



**US Army Corps
of Engineers** ®
Norfolk District

Draft Interim Land Use Control Implementation Plan Former Nansmond Ordnance Depot Ordnance and Explosives Sites

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ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
BGS	Below Ground Surface
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CP	Commerce Park (zoning)
DOD	U.S. Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosives Ordnance Disposal
EPA	U.S. Environmental Protection Agency
FNOD	Former Nansmond Ordnance Depot
FUDS	Formerly Utilized Defense Site
GE	General Electric
GIS	Geographic Information System
LLC	Limited Liability Corporation
LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
LUCOP	Land Use Control Options Paper
M-1	Light Industrial (zoning)
M-2	Heavy Industrial (zoning)
MOA	Memorandum of Agreement
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OE	Ordnance and Explosives
OERIA	Ordnance and Explosives Risk Impact Analysis
O-I	Office/Institutional (zoning)
PRP	Potentially Responsible Party
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
TCC	Tidewater Community College
TNT	Trinitrotoluene
USACE-Norfolk	U.S. Army Corps of Engineers-Norfolk District
UXO	Unexploded Ordnance
VCCS	Virginia Community College System
VDEQ	Virginia Department of Environmental Quality

EXECUTIVE SUMMARY

WHY

The U.S. Army Corps of Engineers-Norfolk District (USACE-Norfolk) is conducting Ordnance and Explosives (OE) removal actions consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process at the Former Nansemond Ordnance Depot (FNOD). However, it is possible that people may encounter OE in areas where OE removals are complete, ongoing, or are required. Land use controls are being implemented at known and suspected OE sites at FNOD to protect human health and the environment while the OE removal actions are implemented and where risk is known, suspected, or cannot be totally eliminated.

WHERE

Known and suspected OE sites at FNOD include: Area J Lake and Possible Burning Ground, Dominion Lands (Phases I and II), Horseshoe Pond Area, James River Beachfront, Main Burning Ground, Nansemond River Beachfront, and the TNT (Trinitrotoluene) Removal Area. These locations are described and illustrated in this Draft Interim Land Use Control Implementation Plan (LUCIP).

WHO

USACE, as the executing agent for environmental restoration activities at Formerly Utilized Defense Sites (FUDS), will be responsible for implementing, maintaining, and monitoring the land use controls for ordnance and explosives at FNOD. USACE may make arrangements with landowners; tenants; government bodies, such as the city of Suffolk; or other stakeholders to help implement, maintain, and monitor land use controls for ordnance and explosives at FNOD. The U.S. Environmental Protection Agency (EPA) and the Virginia Department of Environmental Quality (VDEQ) will oversee these land use controls.

WHAT AND HOW

Land use controls include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment. Land use controls will be implemented as engineering/access controls, institutional controls (proprietary and/or governmental), and educational/notification programs. It must be recognized that no single agency can implement or maintain many of the land use controls, which may be part of this Draft Interim LUCIP. It requires coordination and cooperation. In order to ensure that the land use controls are effective, USACE, the city of Suffolk local government, and stakeholders will enter into separate Memoranda of Agreement (MOAs) to implement, maintain, monitor, and enforce land use controls at FNOD. This document identifies the preferred land use control alternatives for each site and includes information regarding who will implement, maintain, monitor, and enforce land use controls at FNOD. USACE is seeking public comments on the preferred land use control alternatives for each site.

WHEN

This Draft Interim LUCIP will remain in effect until all planned OE removal actions have been completed for known and suspected OE sites at FNOD. USACE-Norfolk are soliciting input from the community on all of the alternatives included in this Draft Interim LUCIP. A public comment period for

this Draft Interim LUCIP and supporting documents is March 7, 2002 through April 15, 2002. A public meeting will be held on March 7, 2002, at which time oral and written comments will be accepted.

INTRODUCTION AND PURPOSE

This Draft Interim LUCIP summarizes the preferred **land use control** alternatives that are proposed to reduce risk to human health and the environment from hazards posed by Ordnance and Explosives (OE) at the Former Nansmond Ordnance Depot (FNOD) (the “site”) during OE removal actions. The site location is illustrated in Figure 1 and includes property currently owned by the Continental Bridgeway One Associates, Limited Liability Corporation (LLC); Dominion Lands, Inc.; General Electric (GE) Company; Hampton Roads Sanitation District; SYSCO Food Services of Hampton Roads, Inc.; Virginia State Board of Community Colleges-Tidewater Community College-TCC; and the Virginia Department of Transportation.

Land use controls include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment. The *Transmittal of Interim Final Management Principles for Implementing Response Actions at Closed, Transferring, and Transferred Ranges* (USACE 2000) created the working definition of land use controls used in this document. However, many still accept a general definition of “institutional controls” that includes physical and administrative mechanisms.



Figure 1. Location Map of the Former Nansmond Ordnance Depot

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number is VAD123933426 for the installation that is designated as the “Former Nansmond Ordnance Depot.” This document is issued by the U.S. Army Corps of Engineers-Norfolk District (USACE-Norfolk), which is the geographic district responsible for

oversight of Formerly Utilized Defense Site (FUDS) activities at FNOD. After public comments received on this have been reviewed and considered, USACE-Norfolk, with landowner input, will work with the community and responsible agencies to implement the interim land use controls selected for the FNOD OE sites. The Final Interim LUCIP will contain a Responsiveness Summary that responds to all significant comments received during the public review of the Draft Interim LUCIP.

The objectives of this document are to: (1) discuss relevant background information, (2) discuss land use control alternatives, (3) explain the rationale for the recommendation, (4) facilitate public participation in the decisionmaking process, and (5) actively solicit community involvement in the selection of interim land use controls for OE sites at FNOD.

This Draft Interim LUCIP summarizes information that can be found in greater detail in the following supporting documents:

- **Land Use Control Assurance Plan (LUCAP)**—This document (SAIC 2001a) describes the assurances that are needed between USACE-Norfolk and stakeholders to implement, maintain, monitor, and enforce land use controls for OE sites at FNOD.
- **Land Use Control Options Paper (LUCOP)**—This document (SAIC 2001b) identifies and evaluates land use control options, identifies existing controls, evaluates the applicability of controls for known and suspected OE sites at FNOD, and recommends land use controls for implementation.
- **Risk Management Strategy Report for OE Hazards**—This document (SAIC 2001c) presents the OE conceptual site model, risk assessment, and other information needed to support the selection of land use controls and development of risk management strategies.

Information Repository
Tidewater Community College
Library Information Desk
7000 College Drive
Portsmouth, VA
Library Hours:
8 a.m. to 9 p.m. Monday through Thursday
8 a.m. to 4:30 p.m. on Friday
8:30 a.m. to 12:30 p.m. on Saturday

The Draft Interim LUCIP and supporting documents will be kept on file for public access at the **information repository**. This information repository is located at **TCC**.

If any significant new information or public comments are received during the public comment period (March 7, 2002 through April 15, 2002), USACE, in consultation with FNOD stakeholders, may modify the preferred alternative outlined in this Draft Interim LUCIP or select another response. Significant comments presented during the March 7, 2002 public meeting and received during the public comment period will be considered and addressed by USACE when finalizing the Draft Interim LUCIP. As mentioned above, the Final Interim LUCIP will contain a Responsiveness Summary that responds to all significant comments. Therefore, USACE and the stakeholders encourage the public to review and comment on all of the alternatives presented in this Draft Interim LUCIP, and all supporting documentation.

BACKGROUND

The U.S. Army used FNOD from 1917 to 1950 to prepare ammunition and components for storage, ship munitions overseas, inspect and dispose of unserviceable munitions, and recondition ammunition. In 1950, the facility was transferred to the Department of the Navy, and was then known as the Marine Corps Supply Forwarding Annex. In 1960, the property was transferred

outside U.S. Department of Defense (DOD) control. Various other land transactions have taken place since the initial release of property.

The Continental Bridgeway One Associates, LLC; Dominion Lands, Inc.; GE; Hampton Roads Sanitation District; SYSCO Food Services of Hampton Roads, Inc.; Virginia State Board of Community Colleges-TCC; and the Virginia Department of Transportation currently own property at FNOD. The property boundaries and zoning are illustrated in Figure 2.

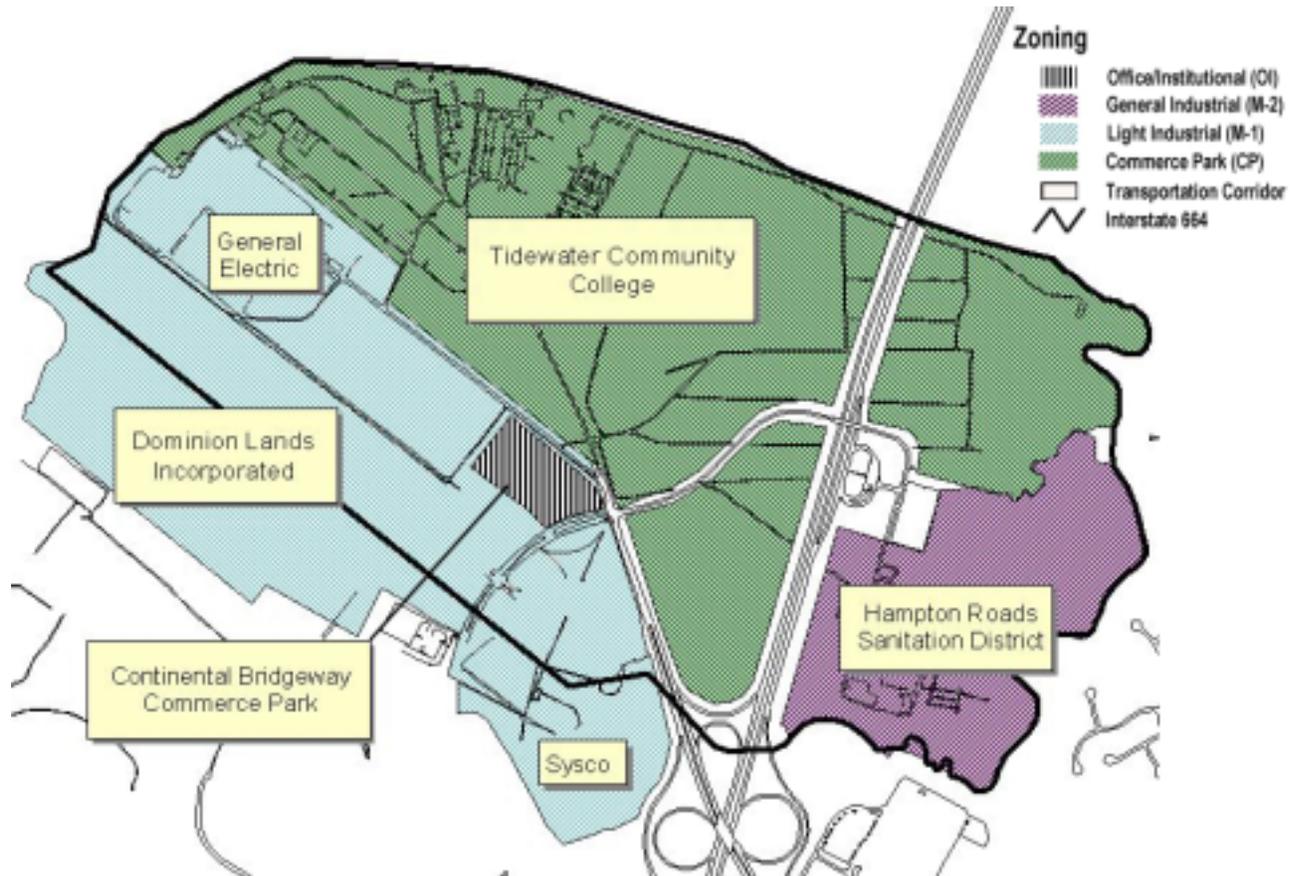


Figure 2. Current Land Owners and Zoning at FNOD

In the spring of 1987, bulk explosives, small-arms munitions, and other ordnance items, both spent and unexploded, were discovered in a 2- to 3-acre area at FNOD. This discovery initiated a series of investigations and removal actions by USACE that continue today. An updated synopsis of investigations and removal actions is provided in the *Risk Management Strategy Report for OE Hazards* (SAIC 2001c).

Several governmental agencies are involved in the investigations, removal actions, and remedial actions at FNOD. Since the Federal Government does not own or control any of the property, FNOD qualifies as a FUDS. Congress, DOD, and the Department of the Army assigned the responsibility for conducting environmental investigations and remediation of FUDS resulting from DOD activity to USACE. USACE-Norfolk is the geographic district responsible for oversight of FUDS activities at FNOD. EPA placed portions of FNOD on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) with the

Federal Government (i.e., DOD) listed as a Potentially Responsible Party (PRP). EPA and VDEQ currently provide regulatory oversight of the investigations, removal actions, and remedial actions at FNOD.

This document describes how LUCs will be implemented over the period of time while OE removal actions are ongoing at FNOD. The needs for long-term controls, as well as the potential need to establish long-term agreements, will be evaluated after all planned OE removal actions are complete. Meanwhile, other remedial investigations and response actions will be completed for potential hazardous substances, pollutants, and contaminants. At some time in the future, when decisions will be made about completing the response process for OE and hazardous substances, pollutants, and contaminants, USACE and EPA will begin a formal site-closeout process for FNOD.

Land Use Controls

Land use controls include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment. Land use controls may be used before environmental restoration activities have commenced, while conducting environmental restoration investigations, during implementation of cleanup activities, or after cleanup activities are complete. Land use controls include engineering/access controls, institutional controls, and educational/notification programs.

Engineering and access controls are engineered remedies that contain or reduce contamination. Other controls, such as fences and signs, are used to control access.

Institutional controls are administrative or legal mechanisms for limiting or restricting access to property. Legal mechanisms to implement institutional controls include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other existing land use management systems that may be used to ensure compliance with use restrictions.

Educational and notification programs normally are designed as an integral part of the institutional, engineering, and access controls. The programs are intended to inform people about the land use controls, how to identify hazards that might remain at the site, and what to do if hazards are discovered.

Removal and Remedial Actions

In contrast to remedial actions, which are intended to ***permanently*** reduce the dangers associated with actual or threatened releases of hazardous substances that are not immediately life threatening, a removal action is taken to address current or potential releases that require ***prompt*** response. Removal actions must be protective of human health and the environment over the short-term (and ideally the long-term) and can be instituted at any time during the remedial process. Removal actions may be conducted as non-time critical, time critical, or emergency, as follows:

- Non-time critical removals occur at sites where a period of at least 6 months is available for planning.
- Time critical removals are actions that must be taken quickly and have a planning period of less than 6 months.

- Emergency removals occur in situations where exposure to OE yields an imminent and substantial threat to human health or the environment and actions should be taken within hours or days.

Both time critical and non-time critical removals are being conducted for OE at FNOD.

Attachment B (DOD/EPA 1999) of the FNOD Interagency Agreement to Perform a Time Critical Removal Action for Ordnance and Explosives Safety Hazards (DOD/EPA 2000) states, “The Corps shall create and provide institutional controls to the property owners and stakeholders for implementation at the FNOD property as part of ordnance risk management.” In addition, these documents indicated that institutional controls are recommended for all sectors and areas of concern.

Site Characteristics

The OE hazards at FNOD can be grouped into four broad categories based on munitions handling practices during the time when FNOD was active and the OE that was actually handled. This categorization establishes the logic for developing the conceptual site model, assessing explosives safety risk, and developing a risk management strategy. In addition, the status of the removal actions (work has not started, work is underway, or work is completed) is an important factor in developing the conceptual site model. The rationale for categorizing the types of sites and status of removal actions are described below and listed in Table 1.

Table 1. OE Site Categories at FNOD

Categories	Believe Work is Required	Work is Ongoing	Work Completed
Burials/Trenches	<ul style="list-style-type: none"> • Area J Lake and Possible Burning Ground 	<ul style="list-style-type: none"> • Main Burning Ground 	
Demilitarized OE Scrap Disposal Areas	<ul style="list-style-type: none"> • Horseshoe Pond Area 		<ul style="list-style-type: none"> • James River Beachfront • Nansemond River Beachfront
Kick-out Areas		<ul style="list-style-type: none"> • Dominion Lands (Phase I-South and Phase II) 	<ul style="list-style-type: none"> • Dominion Lands (Phase I-North)
Washout Areas	<ul style="list-style-type: none"> • TNT Removal Area 		

- **Burials and Trenches**—This type of site is characterized by locations where live ordnance was placed in pits or trenches for demilitarization or making ordnance safe. The pits and trenches were then backfilled with soil to cover munitions that did not detonate or were partially detonated, and ordnance-related scrap (shrapnel and fragments). Because of strong magnetic signatures created by dense areas of munitions and scrap, these areas are easily identified through the use of geophysical instruments, such as magnetometers. In addition, aerial photographic analysis and interviews have been used to identify locations where demilitarization activities were thought to have occurred. The Area J Lake and Possible Burning Ground and Main Burning Ground are burial and trench sites at FNOD.
- **Demilitarized OE Scrap Disposal Areas**—These areas can be found at FNOD where large amounts of debris were discarded in erosion channels on beaches. Although OE scrap has been recovered from source areas at the James River Beachfront and Nansemond River Beachfront sites, no live ordnance has been recovered from any debris. These source areas

typically are very large and are easy to locate. However, locating OE is a challenge because there is a great deal of material, all of which needs to be inspected by hand. In addition to the James and Nansemond River Beachfront sites mentioned above, the Horseshoe Pond area is a demilitarized OE scrap disposal area.

- **“Kick-Out Areas”**—These sites result from activities that occurred at burial and trench sites. During the fires from demilitarization, forces from explosions in the pits or trenches carried away small items, both live (i.e., still containing some explosive or propellant material) and inert. These items, commonly referred to as “kick-out” material, include small projectiles (e.g., 20mm), grenades, and OE scrap (e.g., fuzes). Because of the decades of exposure to the elements and distortion created by the heat of the demilitarization operations, these items are difficult to recognize. However, with the aid of geophysical instruments, well-trained unexploded ordnance (UXO) technicians can locate and recognize OE. Dominion Lands Phases I and II are considered kick-out areas.
- **Washout Areas**—The only known area with residue from washout operations is the TNT Removal Area. Washout operations involved the use of steam cleaners or high-pressure washers to salvage ordnance parts from disassembled munitions or clean out rail cars that were caked with explosives residuum from transporting bulk explosives. The crystalline material is easily recognized visually, but difficult to locate by instrument. If munitions or parts of munitions were mixed in during burial, geophysical instruments could be used to locate the burials. As described in the Archives Search Report (USACE 1993), a large number of munitions and munitions parts also were buried in the general vicinity of the TNT Removal Area.

The Former Athletic Fields (North and South), Former Building E-410, Former Buildings L-11 and L-12, Impregnite Kit Area, and Renovation Plant Area were originally suspected OE sites that have since been surveyed and no further response for ordnance and explosives was determined to be necessary. In some cases, digital geophysical mapping was conducted followed by intrusive investigations of anomalies (i.e., excavation of soil to expose potentially explosive items). No OE material and very little OE-related material was recovered from the intrusive investigations. Although these sites appear on the conceptual site model, they are not evaluated further in this document.

Over the past several years, hundreds of live ordnance items, OE-related scrap, and non-OE scrap have been recovered from various depths during removals conducted at FNOD. Table 2 summarizes the OE that has been found at the Main Burning Ground, the Main Burning Ground Kick-Out Area (Dominion Lands Phases I and II), and the TNT Disposal Area as of October 18, 2001.

An understanding of current property ownership and land use at FNOD is vital to assessing risk and developing a risk management strategy. The current landowners and sizes of properties are listed in Table 3.

While zoning describes important information about FNOD, the authorized types of land use are more important to assessing risk and developing a risk management strategy. The city of Suffolk Comprehensive Plan specifies zoning and land uses (*Unified Development Ordinance, Article 4, § 31-403 [Relation of Zoning Districts to Comprehensive Plan and Purpose Statements] and § 31-406 [Use Regulations]*). The *Unified Development Ordinance* also classifies land uses as “permitted,” “conditional” (i.e., requires approval of City Council), and “prohibited” for each zoning (*Unified Development Ordinance, § 31-406, Table 406-1*). The following bullets summarize the purposes of different types of zoning at FNOD and the status of land uses for each.

Table 2. Summary of OE Found at FNOD *

Item	Number of Items Found	Depth (feet below ground surface [BGS])		Mass (pounds)
		Minimum	Maximum	
Projectiles				
20mm	108	1	24	—
37mm (cases)	2	1	6	—
40mm	55	1	24	—
75mm	3	8	18	—
Grenades	3	4	18	—
Miscellaneous				
Bases, boosters, fuzes, primers	90	0	18	—
Unspecified OE items	239	—	—	—
OE scrap	—	—	—	14,419
Non-OE scrap	—	—	—	139,509

* Summary current as of October 18, 2001

— Data not available

Table 3. Summary of Land Ownership at FNOD

Landowner	Approximate Property size (acres)
Continental Bridgeway One Associates, LLC	13
Dominion Lands, Inc.	229
GE	102
Hampton Roads Sanitation District	125
SYSCO Food Services of Hampton Roads, Inc.	41
Virginia State Board of Community Colleges (TCC, Portsmouth Campus)	518
Virginia Department of Transportation	107

- **Office/Institutional (O-I)**—O-I zoning includes business and commercial developments with urban transportation access. O-I includes 46 conditional (e.g., parks/open space), 47 permitted (e.g., day care facilities and nursery schools), and 143 prohibited (e.g., single-family dwellings) land uses.
- **Commerce Park (CP)**—CP zoning includes offices, office warehouses, research and development facilities “in a controlled park-like setting.” CP includes 33 conditional (e.g. hotels and motels), 27 permitted (e.g., day care facilities and nursery schools), and 175 prohibited (e.g., single-family dwellings) land uses.
- **Light Industrial (M-1)**—M-1 zoning includes a mixture of light manufacturing or research and development-related uses and limited retail and service uses. These zoning categories are designed with screening and buffering to be compatible with adjoining uses. M-1 includes 67 conditional (e.g., day care facilities and nursery schools), 41 permitted (e.g., natural area preserve), and 129 prohibited (e.g., single-family dwellings) land uses.

- **General Industrial (M-2):** Areas of heavy and concentrated fabrication, manufacturing, and industrial uses, which are suitable based upon adjacent land uses, access to transportation, and the availability of public services and facilities. M-2 includes 61 conditional (e.g., detention center), 59 permitted (e.g., natural area preserve), and 117 prohibited (e.g., single-family dwellings) land uses.

The conceptual site model (Figure 3) illustrates the areas of interest with fill colors indicating if removal actions have not been started, are underway, or have been completed and border colors indicating whether the site is a burial/trench, demilitarized OE scrap area, kick-out area, washout area, or non-OE area. In addition, zoning types and boundaries are illustrated with colored patterns identified in the figure legend.

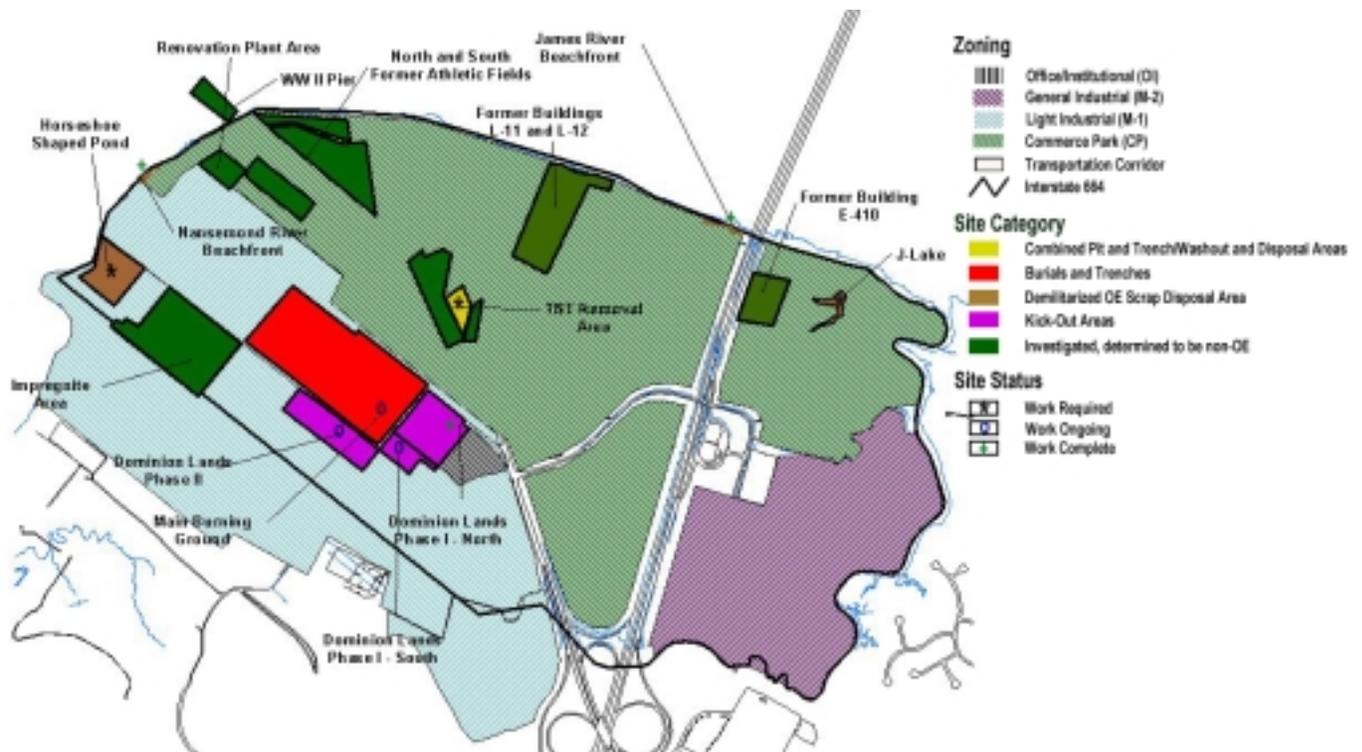


Figure 3. FNOD Conceptual Site Model

SCOPE AND ROLE OF LAND USE CONTROL IMPLEMENTATION PLAN

At FNOD, removal actions have been conducted to clear OE from several sites, several others are planned, and others are currently underway. Additional CERCLA remedial actions are now in the process of being planned and implemented to characterize and address hazardous substances, pollutants, and contaminants. Attachment B (DOD/EPA 1999) of the FNOD Interagency Agreement to Perform a Time Critical Removal Action for Ordnance and Explosives Safety Hazards (DOD/EPA 2000) states, "The Corps shall create and provide institutional controls to the property owners and

stakeholders for implementation at the FNOD property as part of ordnance risk management.” In addition, these documents indicated that institutional controls are recommended for all sectors and areas of concern.

At FNOD, land use control options chosen to be used at FNOD are set forth in this Draft Interim LUCIP for public comment. After public comments received on this Draft Interim LUCIP have been reviewed and considered, USACE-Norfolk, with stakeholder input, will select the land use controls for this site and present the selection in the Final Interim LUCIP. The Final Interim LUCIP will contain a Responsiveness Summary that responds to all significant comments received during the public review.

Land use controls addressed by this Draft Interim LUCIP are those necessary to be implemented until removal activities at all known and suspected OE sites are concluded. At that time, residual risk posed by potentially remaining OE will be assessed at FNOD to determine the need for further land use controls over the long-term.

SUMMARY OF SITE RISKS

The OE risk assessment for FNOD is based on existing information regarding the nature and extent of OE and will be used to support the risk management strategy. OE risk is generally grouped into two categories: (1) explosives safety risks associated with potential detonation of OE and (2) chemical risks associated with the toxicological aspects of OE. This section focuses on explosives safety risk, which is evaluated for eight sites listed in Table 1. This section summarizes the assessment of explosives safety risk that is described in greater detail in the *Risk Management Strategy Report for OE Hazards* (SAIC 2001c).

The utility of knowing precise levels of risk is questionable when the probability of encountering OE is low and the consequences are potentially severe. For this reason, explosives safety risk should be assessed qualitatively. Furthermore, the assessment should focus on determining if OE is present and, if so, determine if human contact is possible. The following sections combine information about known and suspected OE locations with information about human activities to develop an understanding of OE risk at FNOD.

The U.S. Army Engineering and Support Center, Huntsville has developed interim guidance for assessing explosives safety risks to support the detailed analysis of response alternatives in OE Engineering Evaluations/Cost Analyses (EE/CAs) (USACE 2001). This guidance implements the OE Risk Impact Assessment (OERIA) methodology and evaluates risk with respect to three basic risk factors (i.e., site characteristics, human factors, and OE factors) illustrated in Figure 4. OERIA can be used as the model for this assessment.

Table 4 summarizes the baseline or current condition risks in terms of whether work is required, ongoing, or complete. Table 5 presents the impacts on OE safety risk that could be realized by implementing different land



Figure 4. Basic Elements of OERIA

use control alternatives relative to the baselines established on Table 4.

Table 4. Summary of Factors Under Current Conditions (Baseline Scenario) at FNOD

Site	Type ^a	Sensitivity ^b	Density ^c	Depth ^d	Accessibility ^e	Stability ^f	Activities ^g	Population ^h
Work Is Required								
Area J Lake and Possible Burning Ground	Cat. 3 ^c	Cat. 3 ^c	High ^c	Surface to 8 feet BGS ^c	Limited	Stable	Significant	<1/day
Horseshoe Pond Area	Unknown	Unknown	Unknown	Unknown	Limited	Stable	Unknown	<1/day
TNT Removal Area	Cat. 3	Cat. 3	Extremely low	Surface to 8 feet BGS	No restrictions	Stable	Moderate	>20/day
Work Is Ongoing								
Main Burning Ground	Cat. 3	Cat. 3	High	Surface to 8 feet BGS	No restrictions	Stable	Significant	~20/day
Dominion Lands (Phase II)	Cat. 3	Cat. 3	Low	Surface to several inches BGS	Limited	Stable	Significant	~20/day
Work Completed								
Dominion Lands (Phase I)	Cat. 3	Cat. 3	Low or extremely low ^a	Surface to several inches BGS	No restrictions	Stable	Moderate	>20/day
James River Beachfront	Cat. 0	Cat. 0	Extremely low or nonexistent	Greater than 10 feet BGS	Limited	Stable	Moderate	<1/day
Nansemond River Beachfront	Cat. 0	Cat. 0	Extremely low or nonexistent	Greater than 10 feet BGS	Limited	Stable	Moderate	<1/day

- ^a Ordnance types, such as projectiles and grenades, that are listed under category 3 represent OE that will kill an individual if detonated by an individual's activities, and category 0 represents inert OE or scrap that will cause no injury because the item will not explode.
- ^b Ordnance sensitivity is used to describe the likelihood of an ordnance item exploding when handled. Items listed under category 3 represent OE that are very sensitive, and category 0 represents inert OE or scrap that will cause no injury when handled.
- ^c Density refers to the number of ordnance items that can be found in a given area, such as number of ordnance items per acre. Assumption based on OE recovered from another similar type site at FNOD.
- ^d This variable describes the measured or assumed distance from the ground surface to the uppermost point on an ordnance item located underground (BGS= below ground surface).
- ^e Accessibility describes the potential for humans to encounter ordnance.
- ^f Stability describes the potential for natural forces to make ordnance more accessible in the future through events such as frost-heave or hurricanes.
- ^g The category "significant" is highest, followed by "moderate" and "low" categories.
- ^h Population describes the number of people per day who are believed to visit the area where the ordnance is located.

The analysis considers each land use control alternative with respect to each OE factor in OERIA and determines "no impact" or ranks alternatives relatively from most to least effective in reducing risk using a scale range from "Good," to "Better," and "Best." The analysis presented in Table 5 does not reflect removals that already are planned for sites where work is required or for parts of sites that have been completed; these analyses will occur after all OE removal actions have been completed at FNOD. In addition, the baseline in Table 5 represents a worst-case combination of factors spanning all of the sites where work is required, ongoing, or complete.

Table 5. OE Risk Impact Analysis of Land Use Control Alternatives

Site	OE Factors				Site Characteristics		Human Factors		Overall Rank
	Type	Sensitivity	Density	Depth	Accessibility	Stability	Activities	Population	
<i>Engineering/Access Controls</i>									
Construction support	No impact	No impact	No impact	No impact	Good	No impact	Best	Good	Good
Fences ^d	No impact	No impact	No impact	No impact	Best	No impact	Better	Best	Best
Signage ^d	No impact	No impact	No impact	No impact	Best	No impact	Better	Best	Best
<i>Institutional Controls</i>									
Zoning and permits	No impact	No impact	No impact	No impact	Good	No impact	Best	Good	Good
Advisories and restrictions	No impact	No impact	No impact	No impact	Good	No impact	Best	Good	Good
<i>Educational/Notification Programs</i>									
Regular mailings	No impact	No impact	No impact	No impact	Better	No impact	Good	Better	Better
Public information meetings	No impact	No impact	No impact	No impact	Better	No impact	Good	Better	Better
City and program participation	No impact	No impact	No impact	No impact	Better	No impact	Good	Better	Better
Miss Utility	No impact	No impact	No impact	No impact	Better	No impact	Good	Better	Better
Fact sheets	No impact	No impact	No impact	No impact	Better	No impact	Good	Better	Better
Current conditions ^a	Cat. 3 ^b	Cat. 3 ^c	Dense	Surface	No restrictions	Unstable	Significant	>20/day	Not applicable

^a The current conditions represent a worst-case composite across all sites.

^b Ordnance sensitivity listed under category 3 represents OE that is very sensitive and category 0 represents inert OE or scrap that will cause no injury.

^c Assumption based on OE recovered from another similar type site at FNOD.

^d Effectiveness of fences and signs is assumed to be dependent on the construction, design, and maintenance.

This combination was selected to demonstrate the largest impact on risk, which is believed to be the most useful for evaluating land use control alternatives. The following bullets summarize the rationale used to analyze the land use control alternatives presented in Table 5:

- **OE Factors**—As would be expected, land use controls show more significant impacts on site characteristics and human factors than on OE factors. For example, a fence might be effective in limiting or restricting accessibility, but it will not change the type or sensitivity of OE. Consequently, Table 5 does not reflect any impacts on OE factors from implementing any land use control alternatives.
- **Accessibility**—Fences and signs are considered the best impact on risk because they are the most visible deterrent. Education and notification can be effective means of restricting access, but the effectiveness is limited to participants, the composition of which will change

with time. Institutional controls and construction support are both effective, but only by law-abiding participants.

- **Stability**—This OERIA factor does not appear to be important to this analysis at FNOD because all sites are stable.
- **Activities**—Construction support and institutional controls were considered the best alternatives to impact risk because of the preventive nature of these controls. Both are intended to preclude activities by reducing the likelihood of individuals encountering OE. Fences and signs might not preclude some activities, but would signal the presence of hazards associated with potentially moderate activities. Education and notification are believed to be effective, but only for the receptive and compliant audience.
- **Population**—Fences and signs are considered the best controls in reducing the frequency of individuals at FNOD in contacting OE. Education and notification would serve to augment the effectiveness of the fences and signs while people are at FNOD. Institutional controls seemed to be the least likely to impact risk to the population that already visits FNOD.

REMOVAL ACTION OBJECTIVES

For reasons explained below, land use controls are necessary while OE removal actions are being conducted at FNOD. The specific controls may differ depending on whether work in the particular area in question has started, is ongoing, or is complete.

The goal of implementing land use controls is to protect human health and the environment. The following removal action objectives are designed to help meet this basic goal for areas where OE may be present:

- Notify people who may disturb the surface of the land or conduct excavation activities of the potential presence of residual OE before any disturbance occurs
- Prohibit unauthorized subsurface excavation
- Prohibit any change in land use (particularly to residential use) until the current owner/operator or other person using the land is adequately informed of the potential presence of OE
- Ensure occupational and public safety and environmental integrity by providing an acceptable contingency plan in the event that residual ordnance is discovered. The contingency plan should ensure that proper OE clearance procedures are followed and provide that USACE will assist with appropriate expertise.

For OE removal actions at FNOD, the focus for implementing land use controls is on explosives safety risk. Removal actions at FNOD have been or will be designed to locate and remove OE that can be located with current technology. Land use controls are needed while removal actions are conducted at known and suspected OE sites because of the following conditions:

- Before OE removals are conducted, people are potentially at risk where notice and/or access restrictions do not exist.
- The act of removing OE carries with it risks associated with exposure to the OE, including explosives safety risk associated with the energetic material and health risks from the hazardous substances that may be present.
- OE may remain in areas or at depths that are not suspected or identified.

- Detection and removal methods are not always 100 percent effective. Although USACE and contractors follow a rigorous quality assurance program, some ordnance may remain in areas or at depths that already have been subjected to removal actions.

SUMMARY OF ALTERNATIVES

Land use controls that are under consideration for potential use at FNOD during the OE removal actions are presented below. Additional information about the alternatives described below is presented in the LUCOP (SAIC 2001b).

Engineering and Access Controls

Engineering controls are the primary physical means of mitigating risk at FNOD. Engineering controls are engineered remedies that actively contain, reduce, or eliminate contamination at a property. Access controls are used to control exposure. Examples of engineering and access controls include:

- Construction support
- Fences
- Signage.

Construction support is providing assistance in avoiding ordnance and explosives risks in areas where a clearance has not been started or has not been completed.

In some cases, administrative mechanisms are needed to ensure that engineering controls are effective. For example, engineered remedies need to be maintained, repaired, or replaced, as necessary. Since several OE sites are privately owned (see Table 3), access rights may be needed to construct, maintain, repair, monitor, or perform other activities that might be required for land use controls.

Institutional Controls

Institutional controls are administrative and legal mechanisms for limiting or restricting access to property and are classified generally as proprietary controls or governmental controls. Proprietary controls are those established by a private property owner, and governmental controls are those established by local, state, or Federal Government.

Proprietary Controls—Proprietary institutional controls are those established by a private property owner. The most common kinds of proprietary controls are easements, covenants, and reversionary interests.

Typically, the only person who can impose an easement, covenant, or reversionary interest on a piece of land is the owner of that land. In order to implement a proprietary control, then, a private landowner must be willing to burden his land with the control. In addition, proprietary controls must be implemented in accordance with state law. However, a proprietary control can be implemented without Federal, state, or local governmental involvement.

Easement—An easement is a right to use the land of another. Several different kinds of easements exist. Some of these easements are presented below.

- ***Easement In Gross***—An easement in gross is created when the owner of the land grants rights to use or restrict use of the land to an individual. An easement in gross involves only

one piece of land, the land that is burdened. The easement granted is usually personal, without being attached to land owned or used by the holder (grantee), and it usually ends with the death of the grantee. The holder of an easement in gross usually cannot pass the interest by inheritance nor can the holder transfer the interest. However, the owner of the burdened estate has the discretion to either pass the servitude by inheritance or to transfer the servitude.

- **Affirmative Easement**—An affirmative easement allows the holder to use another’s land in a way that would be unlawful without the easement, such as providing a right-of-way. Most easements are affirmative.
- **Negative Easement**—A negative easement prohibits a lawful use of the land. The holder of a negative easement may prohibit the servient land from doing something that it is otherwise privileged to do. Many environmental easements are negative.

Covenant—A covenant is a promise or agreement of two or more parties where one of the parties pledges himself to the other that something will or will not be done.

- **Restrictive Covenant**—A restrictive covenant is a provision in a deed or contract of sale that limits the use of the property and prohibits certain uses. A restrictive covenant is said to ‘run with the land,’ which means that either the liability to perform it or the right to take advantage of it passes to the person or entity to whom the land is transferred from the party who originally entered into the covenant.
- **Equitable Servitude**—A restrictive covenant that can be enforced by requiring specific performance of the terms of the promise in a court of equity is also known as either an equitable easement, if a right is granted, or an equitable servitude, where a burden is imposed. A court will enforce a covenant only where the intent of the parties is clear and the restriction is reasonable.

Statutory Easements—Some states have created statutory use restriction easements that override common law doctrines on easements. Two such programs have been created in Virginia: the **Conservation Easement Law** and the **Open-Space Land Act**.

- Under the **Conservation Easement Law**, an easement appurtenant or in gross can be granted for the primary purpose of any of the following: (1) retaining or protecting the natural or open-space values of real property; (2) ensuring the availability of real property for agricultural, forestal, recreational, or open-space use; (3) protecting natural resources; (4) maintaining or enhancing air or water quality; or (5) preserving the historic, architectural or archaeological aspects of real property. The holder of the easement may be a charitable corporation, charitable association, charitable trust, or governmental body, as defined in Virginia law.
- Under the **Open-Space Land Act**, a public body can acquire an easement appurtenant or in gross for the purpose of preserving open-space land. A public body is: any state agency having authority to acquire land for a public use, or any county or municipality, any park authority, any public recreational facilities authority, any soil and water conservation district, certain community development authorities, or the Virginia Recreational Facilities Authority. “Open-space land” is any land provided or preserved for park or recreational purposes, conservation of land or other natural resources, or historic or scenic purposes. “Open-space land” is also land that is provided or preserved for assisting in the shaping of the character, direction, and timing of community development. “Open-space land” includes wetlands.

Deed Restriction—A deed restriction often is mentioned in regulatory programs as an institutional control. The term “deed restriction” does not have a particular meaning in property law. Rather, a deed restriction can refer to any of a number of proprietary controls or other notices that are recorded on the deed. These include easements, covenants that run with the land, reversionary interests, and reverter clauses. These also include notices on deeds that are required by some laws and rules for property where hazardous substances have been managed.

Governmental Controls—Institutional controls can be established by Federal, state, and local governmental authorities as well as by private individuals and landowners. State and local governments traditionally have carried out this function over lands within their jurisdictions through the use of their police power.

Zoning and Planning—Planning and zoning are the most common forms of local land use control. With this type of institutional control, use restrictions are imposed through the local zoning or land use planning authority. Examples of use restrictions are those that limit access and prohibit disturbance of the remedy. There is no Federal involvement in zoning, nor is state-owned or federally owned land subject to local zoning ordinances. Much of the property at FNOD is currently state-owned.

The city of Suffolk enacted a “Unified Development Ordinance” effective September 1999, which contains zoning requirements and subdivision regulations for all property within the jurisdiction of the city. Emphasis of the ordinance is on “smart growth management strategy.”

Under the terms of the Unified Development Ordinance, the city of Suffolk requires that:

No person shall construct any structure, use any land or change the use of any structure or land until a zoning permit has been obtained from the zoning Administrator and a building permit has been obtained from the Building Official in the Department of Neighborhood Development Services.

Thus, no development can be performed without obtaining all applicable permits for the development along with any required plan approvals.

Costs of implementing local governmental zoning controls would be low because the programs are already in place.

Regulatory Permit Programs—Permit programs exist at the Federal, state, and local levels. Often, the Federal and state governments work together in drafting a permit issued to a facility. Examples of permits that can be of use in implementing institutional controls include a water use authorization, restrictions on use of groundwater implemented through a state permitting system, or a local building permit requirement.

Advisories and Restrictions—Often, a state authority or a local authority such as a municipal health department will issue an advisory on water and well use.

Different forms of advisories include newspaper notices, publications in specialty publications, signs, mailings to residents, and announcements on television and radio. Use of signs requires frequent monitoring by the responsible party to ensure that the sign has not been removed and is still in readable condition.

Statutory or Rule Requirements—Some statutes or rules establish a requirement that amounts to an institutional control, such as the 5-year review requirement of CERCLA or the deed notice requirements of the RCRA closure rules.

Educational/Notification Programs

Educational programs are intended to inform people about land use controls at FNOD, how to identify hazards that might remain at the site, and what to do if hazards are discovered. Notification and education will include ensuring that land users are aware of the steps to take once OE is encountered, as well as steps to take during routine activities to minimize the chance of having an accident.

- **Regular Mailings**—Publish a notification pamphlet and distribute regularly to owners/occupants of affected properties until OE removals are complete.
- **Public Information Meetings**—Educate the public about the dangers of the OE that is potentially present at FNOD.
- **City/Program Participation**—Broadcast radio public service announcements and publish newspaper advertisements and articles to inform the entire community several times a year about Restoration Advisory Board (RAB) meetings or other public events and about work progress.
- **Emergency Services/Miss Utility Support**—Use existing notification systems for different communication needs (e.g., 911 to notify USACE or local explosives ordnance disposal [EOD] unit if OE is discovered; if possible, use Miss Utility to warn excavators of potential presence of OE).
- **Fact Sheets**—Post fact sheets in buildings on FNOD properties and distribute at public information forums.

Educational efforts under consideration include regular mailings, public information meetings, newspaper advertisements, pamphlets published by USACE describing the potential OE that could be encountered, and training programs for specified personnel.

Agency Review and Agreement of Land Use Changes—This institutional control could be implemented by state agencies. The basic concept would be to establish a state-agency-to-state-agency agreement for review of projects. For example, VDEQ could have an agreement with the Virginia Department of Transportation that VDEQ can review proposed projects located in the affected area. In the agreement, it would be established that VDEQ has veto power over the project. This kind of arrangement could be made among local government agencies as well, or between a local government entity and a state agency.

Virginia already has legislation in place that allows VDEQ to comment on projects conducted by the Virginia Department of Transportation, which involve highway construction, at Virginia Code 10.1-1188.

Consultation Process Among Local Governments or Between Local, State, and Federal Agencies—A consultation requirement is relatively easy to implement, and could be an effective means for putting USACE-Norfolk on notice that a landowner intends to change the use of a parcel on which land use restrictions have been placed.

Records—Another notification method under consideration is to use a records system or share a records system. This kind of institutional control would consist of a database of all sites where the potential presence of OE is suspected, as well as sites that have been cleaned up, along with the use restrictions attached. The database could be distributed to the city, which can integrate it with utility maps, to the zoning and building permit offices, to the municipal and state health departments, to property records offices, perhaps to lenders and insurance providers, to VDEQ, and maintained by the Federal Government.

A geographic information system (GIS) system for the FNOD already is being developed by the city of Suffolk Planning and Zoning Division, which regulates planning and land use. The GIS system will feed into the 911 emergency notification system. USACE intends to enter into an agreement with this division to ensure and reinforce enforcement efforts.

Monitoring—A monitoring program could be established by the city of Suffolk or another interested party to ensure that the land is not disturbed or any construction performed without appropriate knowledge of the potential dangers and what to do if OE is discovered.

Monitoring requirements will be written into agreements for implementing and enforcing institutional controls. Some officials in the city of Suffolk have indicated willingness to enter into an agreement for implementing and enforcing certain institutional controls at the site, including visual monitoring. However, the City Council would have to agree to enter into agreements and the City Manager would need to sign any such agreements.

In addition, the Federal Government has an ongoing monitoring requirement. Under CERCLA Section 121(c), a 5-year review of a remedial action is required whenever any hazardous substances, pollutants, or contaminants are left at the site. USACE is required to conduct the 5-year review at FNOD. The review is conducted to ensure that human health and the environment are being protected by the remedial action. This purpose includes assessing whether land use controls are functioning as expected.

Notice—Notification of potential hazards can be accomplished in many ways. Landowner notification and local utilities notification are two methods that are likely to be used at FNOD during removal actions. Another notification tool is the GIS-based records system.

One method already has been set up with the city of Suffolk, Emergency Services Department. This Department has entered into a contingency plan with USACE that directs calls to USACE or local EOD units when called onsite for incidents at FNOD.

In addition, Virginia has the Miss Utility program in place to inform persons who will conduct excavation activities of the presence of underground utility. Through this program, notice of potential contamination, information about how to protect employees while conducting excavation activities, and what to do if ordnance is encountered could be provided to persons who plan to conduct excavation activities if the Virginia State Corporation Commission is able to expand the system as such. One possible drawback of this approach is that the legislation for Miss Utility may have to be amended to authorize the government to conduct these activities under the Miss Utility program. If the legislation were amended, the Miss Utility program notice would be readily enforceable.

EVALUATION OF ALTERNATIVES

Response alternatives will be evaluated in this document against nine criteria: overall protection of the environment; compliance with applicable or relevant and appropriate requirements (ARARs); long-term effectiveness and permanence; reduction of toxicity, mobility, and volume of contaminants through treatment; short-term effectiveness; implementability; cost; state/support agency acceptance; and community acceptance.

Of these criteria, the most important for the land use controls at FNOD OE sites (i.e., for the duration of the removal actions) are short-term effectiveness, implementability, cost, state acceptance, and community acceptance. State and community acceptance are addressed following public review. The long-term effectiveness and permanence criterion will increase in importance after all planned OE removals are completed at FNOD. The following bullets summarize the relevance to FNOD land use controls:

- **Short-term effectiveness** is evaluated by how the component of the alternative will protect the community while OE response actions are being conducted at FNOD. Workers are included in the population that may be affected by short-term exposure.
- **Implementability** addresses the technical and administrative feasibility of implementing an alternative and the availability of various services required during its implementation.
- **Cost** is used as a comparative tool under the nine criteria evaluation. The respective alternatives are compared with respect to cost; however, no conclusion is drawn as to the cost-effectiveness of the alternative. Cost-effectiveness is determined in the final remedy selection phase.
- **State acceptance** reflects the CERCLA requirement to provide for substantial and meaningful state involvement.
- **Community acceptance** refers to all interested parties. Many institutional controls cannot be implemented without the express consent, cooperation, and action of the local community.

This section profiles the relative performance of each alternative against the CERCLA criteria, noting how it compares to the other options under consideration. The “Detailed Analysis of Potential Land Use Controls” is presented in the LUCOP (SAIC 2001b).

Short-term Effectiveness

Some of the potential land use controls would have a high degree of short-term effectiveness at FNOD as long as they were effectively implemented. Notification and educational requirements fall within this category, as do monitoring controls.

Construction support ranges from conducting safety briefings, to providing a two-person UXO team on standby in case construction contractors encounter OE, to UXO teams required to conduct subsurface UXO clearance for the known construction footprint prior to initiating intrusive construction activities. Since USACE is planning to conduct OE removals at all known and suspected OE sites and will be onsite for the next several years, the latter two scenarios (i.e., standby teams and UXO clearance) are effectively already being implemented. Providing safety briefings to construction contractors is considered most effective while USACE is onsite because USACE can confirm that safety procedures are being followed and, if necessary, increase the level of support.



Fences and signs often are ignored and can be ineffective in terms of restricting access without the cooperation of the landowner, local officials, and community in enforcing/obeying trespassing laws. In addition, they lose their effectiveness if not properly maintained or monitored. However, since they will be needed only for a short period of time, maintenance is not likely to impact the effectiveness, assuming the fences and signs are installed properly. The frequent presence of USACE personnel and contractors at FNOD increases the effectiveness.

Based on the feedback obtained from meetings and questionnaire responses provided by stakeholders, proprietary controls will not be considered in this evaluation because landowners do not support these types of controls. These controls can be implemented only with the consent, cooperation, and action of the landowners.

Zoning as an institutional control can rely on programs already in place that can be supplemented or extended slightly to provide notice, education, and enforcement requirements for land use restrictions and changes at FNOD for the duration of the OE removal actions. This option would be very effective in the short-term, but as zoning can change, long-term effectiveness and permanence is not as favorable.

At this time, regulatory permit programs do not appear to be needed to implement land use controls for FNOD OE sites. This analysis will be conducted if regulatory permits are needed at some time in the future.

Advisories are effective in the short-term if they reach the intended audience, and if the audience understands the message and is willing to comply with the advisory.

Statutory requirements—specifically, CERCLA’s requirement to review the protectiveness of remedial actions every 5 years—would not help ensure the effectiveness of land use controls over the short period (4 years or so) that USACE is considering here. In addition, this requirement, strictly speaking, does not apply to short-term removal actions such as those being considered here.

Educating and notifying the public about hazards associated with the potential OE present at FNOD and methods to avoid the hazards could provide an effective measure for protecting the public from those OE hazards as long as the program is maintained.

Agency review and agreement of land use changes has a great potential to be effective on a short-term basis while the OE removals are being implemented, as does agency consultation arrangements. This control also could be effective in the long-term if the agreements are maintained.

A consultation process among local governments or between local, state, and Federal agencies is already in effect between USACE and local emergency services. This option has a high degree of short-term effectiveness and it could be effective over a period of time if the process is implemented as planned.

Records of land use restrictions or of areas where potential OE exists would be very effective in the short-term and the long-term. If the records were in a GIS system that was readily accessible for potential developers or users of the land, the records could provide adequate notice to satisfy human health and safety concerns on an immediate basis.

Monitoring activities and site conditions on a regular basis can be an extremely effective institutional control as long as the monitoring program is maintained.

Notice requirements would have a high degree of effectiveness at FNOD as long as they were effectively implemented.

Implementability

USACE has personnel and contractors onsite to implement construction support (e.g., conduct safety briefings) and will have personnel onsite or contingency personnel available on-call, so implementing this land use control will require very little additional effort.

Fences and signs are relatively easy to implement. However, since fences and signs would only be needed in areas where removal actions have not been completed or started, construction support would be needed. An alternative to providing construction support is to conduct OE surface clearances in narrow lanes in which to drive fence posts. Construction permits also would be needed.

Based on the feedback obtained from meetings and questionnaire responses provided by stakeholders, proprietary controls will not be considered in this evaluation because landowners do not support these types of controls. These controls can be implemented only with the consent, cooperation, and action of the landowners.

One advantage of using zoning as an institutional control is that the local government, which is the closest level of government to the land, already implements zoning and monitors the use of the land. Another advantage of using zoning as an institutional control is that requirements are established only in the context of a high degree of public participation for decisions involving each and every parcel, as well as decisions involving an entire neighborhood.

One major weakness with local governmental institutional controls is that the zoning process is subject to political pressures that may be antithetical to environmental concerns, and the legislation easily can be changed or repealed. In addition, the Commonwealth of Virginia has no say over local zoning processes or content, nor is the Commonwealth subject to regulation by local zoning restrictions. Therefore, local governmental controls need to be used in combination with other institutional controls that may be more stable and credible than the local controls.

Viability of local governmental institutional controls can be strengthened. One way is to encourage the local government to enter into an MOA with USACE to ensure implementation and enforcement of the institutional controls. Another way is to enlist the aid of public opinion and support by getting the public involved and relying on their interest and pressure to encourage continuity of the institutional controls.

Within the city of Suffolk government, some officials have indicated willingness to enter into an agreement for implementing, enforcing, and monitoring institutional controls at FNOD. However, the City Council would have to agree to enter into agreements and the City Manager would need to sign such agreements.

At this time, regulatory permit programs do not appear to be needed to implement land use controls for FNOD OE sites. This analysis will be conducted if regulatory permits are needed at some time in the future.

The effectiveness of an advisory is limited to the understanding and willingness of individuals to observe the advisory. However, since advisories are not expensive to issue, they are a desirable tool and can reach a large audience. They are also part of any serious education program. The local health department or police office could be called upon to issue the advisory.

Statutory requirements—specifically, CERCLA's requirement to review the protectiveness of remedial actions every 5 years—would not help ensure the effectiveness of land use controls over the short period (4 years or so) that USACE is considering here. In addition, this requirement, strictly speaking, does not apply to short-term removal actions such as those being considered here.

With regard to educational and notification programs, many organizations and avenues exist that could provide education or notice to the public about the OE hazards at FNOD. These organizations include USACE, state agencies such as VDEQ and the Virginia Department of Transportation, and several departments in the city of Suffolk. Avenues to provide notice and information include existing government programs, newspapers, and radio or television. For records systems, authority exists at the local and Federal levels for establishing a GIS-based records system.

Agency review and agreement of land use changes depends on agency desire to enter into agreements and ability to cooperate. One avenue for agency action review is already in place between VDEQ and the Virginia Department of Transportation.

An agency consultation control would use systems already in place and would impose little extra burden. This institutional control is implemented on a voluntary basis by community programs that are interested in maintaining the public health and safety.

If the Miss Utility program is used to provide notice to the public, legislation defining the program may have to be amended first.

Cost

The total costs of implementing different controls are presented below. Total costs include capital cost to implement controls, as well as operation and maintenance (O&M) costs to maintain, monitor, and enforce them. For the purpose of discussion, total costs less than \$25,000 are considered low, moderate if greater than \$25,000 and less than \$100,000, or high if greater than \$100,000. The total O&M costs were calculated for four follow-on years (i.e., assuming capital costs cover first year) and are based on present-worth of future operating costs with an interest rate of 5 percent per year. In addition, ranges are provided for the costs because EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988) recommends providing costs that are accurate within -30 to +50 percent.

Since USACE personnel or contractors with the qualifications needed to conduct construction oversight are already onsite and familiar with the site and types of OE that could be encountered, the cost of implementing this alternative is low.

The total costs for fencing is considered high and the cost for signs is considered low. The capital cost associated with installing fence is based on the assumption that an area equivalent to twice that of the perimeter of the Main Burning Ground, which is 10,946 feet (or 2 times 5,473 feet), is fenced and 10 percent of the total linear footage is maintained or replaced per year at \$16/linear foot.

Costs for the remaining options are presented in Table 6. Additional information is provided in the LUCOP (SAIC 2001b) regarding the basis for the cost estimates.

Table 6. Summary of Alternative Land Use Control Cost Estimates

Alternative	Costs			Range		Cost Qualifier
	Capital	O&M	Total	-30%	+50%	
Engineering/Access Controls						
Construction support	\$130	\$450	\$580	\$400	\$850	L
Fences	\$175,000	\$59,000	\$234,000	\$164,000	\$350,000	H
Signage	\$875	\$12,000	\$12,875	\$9,000	\$19,000	L
Institutional Controls						
Zoning	\$14,000	\$47,000	\$61,000	\$43,000	\$92,000	M
Advisories/restrictions	\$5,000	\$17,000	\$22,000	\$15,000	\$33,000	L
Education/Notification Program						
1. Education/Notification:						
Regular mailings	\$5,000	\$17,000	\$22,000	\$15,000	\$33,000	L
Public information meetings	\$17,000	\$41,000	\$58,000	\$40,000	\$86,000	M
City/program participation	\$6,000	\$20,000	\$26,000	\$18,000	\$39,000	M
Emergency services/Miss Utility	\$6,000	\$20,000	\$26,000	\$18,000	\$39,000	M
Fact sheets	\$31,000	\$34,000	\$65,000	\$45,000	\$97,000	M
2. Administrative Activities:						
Agency review	\$2,000	\$1,500	\$3,500	\$2,500	\$5,000	L
Consultation process	\$100	\$330	\$430	\$300	\$700	L
Records	\$6,000	\$8,000	\$14,000	\$10,000	\$22,000	L
Monitoring	\$56,000	\$97,000	\$153,000	\$107,000	\$229,000	H
Notice	\$6,000	\$8,000	\$14,000	\$10,000	\$22,000	L

L – Low (total cost less than \$25,000)

M – Moderate (total cost greater than \$25,000 and less than \$100,000)

H – High (total cost greater than \$100,000)

State Acceptance

To determine state/support agency acceptance of potential land use control options, a questionnaire was distributed to all known interested persons. Two state agencies (i.e., Virginia Community College System [VCCS] and Virginia Department of Transportation) submitted informal responses to the questionnaires. Formal responses to the questionnaires must come from higher levels of management, possibly from the Attorney General’s Office.

One state respondent to the questionnaire supports the use of a records system, where a notice in the planning records could be picked up during a Phase I assessment conducted in accordance with American Society for Testing and Materials (ASTM) standards. One state respondent agrees with the use of zoning and planning as an institutional control at FNOD, but cautions that local

zoning regulations do not apply to state-owned property. One state respondent supports the use of advisories as a viable institutional control option.

Community Acceptance

One of the primary purposes of this document is to solicit comments from the public on alternatives for land use controls to protect the public from ordnance and explosives at FNOD. USACE will respond to significant public comments and take them into account before making a final decision on which land use controls to select. USACE encourages the public to comment on the plan outlined in this document.

To preliminarily assess community acceptance of potential land use control options, a questionnaire was distributed to all known interested persons.

One community respondent out of two has supported the use of local governmental services to provide information. In addition, community acceptance for educational and notification programs has been demonstrated in meetings and conversations held on the issue of notice. For records, one local landowner respondent noted that it preferred the use of locally available records systems.

Both of the community respondents agree with use of zoning controls as an institutional control at the FNOD. Further, some officials within the city of Suffolk government have indicated willingness to enter into an agreement for implementing, enforcing, and monitoring institutional controls at FNOD. However, the City Council would have to enter into agreements and the City Manager would need to sign such agreements. One of the respondents does not necessarily believe that an agreement is required to enforce the controls.

The consultation option depends on community interaction to be effective. Some forms of governmental or agency consultation would have high community acceptance.

PREFERRED ALTERNATIVE

USACE is proposing the following as the preferred alternative for land use controls for ordnance and explosives at FNOD while OE removal actions proceed (Table 7). USACE will be responsible for implementing, maintaining, and monitoring interim land use controls for ordnance and explosives at FNOD. Table 8 summarizes the preferred alternatives by FNOD site.

Table 9 provides an overview of the roles and responsibilities that are intended be included in the agreements for groups of land use controls with similar or related characteristics. These roles and responsibilities have been discussed preliminarily, but have not been formalized.

Based on information currently available, USACE believes the preferred alternatives will contribute to meeting the criteria of overall protection of human health and the environment and compliance with ARARs when used in each removal action. The preferred alternatives provide the best balance of tradeoffs among possible land use controls with respect to the balancing and modifying criteria. USACE expects the preferred alternatives to satisfy the following statutory requirements of CERCLA Section 121(b) when used in each removal action: (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

Table 7. Summary of Preferred Alternatives for Land Use Controls

Control	Conditions of Applicability
<i>Engineering and Access Controls</i>	
Construction support	Where risk is presumed
Fences	Where risk dictates
Signage	Anywhere work is ongoing or has not started
<i>Institutional (Governmental) Controls</i>	
Zoning and planning	Where land use should be specifically controlled
Advisories/restrictions	All of FNOD (special notice to known OE sites)
<i>Educational and Notification Programs</i>	
Regular mailings	All FNOD and surrounding community
Public information meetings	All FNOD and surrounding community
City/program participation	All FNOD and surrounding community
Emergency services/Miss Utility support	All FNOD (special notice to known OE sites)
Fact sheets	All FNOD (special notice to known OE sites)
<i>Administrative Activities</i>	
Agency review and agreement of land use changes	All FNOD (special notice to known OE sites)
Consultation process	All FNOD (special notice to known OE sites)
Records	All FNOD (special notice to known OE sites)
Monitoring	All FNOD (special notice to known OE sites)
Notice	All FNOD (special notice to known OE sites)

Table 8. Summary of Preferred Alternatives by Site

Site	Recommendations
<i>Believe Removal Action Is Required</i> <ul style="list-style-type: none"> • Area J Lake and Possible Burning Ground • Horseshoe Pond Area • TNT Disposal Area 	<ul style="list-style-type: none"> • Proceed with planned removals • Maintain existing fences and signs • Monitor for zoning variance applications or other potential changes to land use • Review permits and provide OE oversight support for construction activities, where applicable • Impose advisories and restrictions to minimize incompatible land usages • Continue ongoing educational programs
<i>Removal Action Is Ongoing</i> <ul style="list-style-type: none"> • Main Burning Ground • Dominion Lands (Phase II) 	<ul style="list-style-type: none"> • Continue ongoing removals • Secure work areas by using fences and signs • Review construction permits and provide OE oversight support for construction activities, where applicable • Impose advisories and restrictions to minimize incompatible land usages • Continue ongoing educational programs
<i>Removal Action Completed</i> <ul style="list-style-type: none"> • Dominion Lands (Phase I) • James River Beachfront • Nansemond River Beachfront • Former Building E-410 • Former Buildings L-11/L-12 	<ul style="list-style-type: none"> • Monitor zoning for variance applications or other potential changes • Review construction permits and provide OE oversight support for construction activities, where applicable • Impose advisories and restrictions to minimize incompatible land usages • Continue ongoing educational programs

Table 9. FNOD Land Use Control Roles and Responsibilities Matrix

Control	USACE	EPA	VDEQ	City of Suffolk	Property Owner
Fences and signs	<ul style="list-style-type: none"> Conduct and report inspections to EPA, VDEQ, and RAB Report incursions and damage to EPA, VDEQ, and RAB 	<ul style="list-style-type: none"> Review USACE report 	<ul style="list-style-type: none"> Review USACE report 	<ul style="list-style-type: none"> Prosecute trespassers Notify USACE of known incursions 	<ul style="list-style-type: none"> Prosecute trespassers Notify USACE of known incursions and damage
Construction support	<ul style="list-style-type: none"> Provide support on property where clearance has not started or is ongoing Report requests for support and OE discoveries to EPA, VDEQ, and RAB 	<ul style="list-style-type: none"> Review USACE report 	<ul style="list-style-type: none"> Review USACE report 	<ul style="list-style-type: none"> Notify land owner where construction support is required Request construction support for appropriate properties 	<ul style="list-style-type: none"> Request construction support where appropriate
Permits	<ul style="list-style-type: none"> Review and provide comments on permit applications (e.g., new construction, variances, etc.) Provide required support if permit is approved 	<ul style="list-style-type: none"> Review and provide comments on permit, variance, etc. applications 	<ul style="list-style-type: none"> Review and provide comments on permit, variance, etc. applications 	<ul style="list-style-type: none"> Where applicable, notify land owner of potential presence of OE and request USACE, EPA, and VDEQ review of application Request construction support for appropriate properties 	<ul style="list-style-type: none"> Follow the city of Suffolk permit application process (private property owners only)
Zoning	<ul style="list-style-type: none"> Review and provide comments on proposals of zoning changes Provide required support if zoning changes are approved 	<ul style="list-style-type: none"> Review and provide comments on proposals of zoning changes 	<ul style="list-style-type: none"> Review and provide comments on proposals of zoning changes 	<ul style="list-style-type: none"> Notify USACE of proposed changes 	<ul style="list-style-type: none"> Follow the City of Suffolk permit application process (private property owners only)
Advisories	<ul style="list-style-type: none"> Provide materials and information to public events scheduled by city of Suffolk (e.g., pamphlets, GIS information, deed language) Maintain OE removal history and status in GIS and provide to city of Suffolk 	<ul style="list-style-type: none"> Review and comment on USACE materials 	<ul style="list-style-type: none"> Review and comment on USACE materials 	<ul style="list-style-type: none"> Distribute materials provided by USACE to land owners during real estate transactions and permit approvals Update OE removal status from USACE GIS Provide notice to existing and prospective land owners 	<ul style="list-style-type: none"> Adhere to the advisories provided by USACE Voluntarily record advisories in property deeds
Education and notification	<ul style="list-style-type: none"> Conduct regular information mailings and meetings Participate in Miss Utility Program Upon request, provide individual land owners full disclosure of status of OE removals on their property 	<ul style="list-style-type: none"> Review and comment on USACE materials Participate in public meetings 	<ul style="list-style-type: none"> Review and comment on USACE materials Participate in public meetings 	<ul style="list-style-type: none"> Distribute educational materials provided by USACE concerning potential OE hazards Participate in public meetings Notify USACE of OE encounters through 911 calls 	<ul style="list-style-type: none"> Participate in public meetings and remain knowledgeable about OE status of their property Notify all tenants and occupants of OE status of property

COMMUNITY PARTICIPATION

Public Comment Period—USACE-Norfolk is soliciting input from the community on all of the alternatives that have been proposed for the site. The comment period will extend from March 7, 2002 through April 15, 2002. The comment period includes a public meeting on March 7, 2002, at which time USACE-Norfolk will discuss the Draft Interim LUCIP and accept both oral and written comments. Written comments must be postmarked no later than the last day of the public comment period, which is April 15, 2002.

Public Meeting
March 7, 2002
Manning Building – Tidewater
Community College, Portsmouth
Campus
6:00-7:00 pm Open House
7:00-9:00 pm Formal Presentations and
Question and Answer Period

Copies can be obtained by contacting Kenneth W. Hafner at (757) 441-7673 or the document can be viewed online or downloaded from the following Internet address:

<http://www.nao.usace.army.mil/Projects/Nansemond/welcome.html>.

To send written comments, contact the following representatives:

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