OTHER EDGEWOOD AREAS

Engineering Evaluation/Cost Analysis for I-Field World War II Japanese Bunkers A and F

July 2003

U.S. Army Garrison
Aberdeen Proving Ground, Maryland

Engineering Evaluation/Cost Analysis
for
I-Field WWII Japanese Bunkers A and F
Other Edgewood Areas
Aberdeen Proving Ground, Maryland

1.0 SITE CHARACTERIZATION

1.1 Site Description and Background

The I-Field World War II (WWII) Japanese Bunker Area is a former target area within the Other Edgewood Areas of Aberdeen Proving Ground (APG) (Figure 1-Attachment A). The Japanese Bunker Area lies at the southern edge of the I-Field Impact Area, within the Boone Creek Investigation Area (Figure 2-Attachment A). The 30-acre site contains 16 steel-reinforced concrete replicas of Japanese bunkers used as targets by the U.S. Army during WWII and 1960s test programs. Bunker A measures 19 feet in diameter, stands 8.5 feet above ground level, and is at least 3.5 feet below ground surface (bgs) (Figure 3 – Attachment A). Bunker F is wedge-shaped, measures 24 feet by 45 feet, stands 10 feet about ground level, and is at least 3 feet bgs (Figure 3 – Attachment A). Examinations of the bunkers revealed that the structures still contain various types of materials, labware, equipment, and ordnance related items discarded from historical testing activities. The site is located in the restricted area. Access to the restricted area is limited to properly cleared personnel or individuals in an escorted capacity. A wide variety of physical security countermeasures to include barrier systems, sensors and random patrols by law enforcement personnel are in place to prevent unauthorized access.

1.2 Work Completed To Date

No previous removal actions addressing waste clean up at the I-Field WWII Japanese Bunker Area have been completed. During RI field investigations at the I-Field Japanese Bunker Area, one water sample was collected from the standing water inside Bunker F for Target Compound and Target Analyte List compounds, explosives, total phosphorus, phenols, alkalinity, total organic carbon, gross alpha and beta radiation, and chemical agent degradation products. No samples were collected from Bunker A.

1.3 Source, Nature and Extent of Contamination

The I-Field WWII Japanese Bunker Area borders the wetland area of the Bush River Watershed, approximately 1,000 feet northeast of Ford Point. Bunker A lies in the north central portion of the site and Bunker F stands in the northeastern corner of the site (Figure 3 – Attachment A).

Bunker A was used primarily as a storage and work area. Physically, Bunker A has only minor exterior and interior damage (closed cracks, calcium carbonate precipitate), related primarily to its age. Bunker A is divided into six evenly-spaced V-shaped rooms that hold worktables, miscellaneous containers, and shelving units holding multiple containers that have leaked a dark, unknown substance also visible were leaking cans of grease and hydraulic oil as well as

ordnance related components. Boxes containing radiological symbols, glass labware some of which may contain liquid, are also present within Bunker A. The total waste volume is estimated at 15 cubic yards.

Bunker F was used primarily as a target. Located in the tree line area and surrounded by heavy field grass, suspect ordnance related items litter the ground surface around the bunker. The exterior walls show mainly projectile damage. Aerial bombs have damaged the roof area and heavy projectiles have damaged the walls of the bunker's two interior rooms. The bunker is flooded with approximately 3 feet of water along with 6 to 8 inches of silt covering the floor. During site visits to Bunker F, approximately 100 unknown items have been observed on and below the silt. Some glass labware is visible. The total waste volume is estimated at 15 cubic yards.

No organic constituents were detected in the RI sample collected from standing water within Bunker F. Only total aluminum (at 212 μg/L) was detected in the bunker water above the U.S. Environmental Protection Agency (USEPA) Biological Technical Assistance Group surface water criteria. The water within Bunker F is considered to be attributable to run-in from precipitation events, with no connection to nearby surface water bodies. The total bunker water volume is estimated at 8,300 gallons.

1.4 Streamlined Risk Evaluation

I-Field WWII Japanese Bunkers A and F contain military waste resulting from historical testing activities. This waste may include ordnance related items. These hazardous materials represent a health and safety threat to workers who inadvertently enter the site.

Contaminants may potentially migrate from Bunkers A and F by various environmental pathways and impact the soil, surface water, and sediment. The potential release of these waste material constituents may pose a potential threat to human and ecological receptors.

2.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

The removal action objectives are to:

- Eliminate the threat to health and safety associated with direct human contact with waste material; and,
- Eliminate the potential for hazardous constituent release to soil, sediment and surface water.

2.1 Determination of Removal Scope

The removal action will address only the waste materials within Japanese Bunkers A and F located at the southern edge of the I-Field Impact Area. Potentially contaminated water and soil immediately associated with the waste at Bunkers A and F will also be addressed during this action. Waste materials within the remaining I-Field WWII Japanese Bunkers will be addressed under separate investigations or removal actions, and are not within the scope of this removal action.

2.2 Determination of Removal Schedule

The response being considered is a non-time critical removal action as defined under the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA). Work is scheduled to be performed during the summer of 2003. The duration of the remediation will be dependent on weather conditions, U.S. Army Aberdeen Test Center test schedule conflicts, Explosive Ordnance Disposal (EOD) team support schedule, and any required U.S. Army Technical Escort Unit support.

3.0 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Three alternatives have been identified for a removal action at I-Field WWII Japanese Bunkers A and F. These alternatives are: No Action; Land Use Controls with Monitoring; and Removal and Disposal. These three alternatives are described and evaluated against the criteria of effectiveness, implementability and cost.

3.1 Alternative 1 – *No Action*

The No Action alternative would involve no actions specifically intended to address I-Field WWII Japanese Bunkers A and F. No actions would be taken to control or monitor constituent release from the sites. No engineering measures would be implemented to prevent contact with waste materials. However, access controls would exist with continuance of the existing physical security measures, to include limiting access to properly cleared personnel or individuals in an escorted capacity. The restricted area in which the site is located would continue to be protected by barrier systems, sensors and random patrols by law enforcement personnel. Even with a No Action decision for removal, Japanese Bunkers A and F would be evaluated and addressed by the feasibility study and remedial decision process for the Other Edgewood Areas Boone Creek Investigation Area, to be accomplished during the next several years.

The No Action alternative is possibly not protective of human health because contact with hazardous materials would not be controlled or prevented through engineering measures. This alternative is also possibly not protective of the environment because hazardous constituent release to soil, sediment, and surface water is not prevented. The No Action alternative would not meet removal action objectives.

The No Action alternative is easily implemented. No capital cost is associated with this alternative. If a future No Action decision was again made with the CERCLA record of decision (ROD), the only long-term costs would be for 5-year remedy reviews, which would have a present worth cost of approximately $57,000 for a 30-year period.[1]

3.2 Alternative 2 – *Land Use Controls with Monitoring*

Under Alternative 2, Land Use Controls with Monitoring, land use controls (LUCs) would be implemented to control access to the site and ensure that a change in land use incompatible with

[1] The Environmental Protection Agency guidance for cost estimates under CERCLA is to estimate the present worth cost for 30 years of operations and maintenance.

health and safety considerations is not implemented. Monitoring would be accomplished to detect any potential release of hazardous constituents from the bunker locations.

This alternative would be effective in protecting human health and would identify any change in site status that represents an increasing risk to ecological receptors. Therefore, this alternative would be at least partially effective, and possibly fully effective, in meeting removal action objectives.

This LUCs and monitoring alternative is readily implemented, being technically and administratively feasible. While the capital cost of this alternative is small, the estimated total present worth cost is $965,000 because of the costs of security patrols and annual monitoring for a 30-year period.

3.3 Alternative 3 – *Removal and Disposal*

Alternative 3 would consist of removal and disposal of waste material at Bunkers A and F. The removal would be accomplished after vegetation clearance, construction of an access road to each bunker, and on-site assessment of the waste material for hazard assessment and identification purposes. The standing water in Bunker F will be pumped out and containerized before assessment of the bunker occurs. Because of the nature of the wastes, removal of all material and potentially contaminated soil would be accomplished by qualified EOD personnel using primarily manual techniques. All removed wastes, liquid, and soil will be appropriately characterized and managed using established APG protocols and procedures.

This alternative would be effective in protecting human health and the environment, would meet removal action objectives, and could be readily implemented. The cost of this alternative is estimated to be $125,000, and consists entirely of capital cost with no long-term operations and maintenance. The cost of this action is directly related to the volume and nature of the waste materials at each bunker.

4.0 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The removal alternative (Alternative 3) would be protective of human health and the environment by preventing the exposure to wastes. The LUC alternative would be protective of human health, but is possibly not protective of the environment. The No Action alternative would involve no actions to protect either human health or the environment. Alternative 3 would be implemented in a manner that complies with location and action-specific ARARs (e.g., fugitive dust emissions) and meets remedial action objectives. The LUC alternative could possibly only partially meet remedial action objectives, while the No Action alternative would possibly not meet objectives. Only Alternatives 2 and 3 would have long-term effectiveness. However, the LUC alternative would require long-term action to maintain effectiveness.

All of the alternatives are readily implemented (technically feasible, implementable with readily available equipment and materials, and administratively feasible).

The No Action alternative would involve costs only for 5-year remedy reviews if the no action decision was carried forward as a long-term remedy in the ROD. The estimated costs of the three alternatives are:

No Action	$57,000
Land Use Controls with Monitoring	$965,000
Removal and Disposal	$125,000

The three removal action alternatives have been evaluated for environmental considerations under the National Environmental Policy Act (NEPA). Table 1 presents a discussion of potential environmental impacts and satisfies NEPA requirements.

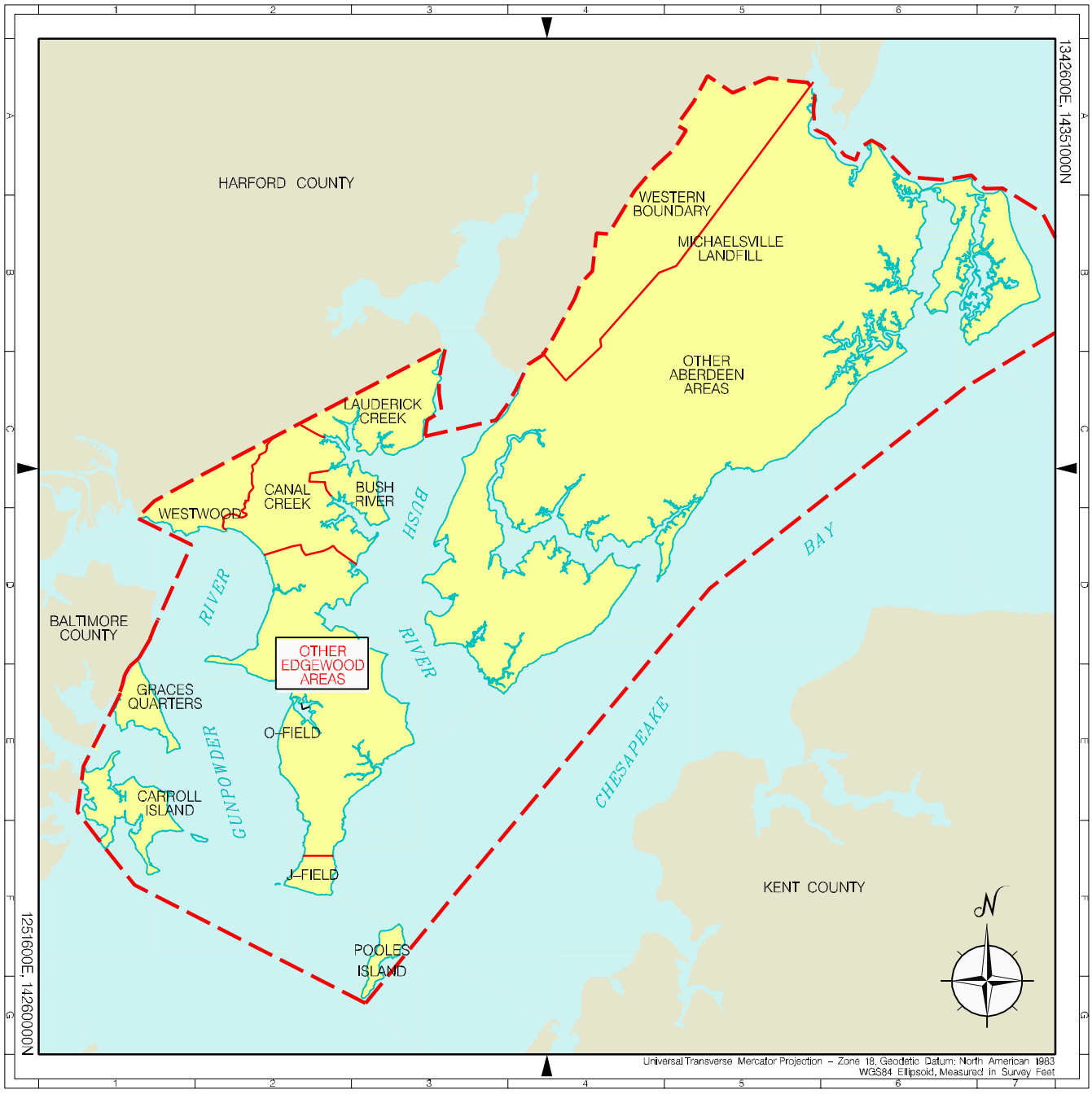
5.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

The Removal and Disposal alternative is recommended because it offers the highest degree of protectiveness, is readily implementable, and a permanent remedy that does not depend on long-term land-use controls and/or maintenance.

Table 1. Environmental Considerations for Removal Action Alternatives

	Alternative 1 No Action	Alternative 2 Land Use Controls with Monitoring	Alternative 3 Removal and Disposal
WETLANDS	No impacts	No impacts	Removal activities will be limited to the recovery of waste and potentially contaminated liquid/soil from the interior portions of each bunker. No impact to wetland areas is expected.
ARCHEOLOGICAL RESOURCES	No impacts	No impacts	No impacts
THREATENED / ENDANGERED SPECIES	No impacts	No impacts	The waste removal activities would be of short duration and limited to a small area, with no significant impacts to threatened or endangered species.
SEDIMENT AND EROSION CONTROL	No impacts	No Impacts	Implementation will not require sediment and erosion controls since only interior bunker areas are to be disturbed.
NOISE POLLUTION	No impacts	No Impacts	Noise control measures may need to be implemented to minimize impacts during any necessary on-site detonation of unexploded ordnance
HAZARDOUS WASTE	No actions would be taken to mitigate threats associated with waste material present at both bunkers	Effectiveness of removal would depend solely on long-term land use controls	Removal and disposal of waste would eliminate any possible threats associated with direct human contact with hazardous wastes possibly present at each bunker. Excavated wastes would be managed in accordance with Federal, State, and Army regulations.
AIR POLLUTION	No impacts	No impacts	Proper procedures would need to be implemented to control emissions of dust

Attachment A



1400010500 7000 3500 0 7000 14000 28000

GRAPHICAL SCALE
IN FEET (1" = 14000')
1:168000

L E G E N D

- Aberdeen Proving Ground
- Water
- Installation Boundary
- Study Area Boundary

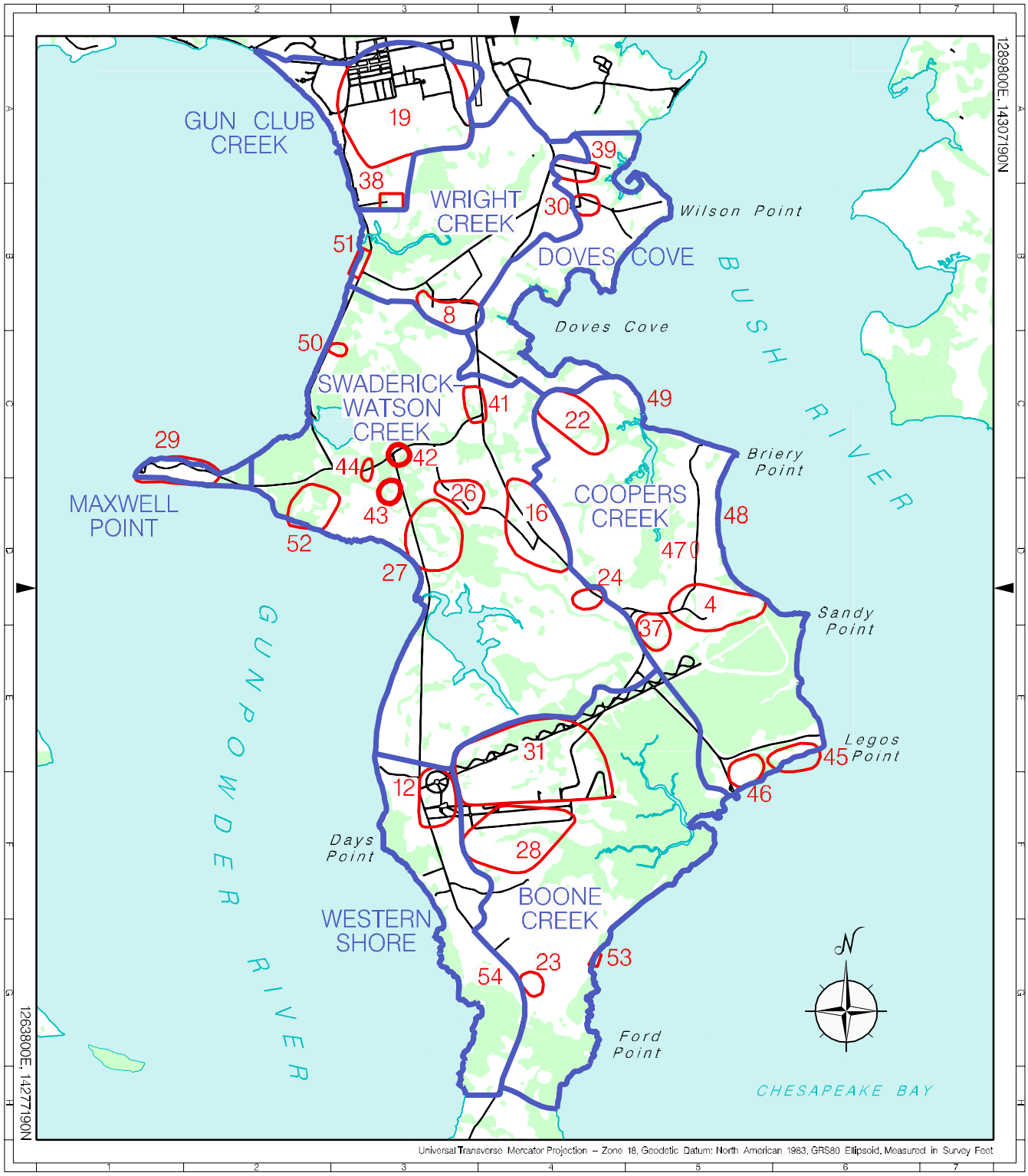
6095 Marshalee Drive
Elkridge, MD 21075
(800) 727-6677
www.gpworldwide.com

TITLE:

LOCATION OF THE OTHER EDGEWOOD AREAS

CARTOGRAPHER:	APPROVED BY:	DATE:	FIGURE:
M. BROOKS	M. DUNKERLY	09-25-02	1

x



4000 3000 2000 1000 0 2000 4000 8000

GRAPHICAL SCALE
IN FEET (1" = 4000')
1:48000

L E G E N D

Roads
Water
Cluster Locations
Wetlands
Investigation Area

6095 Marshalee Drive
Elkridge, MD 21075
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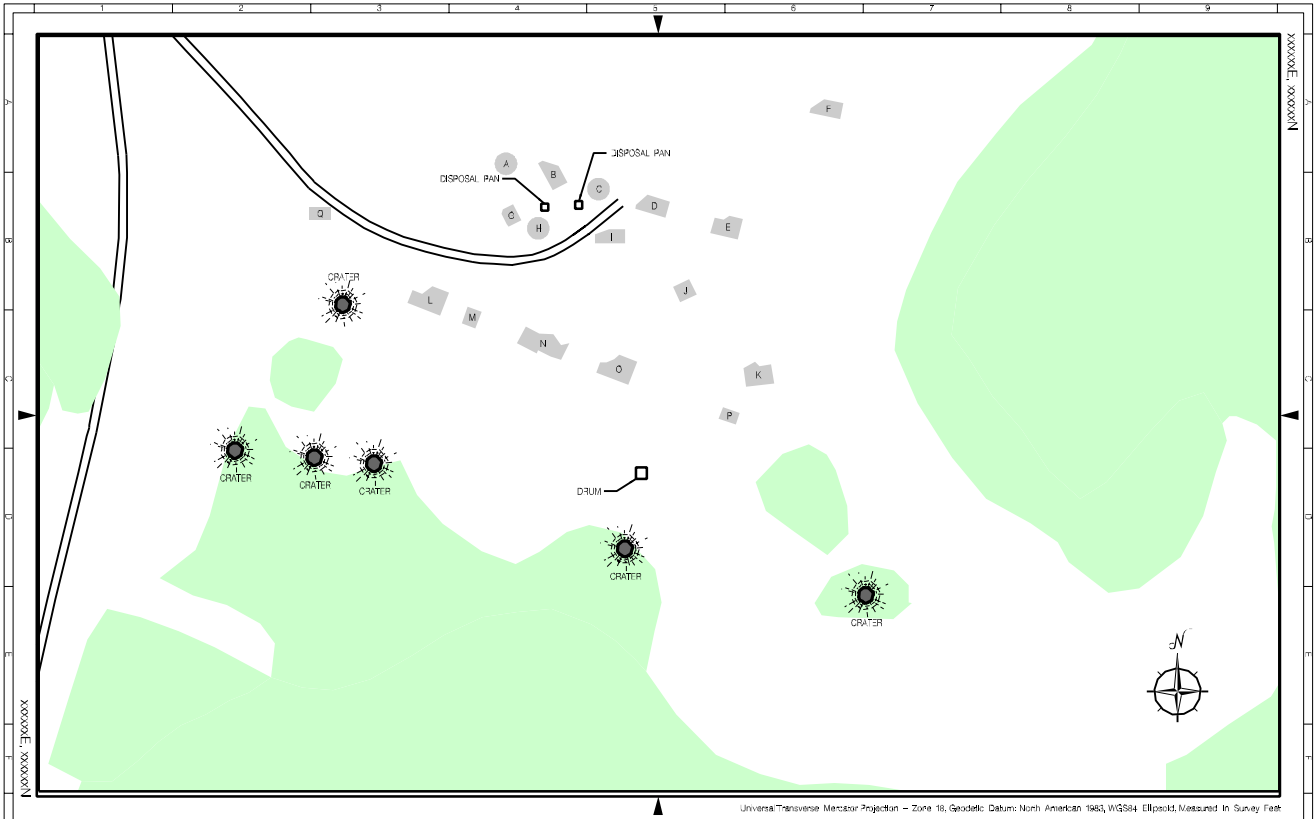
www.gpworldwide.com

TITLE:

OTHER EDGEWOOD AREAS INVESTIGATION AREAS AND CLUSTER LOCATIONS

CARTOGRAPHER:	APPROVED BY:	DATE:	FIGURE:
B. JOYCE	M. BROOKS	01-13-03	2

x



L E G E N D

Structure
Paved Road
Water
Wetland

200 150 100 50 0 100 200 400

GRAPHICAL SCALE
IN FEET (1" = 200')
1:2400

TITLE:

I–FIELD JAPANESE BUNKERS

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CARTOGRAPHER:	APPROVED BY:	DATE:	FIGURE:
M. BROOKS	M. BROOKS	02–01–03	3

x