 north. Highwood, population 4,143, lies immediately adjacent to the southwest corner of the Post. The  
19 urban center encompasses 0.6 square miles. Highland Park, population 31,365, covers 12.5 square miles  
20 and the city of Lake Forest, population 20,059, covers 17.1 square miles. These cities are relatively small  
21 and are comprised of mostly residential housing with some small shops and restaurants  
22 ([www.census.gov](http://www.census.gov); SAIC, 2002).

23 **5.1.4 Ecological Profile**

24 **5.1.4.1 Habitat Type**

25 Fort Sheridan lies within the Eastern Broadleaf Forest Province dominated by oak-hickory forests. The  
26 natural habitat areas that historically covered Fort Sheridan have slowly been replaced, as much of the  
27 installation was in use for more than a century. Much of the land has been used for barracks, officers'  
28 housing, administration buildings, stables, a hospital, a golf course, a cemetery, various weapons ranges,  
29 and an airfield. The natural areas are now primarily in the remaining ravines and some areas of the bluff  
30 and beach. The rest of the facility is of the suburban habitat type characterized by lawns among  
31 buildings and parking lots. Mature shade trees are in many of the open areas with the greatest number  
32 within the golf course. The northern portion of Fort Sheridan is bordered by the Lake County Forest  
33 Preserve.

1 Four wetlands have been identified at Fort Sheridan by the US Fish and Wildlife Service. Three of the  
2 wetlands are lacustrine and they occupy approximately 10 acres along the shore of Lake Michigan. Two  
3 of them are on the beach within the DoD OU extending south from Bartlett Ravine toward the Boles  
4 Loop drain. The third lacustrine wetland consists of the beach area located approximately between the  
5 former Wells Ravine and Shenck Ravine. The fourth wetland is a recreational fishing pond. It is  
6 approximately 1 acre in size, is classified as a palustrine wetland, and is located in the northeast corner  
7 of the installation far from the MRSs (SAIC, 2002). See **Figure 2-8** for the locations of the ravines.

#### 8 **5.1.4.2 Degree of Disturbance**

9 The current degree of disturbance at the Trench Warfare Range MRS is moderate. The trenches have  
10 not been used for training since WWI and operations at Landfill 5 ended in the 1960s. The western  
11 extension of Van Horne Ravine (the portion to the west of Patten Road) is believed to have been filled  
12 in between 1941 and 1943. Any current disturbance is the result of installation of a landfill cap at  
13 Landfill 5 and regular maintenance activities (e.g., mowing). The future use of the property is undecided.

#### 14 **5.1.4.3 Ecological Receptors**

15 There are a number of threatened and endangered plants that live within unique habitats on Fort  
16 Sheridan. The ravine system supports a prairie-like habitat which supports 118 plant species with 6  
17 state threatened species and 6 state endangered species (USACE, 1999; ERD, 1989; SAIC, 1996; Plants  
18 Database, 2004). No federally endangered or threatened plant species are present. Additionally, some  
19 migratory birds that pass through the area have federal status. The federally endangered Peregrine  
20 Falcon (*Falco peregrinus*), the piping plover (*Charadrius melodus*), the common tern (*Sterna hirundo*), and a  
21 threatened species, the Veery (*Catharus fuscenscens*), have been spotted on Fort Sheridan during  
22 migratory periods of fall and spring (SAIC, 2002a; SAIC 1999).

23  
24 The predominantly suburban habitat at Fort Sheridan supports suburban wildlife species. The habitat is  
25 enhanced by the wooded ravines, the bluff, and beach areas. The adjacent nature preserve also  
26 enhances the Fort Sheridan habitat. Common birds include the American Robin (*Turdus migratorius*),  
27 house sparrow (*Passer domesticus*), and starling (*Sturnus vulgaris*). The most common mammals are the  
28 gray squirrel (*Sciurus carolinensis*) and raccoon (*Procyon lotor*). Mown lawns may limit normal populations  
29 of various mammals such as deer mouse (*Peromyscus maniculatus*), meadow vole (*Microtus pennsylvanicus*),  
30 and the short tailed shrew (*Blarina brevicauda*) (SAIC, 2002a; SAIC, 1999).

31  
32 There is only minimal vegetative cover located at the Trench Warfare Range MRS, none of which  
33 includes the state listed rare plant species or those on the watch list. As such, these are not considered

1 to be potential receptors. While fencing on part of the site may limit access to some mammals, it would  
2 not preclude entry by birds or possibly burrowing animals. Consequently, these groups would  
3 represent the mostly likely target receptors at the Trench Warfare Range MRS.

#### 4 **5.1.5 Munitions/Release Profile**

##### 5 **5.1.5.1 Types of Munitions and Release Mechanisms**

6 The trenches were used for training beginning in 1917. The documentation of the training indicates  
7 signal flares, rockets, trench mortars firing aerial bombs, star shells, "Bengal" lights, and rifles were used  
8 by the soldiers (Adams, 1920). Interviews conducted with site personnel during e<sup>2</sup>M's site visit to Fort  
9 Sheridan also confirmed that no MEC was found during the heavy construction around the Trench  
10 Warfare Range MRS located on the USARC property. The 1996 ASR, however, indicates there may be  
11 OE residue (munitions debris) within the area in and around Van Horne Ravine (see **Section 2.2** of this  
12 report for more detail). The OE Sampling and Removal Action performed by HFA in 1996 revealed  
13 MEC at the Trench Warfare Range MRS. Three inch Stokes mortars, a Stokes fuze, and a 37mm  
14 projectile fuze (live) were all found in the area. The mortars were inert and all items were BIP in April  
15 1997.

16  
17 Because historical records indicate the trenches were used for training and MEC has been confirmed at  
18 the MRS, it is possible MC is present at the MRS.

##### 19 **5.1.5.2 Maximum Probable Penetration Depth**

20 The maximum probable penetration depth at the Trench Warfare Range MRS is unknown. The  
21 trenches are believed to have been at least six feet deep. After they were filled in, construction took  
22 place over the top of them, raising the land surface. Mike Dace with the USACE, St. Louis District  
23 believes that the bottom of the former trenches may be as deep as 20 feet bgs. The investigations of  
24 Landfill 5 have documented the waste ranges from 3 feet to 34 feet thick (SAIC, 2002).

##### 25 **5.1.5.3 MEC Density**

26 The density of MEC at the Trench Warfare Range MRS is unknown. Some electromagnetic (EM)  
27 geophysical surveying was performed at Landfill 5, but no conclusions were made about the presence or  
28 absence of MEC. Anomalies detected in the area were attributed to overhead and buried utilities,  
29 fences, and vehicles in the parking area. It is believed that any OE (MEC) buried in the trenches would  
30 be beyond detection capability because of the depth of potential burial (USACE, 1996). The ASR  
31 *Findings* states a "serious potential exists for these types of munitions to be found in the areas around  
32 the trench system" (USACE, 1996). However, the ASR *Conclusions and Recommendations* goes on to say  
33 "We do not recommend sampling the remainder of the trench system area" in regards to the area

1 located on the USARC Property. "Extensive construction over this area would have uncovered any OE  
2 near the surface. We have found no evidence that OE was uncovered during this construction" (USACE,  
3 1996).

4  
5 The OE Sampling and Removal Action performed by HFA in 1996 revealed MEC and inert munitions  
6 (munitions debris) at the Trench Warfare Range MRS in three separate survey areas.

#### 7 **5.1.5.4 Munitions Debris**

8 MEC has been found at the site. The actual extent or presence of munitions debris is not fully  
9 understood.

#### 10 **5.1.5.5 Associated Munitions Constituents (MC)**

11 MEC has been found at the site.

12  
13 Activities conducted in the area around the trenches have led to the contamination of the groundwater  
14 with explosives and metals. Among the explosives detected, 1,3,5-trinitrobenzene, 1,3-dinitrobenzene,  
15 and the breakdown product 4-amino-2,6-dinitrotoluene were detected in well B122MW01 located  
16 between Buildings 122 and 145 in the footprint of the Trench Warfare Range MRS (see **Figures 2-5**  
17 **and 4-2**). Site activities conducted at the area around the former trenches have also impacted the  
18 surface and subsurface soil. "Metals concentrations that exceed background in surface soil on and  
19 surrounding Landfill 5 were detected (SAIC, 1999)" within the Trench Warfare Range MRS footprint.  
20 Surface soil samples collected among Buildings 122, 145, and 149 (see **Figures 2-5 and 4-2**) had lead  
21 levels ranging from 85.3 to 1,400 micrograms per gram (ug/g). The subsurface soil (18 ug/g) and the till  
22 underlying the waste (14 ug/g to 141 ug/g) at Landfill 5 had lead concentrations exceeding background  
23 (SAIC, 1999). See Section 4.2.1 of this report for more detailed sample results.

24  
25 See **Section 4.2.1** for a description of the metals analysis conducted by HFA after the OE Removal &  
26 Sampling Action. Metals detected exceeded Fort Sheridan UTLs, but only arsenic exceeded IEPA Tier I  
27 residential remediation objectives.

#### 28 **5.1.5.6 Transport Mechanisms/Migration Routes**

29 The transport of MEC and MC will largely depend on the type(s) of release mechanisms that take place  
30 at a particular site; that is, the release mechanism will determine the potential source areas (i.e., where  
31 the items are physically located in the environment) and possibly their physical state. The suspected  
32 release mechanisms identified at the Trench Warfare Range MRS for MEC and MC, alike, are as follows:  
33 firing of munitions, dropping of munitions, mishandling/loss, abandonment of munitions, munitions

1 contaminated materials, and buried munitions. Based on these release mechanisms, MEC are likely to be  
2 buried in the subsurface soils; and MC and may be detected in surface or subsurface soils, sediments,  
3 groundwater, and surface water. MEC has been found at the site. There is also concern for MC from  
4 propellants used in firing the munitions. Having identified these source areas, the likely transport  
5 mechanisms would include the following:

6 Surface Soil

- 7 • handling/re-distribution by human or ecological elements
- 8 • surface water run-on and/or run-off

9 Subsurface Soil

- 10 • soil disturbance via excavation or intrusive soil sampling
- 11 • ecological elements (e.g., nesting/burrowing animals)

12 Migration routes would include the following:

13 Surface Soil

- 14 • surface soil to subsurface soil, surface water, and/or sediment
- 15 • surface soil to groundwater

16 Subsurface Soil

- 17 • subsurface soil to surface soil (via ecological element)
- 18 • subsurface soil to groundwater

19 Groundwater

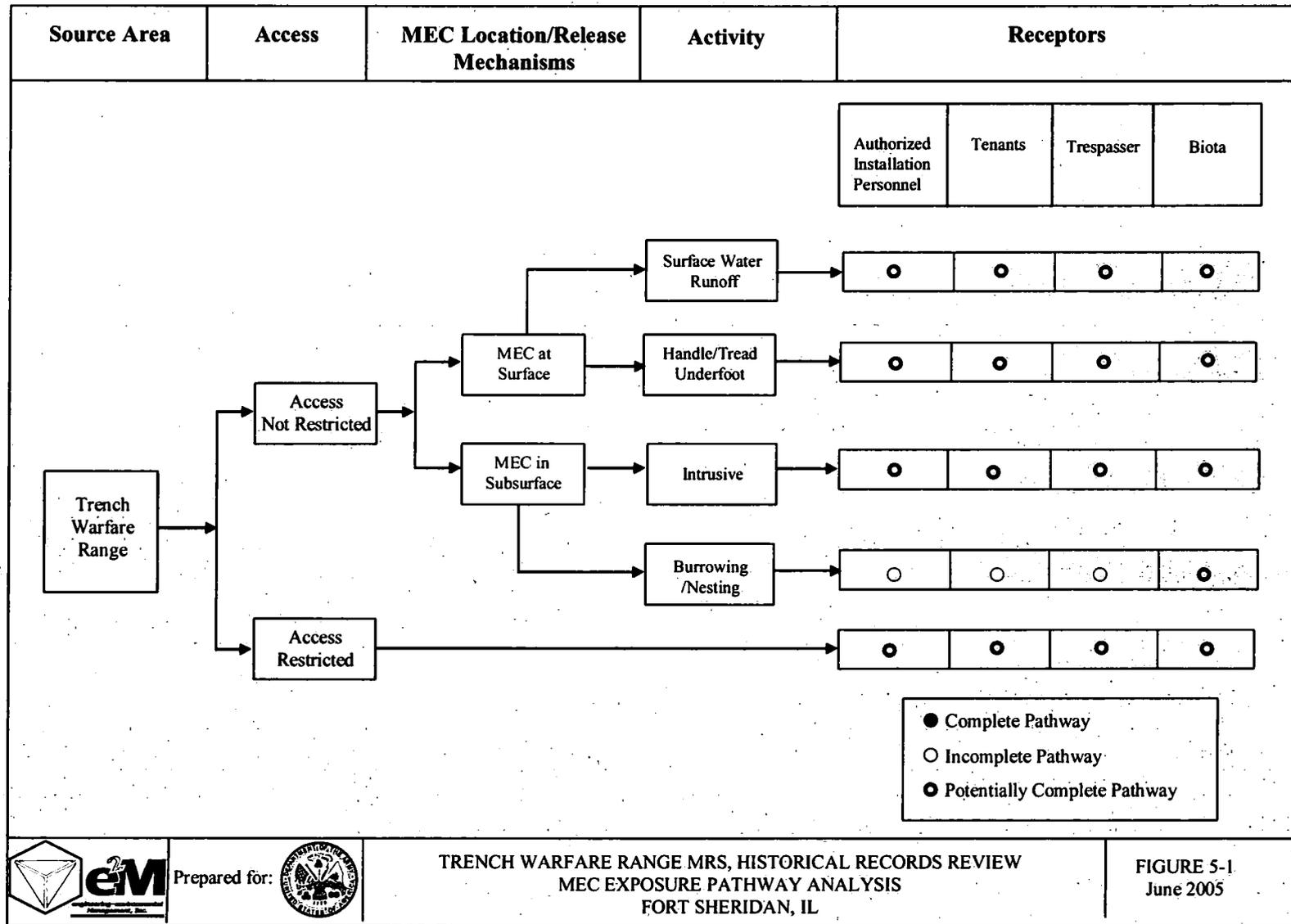
- 20 • groundwater discharge to surface water (Lake Michigan)

21 **5.1.6 Pathway Analysis**

22 **5.1.6.1 MEC**

23 Activities at the Trench Warfare Range MRS were discontinued after WWI. Access to the site is  
24 currently limited by the presence of partial fencing around the site, but in the areas without fencing,  
25 anyone is allowed access to the site. MEC are potentially present in the subsurface soils. Potential  
26 points of exposure include the handling of or treading on MEC and excavation. Based on these factors,  
27 a potentially complete exposure pathway for human receptors (i.e., recreational users) would exist in  
28 the event of the disturbance (e.g., excavation) of subsurface soils. A potentially complete subsurface  
29 pathway may exist for ecological receptors that may nest or burrow at the site and come into contact  
30 with MEC. The potential exposure pathways are depicted in the flow chart provided in **Figure 5-1**.

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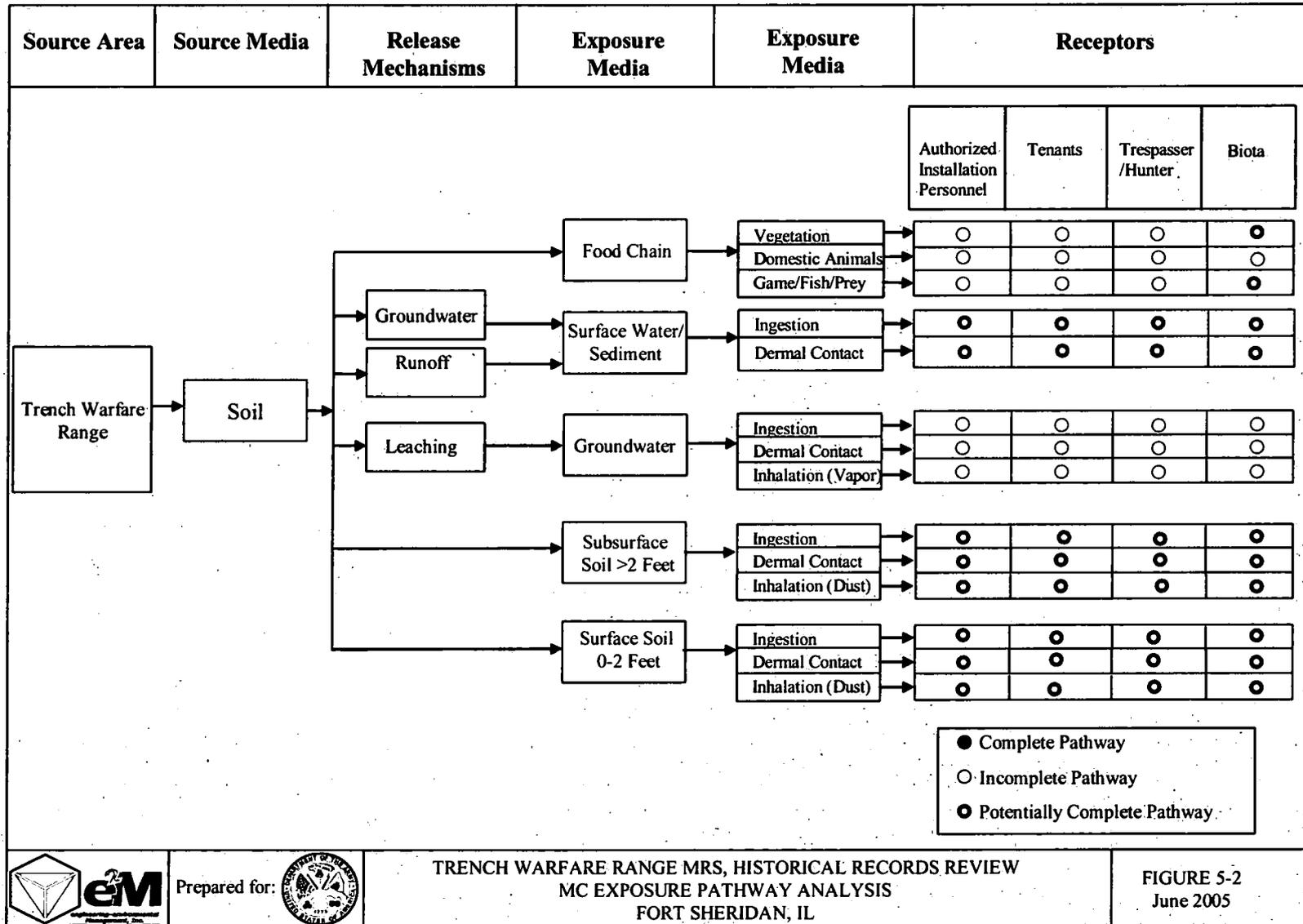
TRENCH WARFARE RANGE MRS, HISTORICAL RECORDS REVIEW  
MEC EXPOSURE PATHWAY ANALYSIS  
FORT SHERIDAN, IL

FIGURE 5-1  
June 2005

1 **5.1.6.2 MC**

2 MC may be encountered in surface soil, subsurface soil, sediment, groundwater, or surface water. High  
3 levels of lead and some explosives have been detected in the soil and groundwater in Landfill 5 and the  
4 former Trench Warfare Range MRS area. Based on these factors, a potentially complete exposure  
5 pathway for human receptors would exist in the event of a chance encounter with exposed MC on the  
6 surface and/or during the disturbance (e.g., excavation) of subsurface soils. A potentially complete  
7 subsurface pathway may exist for ecological receptors that may nest or burrow at the site and come  
8 into contact with MC. The potential exposure pathways are depicted in the flow chart provided in  
9 **Figure 5-2.**

10  
11



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TRENCH WARFARE RANGE MRS, HISTORICAL RECORDS REVIEW  
MC EXPOSURE PATHWAY ANALYSIS  
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FIGURE 5-2  
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## 5.2 AAA Complex MRA

### 5.2.1 MRA Profile

The AAA Firing Points "A" and "B" make up just over 13.7 acres of land. The sites are located in the southeastern portion of Fort Sheridan close to the beach of Lake Michigan. Firing Point "A" is further south than Firing Point "B". Firing Point "A" is adjacent to the NCO Family Housing Area. Firing Point "B" is partially covered with roads and buildings. A site walk of the area was conducted by Malcolm Pirnie on March 19, 2003. It was noted that there were no physical indications of where the firing points had been located. Neither the beach nor the Firing Points "A" and "B" showed any evidence of MEC. The southern Small Arms Range, Pistol Range, and Machine Gun Range overlap with Firing Point "A" and cover approximately one acre. The detailed layout of the MRA is presented in **Figures 2-4, and 2-6.**

#### 5.2.1.1 Structures

The structures at the AAA Firing Points include the NCO Housing Area at Firing Point "A" and the Small Arms Ranges. Buildings 384, 388, and 389 overlap with Firing Point "B" (see **Figure 2-5**). These buildings were used for storage.

#### 5.2.1.2 Utilities

Utilities located within the confines of the AAA Complex MRA are unconfirmed, but due to the presence of military family housing in the area, it is likely utilities exist.

#### 5.2.1.3 Boundaries

The AAA Firing Points are bordered to the north and south by open land, to the east by Lake Michigan and to the west by various buildings. The southern Small Arms, Pistol, and Machine Gun Ranges formerly located in the NCO Housing Area are bordered by Landfill 7 to the north, Shenck Ravine to the south, Lake Michigan to the east, and more housing to the west.

#### 5.2.1.4 Security

Fort Sheridan is surrounded by a perimeter fence. The Fort is patrolled regularly by Great Lakes Security. Access to the installation is gained by passing through an unguarded entrance. Anyone can access the installation. Once on site, individual movement is not restricted. Since Firing Point "A" and the Small Arms Ranges are located adjacent to the NCO Housing Area, residents and recreational users can access the sites. The 1996 ASR indicates that a fence surrounds Firing Point "B".

1 **5.2.2 Physical Profile**

2 The general physical profile (i.e., climate, topography, geology, soil, hydrogeology, hydrology, and  
3 vegetation) of the AAA Complex MRA is analogous to the conditions described for the installation and  
4 at the Trench Warfare Range MRS. Descriptions of each profile can be found in **Sections 5.1.2.1**  
5 through **5.1.2.7**.

6 **5.2.3 Land Use and Exposure Profile**

7 The general land use and exposure profiles (i.e., current land use, current human receptors, potential  
8 future land use, potential future human receptors, zoning/land use restrictions, beneficial resources, and  
9 demographics/zoning) at the AAA Complex MRA are in general similar to the conditions found at the  
10 Trench Warfare Range MRS and throughout Fort Sheridan. Since the western edge of the AAA Firing  
11 Point "A" and the Small Arms Ranges border the NCO Family Housing Area, there is the potential for  
12 residents to access the sites. Descriptions of each profile can be found in **Sections 5.1.3.1** through  
13 **5.1.3.7**.

14 **5.2.4 Ecological Profile**

15 The general ecological profile (habitat type, degree of disturbance, and ecological receptors) at the AAA  
16 Complex MRA is analogous to the conditions throughout Fort Sheridan. Descriptions of each profile  
17 can be found in **Section 5.1.4**. Regarding the degree of disturbance at the AAA Complex MRA,  
18 housing units were built adjacent to Firing Point "A" and the southern Small Arms Ranges sometime  
19 after 1950. Buildings and roads were constructed on top of Firing Point "B" sometime after 1950.

20 **5.2.5 Munitions/Release Profile**

21 **5.2.5.1 Types of Munitions and Release Mechanisms**

22 For a brief history of the AAA Firing Points at Fort Sheridan, refer to **Section 4.2.2**. Various gun  
23 battalions (semi-mobile) and automatic weapons battalions (semi-mobile) were stationed at Fort  
24 Sheridan between 1930 and 1944. **Table 5-1** shows the "Typical Anti-Aircraft Artillery Battalions" and  
25 is taken from the 1996 ASR.

1 **Table 5-1: Typical AAA Battalions**

	Gun (Semi-mobile)	Automatic Weapons (Semi-mobile)
40mm AA Gun	0	32
90mm AA Gun	16	0
Multi-Carriage .50 Cal MG	16	32
.50 Cal MG HB	14	5
Rocket Launcher 2.36 AT	8	32

2 (AA=Anti-Aircraft; MG=Machine Gun; HB=Heavy Barrel; AT=Anti-Tank.)

3  
4 Anti-Aircraft guns were being phased out in favor of guided missiles in the mid 1950's.  
5 Release mechanisms at the site include mishandling/loss, abandonment, burial, firing and dropping.

6  
7 Only small arms (less than 0.50 caliber) were used at the southern Small Arms, Pistol, and Machine Gun  
8 Ranges. Release mechanisms include mishandling/loss, abandonment, burial, firing and dropping.

9  
10 **5.2.5.2 Maximum Probable Penetration Depth**

11 The firing points were located along the top of the bluff of Lake Michigan (Ceres, 2004). The maximum  
12 probable penetration depth at the AAA firing points "A" and "B" is unknown.

13  
14 The maximum probable penetration depth at the southern Small Arms Ranges is unknown.

15 **5.2.5.3 MEC Density**

16 The density of MEC at the AAA Complex MRA is unknown. The 1996 OE Removal & Sampling Action  
17 conducted by HFA in 1996 included surveys at the AAA Complex MRA, but there were no discoveries  
18 of MEC. However, the live 37mm fuze found in grid 6E6 at the Trench Warfare Range MRS is possibly a  
19 result of activity at AAA Firing Point "B". The 1996 ASR states that there is a moderate potential for  
20 "OE remaining at these sites...and is based on the likelihood that some misfired munitions and ordnance  
21 residue not consumed in a specific firing exercise may have been improperly disposed at the site"  
22 (USACE, 1996). The 1996 ASR also indicates that a 105mm cartridge case has been found in the area.

23  
24 MEC is not a concern at the southern Small Arms, Pistol, and Machine Gun Ranges because only small  
25 arms were used at the sites.

1 **5.2.5.4 Munitions Debris**

2 With the exception of the 105mm cartridge case, visual observations indicate no munitions debris is  
3 visible at the AAA Complex MRA.

4  
5 During a site inspection conducted by USACE in October 1995 at the southern Small Arms, Pistol, and  
6 Machine Gun Ranges, there was no evidence found at the sites of OE (MEC).

7 **5.2.5.5 Associated Munitions Constituents**

8 The MC associated with the AAA Complex MRA includes metals (lead is likely), explosives, and  
9 propellants. The projectiles used at the site consisted primarily of machined iron or steel casings and  
10 contained explosive fillers. Explosive fillers for the sizes of ordnance used at the site include tetryl, Tri-  
11 Nitro-Toluene (TNT), black powder, or 50/50 ammonium nitrate and TNT. "Small amounts of brass,  
12 aluminum or zinc-lead alloy may have been used in the fuses of these projectiles" (Harding ESE, 2001).  
13 High explosives were possibly used with the 2.36-Inch Anti-Tank Rocket Launcher.

14  
15 Groundwater beneath and surrounding Landfill 7 contained many metals exceeding background  
16 concentrations, including aluminum, iron, lead, and zinc. Aluminum, lead, and zinc were also detected  
17 above background concentrations in surface soil and the underlying till at Landfill 7. Iron also exceeded  
18 background in the underlying till. Iron, lead, and zinc also exceeded background in beach sediments  
19 (SAIC, 1999).

20  
21 At the southern Small Arms Ranges, there is the potential for lead contamination at these sites  
22 associated with the small arms ammunition. Also, there is the potential for MC from propellants  
23 (USEPA, 2003).

24 **5.2.5.6 Transport Mechanisms/Migration Routes**

25 The transport of MEC and MC will largely depend on the type(s) of release mechanisms that take place  
26 at a particular site; that is, the release mechanism will determine the potential source areas (i.e., where  
27 the items are physically located in the environment) and possibly their physical state. The release  
28 mechanisms identified at the AAA Complex MRA for MEC and MC, alike, are as follows:  
29 mishandling/loss, abandonment, burial, firing and dropping. Based on these release mechanisms, MEC  
30 are likely to be found in surface soil and buried in the subsurface soils; and MC and may be detected in  
31 surface or subsurface soils, sediments, groundwater, and surface water. Having identified these source  
32 areas, the likely transport mechanisms at the AAA Complex MRA would include the following:

- 1 Surface Soil
- 2     • handling/re-distribution by human or ecological elements
- 3     • surface water run-on and/or run-off
- 4 Subsurface Soil
- 5     • soil disturbance via excavation or intrusive soil sampling
- 6     • ecological elements (e.g., nesting/burrowing animals)
- 7 Migration routes would include the following:
- 8 Surface Soil
- 9     • surface soil to subsurface soil, surface water, and/or sediment
- 10    • surface soil to groundwater
- 11 Subsurface Soil
- 12    • subsurface soil to surface soil (via ecological element)
- 13    • subsurface soil to groundwater
- 14 Groundwater
- 15    • groundwater discharge to surface water (Lake Michigan)

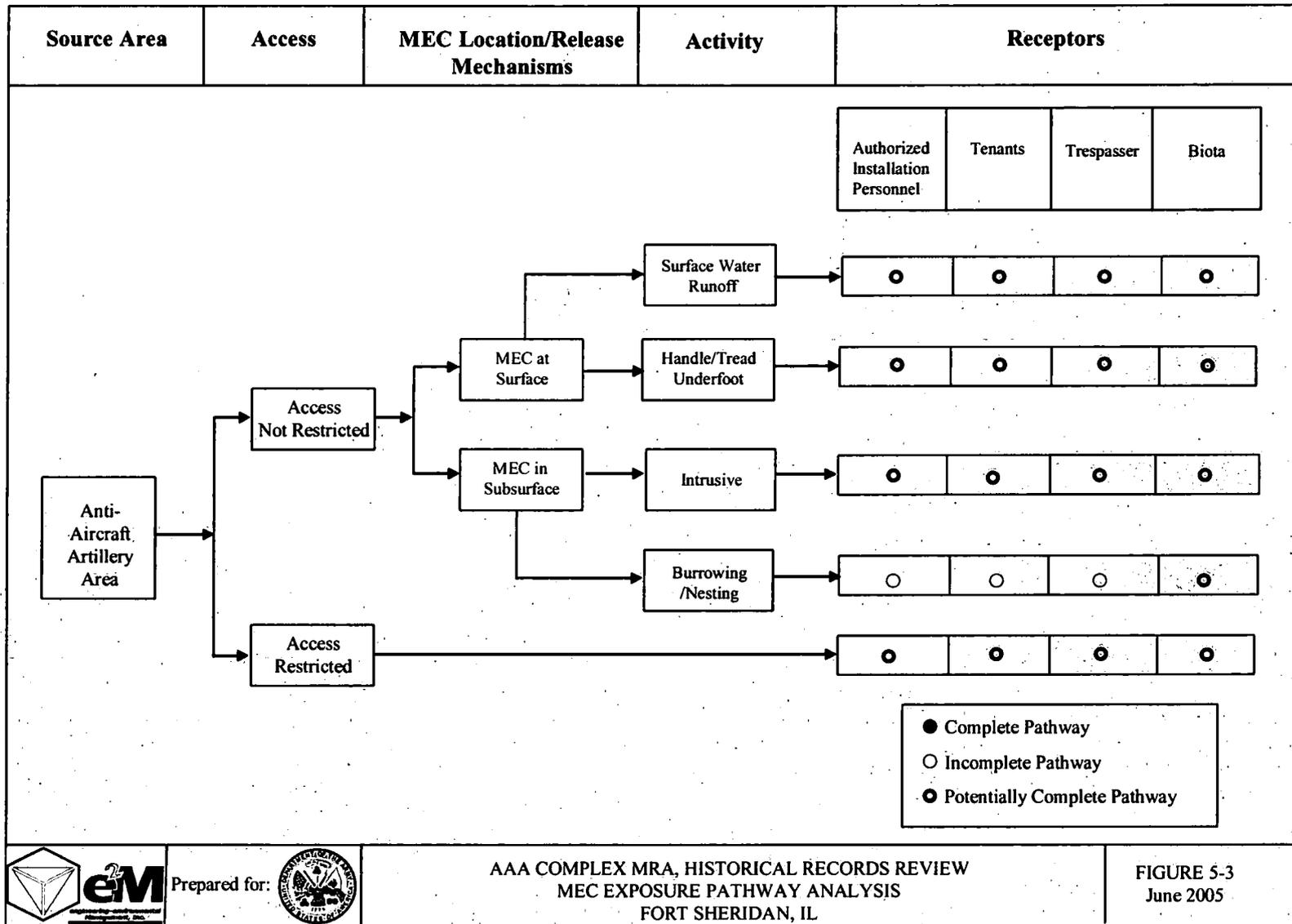
1 **5.2.6 Pathway Analysis**

2 **5.2.6.1 MEC**

3 Activities at the AAA Complex MRA were discontinued around 1950. Firing Point "A" is easily  
4 accessible because of its proximity to the housing area. Access to Firing Point "B" is currently limited by  
5 a security fence and only authorized personnel are allowed access to the site. The ASR expresses  
6 concern regarding the potential for buried OE (MEC) at the site to become a hazard to the public  
7 because of the close proximity to a housing area. USACE more specifically states that "there is a high  
8 likelihood of unsupervised digging by children in this area..." (USACE, 1996). MEC are potentially  
9 present in the surface and subsurface soils. Potential points of exposure include the handling of or  
10 treading on MEC. Based on these factors, a potentially complete exposure pathway for human  
11 receptors would exist in the event of a chance encounter with exposed MEC on the surface and/or  
12 during the disturbance (e.g., excavation) of subsurface soils. A potentially complete subsurface pathway  
13 may exist for ecological receptors that may nest or burrow at the site and come into contact with MEC.  
14 The potential exposure pathways are depicted in the flow chart provided in **Figure 5-3**.

15  
16 MEC is not a concern at the southern Small Arms, Pistol, and Machine Gun Ranges because only small  
17 arms were used at the sites; however, since these MRSs are combined with the Firing Point MRSs into  
18 the AAA Complex MRA, the exposure pathways will still be considered as potential for the MRA as a  
19 whole. The exposure pathways are depicted in the flow chart provided in **Figure 5-3**.

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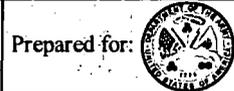
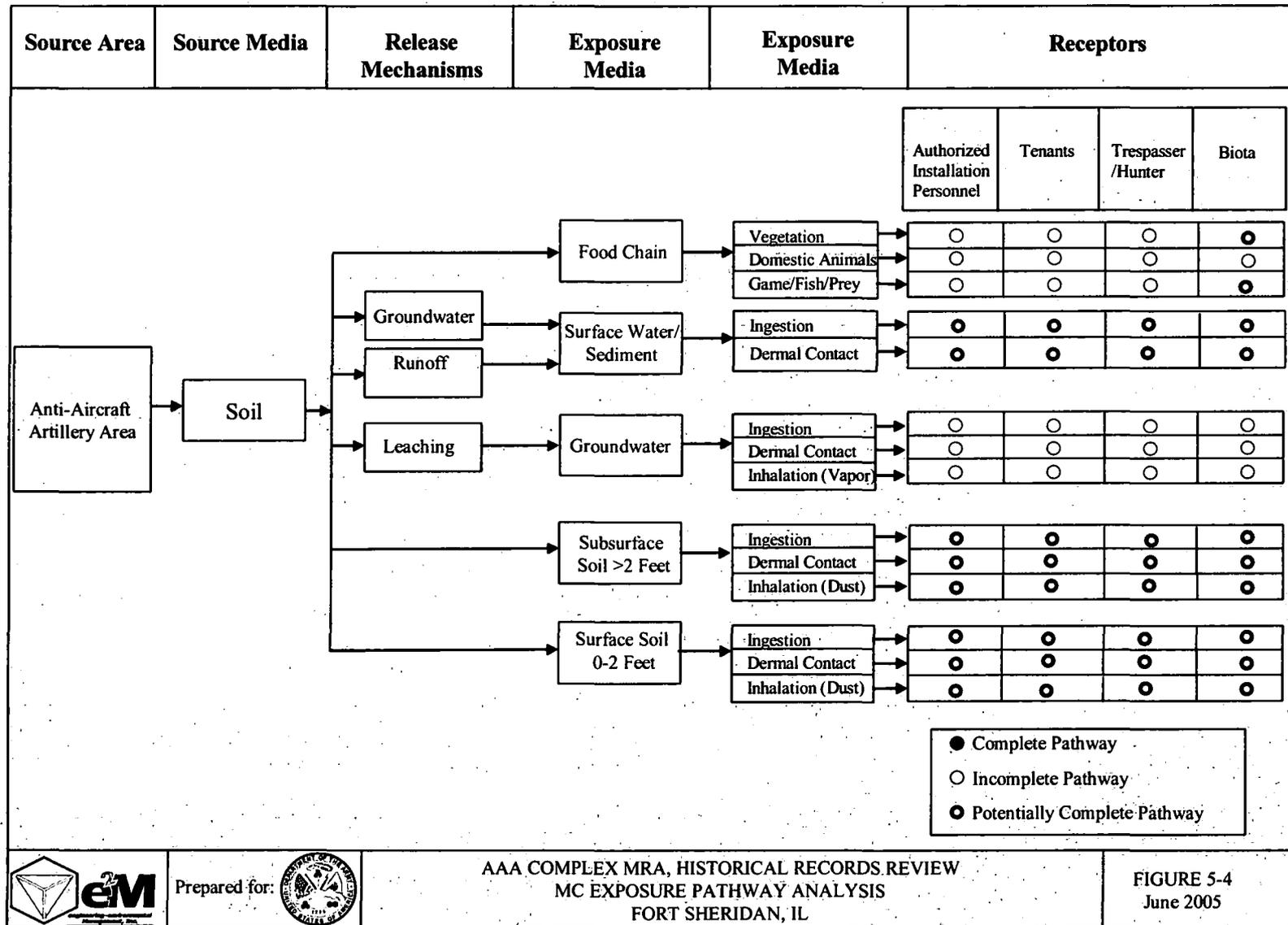


AAA COMPLEX MRA, HISTORICAL RECORDS REVIEW  
MEC EXPOSURE PATHWAY ANALYSIS  
FORT SHERIDAN, IL

FIGURE 5-3  
June 2005

1 **5.2.6.2 MC**

2 At the AAA Complex MRA, MC may be encountered in surface soil, subsurface soil, sediment,  
3 groundwater, or surface water. Based on these factors, a potentially complete exposure pathway for  
4 human receptors would exist in the event of a chance encounter with exposed MC on the surface  
5 and/or during the disturbance (e.g., excavation) of subsurface soils. A potentially complete subsurface  
6 pathway may exist for ecological receptors that may nest or burrow at the site and come into contact  
7 with MC. The potential exposure pathways are depicted in the flow chart provided in **Figure 5-4**.



AAA COMPLEX MRA, HISTORICAL RECORDS REVIEW  
MC EXPOSURE PATHWAY ANALYSIS  
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FIGURE 5-4  
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1 **5.3 AAA Complex- Transferred MRS**

2 **5.3.1 MRS Profile**

3 The AAA Complex- Transferred MRS makes up just over 198,255 acres. As stated in **Section 4.2.3**,  
4 there is the potential for rounds to have been fired up to 15.4 miles offshore. The detailed layout of the  
5 site is presented in **Figure 2-3** and the range fans are depicted in **Figure 2-9**.

6 **5.3.1.1 Structures**

7 Because the firing fans are over water, there are no structures at the MRS.

8 **5.3.1.2 Utilities**

9 Utilities located within the confines of the AAA Complex -Transferred MRS are unknown.

10 **5.3.1.3 Boundaries**

11 The AAA Complex – Transferred MRS is bordered to the north, south, and east by open water and to  
12 the west by the beach along Lake Michigan and Fort Sheridan.

13 **5.3.1.4 Security**

14 Access to Lake Michigan from Fort Sheridan is prohibited; however, boating, fishing, and swimming  
15 access to the lake is available immediately north and south of Fort Sheridan.

16 **5.3.2 Physical Profile**

17 **5.3.2.1 Climate**

18 The climate at the AAA Complex – Transferred MRS is analogous to the conditions described for the  
19 installation and at the Trench Warfare Range MRS and can be found in **Section 5.3.2.1**; however, Lake  
20 Michigan may have its own micro-climate.

21 **5.3.2.2 Geology**

22 Fort Sheridan is located on the southwestern shore of Lake Michigan and the AAA Complex –  
23 Transferred MRS is an over-water range extending over Lake Michigan. This portion of Lake Michigan is  
24 the largest and deepest basin of the lake (Chippewa Basin). The basin extends north from the southern  
25 shore to the mid-lake plateau. It is so named because it is the main site of the former Lake Chippewa.  
26 Depths in excess of 275 meters, the deepest of Lake Michigan, are reached near the southern end of  
27 this basin, where a large segment of the floor of Lake Michigan extends below sea level. Bedrock  
28 geology of the Chippewa Basin probably consists of a dip slope of resistant Silurian dolomites forming  
29 the western boundary, with the deeper eastern two-thirds of the basin having been eroded in less  
30 resistant upper Silurian redbeds. Evaporites occur within the upper Silurian section, and dissolution of  
31 these evaporites may have contributed to the collapse and stripping away of the overlying Devonian

1 strata. North-south trending ridges on the floor of the basin may coincide with erosional remnants of  
2 moderately resistant strata within the upper Silurian section. Escarpments forming the eastern  
3 boundary of the Chippewa Basin probably are underlain by the eroded edges of the resistant Devonian  
4 carbonates. Whereas the main Chippewa Basin may have been eroded in less resistant upper Silurian  
5 strata, the smaller South Chippewa was probably eroded mostly in upper Devonian shales, with a dip  
6 slope on the west formed partly on more resistant middle Devonian limestones. Depths in this smaller  
7 basin do not extend below sea level (maximum depth in excess of 165 meters), but this basin was deep  
8 enough to contain lake water even during the lowest lake levels of the Chippewa lowstand (National  
9 Oceanic and Atmospheric Administration [NOAA], 2004).

### 10 **5.3.2.3 Topography**

11 Specific information on the topography of Lake Michigan within the AAA Complex – Transferred MRS  
12 was unavailable. For information regarding the general topography of the lake bottom refer to **Section**  
13 **5.1.2.2, Geology.**

### 14 **5.3.2.4 Soil**

15 Specific information on the soils of Lake Michigan bottom are unavailable. The lake bottom is typically  
16 sediments composed of sand and silt.

### 17 **5.3.2.5 Hydrogeology**

18 Information regarding the hydrogeology of Lake Michigan in the AAA Complex- Transferred MRS is  
19 unavailable; however, information regarding the hydrogeology of Fort Sheridan can be found in **Section**  
20 **5.1.2.5.**

### 21 **5.3.2.6 Hydrology**

22 Information regarding the hydrology at the AAA Complex – Transferred MRS is unavailable; however  
23 information regarding the hydrology of Fort Sheridan can be found in **Section 5.1.2.6.**

### 24 **5.3.2.7 Vegetation**

25 Several species of submerged aquatic vegetation (SAV) inhabit Lake Michigan. See below for a list of  
26 SAV species. Additionally, one aquatic invasive species is becoming a nuisance: Eurasian water milfoil  
27 (*Myriophyllum spicatum*). This invasive species is prolific and grows in thick mats in shallow areas. Mats  
28 of Eurasian water milfoil can displace native SAV species and can wrap around boat propellers. Once  
29 the SAV becomes established in a water body it is nearly impossible to eradicate the pest.

- 30 • Stonewort (*Chara spp.*)
- 31 • Duck Weed (*Lemna minor*)
- 32 • Floating-leaf Pondweed (*Potamogeton natans*)
- 33 • Large-leaf Pondweed (*Potamogeton amplifolius*)

- 1 • Claspig-leaf Pondweed (*Potamogeton richardsonii*)
- 2 • Sago Pondweed (*Potamogeton pectinatus*)
- 3 • Common Naiad (*Najas flexilis*)
- 4 • Wild Celery (*Vallisneria spiralis*)
- 5 • American Elodea (*Elodea canadensis*)
- 6 • Coontail (*Ceratophyllum demersum*)
- 7 • Bladderwort (*Utricularia* spp.)

### 8 **5.3.3 Land Use and Exposure Profile**

#### 9 **5.3.3.1 Current Land Use**

10 The current use of Lake Michigan includes boating, fishing, swimming, and general recreation.

#### 11 **5.3.3.2 Current Human Receptors**

12 Current human receptors include recreational users who can access the site.

#### 13 **5.3.3.3 Potential Future Land Use**

14 Potential future land use will most likely be the same as current land use (boating, fishing, swimming, and  
15 general recreation).

#### 16 **5.3.3.4 Potential Future Human Receptors**

17 Potential future human receptors will include recreational users of the lake.

#### 18 **5.3.3.5 Zoning/Land Use Restrictions**

19 It is unknown whether there are formal zoning or deed restrictions at the AAA Complex – Transferred  
20 MRS.

#### 21 **5.3.3.6 Beneficial Resources**

22 Four wetlands have been identified at Fort Sheridan by the US Fish and Wildlife Service (SAIC, 2002).  
23 These wetlands are predominantly along the beach of Lake Michigan. See **Section 5.1.4.1** for more  
24 detail.

25  
26 Lake Michigan supplies drinking water to Fort Sheridan and the Chicago metropolitan area.

#### 27 **5.3.3.7 Demographics/Zoning**

28 See **Section 5.1.3.7** above.

1 **5.3.4 Ecological Profile**

2 **5.3.4.1 Habitat Type**

3 The AAA Complex – Transferred MRS is an aquatic freshwater lake habitat. See **Section 5.1.4.1** for a  
4 description of wetlands associated with Fort Sheridan.

5 **5.3.4.2 Degree of Disturbance**

6 The degree of disturbance within Lake Michigan is unknown.

7 **5.3.4.3 Ecological Receptors**

8 There are a variety of ecological receptors within Lake Michigan. Species that were extirpated in some  
9 or all of the Great Lakes include lake trout, Atlantic salmon, blue pike, and several species of ciscoes.  
10 Species whose populations have dramatically declined include American eel, lake sturgeon, lake trout,  
11 lake whitefish, lake herring, coaster brook trout, deepwater sculpin, and several species of native unionid  
12 clams. Several of these species were historically used by Native American tribes for subsistence and  
13 ceremonial purposes. The chinook salmon (*Oncorhynchus tshawytscha*) population in Lake Michigan  
14 supports a highly valuable recreational fishery (USGS, 2004). The zebra mussel (*Dreissena polymorpha*) is  
15 considered a nuisance species in Lake Michigan.

16 **5.3.5 Munitions/Release Profile**

17 **5.3.5.1 Types of Munitions and Release Mechanisms**

18 For a brief history of the AAA Firing Points at Fort Sheridan, and the AAA Complex-Transferred MRS  
19 refer to **Sections 4.2.2 and 4.2.3**. Various gun battalions (semimobile) and automatic weapons  
20 battalions (semimobile) were stationed at Fort Sheridan between 1930 and 1944. In **Section 5.2.5.1**,  
21 **Table 5-1** shows the “Typical Anti-Aircraft Artillery Battalions” and is taken from the 1996 ASR.  
22

23 As stated in **Section 2.2.3**, this MRS was used by the 61st Coast Artillery as a fly-over target range for  
24 projectiles including: 37mm, 40mm, 90mm, 120mm, and Rocket Launcher 2.36 Anti-Tank (AT). Targets  
25 were usually towed over Lake Michigan (USACE, 1996).

26 **5.3.5.2 Maximum Probable Penetration Depth**

27 The maximum probable penetration depth into the sediment at the bottom of Lake Michigan is  
28 unknown.

29 **5.3.5.3 MEC Density**

30 The density of MEC at the AAA Complex -Transferred MRS is unknown. See **Section 4.2.3**.

1 **5.3.5.4 Munitions Debris**

2 See Section 4.2.3.

3 **5.3.5.5 Associated MC**

4 The MC associated with the AAA Complex – Transferred MRS include metals (lead is likely), explosives,  
5 and propellants. The projectiles used at the site consisted primarily of machined iron or steel casings  
6 and contained explosive fillers. Explosive fillers for the sizes of ordnance used at the site include tetryl,  
7 TNT, black powder, or 50/50 ammonium nitrate and TNT. “Small amounts of brass, aluminum or zinc-  
8 lead alloy may have been used in the fuses of these projectiles” (Harding ESE, 2001). High explosives  
9 were possibly used with the 2.36-Inch Anti-Tank Rocket Launcher.

10 **5.3.5.6 Transport Mechanisms/Migration Routes**

11 The transport of MEC and MC will largely depend on the type(s) of release mechanisms that take place  
12 at a particular site; that is, the release mechanism will determine the potential source areas (i.e., where  
13 the items are physically located in the environment) and possibly their physical state. The release  
14 mechanisms identified at the AAA Complex - Transferred MRS for MEC and MC, alike, are as follows:  
15 firing and dropping. Based on these release mechanisms, MEC are likely to be found in sediment; and  
16 MC and may be detected in sediments and surface water. Having identified these source areas, the  
17 likely transport mechanisms would include the following:

18 Sediment:

- 19 • Disturbance of sediment

20 Migration routes would include the following:

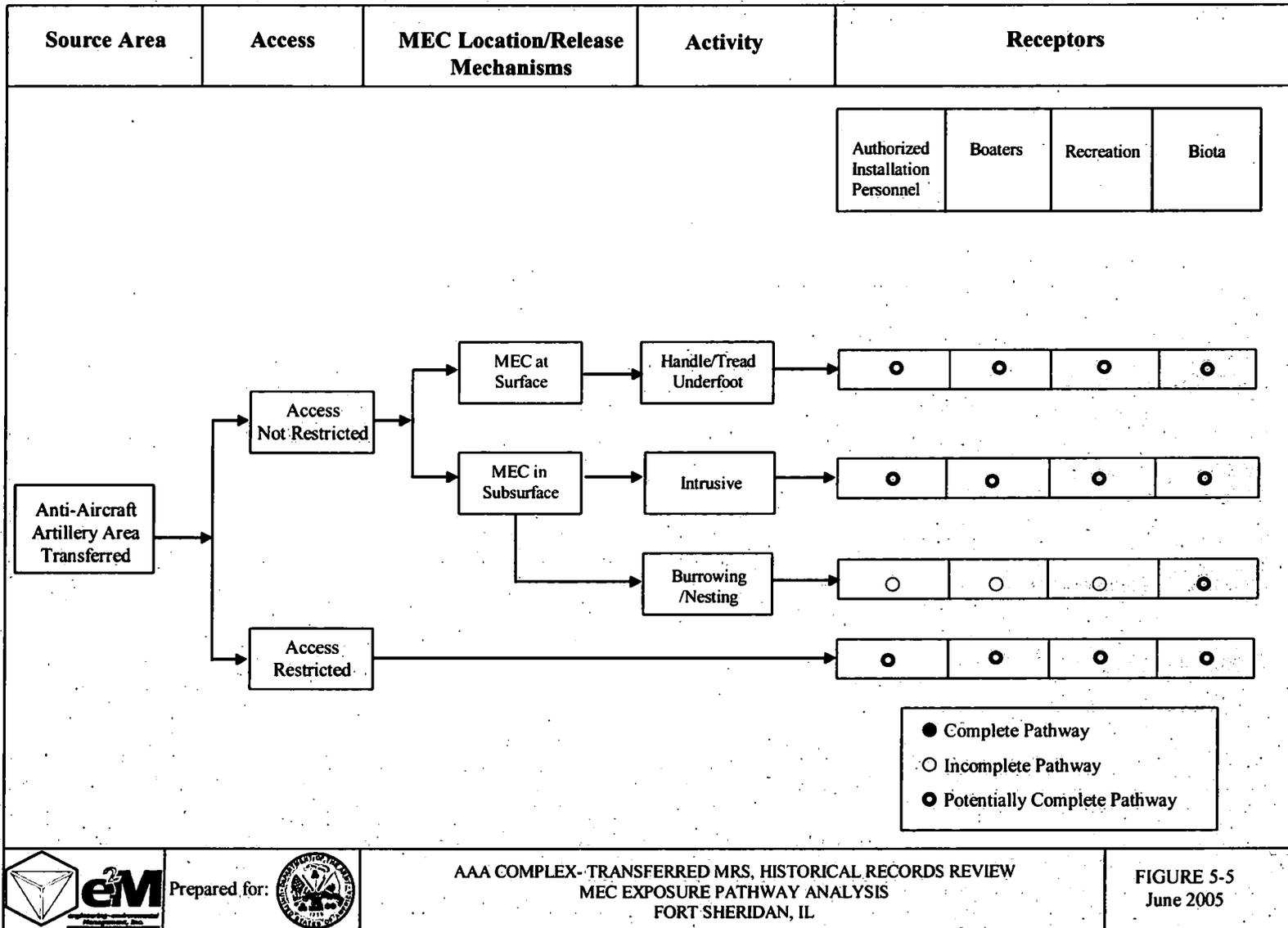
21 Sediment:

- 22 • Sediment to surface water  
23 • Sediment to groundwater

24 **5.3.6 Pathway Analysis**

25 **5.3.6.1 MEC**

26 MEC are potentially present in the sediment. Potential points of exposure include the handling of,  
27 dredging of, or treading on MEC. Based on these factors, a potentially complete exposure pathway for  
28 human receptors would exist in the event of a chance encounter with exposed MEC during the  
29 disturbance (e.g., excavation) of sediment. A potentially complete subsurface pathway may exist for  
30 ecological receptors that may nest or burrow at the site and come into contact with MEC. The  
31 potential exposure pathways are depicted in the flow chart provided in **Figure 5-5**.

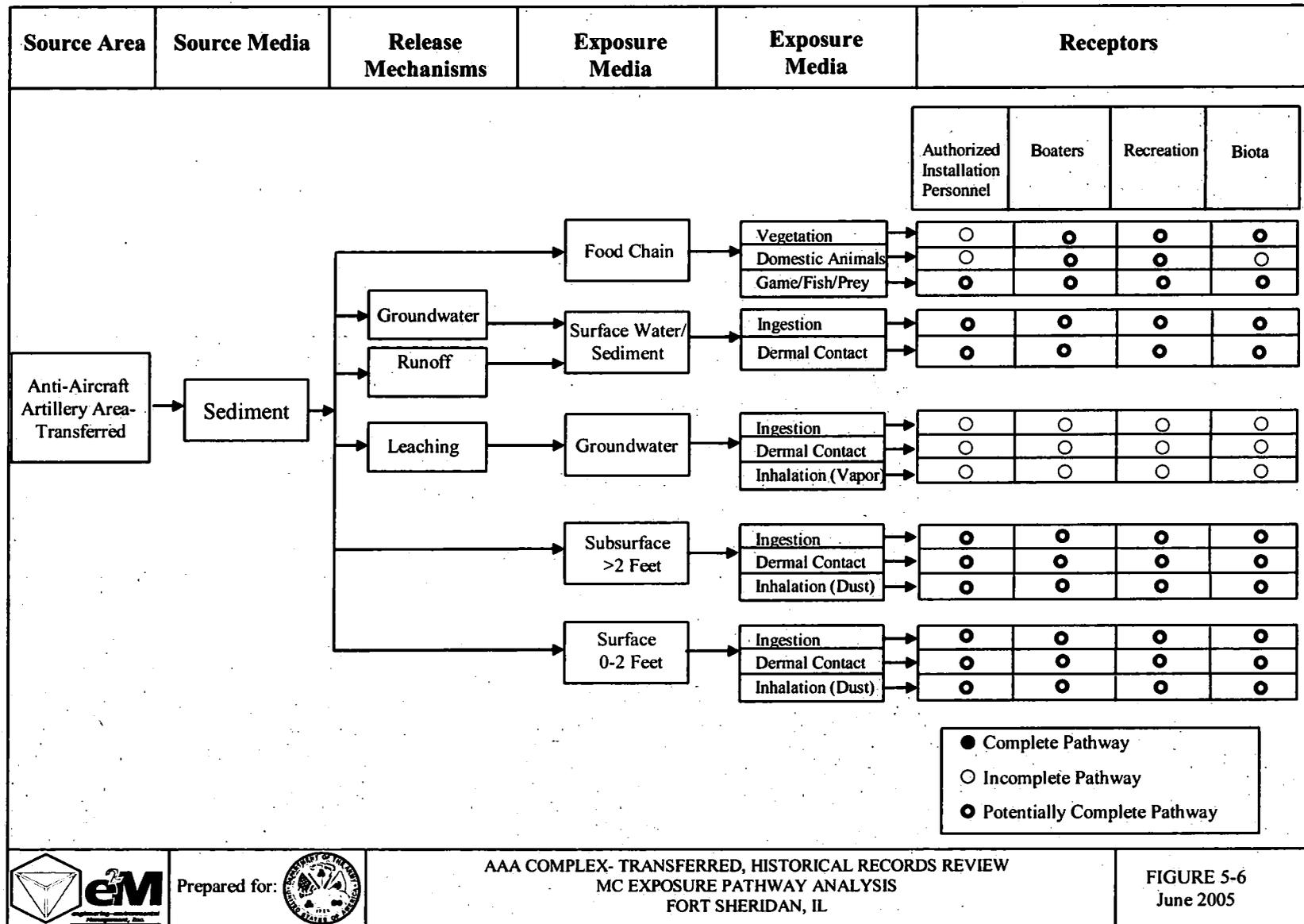


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FIGURE 5-5  
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- 1 **5.3.6.2 MC**
- 2 MC may be encountered in sediment or surface water. Based on these factors, a potentially complete
- 3 exposure pathway for human receptors would exist in the event of a chance encounter with exposed
- 4 MC in the surface water and/or during the disturbance (e.g., excavation) of sediment. A potentially
- 5 complete subsurface pathway may exist for ecological receptors that may nest or burrow at the site and
- 6 come into contact with MC. The potential exposure pathways are depicted in the flow chart provided
- 7 in **Figure 5-6**.



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FIGURE 5-6  
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## 5.4 Grenade Course MRS

### 5.4.1 MRS Profile

The Grenade Course is suspected to have been located south of Shenck Ravine in the current NCO Family Housing area. It would have covered approximately 26 acres (Malcolm Pirnie, 2003). See Figure 2-3.

#### 5.4.1.1 Structures

The structures at the Grenade Course MRS include the NCO Family Housing Area. There are approximately 42 units in the housing area and they were built directly on top of the suspected Grenade Course.

#### 5.4.1.2 Utilities

Utilities located within the confines of the Grenade Course MRS are unconfirmed, but due to the presence of military family housing in the area, it is likely utilities exist.

#### 5.4.1.3 Boundaries

The Grenade Course MRS is bordered to the north by Shenck Ravine and to the south by the installation boundary. The beach and Lake Michigan are located to the east and the US Army Reserve property is to the west.

#### 5.4.1.4 Security

Fort Sheridan is surrounded by a perimeter fence. The Fort is patrolled regularly by Great Lakes Security. Access to the installation is gained by passing through an unguarded entrance. Anyone can access the installation. Once on site, individual movement is not restricted. Since the Grenade Course MRS is located in the same location as the current NCO Housing Area, residents and recreational users can access the MRS.

### 5.4.2 Physical Profile

The general physical profile (i.e., climate, topography, geology, soil, hydrogeology, hydrology, and vegetation) of the Grenade Course MRS is analogous to the conditions described for the installation and at the Trench Warfare Range MRS. Descriptions of each profile can be found in Sections 5.1.2.1 through 5.1.2.7.

### 5.4.3 Land Use and Exposure Profile

The general land use and exposure profiles (i.e., current land use, current human receptors, potential future land use, potential future human receptors, zoning/land use restrictions, beneficial resources, and

1 demographics/zoning) at the Grenade Course MRS are in general similar to the conditions found at the  
2 Trench Warfare Range MRS and throughout Fort Sheridan. Descriptions of each profile can be found in  
3 Sections 5.1.3.1 through 5.1.3.7.

#### 4 **5.4.4 Ecological Profile**

5 The general ecological profile (habitat type, degree of disturbance, and ecological receptors) at the  
6 Grenade Course MRS is analogous to the conditions throughout Fort Sheridan. Descriptions of each  
7 profile can be found in Section 5.1.4. Regarding the degree of disturbance at the Grenade Course  
8 MRS, the NCO Housing area was built sometime after 1950.

#### 9 **5.4.5 Munitions/Release Profile**

##### 10 **5.4.5.1 Types of Munitions and Release Mechanisms**

11 Rifle and hand grenades used against fixed and moving targets are thought to have been used at the  
12 Grenade Course MRS. Release mechanisms include mishandling/loss, abandonment, burial, firing and  
13 dropping. The 1996 OE Removal & Sampling Action conducted by HFA in 1996 included surveys at the  
14 Grenade Course MRS, and a live rifle grenade was discovered. See Figure 4-1 for the location of the  
15 MEC.

##### 16 **5.4.5.2 Maximum Probable Penetration Depth**

17 The maximum probable penetration depth is unknown.

##### 18 **5.4.5.3 MEC Density**

19 The density of MEC at the Grenade Course MRS is unknown, although a live rifle grenade was  
20 discovered in 1996 by HFA (see Section 4.2.4). An area known as Excavation Area #8 overlaps with  
21 the northeastern portion of the Grenade Course MRS. An EM survey was conducted over the area  
22 during the Phase II RI because of earlier photographic evidence between 1952 and 1985 that the ground  
23 was disturbed. It was concluded that there was the potential for fill material to be present beneath the  
24 bluff and the "mapped EM-61 instrument response indicates that metallic debris is present beneath the  
25 bluff" (SAIC 2000). There were plans presented in the Phase III Technical Plan Addendum to the  
26 RI/BRA to conduct intrusive investigations on the bluff, including soil borings and samples. Metals  
27 analysis was planned for the soil samples, but it is unknown whether the sampling was conducted and  
28 what the results were.

29

30 The 1996 OE Removal & Sampling Action conducted by HFA in 1996 included surveys at the Grenade  
31 Course, and a live rifle grenade was discovered. See Section 4.2.4 for descriptions of previous EOD  
32 responses at the site.

1 **5.4.5.4 Associated MC**

2 The MC associated with the Grenade Course MRS may potentially include TNT, RDX, and  
3 Pentaerythrite Tetranitrate (PETN). These explosives were typically used in grenades after WWI and  
4 during WWII.

5  
6 Investigations of Shenck Ravine (which formed the northern boundary of the Grenade Course)  
7 conducted during the RI/BRA for Fort Sheridan revealed lead levels that exceeded background in both  
8 surface water and ravine sediments. The EBS conducted in 2004 indicates that the chemical constituents  
9 in Shenck Ravine do not pose a significant risk to human health or the environment. Because of this, the  
10 DoD, USEPA, and IEPA have determined that no action is necessary at this site.

11  
12 See **Section 4.2.4** for a description of the metals analysis conducted by HFA after the OE Removal &  
13 Sampling Action. Arsenic, lead, and mercury exceeded Fort Sheridan UTLs, but only arsenic exceeded  
14 the IEPA Tier I residential remediation objective.

15 **5.4.5.5 Transport Mechanisms/Migration Routes**

16 The transport of MEC and MC will largely depend on the type(s) of release mechanisms that took place  
17 at a particular site; that is, the release mechanism will determine the potential source areas (i.e., where  
18 the items are physically located in the environment) and possibly their physical state. The release  
19 mechanisms identified at the Grenade Course MRS for MEC and MC, alike, are as follows:  
20 mishandling/loss, abandonment, burial, firing and dropping. Based on these release mechanisms, MEC  
21 are likely to be found in surface soil and buried in the subsurface soils; and MC and may be detected in  
22 surface or subsurface soils; sediments, groundwater, and surface water. Having identified these source  
23 areas, the likely transport mechanisms would include the following:

24 Surface Soil

- 25 • handling/re-distribution by human or ecological elements  
26 • surface water run-on and/or run-off

27 Subsurface Soil

- 28 • soil disturbance via excavation or intrusive soil sampling  
29 • ecological elements (e.g., nesting/burrowing animals)

30 Migration routes would include the following:

31 Surface Soil

- 32 • surface soil to subsurface soil, surface water, and/or sediment  
33 • surface soil to groundwater

1 Subsurface Soil

- 2 • subsurface soil to surface soil (via ecological element)  
3 • subsurface soil to groundwater

4 Groundwater

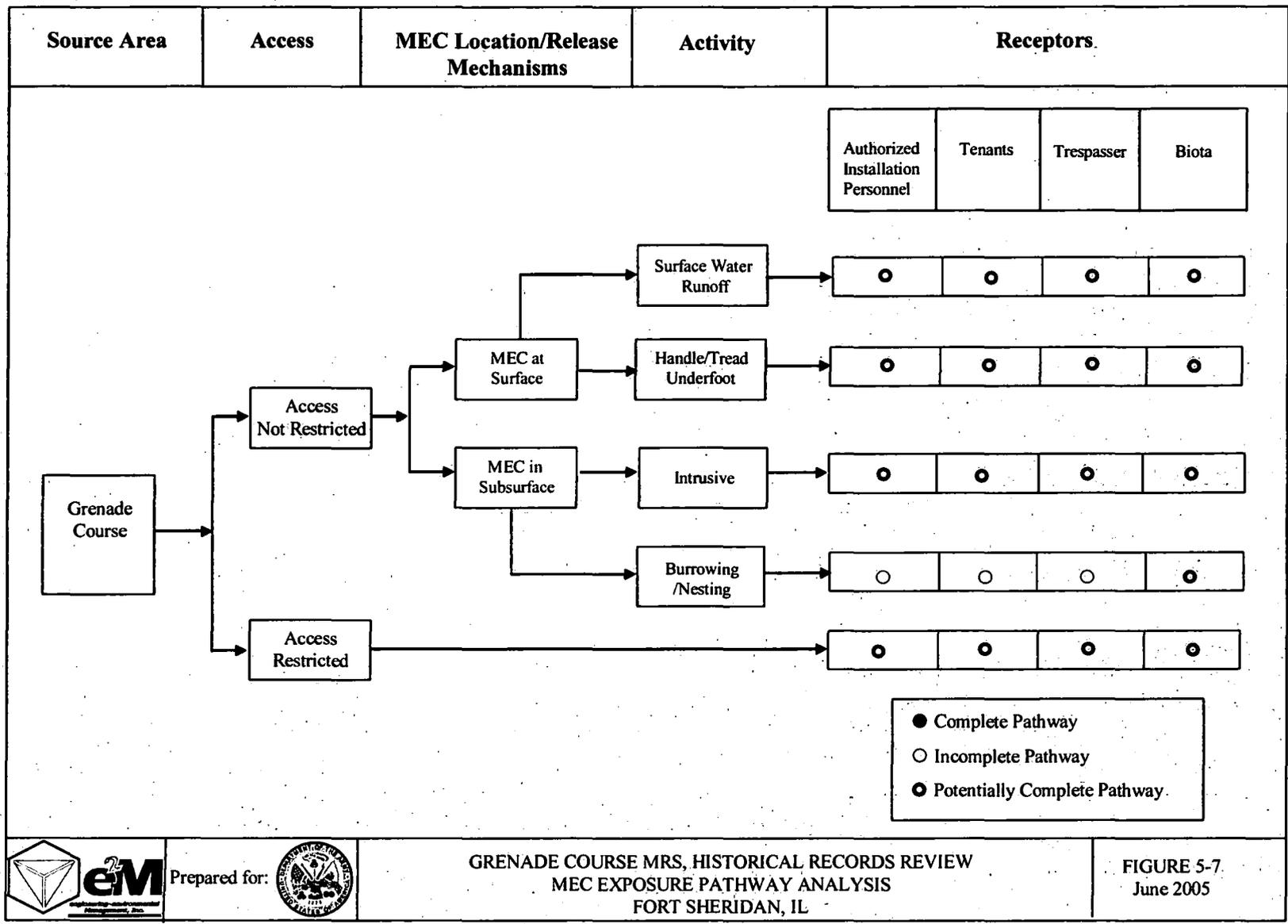
- 5 • groundwater discharge to surface water (Lake Michigan)

6 **5.4.6 Pathway Analysis**

7 **5.4.6.1 MEC**

8 Activities at the Grenade Course MRS were discontinued around December 1948. The site is easily  
9 accessible because it is currently a Navy housing area. MEC are potentially present in the surface and  
10 subsurface soils. Potential points of exposure include the handling of or treading on MEC. Based on  
11 these factors, a potentially complete exposure pathway for human receptors would exist in the event of  
12 a chance encounter with exposed MEC on the surface and/or during the disturbance (e.g., excavation) of  
13 subsurface soils. A potentially complete subsurface pathway may exist for ecological receptors that may  
14 nest or burrow at the site and come into contact with MEC. The potential exposure pathways are  
15 depicted in the flow chart provided in **Figure 5-7**.

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FIGURE 5-7  
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1 **5.4.6.2 MC**

2 MC may be encountered in surface soil, subsurface soil, sediment, groundwater, or surface water.

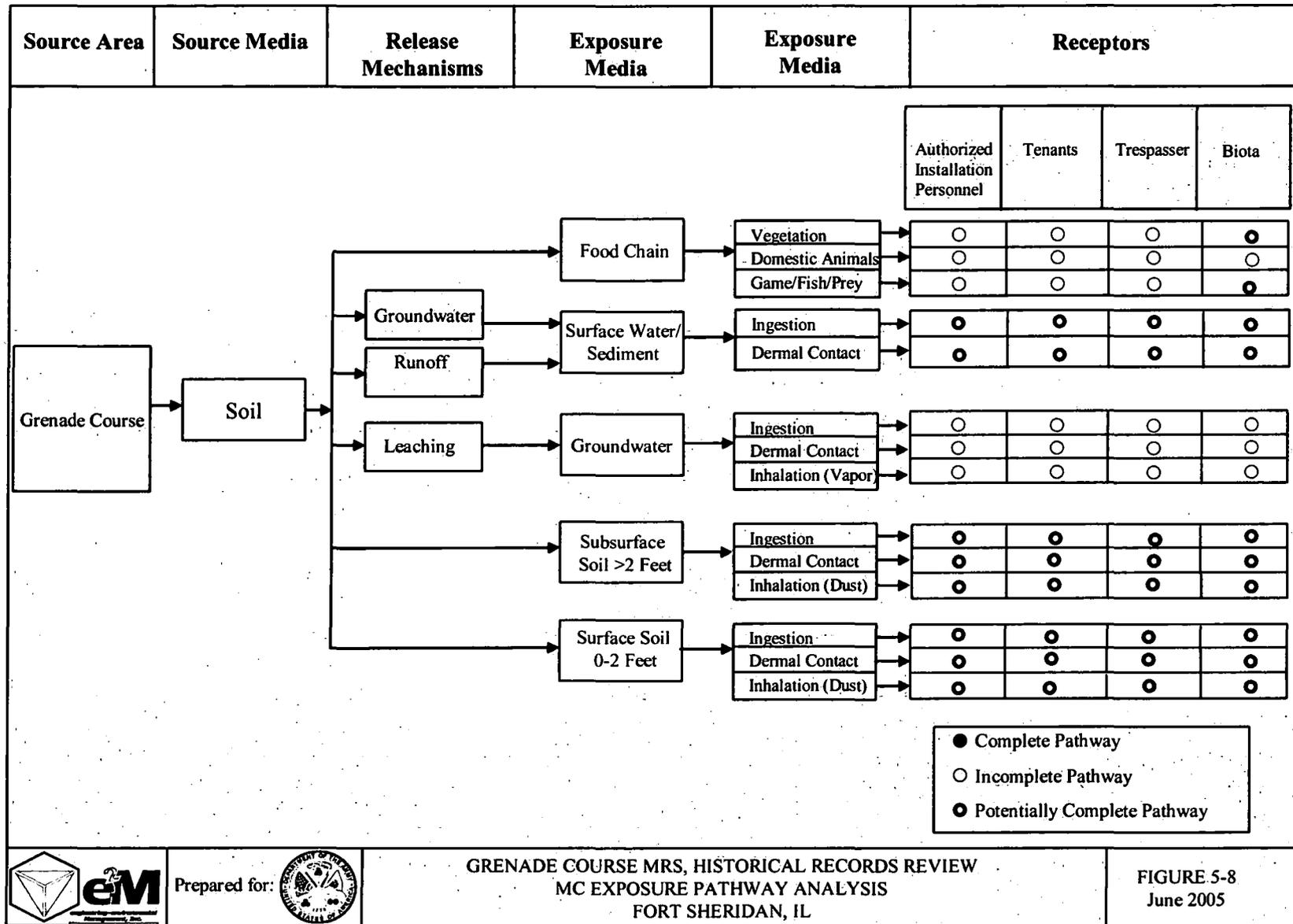
3 Based on these factors, a potentially complete exposure pathway for human receptors would exist in

4 the event of a chance encounter with exposed MC on the surface and/or during the disturbance (e.g.,

5 excavation) of subsurface soils. A potentially complete subsurface pathway may exist for ecological

6 receptors that may nest or burrow at the site and come into contact with MC. The potential exposure

7 pathways are depicted in the flow chart provided in **Figure 5-8**.



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FIGURE 5-8  
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## 1 **5.5 Small Arms Range Complex MRA**

### 2 **5.5.1 MR Site Profile**

3 The Small Arms Range Complex MRA is located along the beach of Lake Michigan. There are two  
4 ranges making up approximately 1.5 acres. The sites are presented in **Figure 2-4** and **Figure 2-10**.

#### 5 **5.5.1.1 Structures**

6 There are no structures at the Small Arms Range Complex MRA. The MRA is mostly undeveloped  
7 beach area along Lake Michigan.

#### 8 **5.5.1.2 Utilities**

9 Utilities located within the confines of the Small Arms Range Complex MRA are unknown.

#### 10 **5.5.1.3 Boundaries**

11 The Small Arms Range Complex MRA is bordered by Lake Michigan to the east, Officer Family Housing  
12 to the west, Bartlett Ravine to the north, and Van Horne Ravine to the south.

#### 13 **5.5.1.4 Security**

14 Fort Sheridan is surrounded by a perimeter fence. The Fort is patrolled regularly by Great Lakes  
15 Security. Access to the installation is gained by passing through an unguarded entrance. Anyone can  
16 access the installation. Once on site, individual movement is not restricted. Residents and recreational  
17 users can access the sites.

### 18 **5.5.2 Physical Profile**

19 The general physical profile (i.e., climate, topography, geology, soil, hydrogeology, hydrology, and  
20 vegetation) of the Small Arms Range Complex MRA is analogous to the conditions described for the  
21 installation and at the Trench Warfare Range MRS. Descriptions of each profile can be found in  
22 **Sections 5.1.2.1 through 5.1.2.7**.

### 23 **5.5.3 Land Use and Exposure Profile**

24 The general land use and exposure profiles (i.e., current land use, current human receptors, potential  
25 future land use, potential future human receptors, zoning/land use restrictions, beneficial resources, and  
26 demographics/zoning) at the Small Arms Range Complex MRA are in general similar to the conditions  
27 found at the Trench Warfare Range MRS and throughout Fort Sheridan. Descriptions of each profile  
28 can be found in **Sections 5.1.3.1 through 5.1.3.7**

1 **5.5.4 Ecological Profile**

2 The general ecological profile (habitat type, degree of disturbance, and ecological receptors) at the Small  
3 Arms Range Complex MRA is analogous to the conditions throughout Fort Sheridan. Descriptions of  
4 each profile can be found in **Section 5.1.4**.

5  
6 The site of the Small Arms Range Complex MRA that is located along the beach of Lake Michigan south  
7 of Bartlett Ravine near Boles Loop is considered to be a sensitive environment. This area is considered  
8 to be one of the best remaining examples of open prairie-like vegetation that once occurred along the  
9 Lake Michigan bluffs. The site is approximately 4 acres and supports 118 plant species including a  
10 number of state endangered or threatened species (SAIC, 2002).

11 **5.5.5 Munitions/Release Profile**

12 **5.5.5.1 Types of Munitions and Release Mechanisms**

13 Only small arms (less than 0.50 caliber) were used at the Small Arms Range Complex MRA. Release  
14 mechanisms include mishandling/loss, abandonment, burial, firing and dropping.

15 **5.5.5.2 Maximum Probable Penetration Depth**

16 The maximum probable penetration depth is unknown.

17 **5.5.5.3 MEC Density**

18 MEC is not a concern at the Small Arms Range Complex MRA because only small arms were used at the  
19 MRA.

20 **5.5.5.4 Munitions Debris**

21 During a site inspection conducted by USACE in October 1995, there was no evidence found at the  
22 MRA of MEC or munitions debris.

23 **5.5.5.5 Associated MC**

24 There is the potential for lead contamination at these sites associated with small arms ammunition.  
25 Also, there is the potential for MC from propellants (USEPA, 2003). For Phase III of the RI/BRA,  
26 sampling was planned for the pistol and machine gun ranges on the beach. "The beach and bluff area will  
27 be assessed for the presence of lead in the beach sediments and bluff face. Sediment samples from the  
28 beach area and soil from the bluff face will be collected for total lead analyses" (SAIC, 2002c). It is  
29 unknown whether this sampling was conducted and what the results were.

30 **5.5.5.6 Transport Mechanisms/Migration Routes**

31 The transport of MC will largely depend on the type(s) of release mechanisms that took place at a  
32 particular site; that is, the release mechanism will determine the potential source areas (i.e., where the

1 items are physically located in the environment) and possibly their physical state. The release  
2 mechanisms identified at the Small Arms Range Complex MRA for MC are as follows: mishandling/loss,  
3 abandonment, burial, firing and dropping. Based on these release mechanisms, MC may be detected in  
4 surface or subsurface soils, sediments, groundwater, and surface water. Having identified these source  
5 areas, the likely transport mechanisms would include the following:

6 Surface Soil

- 7 • handling/re-distribution by human or ecological elements
- 8 • surface water run-on and/or run-off

9 Subsurface Soil

- 10 • soil disturbance via excavation or intrusive soil sampling
- 11 • ecological elements (e.g., nesting/burrowing animals)

12 Migration routes would include the following:

13 Surface Soil

- 14 • surface soil to subsurface soil, surface water, and/or sediment
- 15 • surface soil to groundwater

16 Subsurface Soil

- 17 • subsurface soil to surface soil (via ecological element)
- 18 • subsurface soil to groundwater

19 Groundwater

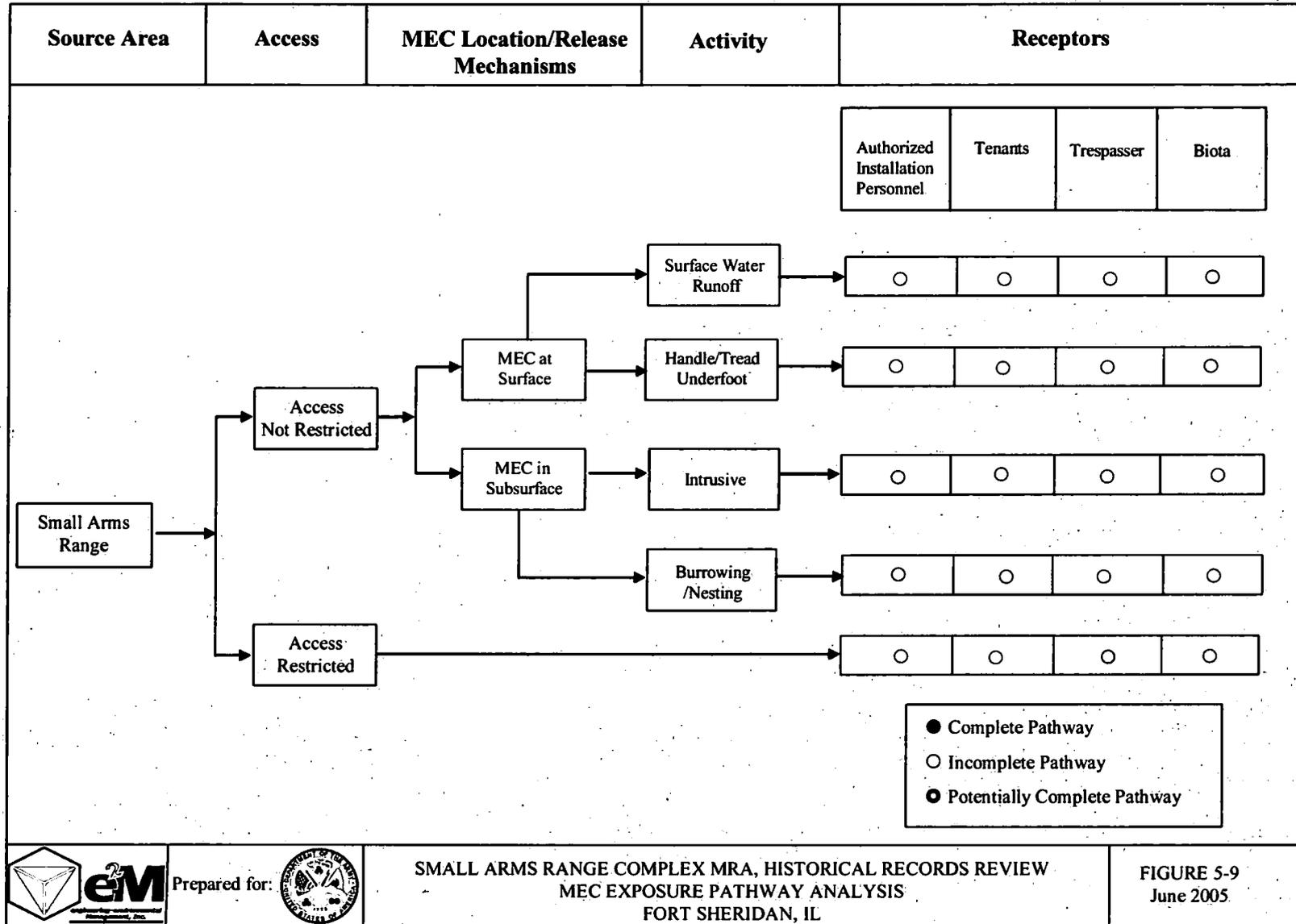
- 20 • groundwater discharge to surface water (Lake Michigan)

21 **5.5.6 Pathway Analysis**

22 **5.5.6.1 MEC**

23 MEC is not a concern at the Small Arms Range Complex MRA because only small arms were used at the  
24 MRA. Because of this, there are incomplete exposure pathways for human and ecological receptors in  
25 regards to MEC. The incomplete exposure pathways are depicted in the flow chart provided in **Figure**  
26 **5-9**.

27



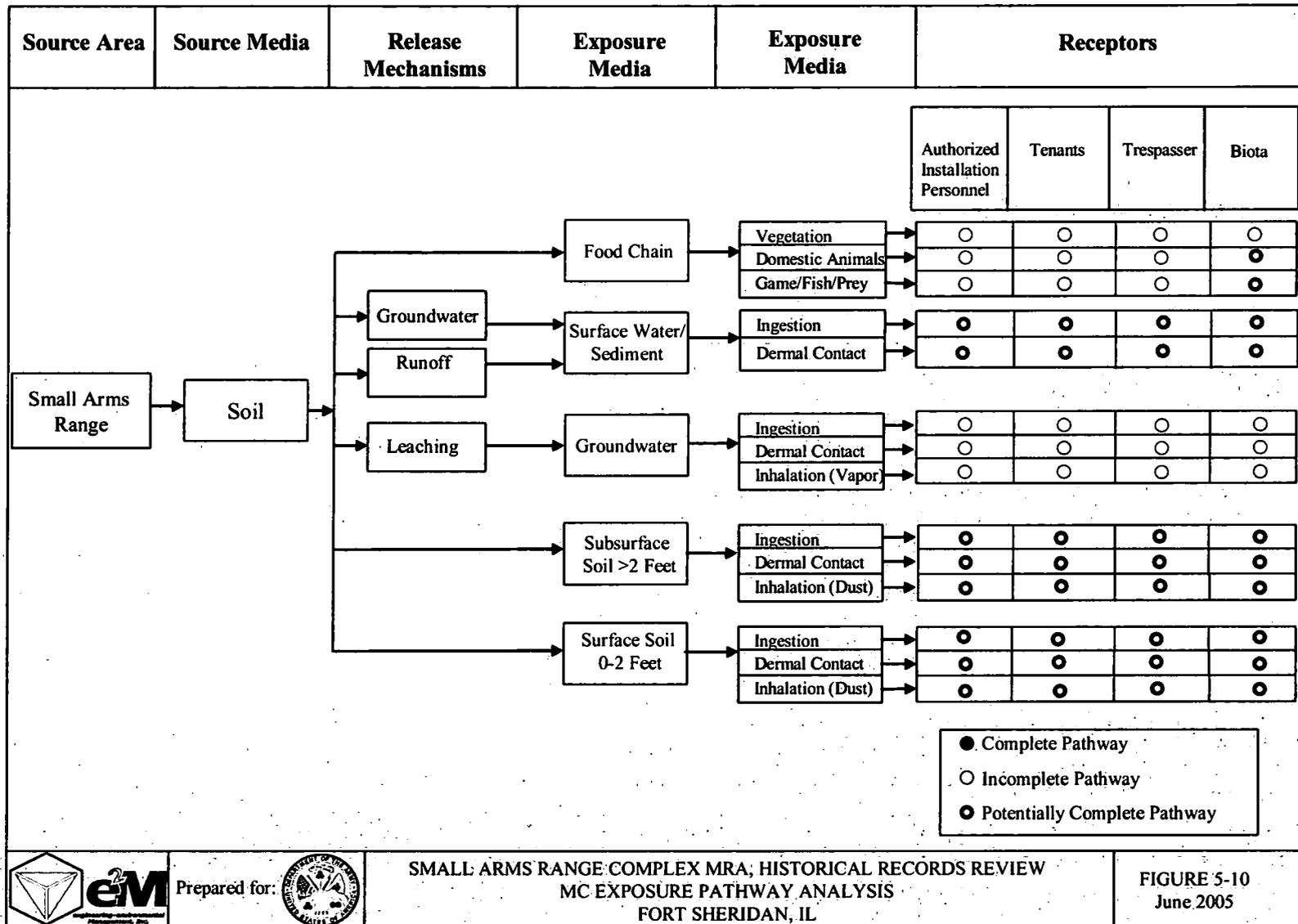
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FIGURE 5-9  
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- 1 **5.5.6.2 MC**
- 2 MC may be encountered in surface soil, subsurface soil, sediment, groundwater, or surface water.
- 3 Based on these factors, a potentially complete exposure pathway for human receptors would exist in
- 4 the event of a chance encounter with exposed MC on the surface and/or during the disturbance (e.g.,
- 5 excavation) of subsurface soils. A potentially complete subsurface pathway may exist for ecological
- 6 receptors that may nest or burrow at the site and come into contact with MC. The potential exposure
- 7 pathways are depicted in the flow chart provided in **Figure 5-10**.



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FIGURE 5-10  
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## 6.0 DATA GAP ANALYSIS

### 6.1 Trench Warfare Range MRS (FTSH-001-R-01)

Although metals contamination is present at the MRS, adequate analytical data is not available to determine if the source is MEC. Therefore, the existing data is not adequate to determine the presence or absence of MC.

The US Department of the Army and the US Department of the Navy, in consultation with USEPA and IEPA have determined that no actions are necessary at the following sites near the Trench Warfare Range MRS: VES Area #7, Building 137/139 Yard Area, Building 142 Administration, Building 361 Yard Area, Building 368 Yard Area, Building 377 Yard Area, Building 379 Yard Area, and the Building 564/565 Yard Area. The results of the BRA indicate chemical constituents detected in the environmental media at these no action study areas on the DoD OU do not pose significant risk to human health or the environment (SAIC 2002c). These investigations were done for hazardous, toxic, and radioactive waste (HTRW) under CERCLA.

The 1996 OE Removal & Sampling Action conducted by HFA revealed MEC at the site. The presence of MEC has been confirmed at the site.

### 6.2 AAA Complex MRA

Data gaps that exist and need to be addressed include adequate data to determine the presence or absence of MC and the presence of MEC. Although some isolated explosives were detected in groundwater at Landfill 7, they were not confirmed in the laboratory and they were not detected consistently between sampling events. Only a portion of the MRA and the MRA media have been evaluated, so the data is not representative of the MRA.

A live 37mm projectile was found by HFA in 1996 at the Trench Warfare Range but in the vicinity of Anti-Aircraft Firing Point "B". Therefore, the possibility exists for MEC to be present at the MRA and this is a data gap that needs to be researched.

At the Small Arms, Pistol, and Machine Gun Ranges no known sampling for MC (metals) has been conducted. Therefore, the presence of MC has not been confirmed at the MRA. This is a data gap that needs to be researched.

### 1 **6.3 AAA Complex – Transferred MRS**

2 In the spring of 2000, ESE contracted with UXB International to provide unexploded ordnance diving  
3 support for investigative work they were performing in Lake Michigan. There was no evidence of UXO  
4 discovered during the investigation (Harding ESE, 2001). However, the presence or absence of MEC is  
5 still unknown.

6  
7 A Site Investigation Report performed by Harding ESE in 2001 concluded no explosive constituents  
8 were present in the sediment samples collected in Lake Michigan. The Report also concluded that  
9 chemical constituents in artillery fired at the AAA ranges have not impacted Lake Michigan. Only a  
10 portion of the MRS and the site media has been evaluated, so the data is not representative of the MRS.

### 11 **6.4 Grenade Course MRS**

12 Metals were detected in samples from Shenck Ravine, but the remainder of the Grenade Course MRS  
13 area has not been evaluated for the presence of MC. This is a data gap that needs to be researched.

14  
15 During the 1996 OE Removal & Sampling Action conducted by HFA at the site, a live rifle grenade was  
16 discovered. There have been two EOD responses at this MRS as well. See **Section 4.2.4** for details.  
17 Live hand grenade fuzes and live hand grenades have been found at this MRS. Because of these findings,  
18 the presence of MEC at the MRS has been confirmed.

### 19 **6.5 Small Arms Range Complex MRA**

20 MEC is not suspect at this MRA since it was historically used to fire small arms only. No known  
21 sampling for MC (metals) has been conducted at this MRA. Therefore, the presence of MC has not  
22 been confirmed at the MRA. This is a data gap that needs to be researched.

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USGS 2004

[http://www.glsr.usgs.gov/main.php?content=research\\_risk&title=Species%20at%20Risk0&menu=research](http://www.glsr.usgs.gov/main.php?content=research_risk&title=Species%20at%20Risk0&menu=research)

**Photographs:**

Photograph 1. "In the Trenches" at Fort Sheridan, 1917. Lake County Discovery Museum, Lakewood Forest Preserve, Wauconda, IL.

Photograph 2. "The Trenches, "Over Here." Lake County Discovery Museum, Lakewood Forest Preserve, Wauconda, IL.

Photograph 3. "40 mm Anti-Aircraft gun shooting at aerial target over Lake Michigan, Fort Sheridan, Illinois, 1942." National Archives, Box #87. Original negative received from Commanding General, Hqs. 6<sup>th</sup> Serv. Comd., S.O.S., Post Office Bldg., Chicago, Illinois, October 1942.



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
WASHINGTON, DC 20310-8200



MEMORANDUM OF UNDERSTANDING  
BETWEEN  
THE DEPARTMENT OF THE ARMY AND THE DEPARTMENT OF THE NAVY

SUBJECT: TRANSFER OF CERTAIN PROPERTIES AT FORT SHERIDAN,  
ILLINOIS

1. PURPOSE. The purpose of this Memorandum of Understanding (MOU) is to provide for the transfer from the Department of the Army (DOA) to the Department of the Navy (DON) of approximately 142 acres of land and improvements, including 329 units of military family housing, hereafter referred to as "housing areas 3, 4, and 5," and a parcel of land of 40 acres, more or less, which is located between the site of the future Army Reserve Center and housing areas 4 and 5 at Fort Sheridan, Illinois. These properties are more particularly described on the Map, which is attached as Exhibit A, and incorporated by reference.

2. BACKGROUND.

a. Section 204(b)(3) of the Defense Authorization Amendments and Base Closure and Realignment Act of 1988, P.L. 100-526, authorizes the transfer of real property between military departments and other instrumentalities within the Department of Defense (DoD), with priority given to such department or instrumentality, that agrees to pay fair market value.

b. The Report of the Defense Secretary's Commission on Base Realignments and Closures recommended the closure of Fort Sheridan, Illinois, and the DON has requested the transfer of the above described property as provided by Section 204(b)(3).

3. AGREEMENT.

Subject to availability of funds:

a. The DON agrees to transfer \$24,000,000 to the DOA for deposit in the DOD Base Closure Account, pursuant to Section 204(b)(4)(A), in Fiscal Year 1994.

b. The DOA agrees to transfer to DON the property described in paragraph 1 above, effective 1 October 1993. At that time the DON will assume responsibility for the operation and maintenance

of the above described property. Current occupants will be allowed to remain in their quarters until rotation from the area occurs. Personnel of Army activities eligible for housing at Fort Sheridan on 1 January 1991 will have equal priority with Navy personnel for assignment to all categories of housing at Fort Sheridan. The DOA recognizes that the DON will redesignate some quarters to serve more enlisted personnel as dictated by housing requirements. The DON agrees to coordinate future housing assignment policy changes with the Headquarters DOA, if they have a major impact on Army personnel.

\* c. Prior to transfer of the property, the DOA will provide a description of environmental studies performed, types of contamination discovered, and recommended remedial actions. To date, environmental testing is in progress, and no remedial action has been recommended. The parties will continue to discuss environmental issues, and the DOA will continue to furnish documentation of environmental conditions to the DON as it is received. The DOA will retain responsibility and liability for environmental restoration of the above described properties, except for the landfill in housing area 5. As to that landfill, the DON assumes liability for the first \$1 million in clean up costs; Army retains liability for clean up in excess of \$1 million.

d. The parties will immediately begin negotiations to implement the transfer. The negotiations shall include, but not be limited to, a survey of the properties, the transfer of operation and management responsibilities, including utilities and snow removal, custodial and other maintenance contracts, property accountability, hand receipt responsibilities, personal property, and other details necessary for a smooth transition. Particular attention will be given to the continuance and establishment of the infrastructure necessary to provide for the operation of the site as "stand alone" housing. The parties acknowledge that the utility system supporting the planned Army Reserve Center west of Patten Road may require integration with that of the housing area.

e. The DON agrees to pay all costs incident to the transfer of the properties including, but not limited to, the costs of legal descriptions and surveys.

f. In the event that the DON determines that the above described property is excess to its needs, the DON agrees to

transfer to DOA funds equivalent to the amount received by DON in excess of \$24,000,000, as a result of disposal.

PROVIDED, HOWEVER, that the above described property transfer to the DON is conditioned upon the transfer of funds described above. In the event the DON is unable to transfer said funds by 30 September 1995, the above described property automatically reverts to the DOA for disposal. The DON shall vacate the property by a date certain to be agreed upon between the parties.

4. EXECUTION. This Memorandum of Understanding becomes effective upon approval by the Secretary of Defense.

M. P. W. Stone

M. P. W. Stone  
Secretary of the Army

8-8-91

Date

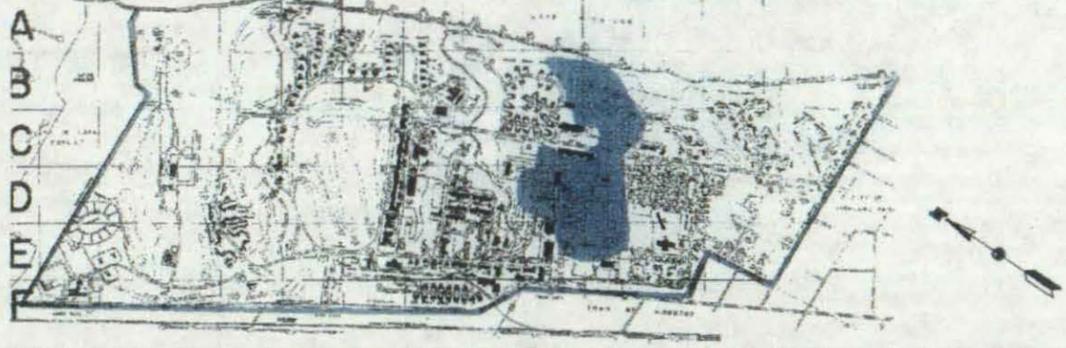
H. Lawrence Garrett III

H. Lawrence Garrett III  
Secretary of the Navy

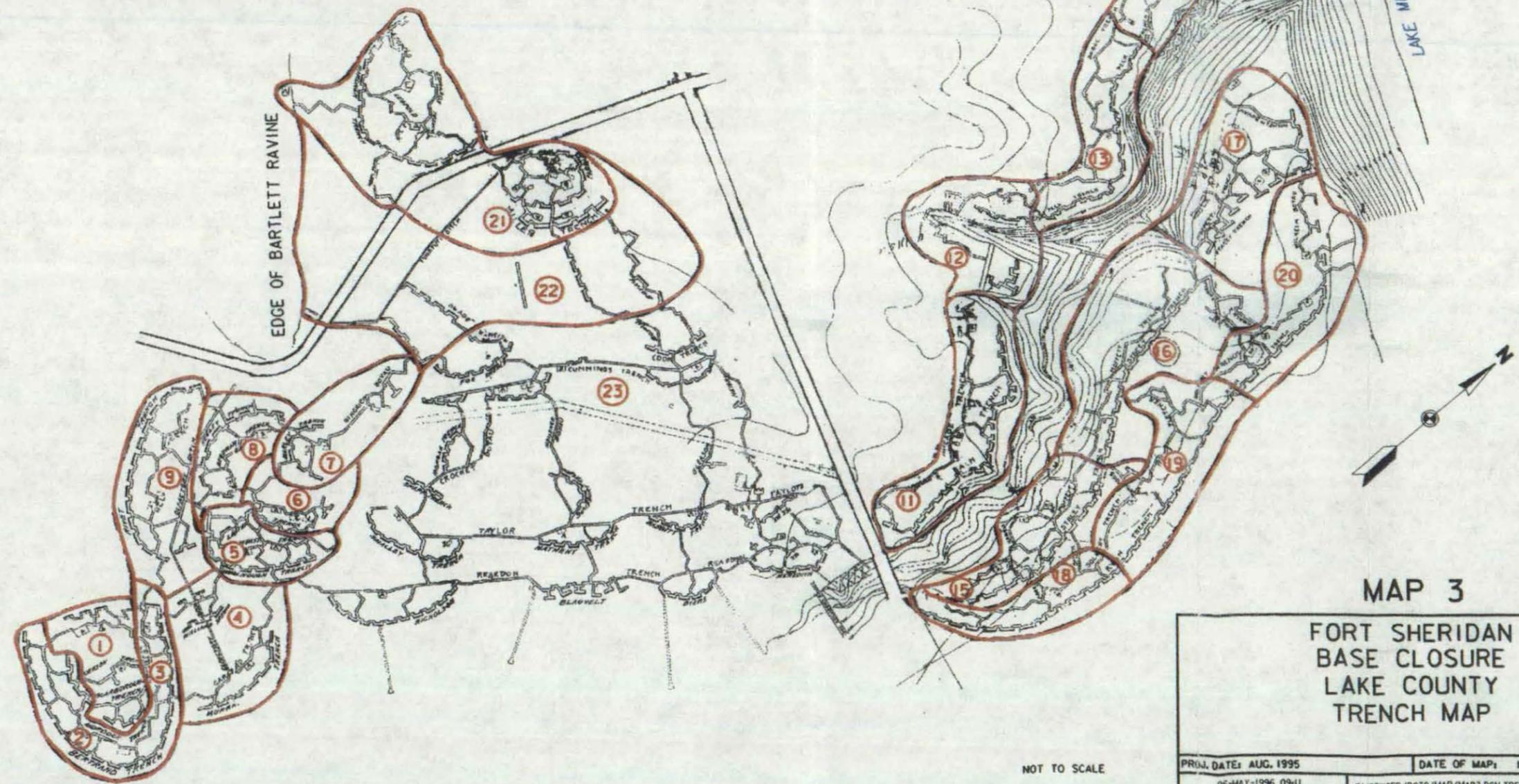
8/8/91

Date

1 2 3 4 5 6 7 8 9 10 11 12 13 14



- RESERVATION BOUNDARY
- FORMER TRENCH AREA OVERLAY ON 1987 GENERAL SITE MAP
- COMPANY SECTORS
- ① COMPANY NUMBERS



### MAP 3

FORT SHERIDAN  
BASE CLOSURE  
LAKE COUNTY  
TRENCH MAP

NOT TO SCALE

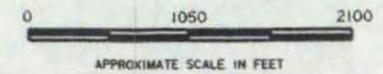
PROJ. DATE: AUG. 1995	DATE OF MAP: 1917
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FEATURE NO.	FEATURE DESCRIPTION
5.	OLD TENT AREA, NOW REGULARLY SIZED AND PLACED BUILDINGS
6.	ORDNANCE MAGAZINE
7.	ORDNANCE MAGAZINE
10.	ANTI-AIRCRAFT ARTILLERY FIRING POINT LOCATION "B"
11.	ANTI-AIRCRAFT ARTILLERY FIRING POINT LOCATION "A"
15.	NORTH BORROW PIT (USE OF BORROW SOILS UNKNOWN)
16.	SOUTH BORROW PIT
17.	BAYONET TRAINING AREA

**LEGEND**

-  RESERVATION BOUNDARY
-  FEATURE LOCATIONS



**PHOTO MAP 2**

FORT SHERIDAN  
 BASE CLOSURE  
 LAKE COUNTY  
 AERIAL PHOTO INTERPRETATION  
 1949

NOT TO SCALE

PROJ. DATE: AUG. 1995

DATE OF PHOTO: 1949

11-MAR-1996 14:28

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