

Final

Action Memorandum for Upper Reaches of Bousch Creek, Camp Allen Landfill (Site 1)

Naval Station Norfolk
Norfolk, Virginia



Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Contract No. N62470-02-D-3052
CTO-0066

October 2007

Prepared by

CH2MHILL

Final

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Bousch Creek, Camp Allen Landfill (Site 1)**

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Under the

**LANTDIV CLEAN III Program
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CH2MHILL

Virginia Beach, Virginia

**Final
DECLARATION**

ACTION MEMORANDUM

Upper Reaches of Bousch Creek

Camp Allen Landfill (Site 1)

Naval Station Norfolk, Norfolk, Virginia

DATE: September 11, 2007

SUBJECT: Sediment Removal Action, Upper Reaches of Bousch Creek, Camp Allen Landfill (Site 1), Naval Station Norfolk, Norfolk, Virginia

FROM: Commanding Officer, Naval Facilities Engineering Command, Mid Atlantic

TO: CAPT S. J. DiNobile, USN
Commanding Officer
Naval Station Norfolk

This Action Memorandum documents approval for the removal action as described herein for the Upper Reaches of Bousch Creek, as associated with Site 1, Camp Allen Landfill, at Naval Station Norfolk in Norfolk, Virginia. This Action Memorandum serves as the Decision Document for the Engineering Evaluation/Cost Analysis (EE/CA) for Bousch Creek prepared under separate cover.

This decision document represents the selected removal action for Bousch Creek and is developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 as amended, and is consistent with the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This decision is based on the administrative record for the site.

Conditions at Bousch Creek meet the NCP Section 300.415(b)(2) criteria for removal. Naval Facilities Engineering Command recommends approval of the proposed removal action. The total project ceiling if approved will be \$1,461,000. Response actions should commence as soon as practical to expedite remediation at the site.

Approved by:



CAPT S. J. DiNobile, USN
Commanding Officer
Naval Station Norfolk

3 OCT 07
Date

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- A Final EE/CA for Upper Reaches of Bousch Creek
- B Public Notices and Responsiveness Summary

Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
BERA	Baseline Ecological Risk Assessment
yd ³	cubic yard
CALF	Camp Allen Landfill
CASY	Camp Allen Salvage Yard
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR	Code of Federal Regulations
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DoN	Department of the Navy
EE/CA	Engineering Evaluation/Cost Analysis
ERA	Ecological Risk Assessment
FS	Feasibility Study
IR	Installation Restoration
IRI	Interim Remedial Investigation
IRP	Installation Restoration Program
LUC	Land Use Control
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NSN	Naval Station Norfolk
NTCRA	Non-Time Critical Removal Action
OU	operable unit
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PRAP	Proposed Remedial Action Plan
RAO	Remedial Action Objectives
RBC	risk-based concentrations
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SERA	Screening Ecological Remediation Assessment
TCLP	Toxic Characteristic Leaching Procedure

USC United States Code
USEPA United States Environmental Protection Agency
VDEQ Virginia Department of Environmental Quality
VDOT Virginia Department of Transportation
VOCs volatile organic compounds

I. Purpose

This Action Memorandum documents approval for a non-time critical removal action (NTCRA) for the sediment in the Upper Reaches of Bousch Creek, as associated with Site 1, Camp Allen Landfill, Naval Station Norfolk (NSN), Norfolk, Virginia. The Engineering Evaluation/Cost Analysis (EE/CA) (Attachment A) focused on the contaminated sediment located in the upper reaches of Bousch Creek, resulting from historical practices at Site 1. Additionally, although not associated with Site 1, the EE/CA addressed contaminated sediment in the upper middle reaches of Bousch Creek. The NTCRA will address the contaminants that have been identified in sediment at Bousch Creek as potentially posing ecological risks.

This Action Memorandum serves as the Decision Document for the EE/CA for Bousch Creek and for the Navy to conduct the work proposed therein. The alternatives evaluated in the Bousch Creek EE/CA are summarized below.

- Alternative #1: No Action
- Alternative #2: Removal of Contaminated Sediment and Replacement with Clean Backfill
- Alternative #3: Removal of Contaminated Sediments, Replacement with Clean Backfill, Channel Lining/Protection, and Land Use Controls (LUCs)

This Action Memorandum was completed in accordance with the removal program requirements defined by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the United States Environmental Protection Agency's (USEPA) Superfund Removal Procedures Action Memorandum Guidance (USEPA, 1990).

The Department of the Navy (DoN) has broad authority under CERCLA Section 104 and Executive Order 12580 to carry out removal actions when the release is on, or the sole source of the release is from, the DoN installation. The Navy/Marine Corps Installation Restoration (IR) Program was initiated to identify, assess, characterize, and clean up or control contamination from past hazardous waste disposal operations and hazardous material spills at Navy and Marine Corps activities. This Action Memorandum follows the guidelines published in the *Navy/Marine Corps IR Manual* (NFESC, 2001) and the *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA* (USEPA, 1993).

II. Site Conditions and Background

A. Site Description

This Action Memorandum addresses a NTCRA to mitigate ecological risk in sediment in the Upper Reaches of Bousch Creek, as related with Site 1, Camp Allen Landfill.

This section describes Bousch Creek, documented releases, and current National Priorities List (NPL) status. This section also reviews any previous and current actions conducted by the Navy in this area (and adjacent Installation Restoration sites) and discusses anticipated future actions at the state and local levels.

B. Removal Site Evaluation

Bousch Creek is entirely located within NSN (Figure 1-1). The majority of surface water at NSN flows to either Mason Creek or the remnants of Bousch Creek. The main channel of Bousch Creek was filled during the development of NSN and replaced by a network of drainage ditches and underground culverts. Primary and secondary risk areas have been designated in the upper and upper middle reaches of Bousch Creek, respectively. The primary area, located in the Upper Reaches of Bousch Creek, is affected by metals contamination associated with historical site operations at the Camp Allen Landfill (CALF) (Site 1) (Figure 1-2). The secondary area, located in the Upper-Middle reaches of Bousch Creek, is affected by polycyclic aromatic hydrocarbon (PAH) contamination.

A number of sampling events have been conducted in the Bousch Creek system and nearby IR sites that border Bousch Creek or its tributaries. These are CALF (Site 1), CD Landfill (Site 6), and the Camp Allen Salvage Yard (CASY) (Site 22). Additional details and data related to Bousch Creek may be found in the *Final Ecological Risk Assessment (ERA) Step 7 Report, Upper Reaches of Bousch Creek, Camp Allen Landfill (Site 1)* (CH2M HILL, 2006).

1. CALF

An Interim Remedial Investigation (IRI) of the CALF was conducted in 1991, in which sediment and surface water samples were collected from twelve locations in Bousch Creek. Three rounds of data were collected in 1992 as part of the Remedial Investigation (RI) for the CALF (Baker, 1994b). Sixteen surface water and 34 sediment samples were collected during Rounds 1 and 2, and five sediment samples (all shallow) were collected during Round 3. In August and September 1993, eight surface water, 13 surface sediment, and eight subsurface sediment samples were collected along tributaries of Bousch Creek adjacent to the CD Landfill as part of the RI for that site.

Groundwater samples were collected from CALF site monitoring wells in March 1997 and June 1998, and from extraction wells in August 1997, to provide baseline information on groundwater concentrations of numerous constituents prior to system startup. The long-term monitoring plan for the CALF groundwater remediation system calls for annual sampling of 49 groundwater monitoring wells and five Bousch Creek surface water locations for volatile organic compounds (VOCs) over a 5-year period, with sampling to occur every other year thereafter.

2. CD Landfill

An RI (including a risk assessment) of the CD Landfill performed in 1993 and 1994 (Baker, 1995c) and a Feasibility Study (FS) performed in 1996 (Baker, 1996a) identified potential risks associated with contaminants in the soil, sediments, surface water, and groundwater, and guided the development and evaluation of medium-specific remedial action alternatives. Risks associated with surface water and sediment exposures were restricted to ditch tributaries of Bousch Creek adjacent to the landfill and did not extend into the main portion of Bousch Creek.

A Proposed Remedial Action Plan (PRAP) for Operable Unit (OU) 2 at the CD Landfill, issued on 1 June 1998, identified the preferred alternative as capping with a synthetic flexible liner, groundwater monitoring, and institutional controls. The final Record of

Decision (ROD) was issued on 28 September 1998, with the final landfill cap design issued in October 1998. The construction of the landfill cap was completed in December 1999. A post-closure plan, also completed in December 1999, requires groundwater and surface water monitoring, annual inspections, and maintenance of the landfill's environmental controls for 10 years after the closure was completed.

3. CASY

Several limited sampling events in Bousch Creek have also been conducted at the CASY, where a 36-inch underground storm line traverses the yard to Bousch Creek. Two surface water and two shallow sediment samples were collected in August 1996 from two catch basins located within the underground storm line. Four additional sediment samples were collected in June 1999 at four catch basins within the storm line. Finally, three shallow sediment samples were collected in and around the salvage yard pond in December 1998.

4. Bousch Creek

The first known event was the Confirmation Study conducted by Malcolm Pirnie from 1983 to 1986, during which four surface water samples were collected from Bousch Creek during each of four sampling events (Malcolm Pirnie, 1987). This study was very limited spatially and was confined to surface water. The results showed elevated metals concentrations (cadmium, chromium, lead, and zinc) in surface water and recommended further study.

Data were collected in February and March 1997 to support a Screening Ecological Risk Assessment (SERA) for Bousch Creek, as related to the CALF. Data included 30 surface water samples (collected during low and high tides at each of 15 locations) and 15 shallow sediment samples. Similarly, data were collected in November 1999 to support the Step 3 Baseline Ecological Risk Assessment (BERA) for Bousch Creek. Data from this event were limited to sediments and included 25 shallow and four deep samples. Based on the results of the Step 3 BERA, Step 4-6 studies were scoped. These studies were implemented in winter 2004 and consisted of the collection of 5 surface water samples, 28 surface sediment samples, five sediment cores (with samples collected at 6-inch increments within each 2-foot [ft] core), and 10 whole-body fish tissue samples.

The eight-step Navy ERA policy and guidance conceptually follows the process outlined in the USEPA ERA guidance for the Superfund program (USEPA, 1997). Step 8 addresses risk management issues. The Step 8 process for Bousch Creek was completed by the Tier I Partnering Team during November 2006 meeting during which consensus was reached to proceed with a removal of the sediments that were identified as posing potential ecological risk.

The EE/CA, which focused on the primary and secondary risk areas contained in the Upper Reaches of Bousch Creek, was prepared in 2007 to evaluate alternatives for mitigating these potential ecological risks. The alternative recommended in the EE/CA includes removing contaminated sediment and replacing it with clean backfill. The EE/CA describes the nature and extent of the wastes identified through previous investigations in Bousch Creek, the objectives of the NTCRA, and discusses and analyzes several remedial alternatives that were considered for this site.

The EE/CA (CH2M HILL, June 2007) was made available for public review and comments from July 9, 2007 through August 9, 2007; see the public notice responsive summary in Attachment B. No public comments were received.

C. Physical Location

NSN is the largest naval base in the United States. It is comprised of 4,631 acres of land (A.T. Kearny, March 1992) situated in the northwest portion of the City of Norfolk, Virginia. NSN is bounded on the north by Willoughby Bay, on the west by the confluence of the Elizabeth and James Rivers, and on the south and east by the City of Norfolk. A portion of the NSN eastern boundary is formed by Mason Creek.

NSN includes approximately 4,000 buildings, 20 piers, and an airfield. The western portion of NSN is a developed waterfront area containing the piers and facilities for loading, unloading, and servicing naval vessels. Land use in the surrounding area is commercial, industrial, and residential. The waterfront area south of NSN provides shipping facilities for several large industries. A network of rail lines is located in the area to service nearby industries. Residential areas surround NSN to the south and east. Willoughby Spit, a residential area located northeast of the NSN, is also used for recreational activities.

An ecological evaluation of Bousch Creek, as related to Site 1 (CALF), is among the IR sites being addressed under CERCLA at NSN. Bousch Creek is located in the central portion of NSN and flows into Willoughby Bay (Figure 1-1).

D. Site Characteristics

This section provides background and historical information on Bousch Creek and nearby Installation Restoration Program (IRP) sites. All Bousch Creek history and investigations relate to the nearby sites. Nearby IRP sites that border either Bousch Creek or its tributaries include the CALF (Site 1), the CD Landfill (Site 6), and the CASY (Site 22). These sites plus stormwater flow are the principal source areas or activities that may have impacted ecological receptors in Bousch Creek. The metals-impacted sediments in the primary removal area are thought to be related to historical site practices at the CALF.

1. Camp Allen Landfill (Site 1)

The CALF is located in a developed area of the facility and is bordered by Bousch Creek on the north, south, and west (Figure 1-2). The landfill consists of two primary areas, Area A (the 45-acre main landfill) and Area B (a 2-acre disposal area). Various facilities are located on top of (e.g., brig, heliport) and adjacent to (e.g., CASY) the landfill areas. Residential communities lie to the west of Area A and to the south of both areas.

The Area A landfill was first developed in the early 1940s and was used until about 1974. Historically, Area A received significant quantities of municipal, solid, and hazardous wastes including general refuse; demolition debris; sludge from metal plating, parts cleaning, and paint stripping; over age chemicals; chlorinated organic solvents; acids; caustics; paints and thinners; pesticides; and asbestos. An incinerator burned combustible wastes from the mid-1940s to the mid-1960s. Incinerator ash (plus fly and bottom ash from the base power plant) were deposited in the landfill, and items too bulky for the incinerator

were burned in Area A (Baker, 1994d). The Navy brig facility and a heliport were built over a portion of the Area A landfill in the mid-1970s. The remainder of Area A is now covered and re-vegetated with grasses that are regularly mowed. Area A is essentially surrounded by portions of Bousch Creek.

Area B is east of Area A and is significantly smaller in size. This area received waste from a 1971 fire at the CASY. The CASY handled lubricating oil, organic solvents, paints, paint thinners, acids, caustics, and pesticides. The residue and debris resulting from this fire were buried in trenches at Area B. Drainage ditches to the north and east of Area B are connected to Bousch Creek via a culvert that runs under the CASY.

2. Camp Allen Salvage Yard (Site 22)

The 22-acre CASY is located between Area A and Area B of the CALF (Figure 1-2). The CASY operated from the 1940s until 1995 as a salvage and scrap materials processing area. Activities at the CASY have included the storage and management of waste oils, used chemicals, and scrap industrial/commercial equipment. Metal smelting, various recycling activities, and miscellaneous burning have also occurred. In addition, the site was used to store acids, paint thinners, solvents, pesticides, and transformers. A spill of polychlorinated biphenyls (PCBs) occurred at the CASY in 1989 when a transformer was damaged by a forklift, and a preliminary cleanup action was initiated at that time. When operations at the CASY ceased in 1995, all buildings, incinerators, and rail lines were demolished (Malcolm Pirnie, 1987). The site was regraded, seeded, and mulched (Shaw, 2003).

3. CD Landfill (Site 6)

The CD Landfill is located east of Hampton Boulevard and south of the Navy Exchange, and occupies approximately 22 acres (Figure 1-2). The site includes two areas where landfill operations have occurred; the eastern (unpermitted) section and the western (permitted) section. The eastern portion of the landfill operated from 1974 to 1979, and was used for the disposal of demolition debris, inert solid waste, fly ash, and incinerator residue. In October 1979, a permit was received from the Virginia Department of Health to use the western portion of the landfill for the disposal of demolition debris and other solid wastes, excluding fly ash, incinerator residues, chemicals, and asbestos. Landfilling operations continued in the western portion of the site until 1987. In 1993, most of the existing debris mounds situated in the north-central portion of the landfill were leveled and spread around the site. Two drainage ditches border the landfill to the north and south. These two ditches flow east and merge to form a tributary of Bousch Creek.

4. Proposed I-564 Project

The Virginia Department of Transportation (VDOT) has proposed a plan to construct an I-564 intermodal connector that will provide an interstate connection between I-564 and Hampton Boulevard. This proposed road extension would cross over Bousch Creek and would impact some wetland areas associated with the Bousch Creek system. This project is not, however, expected to require major changes to the size and flow patterns of Bousch Creek. The proposed highway expansion would require that local utilities, Navy-owned ball fields, and a rail line be relocated, and would also impact the northernmost section of the CASY. As a result, the CASY would be covered and ball fields would be constructed on that site to replace those demolished during the proposed highway expansion.

III. Release or Threatened Release into the Environment of a Hazardous Substance, Pollutant, or Contaminant

The Step 7 ERA Report considered usable previous data and the 2004 data to evaluate ecological risks in Bousch Creek related to the CALF (other portions related to the CASY and CD landfill and the lower reaches of Bousch Creek are addressed separately). The Step 7 Report concluded relatively high risks to benthic invertebrate receptors in the upper reaches of the creek (primary area) due to metal exposures from sediments. Unacceptable risks or impacts were not identified for fish communities, plant communities, or to upper trophic level receptors, amphibians, and reptiles. The report also concluded that moderate to high risks to benthic invertebrate receptors in the upper-middle portion of the creek (secondary area) are possible, most likely due to PAH exposures from sediments. The higher PAH concentrations in the secondary area were essentially driven by a single 2004 sample (BC-SD04-01) near the upgradient end of the culvert. The report concluded that the PAHs were not likely related to the CALF.

IV. National Priorities List Status

NSN was placed on the USEPA's NPL on April 1, 1997.

V. Maps, Pictures, and Other Graphic Representations

Several figures are included in the EE/CA (Attachment A) that provide graphical representation of Bousch Creek and its surroundings. These include:

- Figure 1-1: Location of Bousch Creek
- Figure 1-2: Ecological Risk-Based Sediment Removal Areas
- Figure 4-1: Alternate #2 and #3 – Removal Areas (Wide Aerial View)
- Figure 4-2: Alternative #2 and #3 – Removal Areas

VI. Summary of Actions to Date

A. Previous Actions.

1. CALF

A NTCRA was implemented at CALF Area B in 1994 to remove drums, debris, and soil that were contaminated with VOCs, metals, and PCBs.

A Decision Document was signed in 1995 for CALF Area A that required hydraulic containment of contaminated groundwater. A groundwater extraction and treatment system was put in place in 1998 to satisfy this requirement. Data suggests this system has achieved its design objective of hydraulic containment of site groundwater, preventing groundwater discharge to Bousch Creek and other downgradient areas. Treated effluent from the extraction system is discharged to Bousch Creek.

2. CD Landfill

A Decision Document for contaminated ditch sediments (OU 1) was prepared in October 1996 that outlined a removal action for sediments contaminated with metals and pesticides. This action was begun, and partially completed, in the fall of 1997. When a landfill cap was designed to address OU 2 (soil and groundwater), the cap was extended to cover the remaining contaminated sediments, precluding the need for further removal.

3. CASY

An interim removal action, conducted in 1998, resulted in the removal of approximately 4,000 tons of soil predominantly contaminated with PCBs and metals.

Additional soil sampling, conducted in 2001, identified six areas (hot spots) contaminated with metals scattered throughout the site (Baker, 2001). As an interim measure, the Navy began removal of the hot spot soil in conjunction with ongoing PCB soil removal actions over a 2-acre portion of the site. The soil removal action achieved the PCB cleanup goals; however, additional analytical soil data showed that the extent of metals contamination was more widespread than previously estimated. The Navy determined the placement of a soil cover and implementation of LUCs was more cost-effective than attempting the removal of all metals-contaminated soil. The NSN Tier I Partnering Team reached consensus on this course of action in March 2002.

Other remedial actions determined to be necessary at CASY included removal of 1,825 cubic yards (yd³) of sediment located in the drainage channel and pond (which are connected to the Bousch Creek system). In addition, a 1-foot-cover of soil and a cellular concrete block system were installed to cover the remaining contaminated pond sediment (Navy, 2004). An engineered soil cover and the cover for the sediments in the pond have been completed (Shaw, 2003).

The final ROD addressing the soil and sediment at the site, and encompassing the overall soil and sediment cleanup strategy for the site, was signed by USEPA in September 2004. The ROD identifies the risks to the human and ecological receptors exposed to soil and sediment, establishes the Remedial Action Objectives (RAOs), and defines the LUCs for the CASY (Navy, 2004).

A chronological listing of the studies and investigations at Bousch Creek and surrounding areas is provided below.

- Confirmation Study for Bousch Creek – 1983-86
- Interim Remedial Investigation for CALF – 1991
- Remedial Investigation for CD Landfill – 1993-94
- Remedial Investigation/ Feasibility Study for CALF – 1994
- Feasibility Study for CD Landfill – 1996
- BERA for Bousch Creek – 1997
- Proposed Remedial Action Plan (PRAP) for CD Landfill – 1998
- Record of Decision (ROD) for CD Landfill capping – 1998
- BERA for Bousch Creek – 1999
- Post-Closure Plan for CD Landfill OU2 – 1999
- ROD for CASY – 2004

B. Current Actions

Bousch Creek is located centrally in NSN. Currently, VDOT is planning to construct an I-564 intermodal connector between I-564 and Hampton Boulevard. This connector will cross over Bousch Creek but is not expected to affect its flows or size. CASY will be covered and NSN ball fields will be relocated there. The Navy has provided construction considerations related to environmental concerns to VDOT for planned activities at CASY.

VII. State and Local Authority's Role

A. State and Local Actions to Date

Under Executive Order 12580, the President delegates authority to undertake CERCLA response actions to the Department of Defense (DoD). Congress further outlined this authority in the Defense Environmental Restoration Program (DERP) Amendments, under 10 United States Code (USC) Sections 2701 through 2705. CERCLA Section 120 requires the Navy to apply state removal and remedial action law requirements at its facilities.

B. Potential for Continued State/Local Response

The Navy will continue to be the lead agency and the Navy's environmental restoration program will continue to be the exclusive source of funding for remedial actions on NSN property. As members of the NSN Tier I Partnering Team, the USEPA and Virginia Department of Environmental Quality (VDEQ) will continue to be consulted until actions addressing the contaminated area are complete.

VIII. Threats to Public Health, Welfare or the Environment, and Statutory and Regulatory Authorities

Section 300.415 of the NCP lists the factors to be considered in determining the appropriateness of a NTCRA. Paragraph (b)(2)(i) of Section 300.415 applies to the conditions as follows:

300.451(b)(2)(i) *“Actual or potential exposures to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.”*

The Step 7 Ecological Risk Assessment Report for the Upper Reaches of Bousch Creek (Site 1) evaluated sediment chemistry and toxicity data. Results of these analyses indicated potential risk to ecological receptors in the sediments of the upper and upper-middle reaches of Bousch Creek due to the presence of metals and PAHs, respectively.

IX. Endangerment Determination

Actual or threatened releases of pollutants and contaminants from Bousch Creek, if not addressed by implementing the removal action discussed in this Action Memorandum, while not presenting an endangerment to public health or welfare, may present an endangerment to the environment.

X. Proposed Actions and Estimated Costs

A. Proposed Actions

The scope of the removal action to be initiated at Bousch Creek includes removal of the contaminated sediment. This removal action will mitigate ecological risk.

1. Proposed Action Description

The preferred removal action alternative for Bousch Creek proposes that the sediment be excavated, removed, and replaced with clean backfill. The NCP recognizes sediment removal and backfill as an appropriate removal alternative for consideration under NTCRAs (40 Code of Federal Regulations [CFR] 300.415(e)(4)). Therefore, this Action Memorandum and the EE/CA refer to Alternative 2, Sediment Removal and Backfill, as a "removal action," which is consistent with the NCP.

Both the primary and secondary areas would be excavated to a depth of 2 ft below current sediment surface. Using an assumed channel width of 30 ft (creek width is 30 ft for all calculations), an estimated 7,100 yd³ of sediment would need to be excavated.¹ The excavated areas would be backfilled with 1 ft of clean fill, totaling approximately 3,600 yd³ of clean fill.

The action would require rerouting tidal water, storm water, and effluent from the CALF treatment plant around the removal action areas of the creek. This could be accomplished with the installation of a portable dam system at both ends of the removal areas. Effluent water from the treatment plant could be routed via hose past the removal areas.

Excavated sediment would be placed in containment cells to be dewatered prior to shipment for offsite disposal. A drying/bulking agent could be applied to the sediment. Any collected water from the dewatering process would be stored in an onsite holding tank. Both the excavated sediment and water in the holding tank would be sampled for Toxic Characteristic Leaching Procedure (TCLP) waste characterization, transported and appropriately disposed. For the purpose of this EE/CA, excavated sediment is assumed to be non-hazardous and would be placed in a subtitle D landfill.

Vegetation clearing to modify current access roads would be required to provide equipment access to all sediment removal locations. Current site conditions suggest that nominal wetlands will be impacted by the activity. Any necessary wetland impacts would be coordinated appropriately and minimized to the extent practicable. Coordination with Norfolk Southern Railroad would be required for the primary area removal activity. Coordination with NSN flightline operations would be required for the secondary area removal activity.

Selection of this alternative satisfies the objective of the EE/CA, which is to mitigate potential ecological risk. Therefore, land use controls to prevent future disturbance will not be required.

¹ It is assumed that there is no concrete lining in the "concrete-lined" portion of Bousch Creek. Therefore, the excavation volume includes removing 2 ft of sediment in all areas. Otherwise, the intent is to dig to the concrete in this area.

2. Contribution to Remedial Performance

The NTCRA for Bousch Creek will mitigate potential ecological risks and satisfy project implementation and cost requirements. Results of previous investigations for the Upper Reaches of Bousch Creek (Attachment A, Section 2) have identified potential risk and delineated the nature and extent of contamination.

3. Description of Alternatives Technologies

Three alternatives were evaluated and compared based on their effectiveness, implementability, and cost. The EE/CA for the Upper Reaches of Bousch Creek describes each of the alternatives considered in greater detail, and the process by which the alternatives were evaluated, compared and selected. The preferred alternative for Bousch Creek is Alternative 2, Sediment Removal and Backfill. The selection of this alternative balances the effectiveness of Alternatives 2 and 3 against their implementability and cost.

4. Applicable or Relevant and Appropriate Requirements

The NCP requires that removal actions attain Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) with limited exception, to the extent practicable. Analysis of the removal action alternatives for Bousch Creek with the applicable ARARs is presented in the attached EE/CA (Attachment A). The removal action set forth in this Action Memorandum will comply with ARARs to the extent practicable.

5. Project Schedule

The Draft Final Bousch Creek EE/CA was made available to the public for comment for 30 days beginning on July 9, 2007. No comments were received from the public during the comment period.

The proposed estimated project schedule is:

- EE/CA Public Comment Period 1 Month
- Preparation of Work Plan 1 Month
- Subcontracting and Mobilization 2 Months
- Removal Action 1 Month
- Report Writing 1 Month

B. Estimated Costs

The NCP 40 CFR Part 300.415 dictates statutory limits of \$2 million and 12 months of USEPA fund-financed removal actions, with statutory exemption for emergencies and actions consistent with the removal action to be taken. This removal action will not be USEPA fund-financed. The Navy Environmental Restoration Program does not limit the cost or duration of the removal action (*Department of the Navy Environmental Restoration Manual*, Navy, 2006).

1. Response Action Contract

The Navy will contract with an environmental remediation contractor to perform the required work associated with the removal action in the Upper Reaches of Bousch Creek at NSN. The estimated costs are itemized in Table 1.

TABLE 1
Bousch Creek Removal Action Cost—Alternative 2

Excavation and Removal of Contaminated Sediments	
Clearing	\$2,100
Tree Removal	\$7,670
Dewatering	\$19,733
Aquadams, 3' and 6'	\$15,000
Long Reach Excavator	\$36,000
Dump Truck (on tracks)	\$36,000
20,000 gallon tank	\$2,700
Containment Cell	\$5,674
Excavation of Sediment	\$35,500
Drying Agent	\$49,700
Waste Characterization (TCLP)	\$13,200
Waste T/D (solids)	\$445,110
Waste T/D (water)	\$9,600
Subtotal	\$677,987
Backfill and Erosion Control	
Sandfill	\$54,000
Erosion control mat	\$1,155
Tree Planting	\$3,130
Subtotal	\$58,285
Contingency (20%)	\$147,254
Subtotal	\$883,527
General Conditions (10%)	\$88,352.66
Mob/Demob (5%)	\$44,176
Subtotal	\$1,016,056
Contractor OH/P (15%)	\$152,408
Excavation/Backfill Total	\$1,168,464
Design Costs (10%)	\$116,846
Construction Oversight (15%)	\$175,270
Total present value of Alternative	\$1,460,580

XI. Expected Change in the Situation Should Action Be Delayed or Not Taken

If no action is taken or the action is delayed, the potential for ecological risk will remain.

XII. Outstanding Policy Issues

There are no outstanding policy issues regarding this action.

XIII. Enforcement

The Navy can and will perform the proposed response promptly and properly.

XIV. Recommendation

This decision document represents the selected removal action for Bousch Creek, as associated with Site 1, Camp Allen Landfill, at NSN, Norfolk, Virginia, developed in accordance with CERCLA as amended, and is consistent with the NCP. This decision is based on the Administrative Record file for NSN.

Conditions at the site meet the NCP Section 300.415(b)(2) criteria for removal action. The Naval Facilities Engineering Command, in cooperation with the USEPA and VDEQ, recommends approval of the proposed removal action. If approved, the total project ceiling for Bousch Creek will be \$1,461,000. Response actions should commence as soon as practical, due to the potential threat to the environment from Bousch Creek.

XV. References

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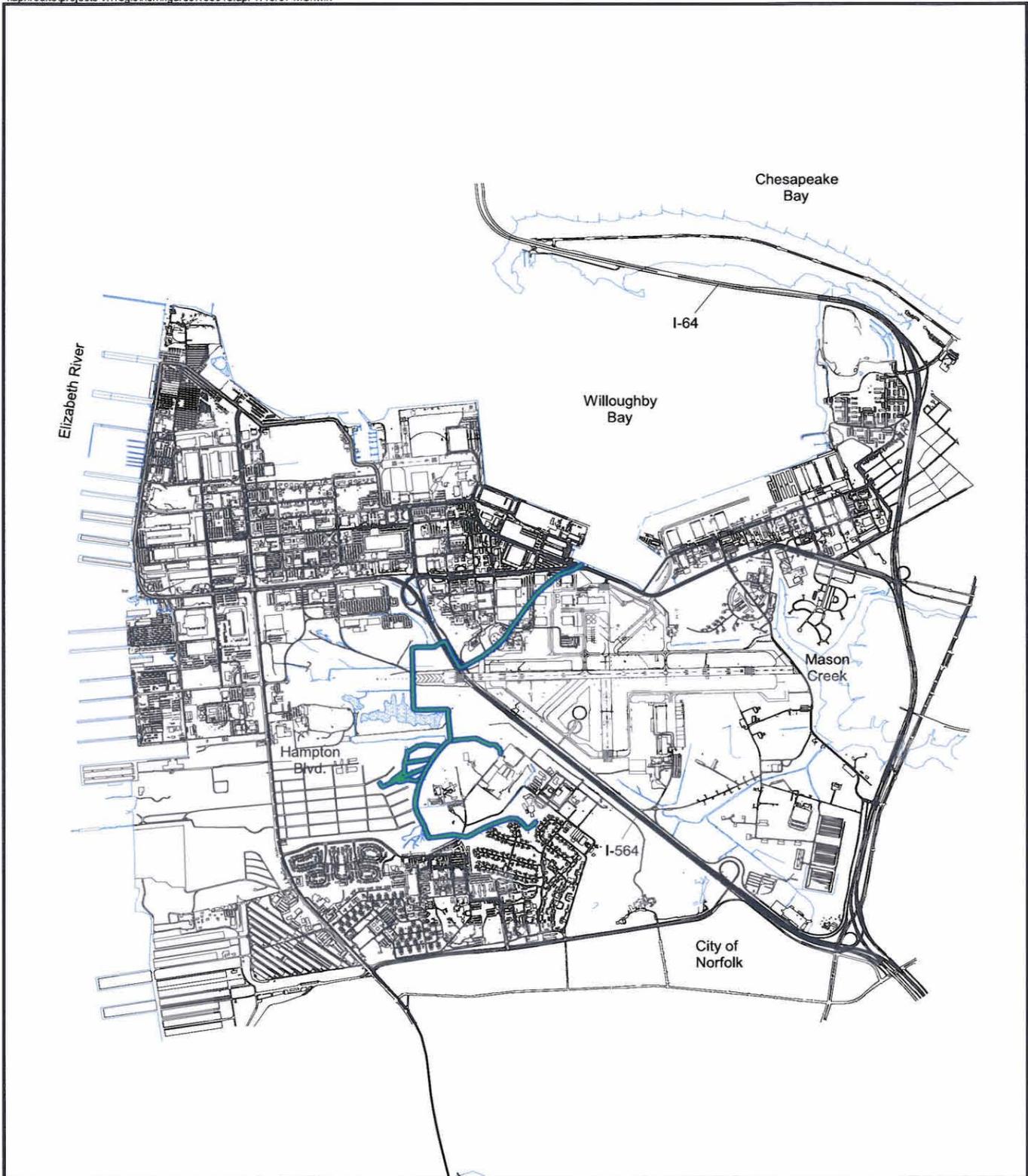
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- USEPA. 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*. Interim Final. EPA/540/R-97/006.



 Bousch Creek

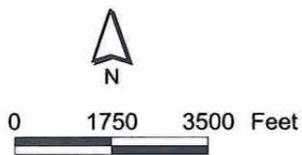
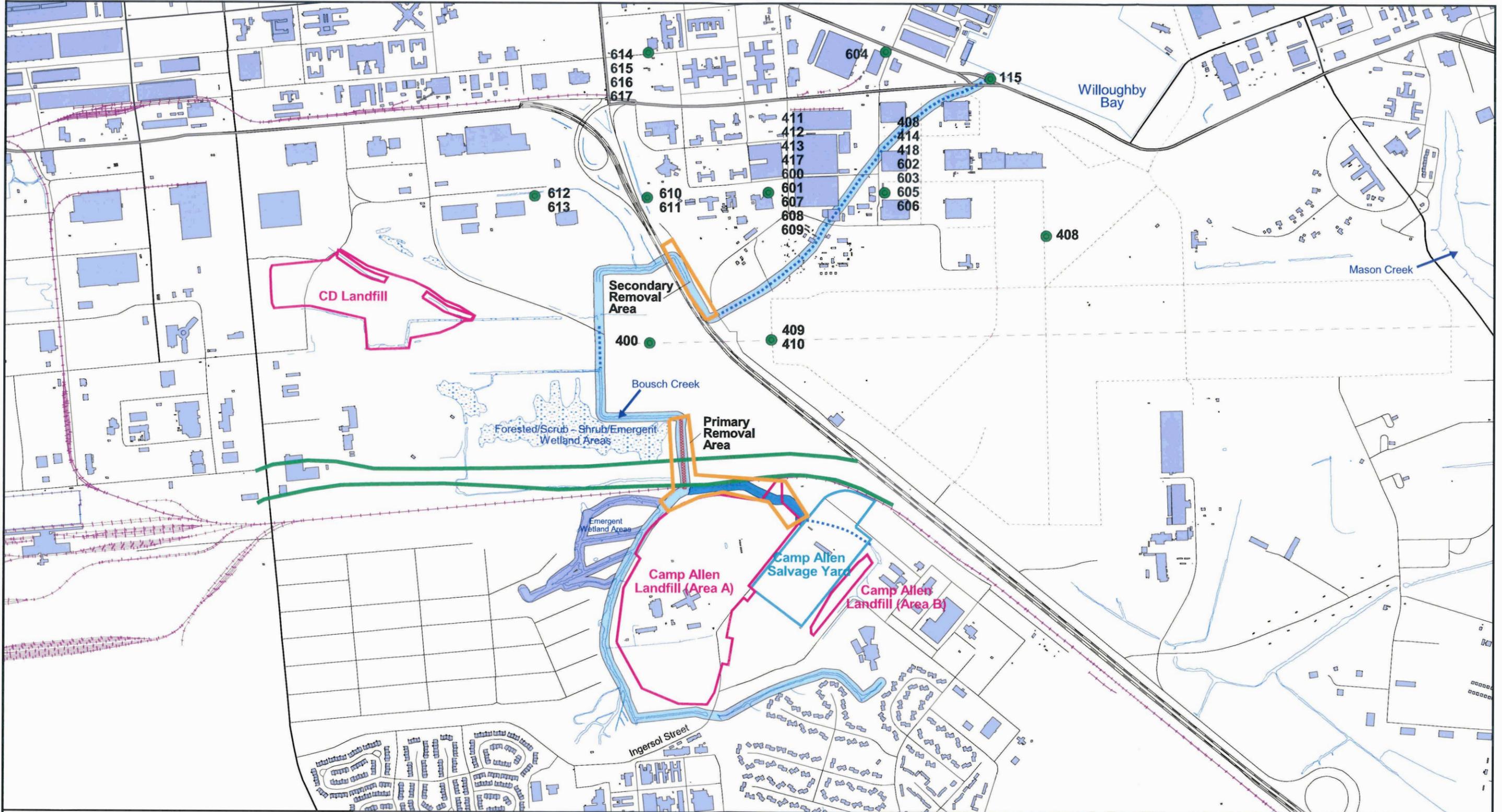


Figure 1-1
Location of Bousch Creek
Bousch Creek Sediment Removal
Navy Action Memo
Naval Station Norfolk
Norfolk, Virginia



- LEGEND**
- Proposed I-564 Corridor (Approximate)
 - Underground Culvert
 - Concrete Lined
 - Sediment Removal Area
 - Outfall

- Eastern Branch Bousch Creek
- Western Branch Bousch Creek
- Main Branch Bousch Creek

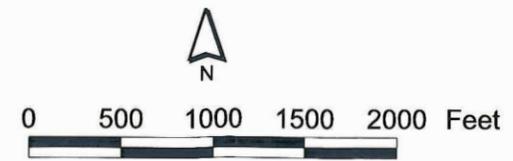


Figure 1-2
 Ecological Risk-Based Sediment Removal Areas
 Bousch Creek Sediment Removal
 Navy Action Memo
 Naval Station Norfolk
 Norfolk, Virginia



LEGEND

- Proposed I-564 Corridor (Approximate)
- Underground Culvert
- Steam Lines
- Concrete Lined
- Sediment Removal Area
- Outfall
- Eastern Branch Bousch Creek
- Western Branch Bousch Creek
- Main Branch Bousch Creek

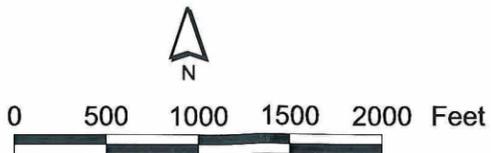


Figure 4-1
 Alternative #2 and #3 - Removal Areas (Wide Aerial View)
 Bousch Creek Sediment Removal
 Navy Action Memo
 Naval Station Norfolk
 Norfolk, Virginia
CH2MHILL



LEGEND

- Underground Culvert
- Steam Lines
- Concrete Lined
- Sediment Removal Area
- Outfall
- Sediment Sampling Location
- Eastern Branch Bousch Creek
- Western Branch Bousch Creek
- Main Branch Bousch Creek

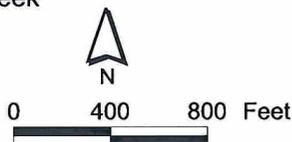


Figure 4-2
 Alternative #2 and #3 - Removal Areas
 Bousch Creek Sediment Removal
 Navy Action Memo
 Naval Station Norfolk
 Norfolk, Virginia

Attachment A
Final EE/CA for Bousch Creek

Attachment A, Final EE/CA for Bousch Creek, is provided electronically on the enclosed CD-ROM.

Attachment B
Public Notice and Responsiveness Summary

No comments were received from the public during the public comment period. As a result, a public meeting was not held. The following notice was placed in The Virginian-Pilot newspaper on July 9, 2007.

Public Notices



NOTICE OF THE NAVY'S INVITATION FOR PUBLIC COMMENT ON THE ENGINEERING EVALUATION/COST ANALYSIS FOR UPPER REACHES OF BOUSCH CREEK NAVAL STATION NORFOLK NORFOLK, VIRGINIA

The Department of the Navy (DoN) invites public comment on the Engineering Evaluation/Cost Analysis (EE/CA) for the Upper Reaches of Bousch Creek. This area of Bousch Creek is associated with historical operations at the Camp Allen Landfill, Installation Restoration Site 1, Site 22, the Camp Allen Salvage Yard, and Site 6, CD Landfill. The EE/CA presents and evaluates alternatives for a non-time critical removal action (NRCRA) to mitigate ecological risk in sediment. In accordance with 40 CFR Section 300.415, an EE/CA is required when a NRCRA is planned for a site. The goals of an EE/CA are to identify the objectives of the removal action and to analyze the effectiveness, implementability, and cost of various alternatives that may satisfy these objectives. An EE/CA documents the removal action alternatives and selection process. The EE/CA is based upon findings of previous site-related documents contained in the DoN's Administrative Record for NSN. The Administrative Record is located at:

**Naval Facilities Engineering Command,
Atlantic Division
6506 Hampton Boulevard
Norfolk, VA 23508-1278
(757) 322-8005**

The EE/CA will be available from **July 9, 2007, through August 9, 2007**, for public review and comment at the following location:

**Kirn Memorial Branch Norfolk Public Library
301 East City Hall Avenue
Norfolk, Virginia 23510
(757) 664-7323**

Provide written comments on the EE/CA from **July 9, 2007, through August 9, 2007**. Send all written comments on or before (post-marked by) **August 9, 2007**, to the following address:

**Mrs. Terri Davis
Attn: Public Affairs Officer
Naval Station Norfolk
1530 Gilbert Street, Suite 2000
Norfolk, Virginia 23511-2722
(757) 322-2576**

If requested, a public meeting will be held by representatives of the DoN to clarify public questions or comments on the EE/CA that supports this NRCRA.