RECORD OF DECISION

SITE 2B - AREA A WETLAND

NAVAL SUBMARINE BASE - NEW LONDON, GROTON, CONNECTICUT

NAVFAC
Naval Facilities Engineering Command

AUGUST 2010

1.0 DECLARATION

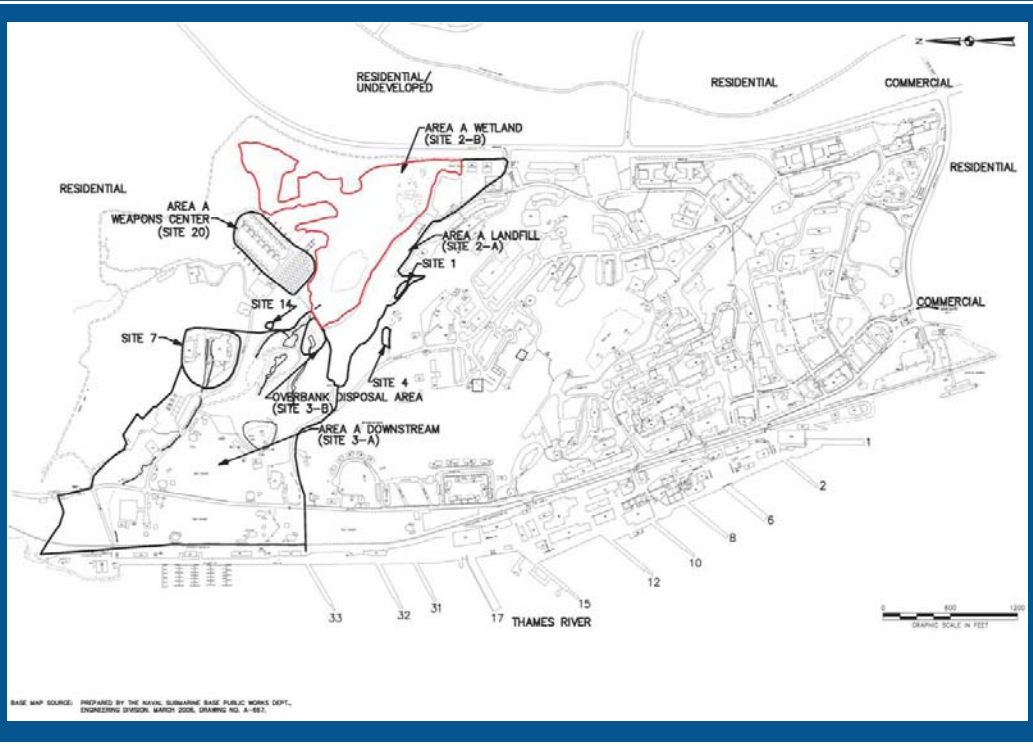
1.1 SITE NAME AND LOCATION

Naval Submarine Base-New London (NSB-NLON)
EPA ID No. CTD980906515
Operable Unit (OU) 12
Area A Wetland - Site 2B
Groton, Connecticut

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedy for sediment at Area A Wetland - Site 2B, OU12 (see Figure 1-1), which was chosen by the Navy and United States Environmental Protection Agency (EPA) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) §9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300 et seq., as amended. This decision is based on information contained in the Administrative Record for the site. The Connecticut Department of Environmental Protection (CTDEP) concurs with the Selected Remedy (see Appendix A).

FIGURE 1-1. SITE LOCATION MAP



1.3 ASSESSMENT OF SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. A CERCLA action is required because concentrations of polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and metals in sediment pose unacceptable risk to current and future to ecological receptors (i.e., sediment invertebrates).

Groundwater at Area A Wetland – Site 2B was addressed as part of the Basewide Groundwater Operable Unit 9. As documented in the OU9 ROD signed in September 2008, groundwater monitoring at Site 2B will continue as required by the Area A Landfill, OU1 ROD.

Surface water at the Area A Wetland is currently monitored under the Area A Landfill long-term monitoring program (OU1). Surface water is not considered further for this OU12 ROD because previous evaluations of surface water data concluded that potential risks to terrestrial and aquatic receptors were not great enough to warrant further evaluation of these receptors at the Area A Wetland. Also, risks to human receptors (construction workers and older child trespassers) from exposure to chemicals in surface water were acceptable.

1.4 DESCRIPTION OF SELECTED REMEDY

The major components of the Selected Remedy for Site 2B include the following:

- Excavation of contaminated sediment greater than remediation goals (RGs) and transport of sediment off-site for proper disposal. Note that the preliminary remediation goals (PRGs) that were developed in the RI Update/FS for the Area A Wetland are referred to and used as RGs in this ROD.
- Restoration of excavated areas to pre-existing elevations with clean organic soil.
- Seeding the restored area to establish native wetland vegetation.
- Monitoring of the area to ensure that the native wetland vegetation has been established.
- Land use controls (LUCs) to prevent future residential use of the Area A Wetland.

The Selected Remedy eliminates unacceptable ecological risk by removing all sediment associated with unacceptable risk. The cleanup of Site 2B will not adversely impact the current and reasonably anticipated future land use of the site as a wetland. The Selected Remedy is expected to achieve substantial long-term risk reduction and allow the property to be used for the reasonably anticipated future land use of the site as a wetland. This ROD documents the final remedial action for Site 2B and does not include or affect any other sites at the facility. Implementation of this remedy is consistent with current use and the overall cleanup strategy for NSB-NLON to cleanup sites to achieve compliance with CERCLA. Compliance with CERCLA includes achieving Applicable or Relevant and Appropriate Requirements (ARARs) identified in Appendix E of this ROD.

1.5 STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. The Selected Remedy does not satisfy the statutory preference for remedies that use treatment as a principal element to reduce the toxicity, mobility, or volume of hazardous substances, pollutants, and contaminants. The Selected Remedy would not achieve reduction in contaminant toxicity, mobility, or volume through treatment, except to the extent water from the dewatering process requires treatment or sediment stabilization reduces the mobility of contaminant within the treated sediment. Based on the type of contamination at the Area A Wetland (PAHs, PCBs, pesticides, and metals), the silt and fines content of the sediment, and the large volume of contaminated

sediment, the Navy concluded that it was impracticable to excavate and treat the chemicals of concern in a cost-effective manner.

Because the human health assessment conducted for the Area A Wetland did not include a residential scenario, LUCs would be required for the entire wetland until it is demonstrated that the entire wetland, or a portion of the wetland, presents acceptable residential risk from contaminants in sediment. At that time, the LUCs can be removed for the portion of the wetland where risks to residential receptors are found to be acceptable. Because contamination will be left in place that may not allow for unrestricted use, 5-year reviews would be required under this alternative.

As part of this decision document the Navy finds under the Section 404 of the federal Clean Water Act that the remedy required in this ROD is the least environmentally damaging practicable alternative to protecting wetland resources because all CERCLA-related contamination detected at concentrations exceeding RGs will be removed from the site, wetlands will be restored in place, invasive species will be controlled, and LUCs will be established to prevent residential development within the wetland area.

USEPA finds, as documented on page 6 of this ROD, under the Toxic Substances Control Act (TSCA) that the RG of 532 ppb for total PCBs used for the remedy will not pose an unreasonable risk of injury to human health or the environment.

1.6 ROD Data Certification Checklist

The locations in Section 2.0, Decision Summary, of the information required to be included in the ROD are summarized in Table 1-1. Additional information can be found in the Administrative Record file for NSB-NLON.

Table 1-1. ROD Data Certification Checklist

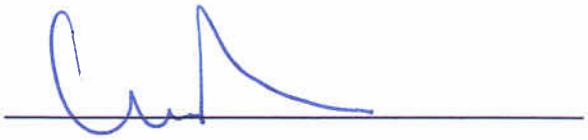
Data	Location in ROD
Chemicals of concern (COCs) and their respective concentrations	Sections 2.5 and 2.7
Baseline risk represented by the COCs	Section 2.7
Cleanup levels established for COCs and the basis for these levels	Section 2.8
How source materials constituting principal threats are addressed	Section 2.11
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the risk assessment	Section 2.6
Potential land and groundwater uses that will be available at the site as a result of the Selected Remedy	Section 2.12.3
Estimated capital, operating and maintenance (O&M), and total net present worth (NPW) costs; discount rate; and number of years over which the remedy costs are projected	Appendix F
Key factors that led to the selection of the remedy	Section 2.12.1

If contamination posing an unacceptable risk to human health or the environment is discovered after execution of this ROD and is shown to be a result of Navy activities, the Navy will undertake the necessary actions to ensure continued protection of human health and the environment.

1.7 Authorizing Signatures

The signatures provided on the following pages validate the selection of the final remedy for sediment at OU12, Site 2B, by the Navy and EPA. CTDEP concurs with the Selected Remedy.

Concur and recommend for implementation:



23 Aug 2010

Marc W. Denno USN
Commanding Officer
Naval Submarine Base – New London

Date

EPA finds under the TSCA that the risk-based cleanup level for total PCBs in the Area A Wetland will not pose an unreasonable risk of injury to human health or the environment pursuant to 40 C.F.R. Section 761.61(c).

Concur and recommend for implementation:

9-2-2010

James T. Owens, III, Director
Office of Site Remediation and Restoration
EPA Region 1

Date

2.0 DECISION SUMMARY

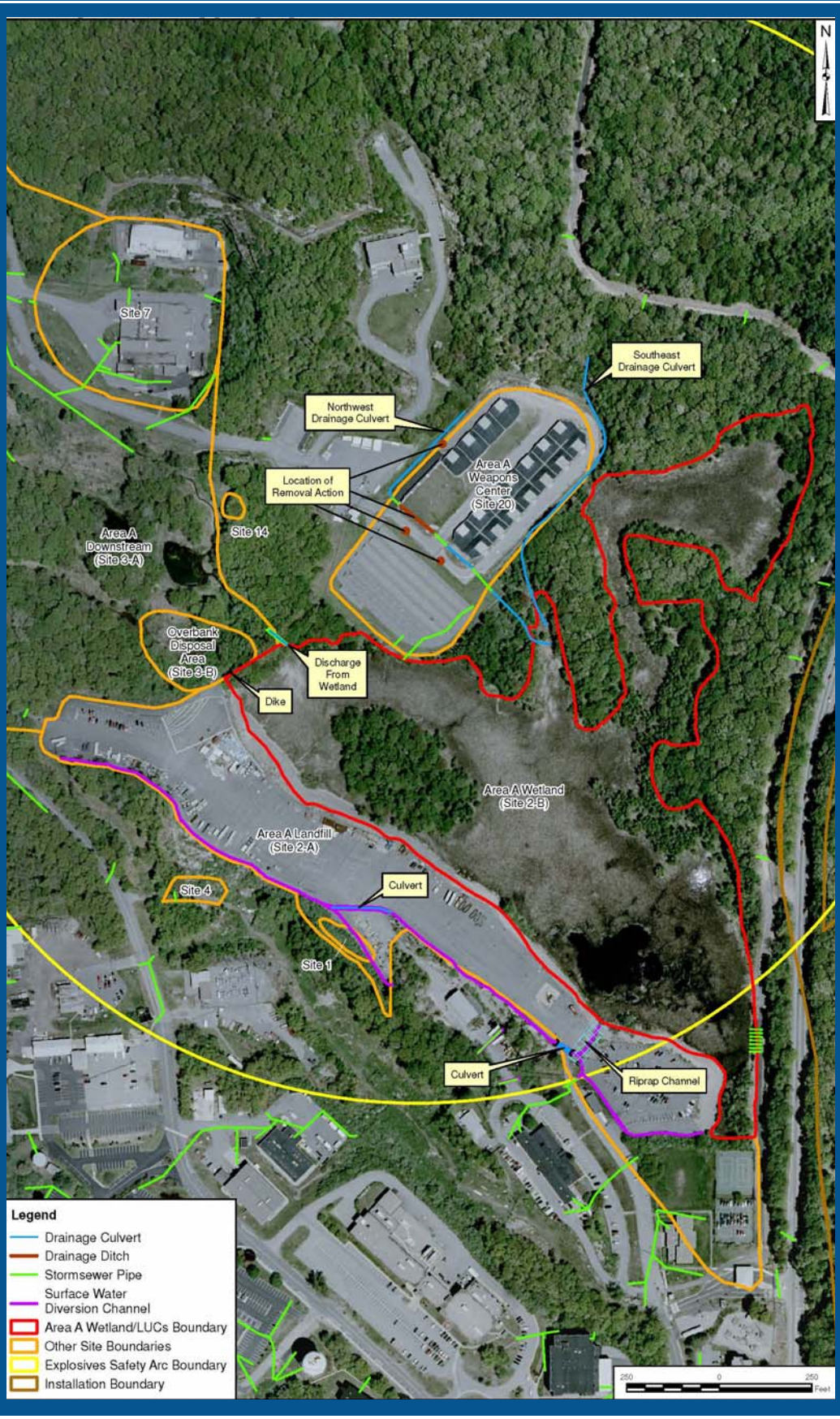
2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

NSB-NLON, EPA ID number CTD980906515, is located in southeastern Connecticut in the Towns of Ledyard and Groton and is situated on the eastern bank of the Thames River, approximately 6 miles north of Long Island Sound. It is bordered to the east by Connecticut Route 12, to the south by Crystal Lake Road, and to the west by the Thames River. NSB-NLON currently provides base command for Naval submarine activities in the Atlantic Ocean. It also provides housing for Navy personnel and their families and supports submarine training facilities, military offices, medical facilities, and facilities for the submarine maintenance, repair, and overhaul.

The Area A Wetland is approximately 26 acres. The Area A Weapons Center (Site 20, OU8) is located northwest of the Area A Wetland, and the Area A Landfill (Site 2A, OU1) is adjacent to the western boundary of the Area A Wetland. Water from the wetland ultimately drains to a channel located in the western portion of the landfill and then discharges through an earthen dike via four 24-inch metal culverts to the Area A Downstream Watercourses (Site 3, OU3). These watercourses subsequently discharge into the Thames River. The Area A Wetland is a relatively flat-lying, swampy, vegetated area with areas of open water (generally shallow) scattered across the wetland unit. The soft organic sediments that characterize these wetlands support a monoculture of the reed *Phragmites communis*, which dominates all other vegetative forms.

NSB-NLON is an active facility, and environmental investigations and remediation at the base are funded under the Installation Restoration (IR) Program. The Navy is the lead agency for CERCLA activities at the facility, and EPA and CTDEP are support agencies.

FIGURE 2-1. SURFACE FEATURES



2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Table 2-1 provides brief summaries of previous investigations at Site 2B. Results of these investigations indicated that elevated concentrations of PAHs, PCBs, pesticides, and metals were present in sediment at the site.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
Phase I Remedial Investigation (RI)	1990 - 1992	Phase I RI field activities included advancement of test borings, monitoring well installation, and the collection of **41 soil and sediment, 2 surface water and 7 groundwater samples**. The Phase I RI concluded that several risk exposure scenarios exceeded acceptable regulatory levels and that a Feasibility Study (FS) should be performed for the Area A Wetland site.
Phase II RI	1993	Phase II RI field activities included advancement of test borings, installation of four monitoring wells, and the collection of 29 sediment, 9 surface water, and 20 groundwater samples. Human Health and Ecological Risk Assessments (HHRA and ERA) were conducted as part of the Phase II RI Report. The Phase II RI concluded that little evidence of surface water or groundwater contamination exists at the site, that the site may pose a risk to construction workers due to potential exposure to manganese in groundwater, and that significant pesticide, PCB, and PAH concentrations exist in site soil and sediment. The ERA concluded that aquatic and terrestrial receptors were at **potential risk** from chemicals in the surface water, sediment, and soil surface. The Phase II RI recommended that an FS be conducted to evaluate a limited action alternative, including groundwater monitoring and access/use restrictions.
Focused Feasibility Study (FFS) for Area A Downstream/Over Bank Disposal Area (OBDA)	1994	Four sediment samples were collected from the southwestern portion of the Area A Wetland (along the earthen dike) as part of the Area A Downstream/OBDA FFS.
FFS for Area A Landfill	1995	A FFS for the Area A Landfill (Atlantic, 1995c) was completed in response to the recommendations of the Phase I and Phase II RIs. **Twenty sediment samples** were collected from 10 transects across the Area A Landfill/Area A Wetland boundary as part of the Area A Landfill FFS. Four sediment samples were collected from the southwestern portion of the Area A Wetland (along the earthen dike). Two sediment samples were collected from each transect, one from the wetland boundary and one approximately 20 feet from the wetland boundary, within the wetland area.
Area A Monitoring Program	1999-Present	**Groundwater and surface water monitoring** has been conducted since 2000 to monitor the remedy in place at the Area A Landfill. Monitoring has been conducted at approximately 21 wells located in the Area A Wetlands to monitor potential contaminant migration. The data do not indicate any significant contaminant migration issues.
Phase III RI Technical Memorandum	2007	A Phase III investigation of sediments in the Area A Wetland was conducted in October 2007 to further refine the nature and extent of contamination and to provide sufficient data to determine potential risks to ecological receptors from contaminated sediments. 16 surface and 9 subsurface sediment samples were collected. A secondary objective of the investigation was to determine the thickness of the overlying organic layer that has formed above the dredged material.
Phase IV RI	2008	Phase IV RI field activities consisted of collecting 24 sediment samples for chemical analysis and a subset of the samples were selected for whole **sediment toxicity testing**. The greatest concentrations of most chemicals were immediately adjacent to the Area A Landfill and/or Area A Weapons Center. Elevated total DDT concentrations were also detected along the dike in the western portion of the wetland.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
Remedial Investigation Update/Feasibility Study	2010	The RI Update/FS was conducted in 2010 to evaluate existing data to determine whether the sediment was toxic to sediment invertebrates. The RI Update/FS included an updated HHRA that included an evaluation of groundwater, surface water, and sediment data, and an ERA that included an evaluation of sediment data. No unacceptable risks were identified for the receptors evaluated in the HHRA (construction workers and older child trespassers). Unacceptable risks were identified for sediment invertebrates so RGs were developed as part of the ERA. The FS was conducted to develop and evaluate remedial alternatives for the sediment in the Area A Wetland.

On August 30, 1990, NSB-NLON was placed on the National Priorities List by the EPA pursuant to CERCLA of 1980 and SARA of 1986. The National Priorities List is a list of uncontrolled or abandoned hazardous waste sites identified by EPA as requiring priority remedial actions. The Navy, EPA, and State of Connecticut signed the Federal Facility Agreement for NSB-NLON in 1995 (EPA, 1995). The agreement is used to ensure that environmental impacts associated with past and present activities at NSB-NLON are thoroughly investigated and that the appropriate remedial action is pursued to protect human health and the environment. In addition, the Federal Facility Agreement establishes a procedural framework and timetable for developing, implementing, and monitoring appropriate responses at NSB-NLON, in accordance with CERCLA (and SARA amendment of 1986, Public Law 99-499), 42 USC §9620(e)(1); NCP, 40 CFR 300; Resource Conservation and Recovery Act, 42 USC §6901 et seq., as amended by the Hazardous and Solid Waste Amendment of 1984, Executive Order 12580; and applicable state laws. There have been no cited violations under federal or state environmental law or any past or pending enforcement actions pertaining to the cleanup of Site 2B.

2.3 COMMUNITY PARTICIPATION

The Navy has been conducting community relations activities for the IR Program at NSB-NLON since the program began. From 1988 to November 1994, Technical Review Committee meetings were held on a regular basis. In 1994, a Restoration Advisory Board (RAB) was established to increase public participation in the IR Program process. Many community relations activities for NSB-NLON involve the RAB, which historically met quarterly and recently has met at least annually on an as needed basis. The RAB provides a forum for discussion and exchange of information on environmental restoration activities among the Navy, regulatory agencies, and the community, and it provides an opportunity for individual community members to review the progress and participate in the decision-making process for various IR Program sites, including Sites 2B.

The following community relations activities are conducted at NSB-NLON as part of the Community Relations Plan:

Information Repositories: The Public Libraries in Groton and Ledyard are the designated information repositories for the NSB-NLON IR Program. All pertinent reports, fact sheets, and other documents are available at these repositories.

Key Contact Persons: The Navy has designated information contacts related to the NSB-NLON. Materials distributed to the public, including any fact sheets and press releases, will indicate these contacts. The Public Affairs Officer will maintain the site mailing list to ensure that all interested individuals receive pertinent information on the cleanup. The contact persons for NSB-NLON are listed below.

Jim Gravette
Remedial Project Manager (Code OPTE3-1)
Naval Facilities Engineering Command
Mid-Atlantic
Building Z-144
9742 Maryland Avenue
Norfolk, VA 23511-3095
Tel: (757) 341-2014
E-mail: james.gravette@navy.mil

Richard Conant, Installation Restoration Program Manager
Naval Submarine Base-New London
Bldg. 439, Box 101, Room 104
Route 12
Groton, CT 06349
Tel: (860) 694-5649
E-mail: Richard.conant@navy.mil

Kymberlee Keckler, Remedial Project Manager
U. S. Environmental Protection Agency, Region 1
Federal Facilities Superfund Section
5 Post Office Square, Suite 100
Mail Code: OSRR07-3
Boston, MA 02109-3912
Tel: (617) 918-1385
E-mail: keckler.kymberlee@epa.gov

Mark Lewis, Environmental Analyst 3
Connecticut Department of Environmental Protection
Eastern District Remediation Program, Remediation Division
Bureau of Water Protection and Land Reuse
79 Elm Street
Hartford, CT 06106-5127
Tel: (860) 424-3768
E-mail: mark.lewis@ct.gov

Mailing List: To ensure that information materials reach the individuals who are interested in or affected by the cleanup activities at the NSB-NLON, the Navy maintains and regularly updates the site mailing list that comprises approximately 50 addresses.

Regular Contact with Local Officials: The Navy arranges regular meetings to discuss the status of the IR Program with the RAB.

Press Releases and Public Notices: The Navy issues press releases as needed to local media sources to announce public meetings and comment periods, the availability of reports, and to provide general information updates.

Public Meetings: The Navy conducts informal public meetings to keep residents and town officials informed about cleanup activities at NSB-NLON, and at significant milestones in the IR Program. Meetings are conducted to explain the findings of the RI; to explain the findings of the FS; and to present the Proposed Plan, which explains the preferred alternatives for cleaning up individual sites.

Fact Sheets and Information Updates: The Navy develops fact sheets to mail to public officials and other interested individuals and/or to use as handouts at the public meetings. Each fact sheet includes a schedule of upcoming meetings and other site activities. Fact sheets are used to explain certain actions or studies, to update readers on revised or new health risks, or to provide general information on the environmental cleanup process.

Responsiveness Summary: The Responsiveness Summary for the Proposed Plan summarizes public concerns and issues raised during the public comment period and documents the Navy's formal responses. The Responsiveness Summary may also summarize community issues raised during the course of the FS.

Public Comment Periods: Public comment periods allow the public an opportunity to submit oral and written comments on the proposed cleanup options. Citizens have at least 30 days to comment on the Navy's preferred alternatives for cleanup actions as indicated in the Proposed Plan.

Technical Assistance Grant: A Technical Assistance Grant (TAG) from the EPA can provide up to $50,000 to a community group to hire technical advisors to assist them in interpreting and commenting on site reports and proposed cleanup actions. Although EPA has offered TAGs to the RAB, to date, none have been requested or awarded.

Site Tours: The Office of Public Affairs periodically conducts site tours for media representatives, local officials, and others.

A notice of availability of the Proposed Plan for Sites 2B (Navy, 2010) was published on June 9, 2010 in *The New London Day* and on June 7, 2010 and June 9, 2010 in the *Norwich Bulletin* newspapers. The Proposed Plan and other documents related to these sites are available to the public in the NSB-NLON Information Repositories located at the Groton Public Library in Groton, Connecticut, and the Bill Library in Ledyard, Connecticut. The notice also announced the start of the 30-day comment period that ended on July 9, 2010. A copy of the notice and the Proposed Plan are included in Appendix B of this ROD.

The Proposed Plan notice of availability invited the public to attend a public meeting at the Best Western Olympic Inn on Route 12 in Groton, Connecticut on June 17, 2010 from 6:30 pm to 7:00 pm. The public meeting presented the proposed remedies and solicited oral and written comments. At the public meeting, personnel from the Navy, EPA, and the CTDEP answered questions from the attendees during the informal portion of the meeting. In addition, public comments on the Proposed Plan were formally received and transcribed. The transcript for the public meeting is provided in Appendix C. Responses to the comments received during the public comment period are provided in the Responsiveness Summary in Section 3.0.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

Site 2B is part of a comprehensive environmental investigation and cleanup program currently being performed at NSB-NLON under CERCLA authority pursuant to the Federal Facility Agreement dated January 11, 1995. IR Program cleanup activities are being performed under CERCLA, and 23 IR Program sites within 12 OUs have been identified at NSB-NLON. Sediment at Site 2B is classified as OU12, and groundwater at Site 2B is part of the Basewide Groundwater OU9, which also includes groundwater at Sites 2A, 3, 7, 9, 14, 15, 18, 20, and 23. Final remedies were selected for groundwater at all OU9 sites in the Final ROD (Navy, 2008). Sites in the FS stage include OU4 which includes Sites 10, 11, 13, 17, 19, 21, 22, 24, and 25. No Further Action (NFA) Decision Documents have been signed for Sites 1, 3 [New Source Area soil], 4, 14, 15, 16, 18 (soil). Remedies selected for the following sites have been documented in separate RODs: Site 2 (soil), Site 3 (soil and sediment), Site 4, Site 6, Site 8, and Site 20 (soil and sediment). A non-time critical removal action was conducted for Site 3 (OBDA Debris), and is considered Response Complete. Other Response Complete sites include Site 7 (soil) and Site 9 (soil). The Site Management Plan for NSB-NLON further details the schedule for IR Program activities and is updated regularly.

Investigations at Site 2A indicated the presence of sediment contamination that poses unacceptable risk to current and future ecological receptors (sediment invertebrates). No previous actions have been taken in response to the contamination at Site 2B. The remedy documented in this ROD will achieve the Remedial Action Objectives (RAOs) for Site 2B, as listed in Section 2.8. Implementation of this remedy will allow continued use of this site as a wetland, which is consistent with current and reasonably anticipated future use and the overall cleanup strategy for NSB-NLON, which is to cleanup sites to achieve compliance with CERCLA. Compliance with CERCLA includes achieving ARARs identified in Table E.1 of this ROD.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Characteristics

Site 2B is underlain by dredged material that consists of silt and clay with traces of fine sand and shell fragments. The dredged material extends across the site to the southeast and southwest beneath the Area A Landfill. The thicknesses of the dredged material are 25 to 35 feet on the southern side of the wetland and 10 to 15 feet on the northeastern side of the wetland. Where dredged material does not directly overlie bedrock, they are underlain by a thin remnant of topsoil consisting of organic-rich silt, clay, and traces of roots and underlain by alluvial deposits. The alluvial deposits consist primarily of sand with silt and/or gravel and are significantly coarser grained than the overlying dredged material. The thickness

of the alluvium in Site 2B borings ranged from 10 to 36 feet. The bedrock surface slopes to the valley occupied by the wetland from northern, eastern, and central bedrock highs toward the center of the wetland.

Groundwater is present within the overburden and bedrock underlying the Area A Wetland, and the water table is close to the ground surface throughout most of the area. Groundwater flow in the overburden is from the northeast, southeast, and southwest into the wetland and then northwest toward Site 3. Groundwater flow in the bedrock mimics the shallow overburden pattern and flows from higher elevations toward the bedrock valley and ultimately to Site 3 through a combination of discharge to local streams and aquifer underflow.

Storm water runoff from the Site 2A landfill cap surface discharges as sheet flow to the north into the Area A Wetland. Two drainage culverts collect runoff from the surrounding hillsides and from the Area A Weapons Center and discharge it to the Area A Wetland. Water typically flows in these drainage culverts only immediately following precipitation events. The drainage culvert along the northwestern side discharges to a storm sewer that passes along the southern side of the Area A Weapons Center and eventually discharges into the Area A Wetland. The drainage culvert along the southeastern side of the Area A Weapons Center collects runoff from the hillside north of the Area A Weapons Center and continues along the southeastern side of the Area A Weapons Center, eventually discharging to the Area A Wetland.

2.5.2 Conceptual Site Model

Figure 2-2 presents the Site 2B conceptual site model (CSM), which identifies contaminant sources, contaminant release mechanisms, transport routes, and receptors under current and future land use scenarios. The three primary sources of contamination to the Area A Wetland were: (1) placement of DDT bricks, (2) runoff from the Area A Landfill, and (3) runoff from the Area A Weapons Center. The chemical concentrations in the dredged material are much lower than concentrations in surface sediment. Human health and ecological risk estimates are discussed in Sections 2.7.1 and 2.7.2, respectively.

FIGURE 2-2. CONCEPTUAL SITE MODEL

Items containing PCBs, PAHs, and metals were stored on, placed in, or poured from containers at the Area A Landfill before it was capped. Because runoff from the landfill drained as overland flow to the north into the Area A Wetland, contaminants from the landfill would have migrated to the southwestern part of the wetland. It is unlikely that the contaminants would have migrated very far into the wetland because organic sediment binds contaminants making them less mobile. This is supported by the analytical data collected as part of Site 2B investigations.

The two drainage culverts (one along the northwestern side and one along the southeastern side of the Area A Weapons Center) that collect runoff from the surrounding hillsides and from the Area A Weapons Center discharge to the Area A Wetland. The drainage culvert along the northwestern side discharges to a storm sewer that passes along the southern side of the Area A Weapons Center and eventually discharges into the Area A Wetland. The drainage culvert along the southeastern side of the Area A Weapons Center collects runoff. Water typically flows in these drainage culverts only immediately following precipitation events. Elevated levels of PAHs were detected in some of the sediment samples from the drainage culvert from the Area A Weapons Center during the Phase II RI (Brown and Root Environmental, March 1997), suggesting that the Weapons Center was historically a source of PAHs to the Area A Wetland. These samples were located downstream of the sediment (with elevated levels of PAHs) that was removed during the 2001 removal action from drainage swales at the Area A Weapons Center.

Based on current and potential future land use, older child trespassers and construction workers were considered potential receptors that may be exposed to contaminated sediment, surface water, and groundwater within the study area. Based on the results of the HHRA, no chemicals in sediment, surface water, or groundwater are causing significant risks to human receptors. Potential ecological receptors in the Area A Wetland include mammals, birds, amphibians, reptiles, plants, and sediment invertebrates. Unacceptable risks were identified for sediment invertebrates that may be exposed to contaminated sediment. Surface water and groundwater are not a concern for ecological receptors.

2.5.3 Nature and Extent and Fate and Transport of Contamination

PAHs, PCBs, pesticides, and metals were identified as chemicals of concern in sediment. Items stored and/or disposed at the Area A Landfill resulted in the release of PCBs, metals, petroleum compounds, sulfuric acid solution, and other chemicals to the underlying soil and the adjacent Area A Wetland. PAHs, pesticides, PCBs, and metals were detected in several sediment samples at concentrations that exceed ecological sediment benchmarks. The greatest concentrations of most of the chemicals were detected in samples immediately adjacent to the Area A Landfill and/or Area A Weapons Center. Elevated levels of total DDT also were found along the dike at the western portion of the wetland.

The areal extent of contaminated sediment in Area A Wetland is shown on Figure 2-3. Because deeper dredged materials are less contaminated than surface sediment, contaminants in the Area A Wetland sediment are assumed to be associated with surface releases such as runoff and the placement of pesticide bricks instead of contaminated dredged material or groundwater discharge. Based on RI results, sediment contamination is assumed to extend to approximately 2 feet below ground surface (bgs). Estimates of the volume of contaminated sediment were generated during the RI Update/FS after calculation of RGs. The volume of contaminated sediment required to be addressed to eliminate risk to ecological receptors is approximately 3,240 cy.

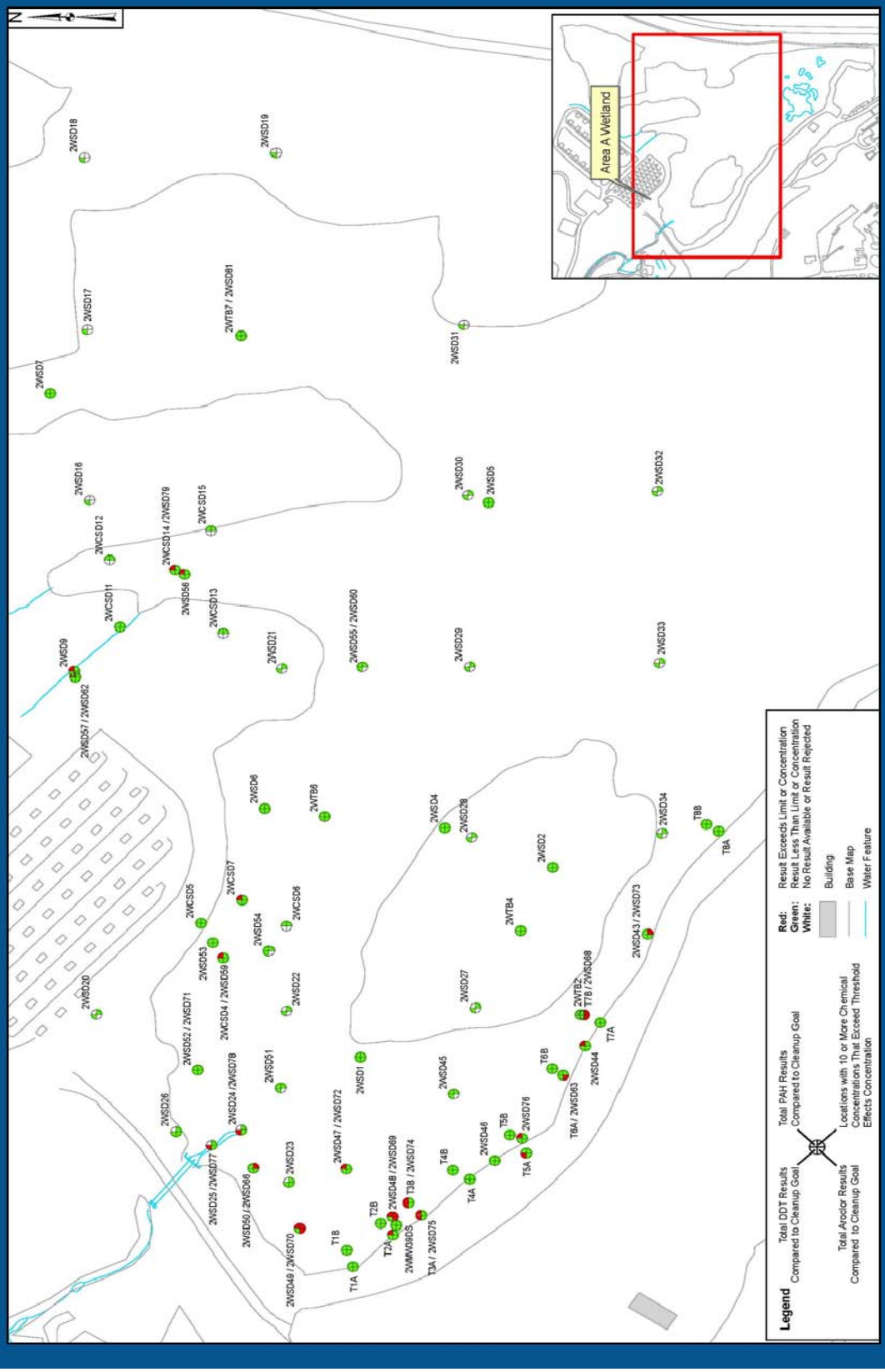
PCBs and PAHs are non-polar hydrocarbons that have a strong affinity for sediment and suspended solid particles. PAHs are somewhat more susceptible to biodegradation, but both classes of compounds are considered persistent in the environment. PCBs and PAHs (with the exception of naphthalene) are only slightly volatile and have very low aqueous solubilities. Metals are also highly persistent and when released to the environment also generally adsorb to the soil matrix and remain bound to particulate matter. Pesticides are not considered to be very mobile in the environment and tend to remain affixed to soil particles. Because of this, they tend to migrate from source areas via bulk movement processes (e.g., transport by wind erosion or with suspended particulates in water), and, if leaching from soil to groundwater occurs, it usually does not travel far.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

NSB-NLON is currently an active Navy base and is expected to remain so into the foreseeable future. Adjacent to the northern, southern, and eastern boundaries of NSB-NLON, land uses include residential, commercial, recreational, and open space. Currently, the Area A Wetland is both a federal jurisdictional wetland regulated under Section 404 of the federal Clean Water Act and a state jurisdictional wetland regulated under the Connecticut Inland Wetlands and Watercourses Act. Owing to area development restrictions, it is anticipated that the area will remain a wetland. Based on the proximity of the site to the Area A Weapons Center, most of the wetland is located within the Navy's explosive arc exclusion zone, and because the site is a jurisdictional wetland, it is not likely that the site will ever be used for residential development. There is no current recreational use in the wetland, and construction activities within the wetland are not anticipated, other than those associated with remediating and restoring the wetland.

CTDEP has classified groundwater beneath the Area A Wetland as within a GB-classified area (a non-drinking water source area) (CTDEP, October 1996), which indicates that the area has been used for long-term intense industrial or commercial development and that a public water supply service is available. Such groundwater may **not suitable for human consumption** without treatment because of waste discharges, spills, or leaks of chemicals or land use impacts. Water beneath the wetland is not currently

FIGURE 2-3. SUMMARY OF RG EXCEEDANCES



used for domestic, commercial or industrial purposes and it is not anticipated that the water will be used for these purposes in the future. The Groton Water Department supplies potable water to NSB-NLON. The primary sources of the Groton water supply are surface water reservoirs, which are supplemented with wells. The water supplies are located within the Poquonock River Watershed, 3 miles east of NSB-NLON, and not within the NSB-NLON watershed. Groundwater and surface water at NSB-NLON are not used for drinking water and flow towards the Thames River.

2.7 SUMMARY OF SITE RISKS

The baseline risk assessment estimates what risks the site poses if no action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The most recent risk assessment was performed for Site 2B for the RI Update/FS in 2010 (TtNUS, May 2010) to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the site.

2.7.1 Summary of Human Health Risk

The major components of an HHRA include data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Data evaluation is a task that uses a variety of information to determine which of the chemicals detected in site media are most likely to present a risk to potential receptors. The end result of the evaluation is a list of contaminants of potential concern (COPCs) and representative exposure point concentrations for each medium. During the exposure assessment, potential human exposure pathways are identified at the source areas under consideration. Chemical-specific toxicity criteria for the identified COPCs are identified during the toxicity assessment and are used in the quantification of potential human health risks. Risk characterization involves quantifying the risks associated with exposure to the COPCs using algorithms established by EPA. Risks from chemicals are calculated for either carcinogenic or noncarcinogenic effects. The uncertainty analysis identifies limitations in the risk assessment that might affect the final risk results. The final result of the risk assessment is the identification of medium-specific COCs and exposure pathways that need to be addressed by a remedial action. Tables summarizing data used in the HHRA and associated results are presented in Appendix D.

Identification of COCs

In general, all available validated data collected during investigations conducted from 1990 through 2008 were used to identify COPCs for the site. Both federal and CTDEP criteria were used for COPCs selection. Federal criteria include Maximum Contaminant Levels (MCLs) and Oak Ridge National Laboratory Regional Screening Levels, and EPA soil screening levels for inhalation (soil to air). CTDEP criteria include values for direct exposure, pollutant mobility, groundwater protection, and surface water protection.

Tables 3.1 through 3.4 in Appendix D present exposure point concentrations (EPCs) for the COCs identified at Site 2B in surface sediment. EPCs are the concentrations used in the risk assessment to estimate exposure and risk from each COC. For each COC, information in the tables includes the range of detected concentrations, frequency of detection (i.e., the number of times the chemical was detected in samples collected at the site), EPC, and how the EPC was derived. In accordance with EPA's Pro-UCL guidance and based on the statistical distributions of the data maximum detected concentrations or 95-percent upper confidence limits on the mean (calculated using various statistical methods) were used as the EPCs for Site 2B COCs.

Exposure Assessment

During the exposure assessment, current and potential future exposure pathways through which humans might come into contact with the COPCs identified in the previous step were evaluated, and the results of the exposure assessment for Site 2B were used to refine the CSM (Figure 2-2). Potential receptors under future land use were construction workers and older child trespassers. Because the site is a wetland and

located within the Navy's explosive arc zone for the Area A Weapons Center, residential land use was not evaluated in the HHRA. Current future exposure pathways at Site 2B are summarized in Table 2-2.

TABLE 2-2. RECEPTORS AND EXPOSURE ROUTES EVALUATED IN THE 2010 HHRA

RECEPTOR	EXPOSURE ROUTE
Older Child Trespasser (7 to 17 years) (current and future land use)	Soil/sediment dermal contact (surface) Soil/sediment ingestion (surface) Surface water (dermal contact) Surface water (ingestion)
Construction Worker (future land use)	Soil/sediment dermal contact (surface and subsurface) Soil/sediment ingestion (surface and subsurface) Inhalation of air/dust/emissions (surface and subsurface soil/sediment) Groundwater (dermal contact) Groundwater (inhalation in a trench) Surface water (dermal contact)

Toxicity Assessment

Toxicity assessment involves identifying the types of adverse health effects caused by exposure to site COPCs and determining the relationship between the magnitude of exposure and the severity of adverse effects (i.e., dose-response relationship) for each COC. Quantitative toxicity values [oral cancer slope factors (CSFs), oral reference doses (reference doses [RfDs], cancer inhalation unit risks, and non-cancer inhalation reference concentrations) determined during this component of the risk assessment were integrated with outputs of the exposure assessment to characterize the potential for adverse health effects for each receptor group.

Tables 6.1 and 6.2 in Appendix D provide carcinogenic risk information relevant to the Site 2B COCs for oral/dermal and inhalation exposure. At this time, CSFs and RfDs are not available for the dermal route of exposure; therefore, dermal slope factors were extrapolated from oral values. An adjustment factor is sometimes applied to extrapolate the dermal values from oral values, depending on how well the chemical is absorbed via the oral route. However, no adjustment factor was required for Site 2B COCs; the oral CSFs were used as the dermal CSFs.

Tables 5.1 and 5.2 provide non-carcinogenic hazard information relevant to the Site 2B COCs for oral/dermal and inhalation routes of exposure, respectively. As was the case for carcinogenic data, dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropriate. Several metals required adjustment factors ranging from 0.007 to 0.15.

Risk Characterization

During the risk characterization, the outputs of the exposure and toxicity assessments are combined to characterize the baseline risk (**cancer risks and non-cancer hazards**) at the site if no action was taken to address the contamination. Potential cancer risks and non-cancer hazards were calculated based on reasonable maximum exposure (RME) and central tendency exposure (CTE) assumptions. The RME scenario assumes the maximum level of human exposure that could reasonably be expected to occur, and the CTE scenario assumes a median or average level of human exposure.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$Risk = CDI \times CSF$$

where: Risk = a unitless probability (e.g., 2×10^{-5}) of an individual developing cancer
CDI = chronic daily intake averaged over 70 years (in mg/kg-day)
CSF = slope factor (in mg/kg-day^{-1})

Tables 8.1 through 8.9 in Appendix D provide RME cancer risk estimates for the significant receptors and routes of exposure developed by taking into account various conservative assumptions about the frequency and duration of exposure for each receptor about the toxicity of the COCs. Total risk estimates for all applicable exposure routes were 1×10^{-5} for construction workers and 3×10^{-5} for older child trespassers. These risk levels indicate that if no cleanup action was taken, the increased probabilities of developing cancer as a result of site-related exposure would range from approximately 1 in 100,000 to 3 in 100,000, **within EPA's acceptable risk range.**

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., a lifetime) to an RfD derived for a similar exposure period. An RfD represents a level to which an individual may be exposed that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ of 1 or less indicates that the dose of a single contaminant is unlikely to result in toxic non-carcinogenic effects from that chemical. The hazard index (HI) is generated by adding the HQs for all chemicals that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may be reasonably exposed. An HI less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health. The HQ is calculated as follows:

$$\text{Non-cancer HQ} = CDI / RfD$$

where: HQ = hazard quotient
CDI = chronic daily intake
RfD = reference dose

CDIs and RFDs are expressed in the same units and represent the same exposure period (i.e., chronic, sub-chronic, or short-term).

Tables 7.1 through 7.9 in Appendix D also provide RME non-cancer HQs for the each receptor and route of exposure and total HIs for all routes of exposure. Total HIs for all applicable exposure routes were 2 for construction workers (although the HIs for exposures to the individual media were less than or equal to unity) and 0.3 for older child trespassers. Additional human health tables are located in Appendix E of the RI Update/FS.

No major sources of **uncertainty**, other than those typically associated with risk assessment estimates, were identified for the 2010 Site 2B HHRA. Based on the results of the HHRA, no cancer risks or non-cancer hazards were identified for current or potential future human receptors.

2.7.2 Summary of Ecological Risk

Potential ecological risks for both aquatic and terrestrial receptors were initially evaluated in the Screening Level ERA included as part of the Phase II RI (Brown and Root Environmental, March 1997). The 1997 SERA concluded that chemicals in the surface water, sediment, and surface soil at the Area A Wetland represented a potential risk to both aquatic and terrestrial receptors.

Ecological risks were updated in the SERA conducted as part of the Phase III RI QAPP (Tetra Tech, October 2007) [Steps 1, 2, and 3a of the ERA process], because the Navy determined that the ERA should be updated using current methodologies and toxicity data because the initial SERA was more than 10 years old. **Exposure pathways** for terrestrial receptors included direct contact with contaminated

surface soil and sediment, ingestion of contaminated food items (aquatic prey), and ingestion and direct contact with surface water. Exposure pathways for aquatic receptors included direct contact and incidental ingestion of contaminated sediment and ingestion and direct contact with surface water. The habitats present at the Area A Wetland consist of terrestrial habitats such as forested and open areas with grasses and shrubs surrounding the wetland, and aquatic habitats consisting of drainageways, areas with ponded water, and a small pond. These habitats support a variety of receptors. Representative receptors evaluated for Site 2B included small birds and mammals, soil invertebrates, sediment invertebrates, fish and other aquatic organisms. Potential risks to terrestrial plants/invertebrates and sediment invertebrates resulting from exposure to chemicals were initially evaluated by comparing chemical concentrations to ecological screening levels. Risk to terrestrial receptors for exposure to COPCs in surface soil, sediment, and surface water were determined using food chain models to estimate the CDI and compare the CDI to toxicity reference values representing acceptable daily doses in mg/kg-day. The SERA also included a refinement of the conservative exposure assumptions/ concentrations to evaluate the potential risks to ecological receptors (i.e., plants, invertebrates, and wildlife receptors), which is termed Step 3a. Several chemicals were initially selected as COPCs because they were detected at concentrations that exceeded their respective screening levels. However, during the Step 3a evaluation, it was determined that the primary risk drivers were PAHs, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, PCBs, and metals. Also, it was determined that the primary receptors of concern were sediment invertebrates. Risks to the other receptors were not great enough to warrant further risk evaluation.

Ecological risks were further evaluated as part of the Phase III RI Technical Memorandum for the Area A Wetland (Tetra Tech, February 2008) using existing data and data collected as part of the Phase III RI. Representative receptors at Site 2B that were evaluated in the SERA included invertivorous birds and mammals, herbivorous birds and mammals, and sediment invertebrates. The SERA prepared as part of the Phase III Technical Memorandum concluded that PAHs, select pesticides (chlordane, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT), PCBs, and metals were detected in several samples at concentrations that exceeded sediment benchmarks based on risks to sediment invertebrates. As noted earlier, the greatest concentrations for most of the chemicals were immediately adjacent to the Area A Landfill, the Area A Weapons Center, and along the dike in the western portion of the wetland. Based on the comparison of chemical concentrations in sediment to sediment benchmarks, risks to sediment invertebrates in the area of the elevated chemical concentrations were expected. However, there was uncertainty in that expectation because site-specific characteristics of the sediment (i.e., total organic carbon, sulfides, etc.) may make the sediment more or less toxic than predicted from the sediment benchmarks. The Phase III RI Technical Memorandum for Area A Wetland (Tetra Tech, February 2008) concluded that risks to wildlife were acceptable so risks to those receptors did not need to be further evaluated.

A decision to proceed to the Baseline ERA (BERA) was made after the results of the Phase III SERA were evaluated. Based on the conclusions of that SERA, it was agreed by the project team that sediment invertebrates were the only receptors that needed to be further evaluated in the BERA, and the BERA would focus on risks from PAHs, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, PCBs, and metals. These conclusions were used to focus the BERA on the receptors most likely at risk (sediment invertebrates). Toxicity tests were conducted on sediment samples from 12 site locations and two reference locations collected as part of the Phase IV RI. The results of the tests were used to determine whether the chemicals in the sediment within the Area A Wetland were impacting sediment invertebrates, and to use that data to develop site-specific risk-based cleanup goals. Site-specific cleanup goals were developed by linking chemical concentrations in the sediment to toxicity test results. Toxicity testing involved sending samples of sediment from the Area A Wetland to a laboratory where a known number of sediment invertebrates were added to the sediment. After the tests were completed, the invertebrates that survived were counted and weighed to evaluate whether the samples were toxic to those invertebrates. The chemical data were evaluated to determine which chemicals (and their associated concentrations) could be related to the toxicity test results so that no observed effects concentrations (NOECs) and lowest observed effects concentrations (LOECs) could be developed. The geometric means of the NOECs and LOECs were then selected as the RGs. In addition, it was agreed by the project team that samples with ten or more chemicals that exceed threshold effects concentrations (TECs) would be considered impacted, unless toxicity testing at that location indicated that the sample was not toxic. This would help account for some

of the impacts that may be occurring from a combination of chemicals detected at elevated concentrations in the samples. No major sources of uncertainty, other than those typically associated with risk assessments were identified in the Site 2B BERA.

2.7.3 Basis for Action

Unacceptable risks owing to levels of PAHs, PCBs, pesticides, and metals were determined for sediment invertebrates at Site 2B. Because risks were identified under the current land use scenario for ecological receptors, a response action is necessary to protect the environment from actual or threatened releases of hazardous substances into the environment that may present an imminent and substantial endangerment. Because the HHRA conducted for the Area A Wetland did not include a residential scenario, LUCs would be required for the entire wetland until it is demonstrated that the entire wetland, or a portion of the wetland, presents acceptable residential risk. At that time, the LUCs can be removed for the portion of the wetland where risks to residential receptors from contaminants in sediment are found to be acceptable. Because of the implementation of LUCs to prevent future residential and recreational use of the Area A Wetland 5-year reviews would be required under this alternative to evaluate the effectiveness of the LUCs.

2.8 Remedial Action Objectives

RAOs are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. RAOs specify the COCs, potential exposure routes and receptors, and acceptable concentrations (i.e., cleanup levels) for a site and provide a general description of what the cleanup will accomplish. RAOs typically serve as the design basis for the remedial alternatives described in Section 2.9. The RAOs developed for the Area A Wetland sediment considering the current and future land use at the NSB-NLON are as follows:

- Reduce risks to sediment invertebrates from exposure to COCs in the Area A Wetland to the remediation goals listed below.
- Mitigate the potential for COCs in Area A Wetland sediment to migrate to less impacted areas of the Area A Downstream Watercourses (specifically Site 3, which was previously remediated) and cause adverse effects to receptors in these areas.
- Prevent residential exposure to contaminants in the Area A Wetland sediments.

No unacceptable risks were identified for human receptors. These RAOs are based on current and reasonably anticipated future non-residential site uses. To achieve the RAOs, ecological cleanup goals were developed for each COC.

The COCs identified for Area A Wetland after the BERA are PAHs, total Aroclor, the pesticides 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT, and metals. The pesticides were grouped and labeled total DDT, which represents the sum of detected concentrations of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. COC-specific RGs for sediment are identified below and are based on the results of sediment toxicity tests and analytical data NOECs and LOECs. For the BERA, sediment toxicity tests were conducted on sediment samples collected from 12 site locations and two reference locations. The results in the site samples were compared to the results in the reference samples to determine whether survival and/or growth of sediment invertebrates was reduced in the site samples compared to the reference samples. The chemical data were then evaluated to determine which chemicals (and their associated concentrations) could be related to the toxicity test results so that NOECs and LOECs could be developed. The geometric means of the NOECs and LOECs were then selected as the RGs (See Table 2-3). Based on this evaluation, the following RGs were developed:

- Total PAHs – 6,585 µg/kg
- Total DDT – 1,504 µg/kg
- Total Aroclor – 532 µg/kg

TABLE 2-3. ECOLOGICAL RG DEVELOPMENT

SAMPLE ID	SAMPLE CONCENTRATION (µG/KG)		
	TOTAL PAHS	TOTAL DDT	TOTAL AROCLOR
Non-Toxic Samples			
SD60	4,564	NA	NA
SD68	5,735	39.7	NA
SD72	5,176	671	480
SD73	1,499	24.3	NA
SD80	4,372	12.6	NA
SD81	2,930	18.6	NA
NOEC(1)	**5,735**	**671**	**480**
Toxic Samples			
SD62	38,215	8.5	NA
SD66	3,392	137	480
SD69	4,556	640	590
SD70	9,342	252	1,100
SD74	30,284	3,390	NA
SD75	50,953	3,370	NA
SD76	7,561	511	180
SD79	63,873	NA	NA
LOEC(2)	**7,561**	**3,370**	**590**
Geometric Mean of NOEC and LOEC - RG	**6,585**	**1,504**	**532**

1 Maximum concentration in a non-toxic sample.
2 Lowest concentration in a toxic sample that is greater than the maximum concentration in a non-toxic sample.
NA Not applicable.

The Navy also agreed that samples with 10 or more chemicals (total PAHs, 4,4'-DDT, total DDT, arsenic, cadmium, chromium, copper, lead, nickel, and zinc) that exceed TECs would be considered impacted, unless toxicity testing at that location indicated that the sample was not toxic. Figure 2-3 depicts the locations where RGs were exceeded.

A few locations require further discussion as presented below:

- Whether the location at 2WSD47/2WSD72 is considered to be impacted is questionable for reasons discussed in the BERA. Because of the uncertainty in whether this location is impacted, additional samples will be collected at and adjacent to this location as part of the pre-design investigation (PDI). Based on the results of the re-sampling, this area will either be characterized as impacted or not-impacted.
- Although the location at T7B/2WSD68 is not considered to be impacted, the Navy agreed to expand the excavation area at this location by 5 feet on both sides (to north and east) to ensure that this sample location is included in the excavation.
- The location of 2WSD43/2SWSD73 is considered to be impacted. The area around this sample (to west, north, and east) will be better defined as part of the PDI.

2.9 DESCRIPTION OF ALTERNATIVES

To address potential unacceptable ecological risks associated with sediment at Site 2B, a **preliminary technology screening** evaluation was conducted in the RI Update/FS. The general response actions are presented in Table 2-4. In-situ treatment options were not considered based on the type and volume of contamination at Site 2B.

TABLE 2-4. GENERAL RESPONSE ACTIONS

GENERAL RESPONSE ACTION	TECHNOLOGY	PROCESS OPTIONS
No Action	None	Not Applicable
Limited Action	LUCs	Institutional Controls
		Engineered Controls
	Monitoring	Sampling and Analysis
	Monitored Natural Recovery	Naturally Occurring Processes
Containment	Covering	Sediment Cover
Removal	Bulk Excavation	Excavation
	Water Removal	Dewatering
Ex-Situ Treatment	Pretreatment	Dewatering
	Physical/Chemical	Sediment Washing/Solvent Extraction
		Chemical Stabilization/Solidification
	Thermal	Incineration
Disposal	Landfill	Off-Site Landfilling
Re-Use	Re-Use Untreated Sediment	Use in Asphalt Batch Plant
		Use in Concrete Manufacturing
	Re-Use Treated Sediment	Fill After Treatment

The technologies and process options retained after detailed screening were assembled into three sediment alternatives. Consistent with the NCP, the no action alternative was evaluated as a baseline for comparison with other alternatives during the comparative analysis. Table 2-5 describes the major components and provides estimated costs for each remedial alternative identified for Site 2B sediment.

TABLE 2-5. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED

ALTERNATIVE	COMPONENTS	DETAILS	COST
Alternative 1: **No Action** *No action to address contaminated sediment and no use restrictions*	Five-year reviews	Five-year reviews would be conducted because site because contamination exceeding CERCLA risk levels would remain in place.	**Capital:** $0 **Every 5 Years**: $25,300 **30-Year NPW:** $97,700 **Discount Rate:** 2.7% **Time Frame:** NA
Alternative 2: **Soil Cover, Wetlands Mitigation, and LUCs** *Installation of a soil cover and LUCs to prevent unauthorized access and digging within the cover limits*	Placement of soil covers over four areas of the site	Installation of 12-inch soil covers over 1.3 acres of contaminated sediment.	**Capital:** $1,672,440 **1st Year:** $27,010 **2nd Year:** $21,050 **3rd Year:** $33,590 **Years 4 through 30:** $13,110 **Every 3 Years:** $3,960 **Every 5 Years:** $25,300 **30-Year NPW:** $2,103,580 **Discount Rate:** 2.7% **Time Frame[1]:** 4 months
	Wetland mitigation and flood storage	Construction of an additional 2.6 acres of wetlands at NSB-NLON to mitigate loss of wetlands due to the cover systems.	
	LUCs and inspections	Implementation of LUCs to provide maintenance and inspections of the soil covers, and to prohibit disturbance of the cover. LUCs would also be implemented to prevent the potential future residential use of the Area A Wetland.	
	Long-term monitoring	Annual monitoring of sediment to confirm that the remedy remains protective and that contaminants are not migrating.	
	Five-year reviews	Five-year reviews would be conducted because contamination would remain in excess of levels that allow for unrestricted use and unlimited exposure	
Alternative 3: **Excavation, Off-Site Disposal, and Site Restoration** *Excavation to meet cleanup goals, off-site disposal of contaminated sediment, and site restoration*	Excavation and off-site disposal	Excavation of 3,200 cy of sediment such that cleanup goals are achieved and off-site disposal of excavated sediment.	**Capital:** $1,773,800 **1st Year:** $7,960 **2nd Year:** $4,990 **3rd Year:** 17,530 **Every 5 Years:** $25,300 **30-Year NPW:** $1,900,180 **Discount Rate:** 2.7% **Time Frame[1]:** 3 months
	Site restoration	Re-grade areas to existing elevation with clean organic soil, seed the area with native wetland vegetation, and monitor to ensure the native wetland vegetation has been established.	
	LUCs	LUCs would be implemented to prevent the potential future residential use of the Area A Wetland.	
	Monitoring	Monitoring to ensure that the native wetland vegetation has been re-established and that *Phragmites* is being controlled within the restored area.	
	Five-year reviews	Five-year reviews would be conducted because contamination would remain in excess of levels that allow for unrestricted use and unlimited exposure	

1 The estimated time frame listed in Table 2-5 is for the duration of construction activities only. Additional time would be required to prepare the necessary work plan and other administrative documents.

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 2-6 and subsequent text in this section summarize the comparison of the remedial alternatives with respect to the **nine CERCLA evaluation criteria** outlined in the NCP at 40 CFR 300.430(e)(9)(iii) and categorized as threshold, primary balancing and modifying. Further information on the detailed comparison of remedial alternatives is presented in the RI Update/FS.

TABLE 2-6. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

CERCLA CRITERION	ALTERNATIVE 1: NO ACTION	ALTERNATIVE 2: SOIL COVER, WETLANDS MITIGATION, AND LUCS	ALTERNATIVE 3: EXCAVATION, OFF-SITE DISPOSAL, AND SITE RESTORATION
Overall Protection of Human Health and the Environment	○	●	●
Compliance with Applicable or Relevant and Appropriate Requirements	○	●	●
Long-Term Effectiveness and Permanence	○	●	●
Reduction of Toxicity, Mobility, and Volume through Treatment	NA	NA	Only to the extent water from the dewatering process requires treatment or sediment stabilization reduces the mobility of contaminant within the treated sediment.
Short-Term Effectiveness	○	●	●
Implementability	●	●	●
Total Cost (Present Net Worth)	**$97,700**	**$2,103,580**	**$1,900,180**
State Acceptance	NA	●	●
Community Acceptance	NA	●	●

● - Meets the criterion. ○ - Does not meet the criterion. NA – Not Applicable

Threshold Criteria

Overall Protection of Human Health and the Environment. Alternative 1 would not be protective of human health or the environment because no action would be conducted to address site risks. Alternative 1 would not achieve RAOs because the no action alternative would not be protective of ecological receptors and would not protect the downstream watercourse from the migration of contaminated sediment.

Alternative 2 would be less protective than Alternative 3 because it would leave contamination in place and rely on engineering and administrative controls to prevent exposure to contamination. Under Alternative 3 sediment causing an ecological risk would be permanently removed from the Site preventing ecological receptors from being exposed to unacceptable levels of contamination.

Compliance with ARARs. ARARs include any federal or state standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate to the site or remedial action. Alternatives 2 and 3 would comply with all **chemical-, location-, and action-specific ARARs** as long as adequate mitigation is conducted to compensate for altered wetland and floodplain resources and to control *Phragmites* in the mitigated or remediated areas. The Navy finds that under the Section 404 of the federal Clean Water Act Alternative 3 is the least environmentally damaging practicable alternative to protect wetland resources because CERCLA-related contamination detected at concentrations exceeding RGs will be removed from the site, wetlands will be restored in place, invasive species will be controlled, and LUCs will be established to prevent residential development within the wetland area. In comparison, Alternative 2 is less practicable because it relies on covering contamination within the existing wetland and creating new wetlands from the upland area adjacent to the Area A Wetland. Both Alternatives 2 and 3 use a total PCB cleanup level of 532 ppb that has been determined by EPA to meet TSCA standards and will not pose an unreasonable risk of injury to health or the environment.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Alternative 1 would have no long-term effectiveness and permanence because no contaminant removal or contact restrictions would occur. Alternative 3 would provide more long-term effectiveness and permanence than Alternative 2 because contaminated sediment would be completely removed from the site and wetland. Alternative 2 would require engineered and administrative controls to be an effective and permanent remedy in the long-term. LUCs implemented under Alternatives 2 and 3 would prevent site development for other uses that could provide unacceptable exposure to future site users (including residential users) to site contamination, and Long-term monitoring and O&M, along with five-year reviews under Alternative 2 would ensure the adequacy of the containment remedy to protect ecological receptors and downstream watercourses from contamination left in place under the cover. Five-year reviews for both Alternatives 2 and 3 would ensure that LUCs remained protective by preventing residential exposure to remaining contaminants throughout the Area A Wetland.

Reduction in Toxicity, Mobility, or Volume Through Treatment. None of the alternatives would utilize treatment to reduce the toxicity, mobility, or volume of COCs except to the extent water from the dewatering processed and/or potential sediment stabilization under Alternative 3, meets this criterion.

Short-Term Effectiveness. Alternative 1 would adversely impact environmental receptors in the short term and could also potentially impact downstream environmental receptors because no action would be performed to reduce site risks. Implementation of Alternatives 2 and 3 would expose site workers to physical risks, and removing vegetation for the implementation of these alternatives could increase the potential for the migration of contaminated sediment to the downstream watercourse. However, the physical risk associated with these potential exposures under Alternatives 2 and 3 could be effectively controlled by using personal protection equipment, complying with proper site-specific health and safety procedures, and utilizing proper best management practices to prevent the migration of contamination through erosion during monitoring and construction activities. There would be no short-term risk to construction workers associate with working with or coming into contact with the site contaminants. Alternative 2 would have an approximate construction duration of 4 months and Alternative 3 would have an approximate construction period of 3 months. LUCs will prevent residential exposure to site contaminants.

Implementability. Alternative 1 would be readily implementable. Technical, engineering, and administrative controls for developing and initiating five-year reviews are readily available. Alternative 2 would be considered the most difficult to implement because this alternative requires wetland mitigation activities, the construction of a barrier layer, preparing the contaminated areas for barrier layer construction, and long-term inspection and operation, monitoring, and maintenance (OM&M) of the cover. The wetland mitigation activities for Alternative 2 requires a 2 to 1 mitigation ratio. To construct the required wetlands, 2.6 acres of land would have to be excavated to create a wetland habitat and restore the flood storage capacity of the Area A Wetland. Alternative 3 would be less difficult to implement than Alternative 2 because this alternative requires a 1:1 restoration of impacted wetlands and the flood

storage capacity of the Area A Wetland will not be affected. The components of Alternative 3 include the excavation, processing, off-site transportation and disposal of contaminated sediment, restoring excavated areas to pre-existing elevations with clean organic soil, seeding with native wetland vegetation, and monitoring to ensure the vegetation has been established and *Phragmites* is controlled in this area. All alternatives can be implemented using conventional and locally available equipment and materials. The establishment of LUCs for Alternative 3 and 4 would be easily implementable as long as the Navy owns the property. The Navy will establish the LUCs for this Remedy in a post-ROD Land Use Control Remedial Design (LUC RD) to ensure that base personnel are aware of and comply with the site restrictions. There will be annual monitoring of compliance with LUCs. If the property were ever transferred from Navy control, implementation of the LUCs would need to be in the form of deed restrictions that would meet State property law requirements.

Both Alternative 2 and Alternative 3 require heavy equipment and trucks to move contaminated sediment and/or clean fill material. Alternative 2 would require more fuel energy than Alternative 3 for onsite activities because the same type of equipment would run a month longer for Alternative 2 than it would for Alternative 3. However, Alternative 3 requires transportation of excavation soils to a landfill for disposal and transportation of clean soil to the site for backfill and Alternative 2 only requires transportation of clean fill to the site for cover construction. As a result Alternative 3 with an estimated number of truck trips equal to 406 would use more fuel energy than Alternative 2, which requires an estimated 363 truck trips. Minimal energy usage would also be required under Alternatives 2 and 3 to perform periodic monitoring and maintenance activities. Not including Alternative 1, for the life of the remedies it is estimated that Alternative 3 has a smaller remedial carbon foot-print than Alternative 2.

Cost. The estimated present-worth cost is greatest for Alternative 2 at $2,103,580, and lowest for Alternative 1 at $97,700. Alternative 3 has an estimated present-worth cost of $1,900,180.

Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. CTDEP, as the designated support agency in Connecticut, concurs with the Selected Remedy (Appendix A).

Community Acceptance. No written questions were received during the formal public comment period for the Proposed Plan. The questions raised at the public meeting on June 17, 2010, were general inquiries for informational purposes only; no objections to the proposed alternative were voiced. These questions and Navy responses are discussed in Section 3.0.

2.11 PRINCIPAL THREAT WASTE

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or that would present a significant risk to human health or the environment should exposure occur. A source material is a material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. The NCP at 40 CFR 300.430(a)(1)(iii)(A) establishes an expectation that treatment will be used to address the principal threats posed by a site wherever practicable. At Site 2B, the contaminant concentrations are not highly toxic or highly mobile; therefore, principal threat wastes are not present at the site.

2.12 SELECTED REMEDY

2.12.1 Rationale for Selected Remedy

The Selected Remedy for Site 2B is Alternative 3, excavation, off-site disposal, site restoration, and LUCS, which was selected because it provides the best balance of tradeoffs with respect to the nine evaluation criteria. The remedy will meet the RAOs by excavating contaminated sediment causing unacceptable ecological risk within the limits of the Area A Wetland.

The principal factors in the selection of this remedy included the following:

- Implementation will reduce current potential unacceptable risk to ecological receptors in a relatively short time frame (estimated construction period of 3 months) with minimal disturbance of existing habitat.
- Excavation and off-site disposal of contaminated sediment will eliminate future exposures and be protective of the environment by removing the possibility of contaminated sediment eroding to downgradient locations.
- The remedy is consistent with the reasonably anticipated future non-residential use of the site.
- The remedy achieves greater protection than covering at a lower cost ($1,900,180 compared to $2,103,580).
- The remedy achieves a level of protection similar to the soil cover alternative but allows for continued use of the property as a wetland without the need to successfully create replacement wetland and carry out long-term soil cover inspections and maintenance.

2.12.2 Description of Selected Remedy

The Selected Remedy includes five major components: (1) excavation of sediment causing unacceptable ecological risk, (2) dewatering of excavated sediment (addition of drying agent as appropriate), (3) off-site disposal of sediment, (4) site restoration and monitoring, and (5) LUCs.

Excavation will consist of removal of an estimated 3,240 cy of sediment within five areas from 0 to 2 feet bgs, as shown on Figure 2-4. The estimated volume of sediment to be removed is based on data from previous investigations; the final limits of excavation will be determined based on the results of a PDI conducted during the remedial design phase. The purpose of the PDI is to further define the lateral extent of contamination where data gaps currently exist. Due to the density of the sampling to be conducted as part of the PDI and the visual evidence associated with exposing the dredged material, post-removal verification samples would not be required to determine the removal of contaminated sediment. Excavation will be conducted laterally to pre-determined sample locations, and vertically to the dredged material underlying these wetland sediments. During excavation, it is assumed that the three existing dredged material wells in the Area A Wetland will require abandonment. It has been determined that these wells are no longer needed for long term monitoring at Area A Landfill, and, therefore these wells will not be replaced.

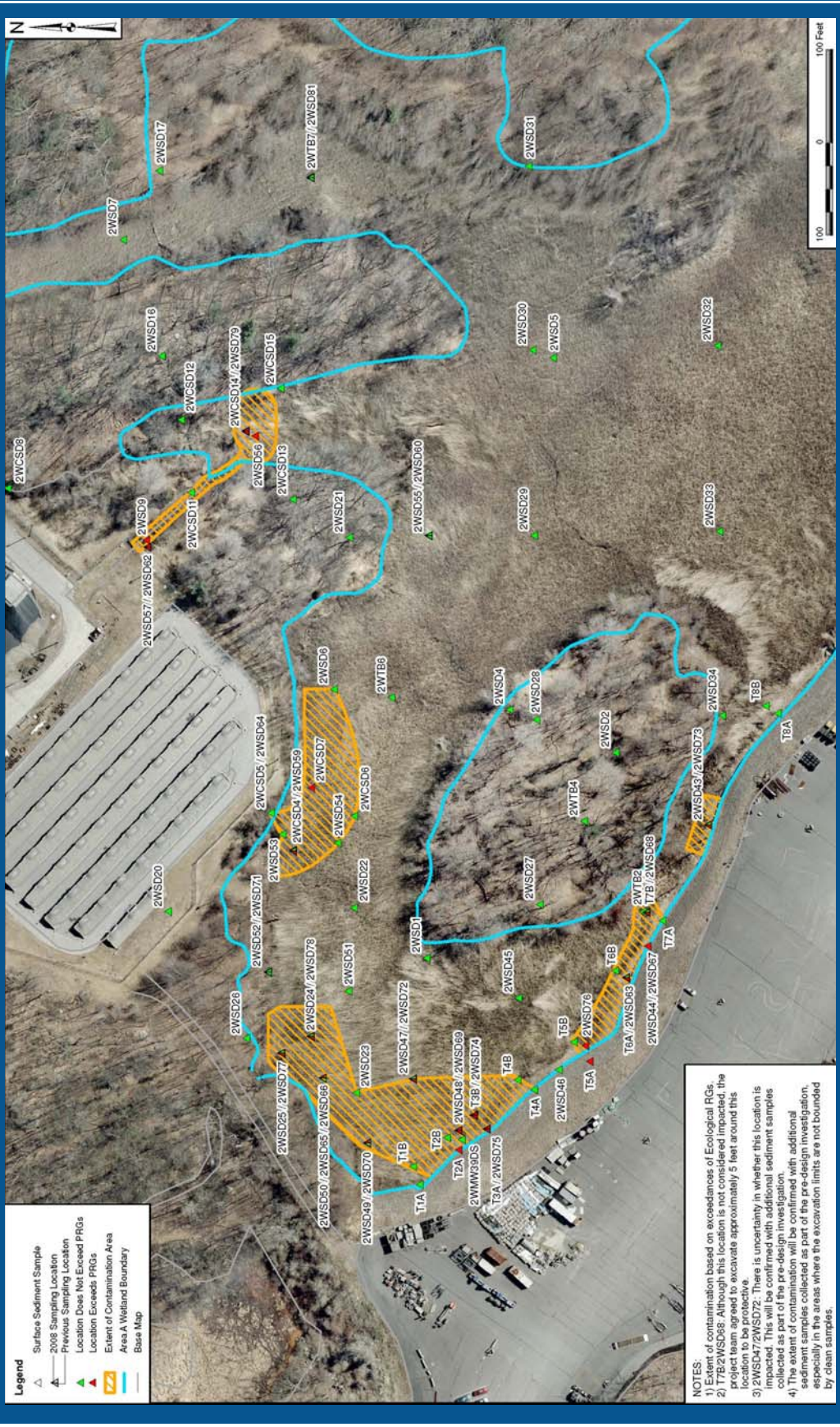
Excavated sediment will be transported to a dewatering pad constructed on the adjacent Area A Landfill cap where it will be mixed with a drying agent to absorb excess moisture to facilitate transportation. It is assumed this process will add an additional 5 percent to the excavated volume; therefore, the disposal volume is estimated to be 3,280 cy. Toxicity Characteristic Leaching Procedure testing will be conducted to verify disposal requirements. Based on existing data, it is assumed that all of excavated sediment will be transported to an off-site Resource Conservation and Recovery Act Subtitle D non-hazardous waste disposal facility. The excavated areas will be backfilled with clean organic soil to pre-excavation elevations, and seeded with native wetland vegetation. Monitoring would be conducted annually to ensure that the wetland vegetation has been established and that *Phragmites* is controlled within the restored area.

The Navy will implement LUCs to prevent potential future residential use of the Area A Wetland (Site 2B). LUCs are required because contaminants in wetland sediment are at concentrations that could result in unacceptable risks to human health if land use is not controlled or restricted. The objective of the institutional controls for the Selected Remedy is to prevent residential development within the wetland area. Note that there is already a LUC for groundwater in this area as indicated in the OU9 ROD.

Figure 2-1 identifies the intended location of the Area A Wetland LUCs. The controls on residential use of this wetland area will be maintained until the concentrations of contaminants in sediment are less than levels that allow for unrestricted use and unlimited exposure.

The Navy will establish the LUCs for this Remedy in a post-ROD Land Use Control Remedial Design (LUC RD). The LUC RD will set out the specific actions needed to implement, operate, maintain, and enforce the LUC component of the Remedy. After LUCs are established in the LUC RD, they will be enforced by requiring all who desire to perform work on NSB-NLON to first coordinate with the installation's IR Program Manager, who will advise the work proponent of the LUCs imposed, if any, at the proposed work location. Should the property ever be transferred out of federal control to private ownership, the deed given to the property recipient would contain deed restrictions, consistent with state law, necessary to continue implementation of required LUCs. As mandated by CERCLA, the Navy retains ultimate responsibility for ensuring all aspects of the Remedy are met.

FIGURE 2-4. IMPACTED AREA CONSIDERED IN THE FS



2.12.3 Expected Outcomes of Selected Remedy

The current use of the site as a wetland, which will be supported by the Selected Remedy, is expected to continue at Site 2B, and there are no other planned land uses in the foreseeable future. Groundwater at the site is not used and is not expected to be used in the future, and the Selected Remedy will have no impact on current or future groundwater uses available at the site. There are no socio-economic, community revitalization, or economic impacts or benefits associated with implementation of the Selected Remedy. It is estimated that the RAOs for Site 2B will be achieved within a construction period of approximately 3 months. Table 2-7 describes how the Selected Remedy mitigates risk and achieves RAOs for Site 2B.

TABLE 2-7. HOW SELECTED REMEDY MITIGATES RISK AND ACHIEVES RAOS

RISK	RAO	COMMENTS
Unacceptable ecological risks to sediment from direct exposure to and ingestion of contaminated sediment, and potential human health risks to residential users from exposure to contaminated sediment.	Reduce risks to sediment invertebrates from exposure to COCs in the Area A Wetland to acceptable levels.	Excavation of contaminated sediment to meet the established RGs will eliminate the risk to sediment invertebrates.
	Mitigate the potential for COCs in Area A Wetland sediment to migrate to less impacted areas of the Area A Downstream Watercourses (specifically Site 3, which was previously remediated) and cause adverse effects to receptors in these areas.	Excavation of contaminated sediment to achieve RGs will remove contaminated sediment from the site that would otherwise be available to migrate via erosion.
	➢ Prevent residential exposure to contaminants in the Area A Wetland sediments.	LUCs will be required for the entire wetland until it is demonstrated that the entire wetland, or a portion of the wetland, presents acceptable residential risk.

However, if proposed land use changes in the future and uses other than as a wetland are expected, additional excavation or other remedial approaches may be required.

2.13 STATUTORY DETERMINATIONS

In accordance with the NCP, the Selected Remedy meets the following statutory determinations:

- **Protection of Human Health and the Environment** – Excavation of sediment to achieve RGs will be conducted, and the site will be restored to create an improved wetland habitat. The Selected Remedy will prevent current and future ecological risks to sediment invertebrates from exposure to contaminated sediment, and protect the environment by removing the possibility of contaminated sediment eroding to downgradient locations.

- **Compliance with ARARs** – The Selected Remedy will attain all identified federal and state ARARs, as presented in Appendix E. As part of this decision document the Navy finds under the Section 404 of the federal Clean Water Act that the remedy called for in this ROD is the least environmentally damaging practicable alternative to protect wetland resources because CERCLA-related contamination detected at concentrations exceeding RGs will be removed from the site, wetlands will be restored in place, invasive species will be controlled, and LUCs will be established to prevent residential development within the wetland area.

EPA finds under the TSCA that the Navy's proposed risk-based cleanup level of 532 ppb for total PCBs used for the remedy will not pose an unreasonable risk of injury to human health or the environment.

- **Cost-Effectiveness** – The Selected Remedy represents the most reasonable value for the money by providing the greatest degree of protection at the lowest cost. Detailed costs for the Selected Remedy are presented in Appendix F.
- **Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent** Practicable – The Selected Remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a practical manner at Site 2B. Based on the type of contamination at the Area A Wetland, the silt and fines content of the sediment, and the large volume of contaminated sediment, in-situ treatment alternatives were screened out during the technology screening phase of the FS. Excavation and off-site disposal provides the best balance of tradeoffs for long-term effectiveness and permanence with ease of implementation for reasonable cost.
- **Preference for Treatment as a Principal Element** – Treatment is not a principal element of the Selected Remedy for sediment at Site 2B because there are no principal threat wastes at the site, and excavation and off-site disposal provides the best balance of tradeoffs with respect to long-term effectiveness and permanence at a reasonable cost.
- **Five-Year Review Requirement** – Five-year reviews would be conducted because contamination would remain in excess of levels that allow for unrestricted use and unlimited exposure.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Area A Wetland was released on June 9, 2010. The Proposed Plan identified excavation, off-site disposal, site restoration, and LUCs as the proposed remedy for Site 2B, Operable Unit 12.

The Navy and EPA reviewed all written and verbal comments submitted during the public comment period and determined that no significant changes to this decision, as originally identified in the Proposed Plan, were necessary or appropriate.

3.0 RESPONSIVENESS SUMMARY

3.1 STAKEHOLDER COMMENTS AND LEAD AGENCY RESPONSES

Participants in the public meeting held June 17, 2010, included members of the public (e.g., RAB members) and representatives of the Navy, EPA, and CTDEP. Questions and concerns raised at the meeting were addressed at the meeting, as summarized in Table 3-1. No additional written comments, concerns, or questions were received by the Navy, EPA, or CTDEP during the public comment period.

TABLE 3-1. SUMMARY OF QUESTIONS FROM PUBLIC INFORMATION SESSION

<table>
<tr><th>QUESTION</th><th>RESPONSE</th></tr>
<tr><td>David Turner asked about the remedial goals for Area A Wetlands and how they compare to the Connecticut RSRs, specifically residential direct exposure criteria.</td><td>There are no specific Connecticut RSRs for sediment. However, the following lists the CTDEP RSR direct exposure criteria compared to the PRGs:
<table>
<tr><th>CTDEP RSR</th><th>PRG</th></tr>
<tr><td>4,4’-DDD = 2.6 mg/kg</td><td rowspan="3">Total DDT = 1.5 mg/kg</td></tr>
<tr><td>4,4’-DDE = 1.8 mg/kg</td></tr>
<tr><td>4,4’-DDT = 1.8 mg/kg</td></tr>
<tr><td>Aroclor-1260 = 1 mg/kg</td><td>Total Aroclor = 0.532 mg/kg</td></tr>
<tr><td>PAHs = 1 mg/kg for some individual PAHs</td><td>Total PAHs = 6.585 mg/kg</td></tr>
<tr><td>The RSRs for 4,4’-DDD, 4,4’-DDE, 4,4’-DDT, Aroclor-1260, and PAHs are presented above. The RSRs for the metals are listed below:

Arsenic = 10 mg/kg
Cadmium = 34 mg/kg
Chromium = 100 mg/kg
Copper = Not available
Lead = 400 mg/kg
Nickel = 1,400 mg/kg
Zinc = 20,000 mg/kg</td><td>Also, locations where the 10 or more of the following chemicals are detected at concentrations that exceed these TECs are considered impacted:
Total PAHs = 1.61 mg/kg
4,4’-DDE = 0.00316 mg/kg
Total Aroclor = 0.0598 mg/kg
Total DDT = 0.00528 mg/kg
Arsenic = 9.79 mg/kg
Cadmium = 0.99 mg/kg
Chromium = 43.4 mg/kg
Copper = 31.6 mg/kg
Lead = 35.8 mg/kg
Nickel = 22.7 mg/kg
Zinc = 121 mg/kg</td></tr>
</table></td></tr>
</table>

3.2 TECHNICAL AND LEGAL ISSUES

No technical or legal issues associated with the Site 2B ROD were identified.

Administrative Record Reference Table

DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
1	**41 soil and sediment, 2 surface water and 7 groundwater samples**	Table 2-1	Atlantic Environmental Services, Inc. (Atlantic), 1992. Phase I Remedial Investigation Naval Submarine Base – New London, Groton, Connecticut. Sections 4.11.2 and 4.11.4.
2	**29 sediment, 9 surface water, and 20 groundwater samples.**	Table 2-1	Brown and Root Environmental, 1997. Phase II Remedial Investigation Report for Naval Submarine Base – New London, Groton, Connecticut. Section 7.2.2.
3	**potential risk**	Table 2-1	Brown and Root Environmental, 1997. Section 7.9.3.
4	**Twenty sediment samples**	Table 2-1	Atlantic, 1995. Focused Feasibility Study for Area A Landfill, Naval Submarine Base, New London, Groton, Connecticut. Appendix A.1.
5	**Groundwater and surface water monitoring**	Table 2-1	Tetra Tech NUS, Inc. (TtNUS), 2003. Year 3 Annual Groundwater Monitoring Report for the Area A Landfill, Naval Submarine Base – New London, Groton, Connecticut. Section 3.1
6	**sediment toxicity testing**	Table 2-1	TtNUS, 2010. Remedial Investigation Update/Feasibility Study for Sediment at Area A Wetlands at Naval Submarine Base, New London, Groton, Connecticut. Appendix F.
7	**No unacceptable risks**	Table 2-1	TtNUS, 2010. Section 6.7.
8	**not suitable for human consumption**	Section 2.6	TtNUS, 2010. Section 3.3.
9	**cancer risks and non-cancer hazards**	2.7.1	TtNUS, 2010. Section 6.5.1.
10	**within EPA's acceptable risk range.**	2.7.1	TtNUS, 2010. Section 6.7
11	**uncertainty**	2.7.1	TtNUS, 2010. Section 6.6
12	**Exposure pathways**	2.7.1	TtNUS, 2010. Sections 6.3.2 and 7.2.2
13	**preliminary technology screening**	2.9	TtNUS, 2010. Section 10.2.
14	**nine CERCLA evaluation criteria**	2.10	TtNUS, 2010. Section 11.1.
15	**chemical-, location-, and action-specific ARARs**	2.10	TtNUS, 2010. Section 9.3, Tables 9-1, 9-2 and 11-1 through 11-3.

ADMINISTRATIVE RECORD

Atlantic (Atlantic Environmental Services, Inc.), August 1992. Phase I Remedial Investigation Naval Submarine Base - New London, Groton, Connecticut. Colchester, CT.

Atlantic, April 1994. Draft Focused Feasibility Study, Area A Downstream/OBDA, Installation Restoration Program, Naval Submarine Base - New London, Groton, Connecticut. Colchester, CT.

Atlantic, April 1995. Background Concentrations of Inorganics in Soil. Naval Submarine Base-New London, Groton, Connecticut. Colchester, Connecticut.

Brown and Root Environmental, March 1997. Phase II Remedial Investigation Report for Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania.

CTDEP, October 1996. Letter from Randy May, CTDEP, Supervising Sanitary Engineer, Hartford, Connecticut to Mark Evans, Remedial Project Manager, Department of the Navy, Lester, Pennsylvania. Groundwater Reclassification USN Submarine Base, October 21. Public Hearing on December 5, 2006.

ECC, August 2009. Year 9 Annual Groundwater Monitoring Report for Area A Landfill, New London, Groton, Connecticut. Marlborough, Massachusetts.

NAVFAC (Naval Facilities Engineering Command), 1988. Master Plan for Naval Submarine Base, New London.

Navy, June 2000. Record of Decision for Area A Weapons Center, Naval Submarine Base – New London, Groton, Connecticut.

NEESA (Naval Energy and Environmental Support Activity), March 1983. Final Initial Assessment Study of Naval Submarine Base, New London, Connecticut. NEESA 13-025. Port Hueneme, CA.

Tetra Tech, January 1999. Lower Subase Remedial Investigation Report for Naval Submarine Base, New London, Groton, Connecticut. King of Prussia, Pennsylvania.

Tetra Tech, December 2001. Basewide Groundwater Operable Unit Remedial Investigation Report for Naval Submarine Base New London, Groton, Connecticut.

Tetra Tech, July 2003. Year 3 Annual Groundwater Monitoring Report for the Area A Landfill, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania.

Tetra Tech, October 2007. Quality Assurance Project Plan for Phase III Investigation for Area A Wetland – Site 2B, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania.

Tetra Tech, February 2008. Phase III RI Technical Memorandum for Area A Wetland - Site 2B, Naval Submarine Base, New London, Groton, Connecticut. King of Prussia, Pennsylvania.

Tetra Tech, October 2008. Sampling and Analysis Plan for Phase IV Remedial Investigation for Area A Wetland - Site 2B, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania.

Tetra Tech, November 2008- Volume II of the Operation and Maintenance Manual for Installation Restoration Program Sites at Naval Submarine Base, New London, Groton, Connecticut. King of Prussia, Pennsylvania.

Tetra Tech, September 2009. Lower Subase Human Health Risk Assessment for Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania.

Appendix A
State of Connecticut Concurrence Letter

STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

79 ELM STREET HARTFORD, CT 06106-5127

PHONE: 860-424-3001

Amey W. Marrella
Commissioner

August 5, 2010

James T. Owens, III, Director,
U.S. Environmental Protection Agency
Office of Site Remediation and Restoration
5 Post Office Square, Suite 100
Mail Code: OSRR07-5
Boston, MA 02109-3912

Marc W. Denno
Captain, USN
Commanding Officer
Naval Submarine Base New London
Box 00, Building 86
Crystal Lake Road
Groton, CT 06349

Re: State Concurrence with Remedy for Operable Unit 12, Area A Wetlands Sediment (Site 2B) Naval Submarine Base New London, Groton, Connecticut

Dear Mr. Owens and Captain Denno:

The Connecticut Department of Environmental Protection (CTDEP) concurs with the final remedy selected by the EPA and the Navy under the Comprehensive Environmental Response, Compensation and Liability Act for addressing sediment at the Area A Wetland (Site 2B) at the Naval Submarine Base New London, in Groton, Connecticut. The Area A Wetland is also known as Operable Unit 12.

The Navy proposes to excavate an estimated 3,240 cubic yards of contaminated sediment from the Area A Wetland, and dispose of the sediment off- site at a permitted facility. The Navy will restore the excavated areas with clean soil and plant native vegetation, and monitor the area to ensure that the native vegetation is reestablished. The Navy will also put in place institutional controls to ensure that the Area A Wetland is not used for residential purposes.

The remedy is described in detail in the proposed plan dated June 2010, and in the draft Record of Decision (ROD), dated June 2010.

Additionally, the institutional controls will be memorialized in the most current version of the base instruction document entitled "NSB-NLON Installation Restoration Site Use Restrictions Instruction Document." This document will remain in effect as long as the Navy continues to own the base.

The ROD states that if the Navy sells or transfers the base, an environmental land use restriction (ELUR) will be recorded in accordance with state law.

CTDEP looks forward to working with the Navy and the US Environmental Protection Agency toward continued remediation at the Naval Submarine Base.

Yours truly,

Amey Marrella

Amey W. Marrella
Commissioner

AWM:MRL

C:

Mr. James Gravette, Remedial Project Manger (Code OPTE3-1)
Environmental, Naval Facilities Engineering Command Mid-Atlantic
Bldg. Z-144, 9742 Maryland Avenue, Norfolk, VA 23511-3095

Ms. Kymberlee Keckler, U.S. Environmental Protection Agency, Region 1
Federal Facilities Superfund Section, 5 Post Office Square, Suite 100,
Mail Code: OSRR07-3, Boston, MA 02109-3912

Naval Submarine Base New London,
Environmental Department
Attn: Richard Conant
Building 439, Room 105, Box 39
Crystal Lake Road
Groton, CT 06349

Appendix B
PRAP

Naval Submarine Base - New London

Sediment at Area A Wetland—Site 2B, Operable Unit 12
Proposed Plan

Introduction

In accordance with Section 117 of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, the law more commonly known as Superfund, this Proposed Plan summarizes the Navy's preferred final option for addressing **sediment** at Area A Wetland—Site 2B [**Operable Unit (OU)** 12] at Naval Submarine Base—New London (the Site). The proposed remedial actions for **sediment** at Area A Wetland were presented in a **Remedial Investigation (RI)** Update/ **Feasibility Study (FS)** Report. The Site is being addressed by the Navy's **Installation Restoration Program**. The goal of the **Installation Restoration Program** is to identify, assess, characterize, and cleanup or control **contamination** from past hazardous waste disposal operations at Superfund sites. The Department of the Navy is the lead agency at the Site, and the United States Environmental Protection Agency (EPA) provides primary regulatory oversight for the **Installation Restoration Program** and the Site; the Connecticut Department of Environmental Protection (CTDEP) provides regulatory support.

This Proposed Plan recommends excavation and off-site disposal of contaminated **sediment** (and saturated soil) with concentrations greater than the selected **Preliminary Remediation Goals** (**PRGs**) from within the Area A Wetland, restoring the excavated areas to pre-existing elevations with clean organic soil, seeding the restored area to establish **native wetland vegetation**, and **monitoring** to ensure that the **native wetland vegetation** rather than **invasive wetland vegetation**, particularly the common reed, becomes established. **PRGs** are **sediment** cleanup values, which are in essence, chemical concentrations in **sediment** below which risks to **sediment invertebrates** are acceptable. Therefore, **sediment** with chemical concentrations exceeding **PRGs** could pose a risk to **sediment invertebrates** at this site.

The Cleanup Proposal…

After careful study of **sediment** at Area A Wetland, the Navy and EPA propose the following plan:

- Excavate contaminated **sediment** greater than the **PRGs** and transport **sediment** off site for proper disposal.
- Restore excavated areas to pre-existing elevations with clean organic soil.
- Seed the restored area to establish **native wetland vegetation**.
- Monitor the area to ensure that the **native wetland vegetation** rather than **invasive wetland vegetation** has been re-established.

Technical terms shown in bold print are defined in the glossary beginning on Page 12.

What Do You Think?

The Navy, EPA, and CTDEP are accepting public comments on the final Proposed Plan for the Area A Wetland - Site 2B from June 9, 2010 to July 9, 2010. You do not have to be a technical expert to comment. If you have a comment or concern, the Navy wants to hear from you before making a final decision. There are two ways to formally register a comment:

1. Offer oral comments during the June 17, 2010 **formal public hearing**, or
2. Send written comments postmarked no later than July 9, 2010 following the instructions provided at the end of this Proposed Plan.

To the extent possible, the Navy will respond to your oral comments during the June 17, 2010 public meeting. In addition, regulations require the Navy to respond to all formal comments in writing. The Navy will review the transcript of the comments received at the meeting, and all written comments received during the formal comment period, before making a final decision and providing a written response to the comments in a document called a **Responsiveness Summary**. The **Responsiveness Summary** will be included in the **Record of Decision** (**ROD**) for Area A Wetland—Site 2B and will be publicly available.

Learn More About the Proposed Plan

- The Navy will describe this Proposed Plan and listen to your questions at an **informational public meeting**. A **formal public hearing** will immediately follow this meeting.
- For further information regarding the proposed cleanup plan or upcoming meeting, please contact the Navy or regulators listed at the end of this Proposed Plan.

Public Meeting and Hearing

Public Meeting

Meeting: 6:30 pm

Hearing: 7:00 pm

Date: June 17, 2010

Location: Best Western Olympic Inn, Route 12, Groton, Connecticut

Introduction (continued)

This Proposed Plan does not include any actions for **groundwater** or **surface water** at the Area A Wetland. It was determined that **groundwater** in the **dredged material** at the Site was not a concern. Previous evaluations of **surface water** data concluded that potential risks to aquatic organisms was not great enough to warrant further evaluation at the Area A Wetland. Also, risks to humans (construction workers and older child trespassers) from exposure to chemicals in **surface water** were acceptable.

EPA and the Navy are also specifically soliciting public comment concerning the determination that the alternative chosen is the least environmentally damaging, practicable alternative for protecting wetland and floodplain resources.

Site Background

Area A Wetland—Site 2B is located in the northeast quadrant of the Site (see Figure 1). In the late 1950s, **dredged material** from the Thames River were pumped to this area and contained within a constructed earthen dike that extends from the Area A Landfill to the southern side of the Area A Weapons Center. The Area A Wetland is approximately 26 acres and the **dredged material** ranges from 10 to 35 feet in thickness. The Area A Wetland is dominated by the reed *Phragmites communis,* to the exclusion of other types of plants. Therefore, this is a low quality wetland because there is little plant diversity and *Phragmites communis* is not used by a lot of wildlife. It was reported that formulated (water-soluble) "bricks" of the pesticide 1,1,1-trichloro-2,2-bis(4-chlorphenyl)ethane (**DDT**) were placed on ice in the wetland during the winter and allowed to dissolve as a mosquito control measure in the 1960s before the 1972 ban of **DDT**.

Currently, the Site is a wetland and is not used for any other purpose. Based on the proximity of the Site to the Area A Landfill and Area A Weapons Center and because the wetland is underlain by **dredged material**, it is not likely that the Site will ever be used for residential or industrial development. Therefore, the proposed future land use is not expected to change. Based on current and potential future land use, older child trespassers (e.g., teenagers) and construction workers may be exposed to contaminated **sediment**, **surface water**, and **groundwater** within the study area. Potential ecological receptors in the Area A Wetland include mammals, birds, amphibians, reptiles, plants, and **sediment invertebrates**.

Items stored and/or disposed at the Area A Landfill resulted in the release of **polychlorinated biphenyls** (**PCBs**), **metals**, petroleum compounds, sulfuric acid solution, and other chemicals to the underlying soil and the adjacent Area A Wetland. A **Remedial Action** was completed in 1997 at the Area A Landfill that included covering the Site with a low-permeability cap. A **ROD** was signed for the soil and **sediment OU** associated with Area A Weapons Center (OU7) in June 2000. In 2001 about 200 cubic yards of **polycyclic aromatic hydrocarbon** (**PAH-**) and arsenic-contaminated soil and **sediment** were excavated.

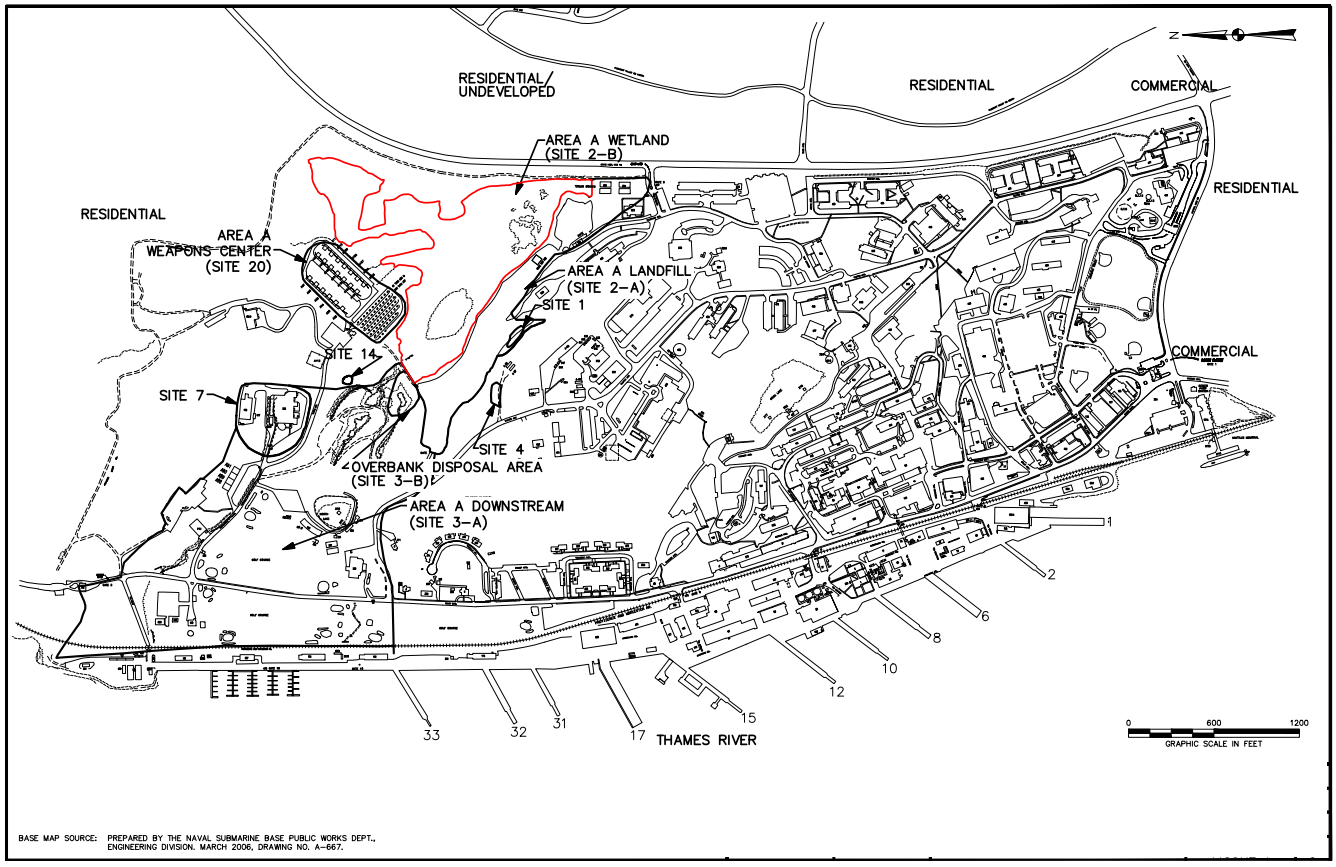


Figure 1. Site Location Map

The Navy conducted several investigations at Area A Wetland and adjacent sites from 1990 to 2009 to assess the nature and extent of c**ontamination** in **surface water, groundwater**, and **sediment** in the wetland. Data from all the previous investigations were evaluated in the **RI** Update/**FS** for **Sediment** at Area A Wetland—Site 2B, which included an updated **human health risk assessment** and an **ecological risk assessment** (**ERA**).

No unacceptable risks were identified for construction workers or older child trespassers. Unacceptable risks were identified for **sediment invertebrates** so site-specific **PRG**s were developed.

Site Characteristics

The **sediment** in the Area A Wetland consists of an organic layer (primarily from the breakdown of plant material) on top of **dredged material**. The organic layer ranged from a few inches to 20 inches in the areas sampled, and was generally thinner along the edges of the wetland and thicker towards the middle of the wetland. The most prominent topographic feature of the wetland is a bedrock outcrop located between the Area A Weapons Center and Area A Landfill, which appears as an "island" in the middle of the wetland (see Figure 2). This "island" is wooded and considered an upland area. Bedrock is within 1 foot of the ground surface at this location.

A small pond is located at the southeastern end of the Area A Wetland that has between 1 and 3 feet of standing water during all seasons. The rest of the wetland is dry for most of the growing season. Water ultimately drains to a channel located in the western portion of the wetland and then discharges to the west through the earthen dike via four 24-inch metal culverts to the Area A Downstream Watercourses, which subsequently discharge into the Thames River. There are several secondary shallow intermittent drainage channels across the wetland leading to this main channel.

The hydraulic gradient is relatively flat across the Area A Wetland. **Groundwater** exists in the **dredged material**, alluvium, and bedrock present beneath the Area A Wetland. As is typical for wetland environments, the water table is nearly at the ground surface throughout most of the Area A Wetland. The presence of the low-permeability **dredged material** limits the vertical migration of **groundwater** and its interaction with **surface water** in the Area A Wetland.

Stormwater runoff from the Area A Landfill cap discharges as sheet flow to the north into the Area A Wetland. The storm water management system incorporated into the landfill cover system was designed to direct storm water runoff from the hillside south of the landfill around the cover system and into the Area A Wetland, and to intercept a portion of shallow **groundwater** flowing into the landfill from the southern slope. The system consists of **surface water** diversion channels, reinforced concrete culverts, and a riprap channel to convey the runoff (see Figure 2).

Two drainage culverts collect runoff from the surrounding hillsides and from the Area A Weapons Center and discharge it to the Area A Wetland (see Figure 2). Water typically flows in these drainage culverts only immediately following precipitation events.

In summary, the three primary sources of **contamination** to the Area A Wetland were: 1) placement of **DDT** bricks, 2) runoff from the Area A Landfill before capping (contributing **PAHs**, **PCBs**, and **metals**), and 3) runoff from the Area A Weapons Center before removal of the contaminated soils and **sediments** (contributing **PAHs**). Chemical concentrations in the **dredged material** are much lower than the concentrations in surface **sediment**.

The **RI** Update/**FS** and the Phase II **RI** reports contain detailed discussions of the extent of **contamination** in **sediment**, **surface water**, and **groundwater**. The focus of this cleanup proposal is **sediment** in the Area A Wetland. **PAHs**, **total DDT**, **total Aroclor**, and several **metals** were shown to cause the majority of the risk to **sediment invertebrates.** Based on the results of the **human health risk assessment**, no chemicals in **sediment**, **surface water**, or **groundwater** cause significant risks to human receptors.

Contamination in **sediment** at the Site is summarized below:

- Samples with the greatest concentrations of **PAHs** were located adjacent to the Area A Landfill and Area A Weapons Center. The highest **PAH** concentrations were found near the Area A Weapons Center.
- The greatest **total DDT** concentrations were found in samples located adjacent to the Area A Landfill and along the dike at the western portion of the wetland.
- All total **PCBs** detections were in samples adjacent to the Area A Landfill.
- Generally, the greatest **metals** concentrations were found in samples collected near the Area A Landfill and Area A Weapons Center. The concentrations of some **metals** were also elevated along the western portion of the wetland near the dike, possibly from historic migration from the landfill.
- The deeper **dredged material** is less contaminated than surface **sediment**; therefore, the chemicals in the Area A Wetland are likely caused by surface releases such as runoff and placement of the pesticide bricks, and not **contamination** from **dredged material** or **groundwater**.

Figure 3 presents a summary of the sample locations where the **PRGs** were exceeded.

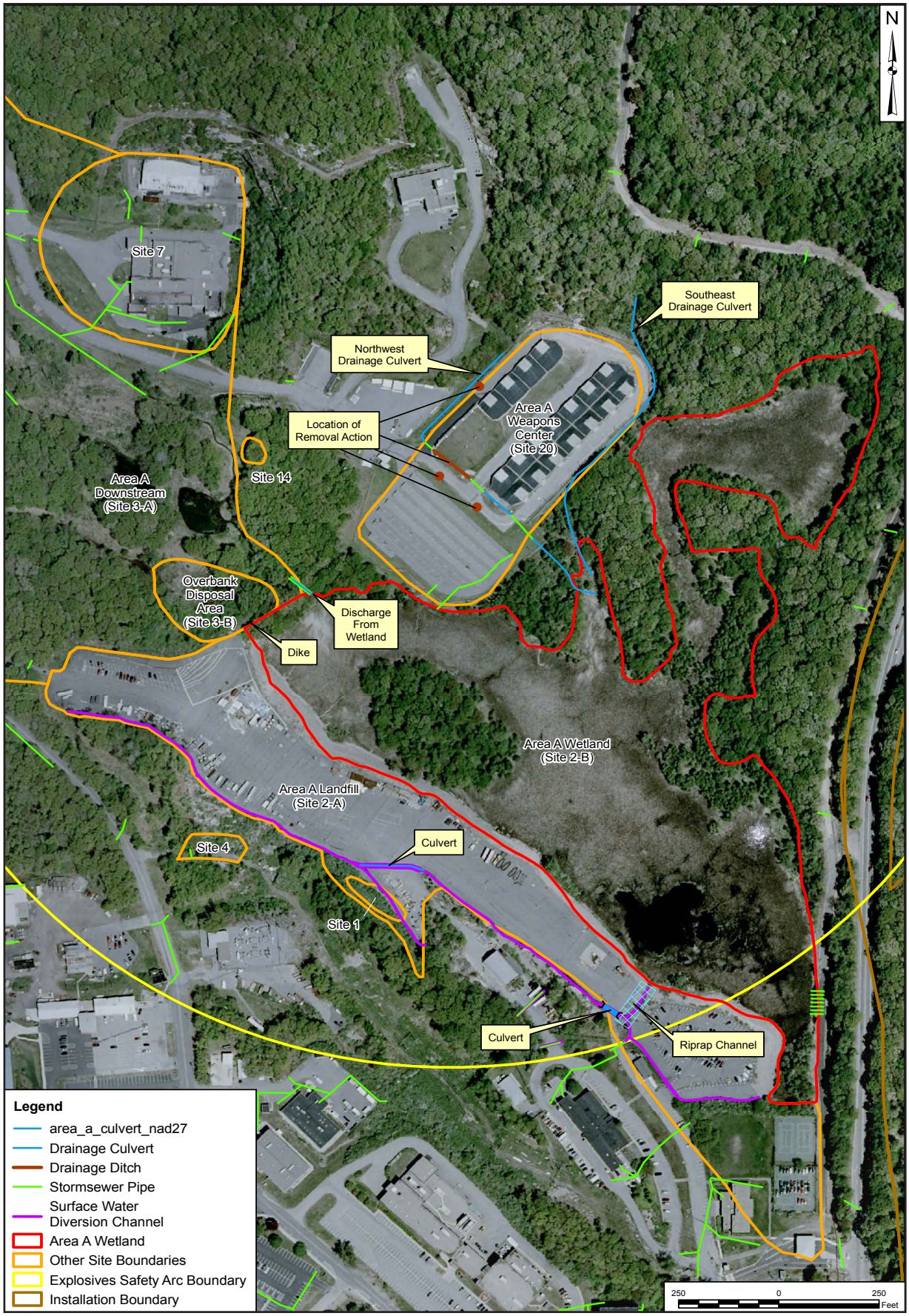


Figure 2. Surface Features

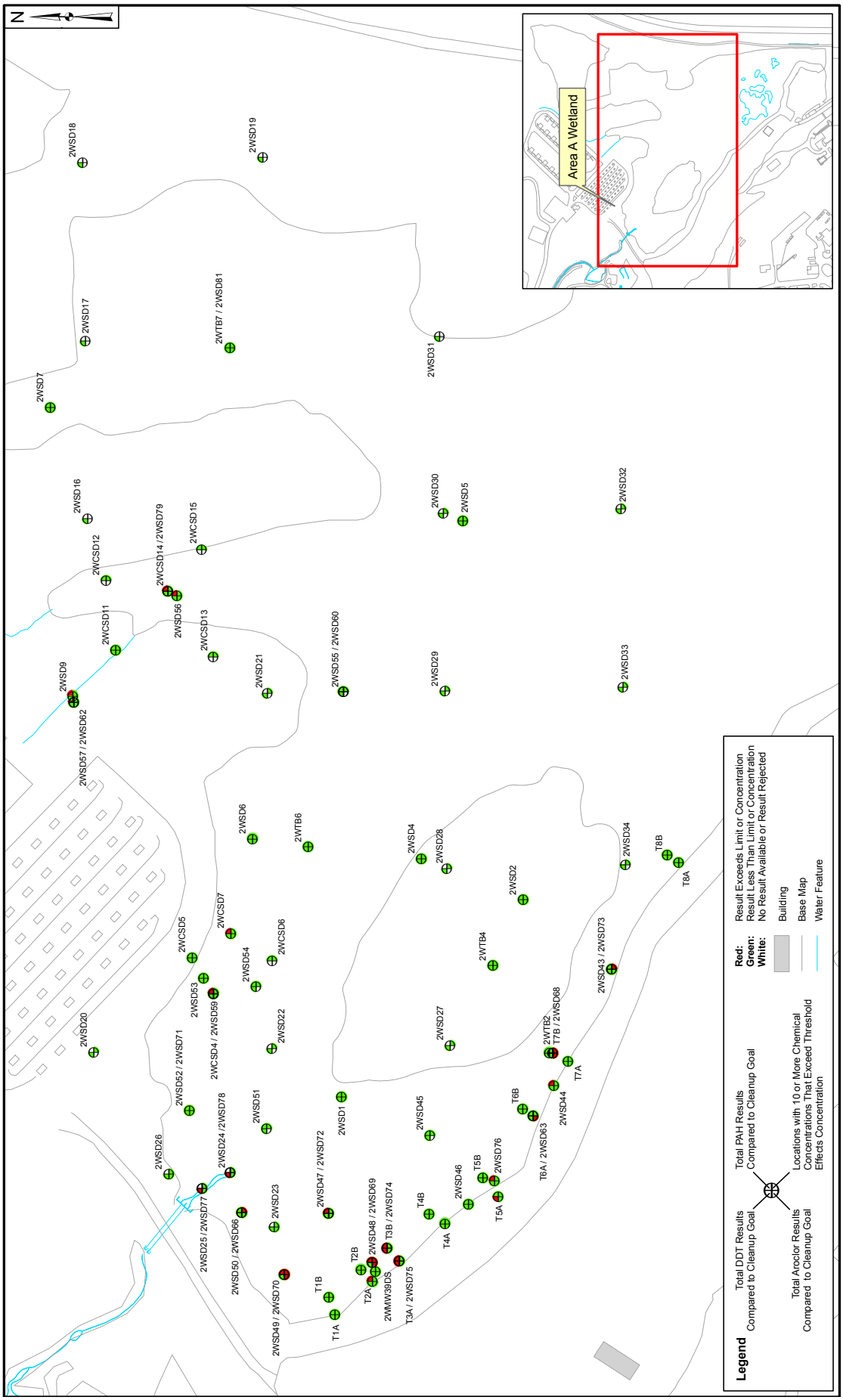


Figure 3. Summary of PRG Exceedances

Scope and Role of Response Action

The **RI** Update/**FS** for OU12 was finalized in May 2010. The **ROD** is anticipated to be signed before September 2010 and will be the final remedial action for OU12. After the cleanup is completed, all **sediment** exceeding **PRGs** will be removed so risks from chemicals remaining at the Site will be acceptable. Therefore, no chemical **monitoring** of the Site will be necessary. The only **monitoring** done will be to ensure that **native wetland vegetation** is re-established in the excavated area.

Summary of Site Risks

As part of the **RI** Update/**FS**, the Navy conducted **risk assessments** to determine the current and future effects of the contaminants on human health and the environment. The **human health risk assessment** evaluated **groundwater**, **surface water**, and **sediment** data; and, the **ERA** evaluated **sediment** data.

The Navy's Preferred Alternative identified in this Proposed Plan, or a different action remedy considered in this Proposed Plan, is necessary to protect public health or welfare or environment from actual or threatened releases of pollutants or contaminants from this site that may present an imminent and substantial endangerment to public health or welfare.

Project Team in Area A Wetland

Area A Wetland Facing Northwest

How are Human Health Risks Evaluated?

A **human health risk assessment** estimates "baseline risk," which is an estimate of the likelihood of health problems occurring if no cleanup action is taken at a site. To estimate baseline risk at a site, the Navy undertakes a four-step process in accordance with EPA guidance:

Step 1: Analyze **Contamination**

Step 2: Estimate Exposure

Step 3: Assess Potential Health Dangers

Step 4: Characterize Site Risk

In Step 1, the Navy looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies help determine which contaminants are most likely to pose the greatest threat to human health.

In Step 2, the Navy considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations to which people might be exposed, and the potential frequency and duration of exposure. Using this information, the Navy calculates a "reasonable maximum exposure" scenario, which represents the highest level of human exposure that could reasonably be expected to occur.

In Step 3, the Navy uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. The likelihood of any kind of cancer resulting from exposure to a site is generally expressed as an upper bound probability, for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected from all other causes. For non-cancer health effects, the Navy calculated a "**hazard index**," where a "threshold level" (measured usually as a **hazard index** of less than 1) exists below which non-cancer health effects are no longer predicted.

In Step 4, the Navy determines whether site risks are great enough to cause health problems for people at or near the site. The results of the three previous steps are combined, evaluated, and summarized. Potential risks from the individual contaminants are added to determine the total risk resulting from the site.

Human Health Risks

The **human health risk assessment** for the Area A Wetland was performed to characterize the potential risks to humans under current and potential future land use. Potential receptors under current land use included older child trespassers and construction workers. Residential or industrial/commercial land use was not evaluated in the **human health risk assessment** because the Site is a wetland. Furthermore, any future development is further restricted because the Site is located adjacent to the Area A Weapons Center, which is an explosive hazard.

Based on the updated **risk assessment**, adverse non-carcinogenic health effects are not anticipated under the defined exposure conditions. Also, Incremental Lifetime Cancer Risks for construction workers and older child trespassers were considered acceptable.

How are Ecological Risks Evaluated?

An **ERA** evaluates the likelihood that adverse ecological effects are occurring or may occur as a result of exposure to one or more stressors. **ERAs** under the Superfund program typically focus on chemical stressors, but biological and physical stressors often need to be considered during data evaluation. The **ERA** process under Superfund consists of the following 8-steps:

Step 1. Screening-Level Problem Formulation and Ecological Effects Evaluation

Step 2. Screening-Level Preliminary Exposure Estimate and Risk Calculation

Step 3. Baseline **Risk Assessment** Problem Formulation

Step 4. Study Design and Data Quality Objectives

Step 5. Field Verification of Sampling Design

Step 6. Site Investigation and Analysis of Exposure and Effects

Step 7. Risk Characterization

Step 8. Risk Management

The first two steps in the process include screening chemicals to select **COPCs**, and determining whether the **risk assessment** process can stop, or needs to be continued to Step 3. These two steps comprise what is termed the screening level **ERA**

Steps 3 through 7 comprise what is termed the baseline **ERA**. The first part of Step 3 is sometimes included in the screening **ERA**, which refines the list of **COPCs** from the screening ERA and determines which ecological receptors are at greatest risk. Therefore the baseline **ERA** can focus on the **COPCs** and receptors that are of greatest concern. Site-specific studies (i.e., toxicity tests) typically are conducted as part of these steps to determine with more certainty whether the **COPCs** are impacting ecological receptors at the site, and the data can often be used to develop site-specific clenaup goals or **PRGs**. Step 8, Risk Management is the responsibility of the remedial project manager, who must balance risk reductions associated with cleanup of contaminants with potential impacts of the remedial actions themselves.

Ecological Risks

The **ERA** focused on risks to **sediment invertebrates** because risks for other ecological receptors (i.e., plants, mammals, birds) were evaluated previously and found to be acceptable. Site-specific toxicity tests were conducted on **sediment** collected from the Area A Wetland. Toxicity testing involved sending samples of **sediment** from the Area A Wetland to a laboratory where a known number of **sediment invertebrates** were added to the **sediment**. After the tests were completed, the invertebrates that survived were counted and weighed to evaluate whether the samples were toxic to those invertebrates. The tests were conducted on one laboratory control sample, two reference samples, and 12 site samples. **PRGs** were then determined by comparing the toxicity established based on growth and survival of the test organisms to the chemical concentrations in the associated **sediment** sample.

Remedial Action Objectives

Remedial Action Objectives (**RAOs**) provide a general description of what the cleanup will accomplish. The **RAOs** are medium-specific goals that define the objectives of conducting cleanups to protect receptors that are at risk from the contaminated media. The following are the **RAOs** developed for the Area A Wetland **sediment** after considering the current and future land use at the Site.

Sediment RAO No. 1: Reduce risks to **sediment invertebrates** from exposure to **COCs** in the Area A Wetland surface **sediment** to acceptable levels. The following PRGs will be used as the acceptable levels:

- **Total PAHs** – 6,585 parts per billion (ppb)
- **Total DDT** – 1,504 ppb
- **Total Aroclor** (total **PCBs**) – 532 ppb

The Navy also agreed that samples with 10 or more chemicals that exceed the **Threshold Effects Concentrations** would be used as a **PRG**.

Sediment RAO No. 2: Mitigate the potential for **COCs** in Area A Wetland surface **sediment** to move to less impacted areas of the Area A Downstream Watercourses (specifically Site 3, which was previously remediated) and cause adverse effects to receptors in these areas.

Summary of Alternatives Considered for Area A Wetland—Site 2B

The Navy prepared a **FS** to evaluate remedial alternatives for **sediment** at Area A Wetland—Site 2B. The three alternatives evaluated in the **FS** for Area A Wetland included Alternative 1 (No Action), Alternative 2 (Soil Cover, Wetlands Mitigation, and **Land Use Controls [LUCs]**), and Alternative 3 (Excavation, Off-Site Disposal, and Site Restoration). These alternatives were presented in the **RI** Update/**FS** Report. Alternative 1 was evaluated for comparison purposes, and Alternatives 2 and 3 were evaluated in light of their ability to meet the **RAOs**.

The following section summarizes the remedial alternatives considered in the **FS**. Estimated costs are presented including capital, operation and maintenance, and **net present worth** (**NPW**) costs.

Summary of Remedial Alternatives

Summaries of the remedial alternatives evaluated in the **RI** Update/**FS** Report are presented below. Figure 4 shows the impacted area considered in the **FS**. With the exception of Alternative 1 (No Action), all alternatives would attain the **RAOs**. Prior to initiating either Alternative 2 or 3, a pre-design investigation would be conducted to refine the extent of contaminated **sediment**.

Alternative 1 – No Action

Regulations governing the Superfund program require that the no-action alternative be evaluated to establish a baseline for comparison to other alternatives. Under this alternative, the Navy would take no action at the Site to prevent exposure to contaminated **sediment.** Because **contamination** would remain in excess of levels that allow for unrestricted use and unlimited exposure, 5-year reviews would be required under this alternative.

Estimated Capital Cost: $0

Estimated Annual O&M Cost: $25,300 every fifth year

*Estimated **NPW** Cost*: $97,700

Alternative 2 – Soil Cover, Wetlands Mitigation, and LUCs

Alternative 2 would consist of constructing a soil cover system over contaminated **sediment**s within the limits of the Area A Wetland, and instituting **LUC**s to restrict unauthorized access to, and digging within, the proposed cover limits. The cover will protect plants and animals and the downstream watercourse by covering the contaminated **sediment** and reducing the potential for exposure and downstream transport. Implementation of this alternative would require the construction of soil covers for five areas encompassing approximately 1.3 acres. Because the cover system would increase the ground elevation, the wetlands in the covered areas would become upland, and the lost wetlands would either need to be replaced, or low quality wetlands would need to be enhanced. Flood storage losses would also need to be replaced. In the **FS**, it was assumed that for every acre of wetland lost, 2 acres of new wetlands would be created adjacent to the Area A Wetland. Therefore, 2.6 acres of new wetlands would need to be created under this Alternative. Annual inspections and maintenance of the cover and **LUCs** would be required and the Site would be monitored over the longer term. Finally, because **contamination** would remain in excess of levels that allow for unrestricted use and unlimited exposure, 5-year reviews would be required under this alternative to evaluate the continued protectiveness of the remedy.

Estimated Capital Cost: $1,672,440

Estimated Annual O&M Cost: $27,010 first year; $21,050 second year; $33,590 third year; $13,110 years 4 through 30, $3,960 every third year, $25,300 every fifth year

*Estimated **NPW** Cost*: $2,103,580

Alternative 3 – Excavation, Off-Site Disposal and Site Restoration

Alternative 3 would consist of excavation and off-site disposal of contaminated **sediment** causing unacceptable ecological risks within the limits of the Area A Wetland and establishing LUCs over the limits of the Area A Wetland. The excavation would average 2 feet in depth over 43,680 square feet (1.0 acres) for a total of 3,240 cubic yards of **sediment** removal. The excavated **sediment** would be transported to a dewatering pad constructed adjacent to the Area A Wetland where material would be mixed with a drying agent to absorb the excess moisture in the soil to allow for material transportation. Following dewatering, the excavated **sediment** would be transported off-site for disposal. Following excavation of contaminated **sediment**, the excavated areas would be backfilled with clean organic soil, seeded with **native wetland vegetation**, and monitored to ensure that the **native wetland vegetation** rather than **invasive wetland vegetation**, has been established.

Estimated Capital Cost: $1,773,800

Estimated Annual O&M Cost: $7,960 first year; $4,990 second year; $17,530 third year; $25,300 every fifth year

*Estimated **NPW** Cost*: $1,900,180

In accordance with federal Executive Order 11990, entitled "Protection of Wetlands," the Navy has determined that there will be unavoidable adverse impacts to approximately one acre of wetlands and aquatic resources from excavating contaminated **sediment** from the Site. The Navy has evaluated the requirements of the applicable regulations, including Section 404 of the Clean Water Act, and identified the proposed action as the least environmentally damaging practicable alternative to protect federally regulated wetland and aquatic resources from exposure to contaminants. This finding is based on the permanent removal of contaminated **sediment** from the wetland and the restoration of the area with clean organic soil, the removal of invasive wetland plants (in accordance with Executive Order 13112, entitled "Invasive Species"), and seeding of the area with **native wetland vegetation**. The wetland area that will be remediated and restored at the Site is shown in Figure 4.

Evaluation of Alternatives

Nine criteria are used to compare alternatives and select a final cleanup plan. EPA and the Navy have already evaluated how well each of the cleanup alternatives developed for the Area A Wetland Superfund site meets the first seven criteria (see table on page 11). Once comments from the State and the community are received, EPA and the Navy will select the final cleanup plan.

Evaluation Criteria for Superfund Remedial Alternatives

1. Overall Protection of Human Health and the Environment: Will it protect you and the plant and animal life on and near the site? EPA and the Navy will not choose a plan that does not meet this basic criterion.
2. Compliance with **Applicable or Relevant and Appropriate Requirements (ARARs)**: Does the alternative meet all federal and state environmental statutes, regulations and requirements? The chosen cleanup plan must meet this criterion.
3. Long-Term Effectiveness and Permanence: Will the effects of the cleanup plan last or could contamination cause future risk?
4. Reduction of Toxicity, Mobility or Volume through Treatment: Using treatment, does the alternative reduce the harmful effects of the contaminants, the spread of contaminants, and the amount of contaminated material?
5. Short-Term Effectiveness: How soon will site risks be adequately reduced? Could the cleanup cause short-term hazards to workers, residents or the environment?
6. Implementability: Is the alternative technically feasible? Are the right goods and services (i.e., treatment machinery) available for the plan?
7. Cost: What is the total cost of an alternative over time? EPA and the Navy must find a plan that gives necessary protection for a reasonable cost.
8. State Acceptance: Do State environmental agencies agree with the proposal?
9. Community Acceptance: What objections, suggestions or modifications do the public offer during the comment period?

The Navy reviewed the results of the **FS** and decided that it was appropriate to select one remedial alternative that could address **sediment contamination** found at the Area A Wetland. The proposed alternative is Excavation, Off-Site Disposal, and Site Restoration. The alternative meets both of the **RAO**s by removing contaminated **sediment** with **COC** concentrations greater than **PRGs**. This alternative has three major components: (1) excavate **sediment** and properly dispose off-site, (2) backfill with clean organic soil and seed with **native wetland vegetation**, and (3) monitor to ensure the **native wetland vegetation** has been established.

- Excavation of **sediment** would average 2 feet depth over 43,020 square feet for a total of 3,190 cubic yards of **sediment**. The excavated **sediment** would be transported to a dewatering pad where a drying agent would be mixed with the **sediment** to absorb moisture. The excavated **sediment** would be transported to an acceptable **Treatment/Storage/Disposal Facility,** and the

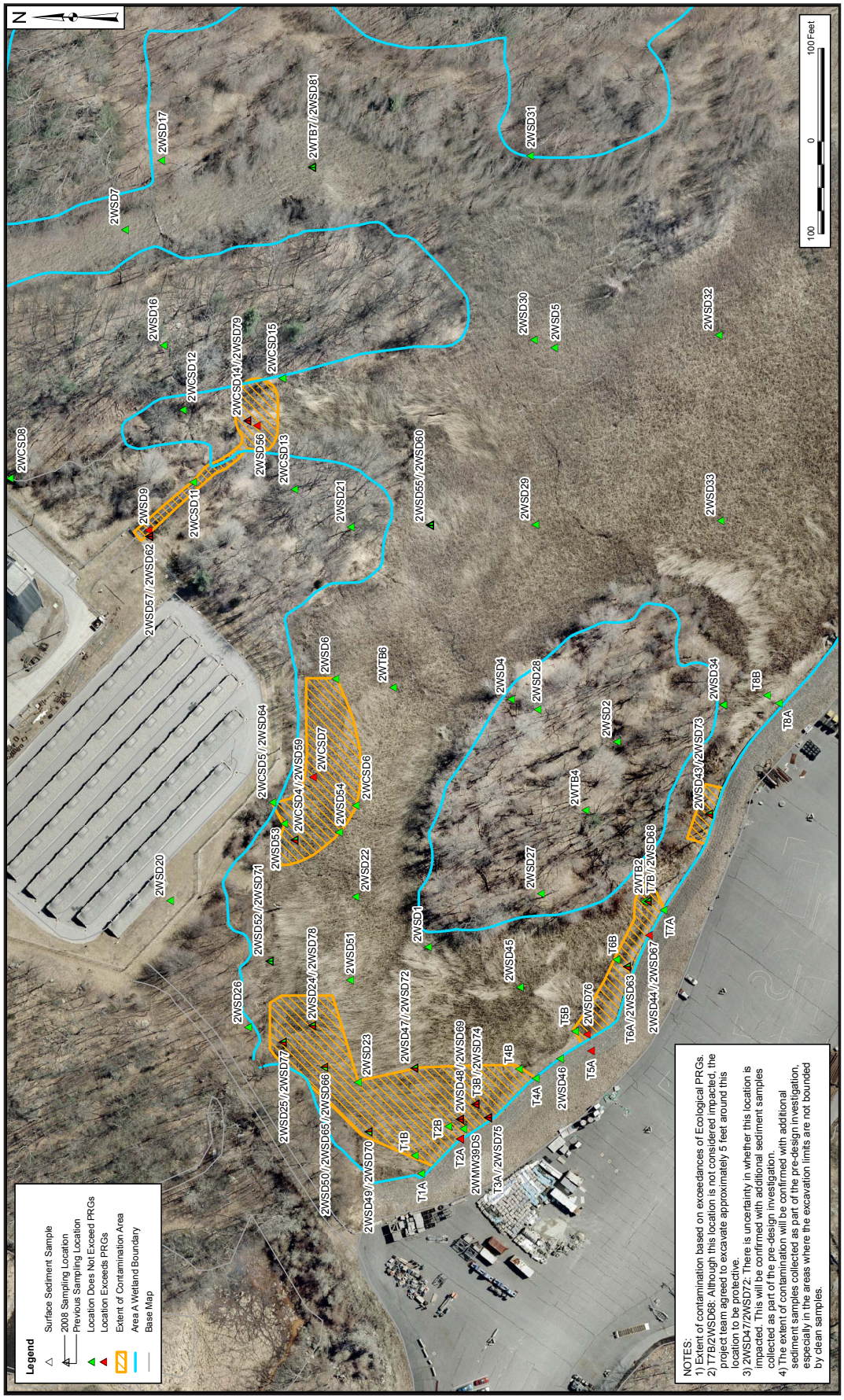


Figure 4: Impacted Area Considered In The FS

Summary of Comparative Analysis of Area A Wetland Remedial Alternatives
NSL-NLON, Groton, Connecticut

Evaluation Criterion	Alternative 1: No Action	Alternative 2: Soil Cover, Wetlands Mitigation, and LUCs	Alternative 3: Excavation, Off-Site Disposal, Site Restoration, and LUCs
Overall Protection of Human Health and Environment	Would not protect receptors and downstream watercourses from risks and migration potential associated with contaminated **sediment** located within the Area A Wetland.	Would protect receptors and the downstream watercourses from the risks and migration potential associated with contaminated **sediment** located within the Area A Wetland. Risks and migration potential would be mitigated by a soil cover (barrier) that will prevent contact with and migration of the contaminated **sediment**. **LUCs, monitoring,** and O&M would be required to prevent digging into the cover and to ensure the cover continues to function as designed.	Would protect receptors and the downstream watercourses from the risks and migration potential associated with contaminated **sediment** located within the Area A Wetland. Risks and migration potential would be mitigated by removing the contaminated **sediment** with **COC** concentrations greater than **PRGs,** restoring the excavated area with native vegetation, and implementing **LUCs**. In addition, a Natural Resource plan to control invasive species throughout the wetland will be developed and followed.
Compliance with **ARAR**s	Would not comply with chemical-specific **ARAR**s.	Would comply with all chemical-, location-, and action-specific **ARARs** upon implementation as long as adequate mitigation is conducted to compensate for altered wetland and floodplain resources and control *Phragmites* in the mitigated or remediated areas.	Would comply with all chemical-, location-, and action-specific **ARARs** upon implementation as long as adequate mitigation is conducted to compensate for altered wetland and floodplain resources and control *Phragmites* in the mitigated or remediated areas. Since **contamination** at concentrations greater than **PRGs** will be permanently removed, instead of covered in place, it is the least environmentally damaging, practical
Long-Term Effectiveness and Permanence	Would have no long-term effectiveness and permanence because no action would occur.	Would provide long-term effectiveness and permanence for the protection of receptors and the downstream watercourse. Protection would be established through the construction of a 2-foot-thick soil cover to eliminate the potential for direct contact or erosion of contaminated **sediments**. **LUCs, monitoring,** and O&M would ensure long-term effectiveness of the remedy.	Would provide the most long-term effectiveness and permanence for the protection of receptors and the downstream watercourse. Protection would be established through contaminant removal and **LUC** implementation to restrict future land usage.
Reduction of Toxicity, Mobility, or Volume through Treatment	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.
Short-Term Effectiveness	Would adversely impact environmental receptors in the short term, and could also potentially impact downstream environmental receptors because no action would be performed to reduce site risks.	Would result in the possibility of exposing site workers to chemical and physical risks, and removing vegetation for the implementation of this alternative would increase the potential for the migration of contaminated sediment to the downstream watercourse. However, the physical risks associated with this alternative could be limited by using personal protection equipment, complying with proper site-specific health and safety procedures, and utilizing proper best management practices to prevent the migration of contamination through erosion during monitoring and construction activities. These risks would need to be mitigated over a 4 month construction schedule.	Would result in the possibility of exposing site workers to chemical and physical risks, and removing vegetation for the implementation of this alternative would increase the potential for the migration of contaminated sediment to the downstream watercourse. However, the physical risks associated with this alternative could be limited by using personal protection equipment, complying with proper site-specific health and safety procedures, and utilizing proper best management practices to prevent the migration of contamination through erosion during monitoring and construction activities. These risks would need to be mitigated over a 3 month construction schedule.
Implementability	Technical and administrative implementation would be simple because 5-Year Reviews would be the only action to implement.	Implementation of this alternative would include the design and construction of a soil cover and the preparation and development of a **LUC** Remedial Design, inspection plan, monitoring plan, and O&M plan. Although this alternative would require a significant effort to implement, all required tools are locally available.	Implementation of this alternative would include excavation, material processing, transportation, and disposal of contaminated **sediment**. Restoration of the remediated wetland with native vegetation is implementable and the remedial work will be conducted in accordance with a Natural Resource Plan to control invasive species throughout the wetland. Implementation would also require the preparation of design and work plans. Although this alternative would require a significant effort to implement, all required tools are locally available.
Costs: Capital Annual **NPW**	 $0 $25,300 every fifth year $97,700	 $1,672,440 $27, 010 year 1; $21,050 year 2; $33,590 year 3; $13,110 years 4 through 30; $3,960 every third year; and $25,300 every fifth year $2,103,580	 $1,773,800 $7,960 year 1; $4,990 year 2; and $17,530 year 3 and $25,300 every fifth year $1,900,180

NOTES:

ARARs Applicable or Relevant and Appropriate Requirements
LUCs Land Use Controls
NPW Net Present Worth
O&M Operation and Maintenance
Blue font indicates Preferred Alternative

sediment would be landfilled. During excavation, four perimeter **monitoring wells** for Area A Landfill would be removed.

- Following **sediment** excavation, the excavated areas would be regraded with clean organic soil and seeded with **wetland vegetation**.
- The seeded area would be monitored under either the **Superfund** or natural resources programs to ensure that **native wetland vegetation** has been re-established.

It is the Navy's and EPA's current judgment that the Preferred Alternative for Area A Wetland—Site 2B is necessary to protect the environment from actual or threatened releases of contaminants in the **sediment** at Area A Wetland because they may present an imminent and substantial risk to ecological receptors at the Site.

Preferred Alternative

The Navy and EPA believe the Preferred Alternative for cleaning up the Area A Wetland—Site 2B (OU12) - is Alternative 3 - Excavation, Off-Site Disposal and Site Restoration. This alternative was selected over the other alternatives because it is expected to achieve substantial and long-term risk reduction through the removal of contaminated **sediment**. This alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to balancing and modifying criteria. The Navy expects the Preferred Alternative to satisfy the following statutory requirements of **CERCLA** §112(b): (a) be protective of human health and the environment; (b) comply with **ARAR**s; (c) be cost-effective; and (d) use permanent solutions and alterative treatment technologies or resource recovery technologies to the maximum extent practicable. Although it does not satisfy the preference for treatment as a principal element, based on the contaminants present in the landfill, treatment of the contaminated **sediment** was not a viable option.

Glossary of Technical Terms

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state environmental rules, regulations, and criteria that must be met by the selected remedy under **Superfund**.

Aroclor: A type of **polychlorinated biphenyl**.

Chemicals of Concern (COCs): Site-related chemicals that are found to be risk drivers in the baseline **risk assessment** because they may pose unacceptable human health or ecological risks.

Chemicals of Potential Concern (COPCs): Site-related chemicals that exceed screening values and may pose risks to human or ecological receptors.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA) that was established to investigate and clean up abandoned or uncontrolled hazardous waste sites. **CERCLA** is commonly referred to as Superfund.

Contamination: Any physical, biological, or radiological substance or matter that, at a certain concentration, could have an adverse effect on human health and the environment.

1,1,1-trichloro-2,2-bis(4-chlorphenyl)ethane **(DDT):** A specific chemical compound used as a pesticide because of its insecticidal properties.

Dredged Material: Sediment that has been removed from a river or other water body.

Ecological Risk Assessment (ERA): Evaluation and estimation of current and future potential for adverse ecological effects from exposure to chemicals.

Feasibility Study (FS): A report that presents the development, analysis, and comparison of remedial alternatives.

Formal Public Hearing: A meeting where the public has the opportunity to submit comments and testimony on the proposed action for the public record.

Groundwater: Water found beneath the earth's surface in the pores of the soil or the cracks in the bedrock. **Groundwater** may transport substances that have percolated downward from the ground surface.

Hazard Index: The index is the ratio of the estimated intake dose from exposure to the acceptable toxicity dose.

Human Health Risk Assessment: Evaluation and estimation of current and future potential for adverse human health effects from exposure to chemicals.

Informational Public Meeting: A meeting that is open to the public to present information about the Proposed Plan for cleaning up the site. At the meeting, the public will have an opportunity to ask questions, and provide comments about the cleanup.

Installation Restoration Program: The purpose of the program is to identify, investigate, assess, characterize, and clean up or control releases of hazardous substances, and to reduce the risk to human health and the environment from past waste disposal operations and hazardous material spills in a cost-effective manner.

Invasive Wetland Vegetation: Non-native, invasive and/or undesirable wetland plant species, in particular common reed (Phragmites australis), as addressed under Executive Order 13112 of February 3, 1999 - Invasive Species; Management of Undesirable Plants on Federal Lands, 7 U.S.C. § 2814; Connecticut Invasive Plant Act, Prohibited actions concerning certain invasive plants, C.G.S. 22a-381d; and the Connecticut Non-Native Plant Species Policy.

Land Use Controls (LUCs): LUCs are legal and administrative measures designed to protect a remedy by restricting unauthorized access to, and digging within a contaminated area.

Metals: Metals are naturally occurring elements. Some **metals**, such as arsenic and mercury, can have toxic effects. Other **metals**, such as iron, are essential to the metabolism of humans and animals.

Monitoring: Collection of environmental information that helps to track changes in the magnitude and extent of **contamination** at a site or in the environment.

Monitoring Wells: A well drilled to collect **groundwater** samples for testing to determine the amounts, types, and distribution of contaminants in the **groundwater** beneath the site. The well enables samples of **groundwater** to be collected at a specific horizontal and vertical location for chemical analysis.

Native Wetland Vegetation: Native plant species that are commonly found in wetlands because they typically are adapted for life in saturated soils.

Net Present Worth (NPW): A present-worth analysis is used to evaluate costs that occur over different time periods by discounting future costs to a common base year. It represents the amount of money that, if invested in the base year and dispersed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life.

Operable Unit (OU): Term for separate areas of contamination where remedial activities may be undertaken. Sites with similar characteristics or in near proximity may be a part of a Superfund site where they are grouped as one **OU**.

Polycyclic Aromatic Hydrocarbons (PAHs): High molecular weight, relatively immobile, and moderately toxic organic chemicals featuring multiple benzenic (aromatic) rings in their chemical formula. Typical examples of **PAHs** are naphthalene and phenanthrene.

Polychlorinated Biphenyls (PCBs): Chlorinated organic compounds with industrial uses such as dielectric fluid in electrical equipment and as plasticizers.

Part Per Billion (ppb): One part of contaminant in a billion parts of **sediment**.

Preliminary Remediation Goals (PRGs): Chemical-specific goals for site contaminants that when achieved will result in site concentrations that pose an acceptable risk levels.

Record of Decision (ROD): An official document that describes the selected remedial action for a site under **CERCLA**. The **ROD** for OU12 will describe the factors that were considered in selecting the remedy following consideration of public comments on the Proposed Plan.

Remedial Action: The actual construction or implementation phase of a Superfund site cleanup that follows remedial design.

Remedial Action Objectives (**RAOs**): Describes what the proposed site cleanup is expected to accomplish

Remedial Investigation (RI): A report that describes the site, documents the nature and extent of contaminants detected at the site, and presents the results of the **risk assessment**.

Responsiveness Summary: A summary of written and oral comments received during the public comment period on the Proposed Plan, together with the Navy's and USEPA's responses to these comments as presented in the **ROD**.

Risk Assessment: Evaluation and estimation of the current and future potential for adverse human health or environmental effects from exposure to contaminants.

Sediment: Soil, sand, and minerals typically transported by erosion from soil to the bottom of **surface water** bodies such as streams, rivers, ponds, and lakes.

Sediment Invertebrates: Small animals without skeletal systems, such as a worm, that live in or on the sediment.

Source(s): Area(s) of a site where **contamination** originated.

Surface Water: Water that collects on the ground surface in a stream, pond, wetland, or other water body.

Threshold Effects Concentrations: Chemical concentrations below which impacts to **sediment invertebrates** are not expected.

Total Aroclor: The total concentration of the various **Aroclor** compounds.

Total DDT: The total concentration of **DDT** and its breakdown products DDE and DDD.

Total PAHs: The total concentration of **t**he various PAH compounds.

Wetland Vegetation: Vegetation that is commonly found in wetland because it is typically adapted for life in saturated soils.

The Public's Role in Alternative Selection

Community input is integral to the selection process. The Navy and regulatory agencies will consider all comments in selecting the remedial actions before selecting the final remedy for the site. The public is encouraged to participate in the decision-making process. This Proposed Plan for Sediment at Area A Wetland—Site 2B is available for review, along with supplemental documentation, at the following Information Repositories:

Groton Public Library
52 Newtown Road
Groton, CT 06340
(860) 441-6750

Hours of Operation
Monday-Thursday: 9am – 9pm
Friday: 9am – 5:30pm
Saturday: 9am – 5pm

Bill Library
718 Colonel Ledyard Highway
Ledyard, CT 06339
(860) 464-9912

Hours of Operation
Monday-Thursday: 9am – 9pm
Friday: 9am – 5pm
Saturday: 9am – 5pm (9am - 1pm after June 20)
Sunday: 1pm – 5pm (closed after June 20)

For further information, please contact:

Jim Gravette
Remedial Project Manager (Code OPTE3-1)
Naval Facilities Engineering Command
Mid-Atlantic
Building Z-144
9742 Maryland Avenue
Norfolk, VA 23511-3095
Phone: (757) 341-2014
Email: james.gravette@navy.mil

Richard Conant, Installation Restoration Program Manager
Naval Submarine Base-New London
Bldg. 439, Room 104, Box 400
Route 12
Groton, CT 06349
Tel: (860) 694-5649
Email: Richard.conant@navy.mil

Kymberlee Keckler, Remedial Project Manager
U. S. Environmental Protection Agency, Region 1
Federal Facilities Superfund Section
5 Post Office Square, Suite 100
Mail Code: OSRR07-3
Boston, MA 02109-3912
Tel: (617) 918-1385
Email: keckler.kymberlee@epa.gov

Mark Lewis, Environmental Analyst 3
Connecticut Department of Environmental Protection
Eastern District Remediation Program, Remediation Division
Bureau of Water Protection and Land Reuse
79 Elm Street
Hartford, CT 06106-5127
Tel: (860) 424-3768
E-mail: mark.lewis@ct.gov

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the Sediment at Area A Wetland—Site 2B at Naval Submarine Base—New London is important to the Navy, EPA, and CTDEP. Comments provided by the public are valuable in helping to select the remedy for this site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by July 9, 2010. Comments can be submitted via mail or e-mail and should be sent to either of the following addresses:

Jim Gravette
Remedial Project Manager (Code OPTE3-1)
Naval Facilities Engineering Command
Mid-Atlantic
Building Z-144
9742 Maryland Avenue
Norfolk, VA 23511-3095
Tel (757) 341-2014
Email: james.gravette@navy.mill

Richard Conant
Installation Restoration Program Manager
Naval Submarine Base—New London
Bldg. 439, Box 101, Room 104
Groton, CT 06349-5039
Tel: (860) 694-5649
Email: Richard.conant@navy.mil

Name _____

Address _____

City _____

State _____ Zip _____

Telephone _____

FOLD HERE

Place
Stamp
Here

Richard Conant

Installation Restoration Program Manager

Naval Submarine Base - New London

Bldg. 439, Box 101, Room 104

Groton, CT 06349-5039

DAILY BRIEFING

DOUSED

TIM COOK/THE DAY

New London firefighters make quick work of a small brush fire in Bates Woods Park off of Ashcraft Road Tuesday. Several small spot fires spread over a small area.

POLICE/FIRE REPORT

POLICE: MAN SNEAKS INTO HIGH SCHOOL, TAKES SHOWER

New London — Police arrested a man Tuesday afternoon who they said sneaked into the high school, took a shower and then fled when confronted by school staff.

According to police, 34-year-old David Gunn walked into the school at about 1 p.m. through a side door that students had propped open.

Gunn went to the locker room, disrobed, and showered. Police said he had gotten dressed again before he was discovered and fled.

Police found Gunn on Bank Street in downtown New London at 2:30 p.m. He was charged with first-degree criminal trespass and was held on a $2,500 bond. According to police, Gunn listed his address as 19 Jay Street, the local homeless shelter.

Police said Gunn did not come in contact with any students, nor do they believe he intended to.

The high school is normally locked on all sides during the school day, with visitors gaining access by pressing a buzzer before being allowed inside.

Nicholas Fischer, superintendent of schools, said the high school did not go into a lockdown because of the incident.

"In that type of situation, there's no need for lockdown," Fischer said. "He didn't threaten anybody, and to my knowledge he didn't talk to anybody. It's an unfortunate incident, it's one we have to pay attention to, one that we have to work to avoid, but it did happen."

Fischer said principal Tommy Thompson is "in the process of reviewing with staff and students what has to be done when a stranger is in the building."

PAWCATUCK TEEN CITED AFTER CRASHING SKATEBOARD INTO CAR

Mystic — A Pawcatuck teenager who was riding his skateboard Friday night before he crashed into a car at the intersection of West Main Street and Water Street was cited by police with reckless use of the highway by a pedestrian.

Groton Town Police said Henry Chmielinski, 18, was skateboarding eastbound on West Main Street when he entered the intersection and struck the side of a 2005 BMW sport utility vehicle, which was driving southbound on Water Street.

Police said the impact caused moderate damage to the vehicle.

Chmielinski was taken to the hospital for non-life-threatening injuries. He has since been released, police said.

TWO ARRESTED ON HEROIN CHARGES

New London — Police arrested two people for possession of heroin and other charges Tuesday afternoon.

Police said Kouwani Barnstorff, 34, of 6 Union Street was wanted by the Norwich Police Department on several outstanding arrest warrants, including one for assault. Police, acting on tips from residents in the area, were able to stop the vehicle in which Barnstorff was a passenger. Police said Barnstorff attempted to run but stopped and surrendered after seeing a New London police dog at the scene.

Police searched the vehicle and confiscated 48 bags of heroin and $4,718 in cash. Barnstorff was charged with two counts of second-degree failure to appear in court, second-degree assault, possession of heroin with intent to sell, possession of heroin within 1,500 feet of a school, day care or public housing and possession of heroin.

The woman driving the car, Elizabeth Hansen, 30, of 74 Mumford Ave., Groton, was also charged with possession of heroin with intent to sell, possession of heroin within 1,500 feet of a school, day care or public housing and possession of heroin.

Police encourage citizens to call the anonymous narcotics infoline at (860) 447-9107 to report any drug activity.

MAN ALLEGEDLY UNDER THE INFLUENCE WHEN HE HIT POLE

Stonington — Police say that a Norwich man was driving under the influence late Monday night when he struck a utility pole on Route 184 in Old Mystic and disrupted power to 1,000 residents.

Eric Bryce, 27, of 91 North Cliff St., was charged with driving under the influence of alcohol or drugs, evading responsibility and failure to drive right.

Sgt. Bruce Smith said Bryce fled the scene after the crash. A Ledyard canine unit along with a Stonington officer tracked Bryce in the area of North Stonington Road and Route 184.

Power was disrupted in the area for more than five hours.

Bryce was taken to Lawrence & Memorial Hospital for treatment of his injuries and then released back into the custody of Stonington police.

Smith said Bryce posted a $1,000 bond and is scheduled to appear at G.A. 10 in New London on June 16.

Smith said when Bryce was released from the police department he threw his crutches and leg brace in the parking lot.

Smith said police plan to charge Bryce with littering.

GROTON TOWN POLICE ISSUE 317 SEAT-BELT TICKETS

Groton — During the recent "Click It or Ticket" seat-belt enforcement campaign, Town Police conducted 608 motor vehicle stops, which resulted in 317 infractions issued for seat-belt violations and three tickets for child-restraint system violations.

Police arrested 10 people for driving under the influence of alcohol or drugs and also made a narcotics arrest during one stop.

The stops also resulted in 62 tickets for various moving violations, including 10 for using a cell phone while driving. Seven people were charged with driving with a suspended license and operating without insurance.

POLICE LOGS

East Lyme

Richard Holmes, 52, of 174 West Main Street #3, was charged Tuesday with third-degree assault and breach of peace.

Groton City

Pernell Young, 45, of 35 Fort St., was charged Tuesday with third-degree assault and disorderly conduct.

Groton Town

Brenden Turner, 18, of 274 Benham Ave., was charged Monday with third-degree assault, second-degree threatening and breach of peace.

Tyler Cauley, 25, of 16 Ledgewood Road, was charged Tuesday with third-degree assault, third-degree strangulation, reckless endangerment, unlawful restraint and interfering with an emergency call.

New London

Joshua Ouellette, 21, of 201 Elm Street Apt. #7, Noank, was charged Monday with violation of a protective order.

Jose Javier Rodriguez, 34, of 48 Prest St., Floor 1, was charged Monday with reckless driving, failure to obey an officer's signal and driving with a suspended license.

Toby Bernard Jackson, 33, of 57 Leafwood Lane #268, was charged Monday with driving with a suspended license, driving an unregistered motor vehicle and driving without registration and/or insurance.

Antonio Pena-Arocho, 33, of 24 Grove Street, was charged Monday with driving with a suspended license, improper use of plates, driving without registration and/or insurance and driving an unregistered motor vehicle.

Christian Collazo, 32, of 48 Crystal Ave., A-36, was charged Sunday with risk of injury to a minor and disorderly conduct.

Cory Calverley, 47, of 85 Corey Road, Groton, was charged Sunday with second-degree failure to appear in court.

Norwich

Alexander Rodriguez, 31, of 41 South Main Street, Jewett City, was charged Monday with third-degree assault, third-degree robbery, sixth-degree larceny, breach of peace, interfering with an emergency call, and interfering with police.

Nacoma Jackson, 27, of 47 Donahue Drive, was charged Tuesday with second-degree breach of peace and second-degree criminal mischief.

State police — Montville

Richard Jansky, 29, of Westbrook, was charged Sunday with third-degree assault and breach of peace.

Sam C. Corcoran, 63, of Portsmouth, R.I., was charged Monday with third-degree larceny.

Christopher K. Fontaine, 25, of 45 Hawthorne Drive, Apt. 3, was charged Monday with third-degree burglary, third-degree criminal mischief, and using a motor vehicle without permission of the owner.

Stonington

Americo Sotomayor Jr., 43, of Ashaway, R.I., was charged Monday with driving under the influence of alcohol or drugs, unreasonable speed and passing on the right.

Martin Cloudas, 41, of 36 Bern St., Mystic, was charged Monday with risk of injury to a minor and second-degree breach of peace.

Waterford

Tara Green, 21, of Torrington, was charged Monday with possession of narcotics, possession of drug paraphernalia, conspiracy to commit a crime and sixth-degree larceny.

Melisanda Kahrimanovic, 22, of Torrington, was charged Monday with possession of narcotics, possession of drug paraphernalia, conspiracy to commit a crime and sixth-degree larceny.

John Thomas Sloan, 25, of 309 Crystal Ave., New London, was charged Monday with driving under the influence of alcohol or drugs, reckless driving and disobeying the signal of an officer.

Kevin Stewart, 40, of 20 West Main St., was charged Monday with driving with a suspended license, failure to carry proper insurance and driving an unregistered vehicle.

Groton boy recovering from Pennsylvania pit bull attack

By JULIANNE HANCKEL
Day Staff Writer

Groton — After being mauled in a vicious attack by two pit bulls a week ago in Hanover, Pa., Ajia Brown, 8, will be moved to Yale-New Haven Hospital Friday after spending the past week at Penn State Hershey Medical Center.

Around 9 p.m. on June 1, Brown, who lives in town with his mother, was outside trying to catch lightning bugs in the yard of a family friend when two dogs squeezed through a hole in the fence separating the neighboring yard and attacked him.

Ajia's mother also sustained severe injuries during the attack when she tried to come to her son's rescue.

Ajia's father, Anthony Brown, said his son told him he could see the lightning bugs better in the darkest corner of the yard, and that there was no warning of the attack.

"He said the dogs didn't bark at him, growl or anything, they just slipped through the fence and attacked him," Anthony Brown said.

According to Anthony Brown, Ajia and his mother stopped to visit her former roommate, a family friend whose son, Chester Little, 47, shares the other half of a multifamily duplex in the 400 block of Pleasant Street in Hanover, Pa.

Ajia's mother, who was inside the home at the time of the attack, ran outside when she heard him screaming, Anthony Brown said.

She tried to rip the dogs off him and it "got to the point where she would throw one dog off and it would just come right back," he said.

Neighbors who heard the commotion tried to beat the dogs off the mother and son with sticks while the owner was able to capture one dog and bring it inside his house, Anthony Brown said. When police officers arrived on the scene around 9:20 p.m., they shot and killed the dog that continued to display overly aggressive behavior, he said.

Both dogs are owned by Little, who was charged Monday with two counts each of failing to license the dogs, failing to vaccinate the dogs and failing to confine the dogs, and one count of harboring a dangerous dog.

The surviving dog, which police are asking to be declared "dangerous" by the district judge, is in quarantine for 10 days, Anthony Brown said.

If Little gets his dog back, according to Pennsylvania's dangerous dog statute, he is required to obtain a $50,000 insurance policy on the dog, post "dangerous dogs" signs on his property, attach a "dangerous dog" ID tag on the dog's collar, keep the dog in a locked, secured structure and submit to state inspections.

Ajia's stepmother, Tina Torres, said that during the attack, Ajia lost more than 25 percent of his scalp, both of his ears and sustained "severe" puncture wounds on various parts of his body.

The blond-haired, blue-eyed boy is active in football, basketball and Boy Scouts, his father said.

"He loves swimming, riding bikes, skateboarding ... his whole life is on hold right now. Everything he loves to do he won't be doing for a long time. But fishing ... yeah, we can still go fishing."

"I'm just lucky he's alive," said Anthony Brown, who added that he and Ajia don't hold any resentment toward the breed.

"Ajia loves dogs. We have dogs and we know some very nice neighborhood pit bulls," Brown said. "We don't blame the breed; anything can happen with any kind of dog, not just pit bulls."

On Tuesday, Ajia underwent the first of what will be multiple surgeries over the next two years, Anthony Brown said. Doctors worked to graft skin taken from Ajia's thigh to cover the area of missing scalp.

"My only hope for him is that he can recover both physically and mentally from this," said his father, who added Ajia is in "high spirits" and his sense of humor hasn't changed at all.

"The tough part of all of this is how he'll suffer emotionally and self-consciously," Anthony Brown said. "But his little spirit is unbreakable."

Ajia's second-grade classmates at Claude Chester Elementary School have made cards for him and are looking forward to his return to school, Principal Carol Glaude said.

Anthony Brown said cosmetic surgeries are not covered by either his or his ex-wife's health insurance.

"The doctors said to expect bills totaling more than $100,000," Brown said. "We simply can't afford it."

"He's such an amazing kid. He just lights up the room wherever he goes and for that light to be dimmed just a little bit, it just breaks your heart," Torres said.

j.hanckel@theday.com

CARDS, DONATIONS

- The family has asked that **cards** for Ajia be sent to Ajia Brown, c/o Anthony Brown, 568 Shennecossett Road, Unit F, Groton, CT, 06340.
- For more information on where **donations** for Ajia can be made, contact Tina Torres at (860) 389-8100.

PUBLIC NOTICE

The Department of the Navy, Naval Submarine Base – New London (NSB-NLON), in conjunction with the United States Environmental Protection Agency and the Connecticut Department of Environmental Protection, announce the availability of the Proposed Plan for the cleanup of contaminated sediment at Area A Wetland-Site 2B and invite the public to review and comment on it. This plan was prepared under the Comprehensive Environmental Response, Compensation and Liability Act (also known as Superfund), which authorized Federal action to respond to releases of hazardous substances into the environment. The public comment period for this Proposed Plan begins June 9, 2010 and ends July 9, 2010.

The Area A Wetland-Site 2B is a low quality wetland and is dominated by the invasive reed, *Phragmites commonis*. Several environmental field investigations were performed to characterize the sediment and the results identified elevated concentrations of several chemicals including polychlorinated biphenyls, polycyclic aromatic hydrocarbons, pesticides, and metals. These contaminants originated from other nearby environmental cleanup sites that have since been cleaned up or environmentally isolated so there is no further source of contamination into the wetlands area. While these contaminants within the wetland area do not pose a human health risk, they could harm the environment, specifically sediment invertebrates. Therefore, site-specific cleanup levels based on risks to sediment invertebrates were developed as part of an Ecological Risk Assessment.

Two alternatives were evaluated to address the contaminated sediment at the site: removal (i.e., excavation and off-site disposal of contaminated sediment, backfilling, and restoring the area with native wetland vegetation) and capping (i.e., installing a two-foot soil cover over contaminated sediment). The Navy considered the effectiveness, implementability, and cost of these alternatives. Based on the results of this evaluation, sediment removal is the Navy's preferred method for addressing contaminated sediment at Area A Wetland-Site 2B. Approximately 3,190 cubic yards of contaminated sediment (i.e., sediment with chemical concentrations greater than cleanup levels) at Area A Wetland-Site 2B will be removed.

Community input is integral to the removal action selection process. The public is encouraged to review the Proposed Plan for the Sediment at Area A Wetland-2B at the following Information Repositories during normal hours of operation:

Bill Library
718 Colonel Ledyard Highway, Ledyard, CT 06339
860-464-9912

Groton Public Library
52 Newton Road, Groton, CT 06340
860-441-6750

The public can provide either oral or written comments on the Proposed Plan for the Sediment at Area A Wetland-Site 2B. Oral comments should be provided during the formal public hearing, scheduled for June 17, 2010 at 6:30 pm at the Best Western Olympic Inn, Route 12, Groton, Connecticut. Written comments should be submitted to either of the Navy contacts listed below, and must be postmarked no later than July 9, 2010.

Mr. Richard Conant
Installation Restoration Program Manager
Naval Submarine Base-New London
Building 439, Box 400, Room 104, Groton, CT 06340
Tel: 860-694-5649
Email: richard.conant@navy.mil

Mr. Jim Gravette
Remedial Project Manager (Code OPTE3-1)
Naval Facilities Engineering Command, Mid-Atlantic
Building Z-144
9742 Maryland Avenue, Norfolk, VA 23511-3095
Tel: 757-341-2014
Email: james.gravette@navy.mil

d259609

KILLINGLY

Mock disaster cut short by real distress

4 firefighters treated for heat symptoms

By DON BOND
For The Norwich Bulletin

Reality intervened on a "major casualty" mock disaster Sunday morning when four firefighters suffered heat exhaustion and dehydration as they searched for victims.

The drill, involving all eight fire companies that serve Killingly, as well as ambulance corps from throughout northeastern Connecticut, was curtailed about halfway through its scheduled four-hour run after the firefighters were overcome.

"It simply was too hot to continue, especially with all the heavy gear we have to wear when doing our job," said Dayville Fire Chief Michael Hewko, who served as incident commander.

Three of the firefighters were taken by ambulance to Day Kimball Hospital in Putnam, where they were later released after being treated in the emergency room. The fourth firefighter was treated by emergency medical personnel at the scene.

The names of the four victims and their fire department affiliations were not available.

Disaster scenario

The scenario for the drill was a boiler explosion and fire at Killingly Central School in Dayville.

Responding firefighters arrived to find "smoke" inside the building and 32 "injured" victims spread throughout the sprawling school. Three mannequins were used to depict three victims who were killed in the explosion.

Hewko said the drill was the brainchild of firefighters Shayne Kettle, of the Williamsville Fire Department, of Rogers, and Scott DeAngelis, of the South Killingly Fire Department.

"I had been thinking about doing a major casualty drill and when Shayne mentioned he was also considering one, we decided to work together and see what we could come up with," DeAngelis said during a detailed critique that followed the drill. Representatives from many of the participating departments joined in the planning process.

DeAngelis said the drill was purposely not detailed for the participating departments to add greater reality to the incident.

Lessons learned

"That was important," Hewko explained," Because now we can not only see the areas in which we excelled, but the areas where we need to make improvements so we can be more effective if something of this magnitude actually occurs."

Hewko said a lack of staffing at the command site and some communications problems were issues that were recognized as problems. "Now we can look at ways of solving those problems," he said.

Heightened reality

DeAngelis said that placing the students who portrayed the injured victims throughout the school added a measure of reality by increasing the difficulty in locating them. Under the scenario, 10 of the injured were termed to be critically injured, 14 suffered moderate injuries and eight were less seriously hurt.

Emergency medical personnel assessed each patient's injuries as they were located, with the idea of sending the most seriously hurt to hospitals before the victims with lesser injuries.

Williamsville firefighter Kevin Gaudreau said the EMS phase of the operation appeared to run smoothly.

"A lot of the EMS personnel were young people and they handled the situation very professionally," Gaudreau said.

LEBANON

Student uses shears to offset sports cuts

Hair trims raise money to help reduce play fees

By PAUL PETRONE
For The Norwich Bulletin

Protesters and the shaggy-haired alike came out to Sunday's hair-cut-athon on West Main Street to raise funds against a pay-to-play proposal by the Board of Education.

The board will vote tonight on the 2010-11 budget. One component will be a pay-to-play program that will charge all Lebanon students $75 for each extracurricular athletic team.

"I think it is going to affect our sports program drastically," said 16-year-old Sean McGee, who organized the event. "One-hundred percent of the money raised (by the hair-cut-athon) will go directly to ending or at least reducing the pay-for-play program."

Six volunteer hairdressers served anybody interested for a $15 donation. A free moon bounce was given by Clubhouse Inflatables, and donated plants from the Farmer's Cow were sold for further fundraising.

Money to offset fees

The overall total raised was not immediately available, but it was far less than the $38,000 the Board of Education is expecting to collect from the $75 fees. The money will go to lower that number, said McGee.

"It is going to create more political issues than anything," Lyman Memorial High School soccer coach Ryan Fabry said. "If parents pay for their child to play, then they are going to expect they play and not sit on the bench."

Superintendent Robert McGray originally proposed eliminating the entire Lebanon Middle School sports program while keeping high school sports free. That was rejected by a Board of Education subcommittee, which instead installed the pay-to-play program for all sports.

Nobody satisfied

"All of these cuts are unfortunate," McGray said. "But the question is, if you don't cut there, you are going to have to cut somewhere else. Nobody is ever satisfied."

Scholarships are available to families who cannot afford the fee. Residents at the hair-cut-athon denied their effectiveness, arguing having to ask for a subsidy would be humiliating to the family.

"Asking for the scholarship is embarrassing, and they say it is confidential, but it is going to leak out," Colleen Clang said. "We might have some great athletes out there who are too embarrassed to ever join the team."

The fundraiser was part of McGee's senior project opposing the pay-to-play program. He is organizing a golf tournament July 31 to raise additional funding.

If you go

What: Board of Education budget vote
When: 7:30 tonight
Where: Lyman Memorial High School media center

BROOKLYN

Lawn mowers tear up track, not grass at AgDays

Speedy yard cutters highlight agriculture fest

By TOM CHIARI
tchiari@norwichbulletin.com
(860) 425-4210

KHOI TON/NORWICH BULLETIN

Tom Johnson, right, wins the SP class of the lawn mower racing event Sunday, while Rob Ingalls finishes second during the AgDays agricultural celebration at the Brooklyn Fairgrounds.

Hunched over the steering wheel, white-knuckle gripping and turning, Jim Phillips ripped like a buzz saw around the dirt racing oval, kicking up clouds of dust in his wake.

He carefully navigated the worn track's four divoted turns Sunday, his souped-up V-Twin B/P Class lawn mower roaring him to victory at Brooklyn's third annual AgDays agricultural celebration at the Brooklyn Fairgrounds.

"What's going through my head is 'don't make a mistake, don't make a mistake, don't make a mistake,' " Phillips said. "Because the guy behind me is just waiting."

A Ledyard resident, Phillips is president of the New England Lawn Mower Racing Association.

"It's a rough ride, especially around the turns," he said of the 40-mph races. "But anybody can get involved, and it's a lot of fun."

Perhaps the fastest, but by no means the loudest, the lawn mower races were just one of the agricultural events at the Windham Agricultural Society's Brooklyn's AgDays celebration this weekend.

Heritage celebrated

The AgDays were a celebration of the region's agricultural heritage and, among others, events included a horse show, ox pull, pedal tractor pull, garden tractor pull, a draft horse show, an antique farm equipment exhibit and an antique tractor and engine show.

"It's important to us because our parents and grandparents grew up on farms," said Penny Francis, a Brooklyn resident and chairman of the AgDays Committee. "All of our own kids are involved too, so it's very family-oriented."

While the tractor events drew raucous crowds, Francis said she most enjoyed the educational exhibits.

"Some older people came in and showed things, teaching people about agriculture and about how it's changed," she said. "Everyone we talked to had a good time."

Everyone except maybe Jim Phillips' mom, Bea Phillips.

"It's a lot of fun to watch and they need more people to root them on," the Preston resident said. "But I'm wondering if they're going to fall."

TOWN BUDGET

Late infusion of cash from state will lower tax rate in Sterling

Reimbursement reduces increase by about one-third

By DON BOND
For The Norwich Bulletin

STERLING —Taxpayers got some unexpected good news from the state only days before they decide the fate of the proposed $10.1 million budget for 2010-11 at a referendum Tuesday.

Board of Finance Chairman David Shippee announced late last week a decision by Gov. M. Jodi Rell to increase the town's reimbursement for special education transportation costs by $54,282. The state previously had deleted the funds from the reimbursement.

"We were told the governor reviewed the funding and decided to increase our reimbursement," Shippee said.

The additional funding will allow the Board of Finance to lower by about one-third the proposed tax increase the budget, if approved by voters, will require.

The tax increase would be 0.36 mills instead of 0.53, Shippee said.

If the budget is approved and the finance board sets the tax rate at 20.36 mills — up from its present 20-mill rate— a taxpayer with property valued at $100,000 will see his taxes increase by $36. The projected increase before the added revenue was approved would have been $53.

One mill is equal to $1 for each $1,000 of assessed property value.

The proposed budget includes $7,588,007 for education and $2,542,364 for general government.

Required spending

The education budget includes $173,514 the finance board added to meet the state-mandated minimum spending requirement. The state regulation requires towns to spend at least as much on education as they did in the previous budget year.

Because that requirement was waived by the state for the 2009-10 budget, the town had to revert back to the 2008-09 budget and match the $7,588,007 voters approved then.

If the town doesn't meet the spending requirement it has to forfeit $2 for every $1 below the minimum funding level. The money would have been taken from the Education Cost Sharing grant in the 2011-12 budget, Interim School Superintendent Kay Griffin said.

"We faced the prospect of adding $173,514 now or having to appropriate more than $346,000 to offset the state reduction in the next budget," Shippee said.

The town's teachers agreed to accept no salary or step increases in 2010-11, the first year of a three-year contract they signed with the Board of Education. Principal Vincent Agostine did not accept the $5,006 raise he was due, asking that the money be used to purchase books for the school library, Griffin said. That account had been unfunded in the original budget proposal.

PUBLIC NOTICE

The Department of the Navy, Naval Submarine Base – New London (NSB-NLON), in conjunction with the United Sates Environmental Protection Agency and the Connecticut Department of Environmental Protection announce the availability of the Proposed Plan for the cleanup of contaminated sediment at Area A Wetland-Site 2B and invite the public to review and comment on it. This plan was prepared under the comprehensive Environmental Response, Compensation and Liability Act (also known as Superfund), which authorized Federal action to respond to releases of hazardous substances into the environment. The public comment period for this Proposed Plan begins June 9, 2010 and ends July 9, 2010.

The Area A Wetland-Site 2B is a low quality wetland and is dominated by the invasive reed, Phragmites commonis. Several environmental field investigations were performed to characterize the sediment and the results identified elevated concentrations of several chemicals including polychlorinated biphenyls, polycyclic aromatic hydrocarbons, pesticides, and metals. These contaminants originated from other nearby environmental cleanup sites that have since been cleaned up or environmentally isolated so there is no further source of contamination into the wetlands area. While these contaminants within the wetland area do not pose a human health risk, they could harm the environment, specifically sediment invertebrates. Therefore, site-specific cleanup levels based on risks to sediment invertebrate were developed as part of an Ecological Risk Assessment.

Two alternatives were evaluated to address the contaminated sediment at the site: removal (i.e., excavation and off-site disposal of contaminated sediment, backfilling, and restoring the area with native wetland vegetation) and capping (i.e., installing a two-foot soil cover over contaminated sediment). The Navy considered the effectiveness, implementability, and cost of these alternatives. Based on the results of this evaluation, sediment removal is the Navy's preferred method for addressing contaminated sediment at Area A Wetland-Site 2B. Approximately 3,190 cubic yards of contaminated sediment (i.e., sediment with chemical concentrations greater than cleanup levels) at Area A Wetland-Site 2B will be removed.

Community input is integral to the removal action selection process. The public is encouraged to review the Proposed Plan for the Sediment at Area A Wetland-2B at the following Information Repositories during normal hours of operation:

Groton Public Library	52 Newton Road	Groton, CT 06340	860-441-6750
Bill Library	718 Colonel Ledyard Highway	Ledyard, CT 06339	860-464-9912

The public can provide either oral or written comments on the Proposed Plan for the Sediment at Area A Wetland-Site 2B. Oral comments should be provided during the formal public hearing, scheduled for June 17, 2010 at 6:30 pm at the Best Western Olympic Inn, Route 12, Groton, Connecticut. Written comments should be submitted to either of the Navy contacts listed below, and must be postmarked no later than July 9, 2010.

Mr. Richard Conant, Installation Restoration Program Manager
Naval Submarine Base-New London Building 439, Box 400, Room 104, Groton, CT 06340
Tel: 860-694-5649 Email: richard.conant@navy.mil

Mr. Jim Gravette, Remedial Project Manager (Code OPTE3-1), Naval Facilities Engineering Command, Mid-Atlantic
Building Z-144, 9742 Maryland Avenue, Norfolk, VA 23511-3095
Tel: 757-341-2014 Email: james.gravette@navy.mil

ELECTION 2010

Primaries tough on political insiders

Incumbents fall short of majorities needed to win nominations

By KATHY KIELY
USA Today

South Carolina legislator Nikki Haley fought back charges of adultery to lead a Republican field for governor, as two of her state's veteran GOP congressmen were pushed into runoffs Tuesday in the latest sign that fresh faces are trumping experienced ones in this election year.

Haley, who denied the accusations of infidelity, will face Rep. Gresham Barrett in a June 22 runoff. Six-term Rep. Bob Inglis meets prosecutor Trey Gowdy on the same day for renomination to his House district. None of the four candidates won 50 percent to earn their nominations outright.

"There's no question that being an incumbent doesn't provide the protection it used to," said Norman Ornstein, who studies Congress at the American Enterprise Institute.

In Arkansas, Blanche Lincoln, an 18-year congressional veteran, was battling to survive a runoff against Lt. Gov. Bill Halter. Halter had the support of the Service Employees International Union and other labor groups in a campaign that turned on Lincoln's refusal to back government-run health insurance and easier union organizing.

Sens. Arlen Specter, D-Pa., and Bob Bennett, R-Utah, and Reps. Alan Mollohan, D-W.Va., and Parker Griffith, R-Ala., have been ousted by voters so far this year.

Other signs that well-known political brands have lost luster: Paul Thurmond, son of the late South Carolina Sen. Strom Thurmond, and Carroll Campbell, namesake son of a former governor, were struggling to get into a congressional runoff with state Rep. Tim Scott. Scott is trying to become the first black Republican in the House since Oklahoma's J.C. Watts retired in 2003.

In California, the leading GOP candidates were not politicians but trail-blazing female businesswomen. Former Hewlett Packard CEO Carly Fiorina was vying to become the party's Senate nominee and former eBay chief Meg Whitman was seeking the GOP nomination for governor.

In Nevada, support from anti-tax tea party supporters was buoying state legislator Sharron Angle in a crowded GOP Senate primary field that included Danny Tarkanian, son of famed college basketball coach Jerry Tarkanian.

GRISWOLD

FROM A1

the town?" he said.

Those who support joining Uncas said it would be less expensive than running a municipal health department. Those opposed to it want Griswold to keep health services in the community.

The sanitarian's salary is $54,975; his father charges about $4,000 a year, and hasn't raised his fee in 20 years. First Selectman Philip Anthony said in an earlier interview that the health department's actual costs are higher; about $125,671, including costs such as benefits, insurance, and postage.

Joining Uncas would cost $77,000 in the coming fiscal year, under the terms of a two-year contract.

Joseph Foy, a resident who attended the April town meeting, said he voted against joining Uncas because he believes it will cost more in the long run, even if it saves money now.

"What we've got now, the town runs," Foy said. "The selectmen or whoever is in charge (run it), which means as a voter, I have a little control. If they do it by state grants or federal grants, I have no control."

Lisbon and Voluntown, which previously paid a combined $44,000 to Griswold for health services, are leaving the town to use a health district July 1.

Lisbon First Selectman Tom Sparkman said the town voted in May to join Uncas.

What's next

What: Special town meeting to decide whether to send the question of whether to join the Uncas Health District to referendum. The meeting will also consider a proposed blight ordinance and the education budget, both of which are expected to go to referendum.
When: 6:30 p.m. Thursday
Where: Griswold Middle School cafeteria

BALLOTS

FROM A1

which means the referendum likely will be June 17.

Av Harris, communications director for Secretary of the State Susan Bysiewicz, said a federal bill signed into law last fall — the Military and Overseas Voter Empowerment Act — would allow the electronic transfer of absentee ballots to members of the military overseas, and will be available in Connecticut by the general election Nov. 2.

The law requires clerks to make absentee ballots available at least 45 days before the general election, or by Sept. 18, to any member of the military who has submitted a request by then.

But Harris said with town referendums there is such a short window between the time a ballot is ready and the referendum is held that it may not be possible to return ballots in time.

Ballots may be sent electronically, but they must be returned by traditional mail under state and federal laws, Harris said. Electronic voting has not been permitted for military personnel or others because of security concerns, he said.

During an interview before he left, Rainier said the issue affects many more than him.

"We have several friends who are in the Army National Guard and they're in Afghanistan right now, and they have no say. It's just not right," he said.

Rainier said the same thing happened to him when he was deployed to Iraq in 2007. His wife, Lora Rainier, who is co-chairman of the Griswold Elementary School Parent Teacher Organization, said she went to Town Hall to ask about casting a ballot in his absence and was told she could not.

"I was simply devastated, as the wife of someone who was in Iraq on the ground, (that) he had no vote," she said.

The couple have two children, ages 5 and 9, at Griswold Elementary.

Jay Rainier said the state should be able to arrange a system that allows active-duty military to preregister in their town clerk's office with identification and then vote electronically so they have a say in local referendums.

He said he doesn't blame local town officials for what happened.

"They're just doing their jobs. The problem is that the policy is just completely wrong," he said. "And it needs to be changed."

What's next

Griswold will hold a special town meeting at 6:30 p.m. Thursday in the Griswold Middle School cafeteria to decide whether to send the proposed $24.29 million education budget to referendum.

NORWICH SCHOOLS

FROM A1

jobs to that total.

Union and nonunion employee concessions to date will save the board $113,000.

School Business Manager Athena Nagel said the $629,952 would represent a fraction above a 1 percent increase over this year.

Superintendent Abby Dolliver said closing Bishop and Greeneville elementary schools could force combining some grade levels, such as having second-third-grade classrooms; and increase class sizes to between 25 and 30 students.

"That's without the $629,000 cut," Dolliver said. "If we have to get to zero percent, whatever numbers we now have we have to do over again."

Resident Ron Ward encouraged the board to go farther faster, asking to show residents and the City Council how a zero-percent budget will affect the city before the council sets the budget and tax rate Monday.

"As ugly as that picture might be, show us what zero percent really looks like," Ward said. "How can we as a community respond, rally and be involved in the conversation with the board or council about how the school system might look unless you paint us an accurate picture?"

In other business

The Norwich Board of Education on Tuesday formally renamed Bishop Elementary School as Bishop School for identification in state records. Thames River Academy, which is moving there next year, will be known as Thames River Academy at Bishop School.

The board also approved a new contract with its nurses union. The contract runs through June 2011 and contains $21,000 in concessions, including a pay freeze for the coming year.

PUBLIC NOTICE

The Department of the Navy, Naval Submarine Base – New London (NSB-NLON), in conjunction with the United Sates Environmental Protection Agency and the Connecticut Department of Environmental Protection announce the availability of the Proposed Plan for the cleanup of contaminated sediment at Area A Wetland-Site 2B and invite the public to review and comment on it. This plan was prepared under the comprehensive Environmental Response, Compensation and Liability Act (also known as Superfund), which authorized Federal action to respond to releases of hazardous substances into the environment. The public comment period for this Proposed Plan begins June 9, 2010 and ends July 9, 2010.

The Area A Wetland-Site 2B is a low quality wetland and is dominated by the invasive reed, Phragmites commonis. Several environmental field investigations were performed to characterize the sediment and the results identified elevated concentrations of several chemicals including polychlorinated biphenyls, polycyclic aromatic hydrocarbons, pesticides, and metals. These contaminants originated from other nearby environmental cleanup sites that have since been cleaned up or environmentally isolated so there is no further source of contamination into the wetlands area. While these contaminants within the wetland area do not pose a human health risk, they could harm the environment, specifically sediment invertebrates. Therefore, site-specific cleanup levels based on risks to sediment invertebrate were developed as part of an Ecological Risk Assessment.

Two alternatives were evaluated to address the contaminated sediment at the site: removal (i.e., excavation and off-site disposal of contaminated sediment, backfilling, and restoring the area with native wetland vegetation) and capping (i.e., installing a two-foot soil cover over contaminated sediment). The Navy considered the effectiveness, implementability, and cost of these alternatives. Based on the results of this evaluation, sediment removal is the Navy's preferred method for addressing contaminated sediment at Area A Wetland-Site 2B. Approximately 3,190 cubic yards of contaminated sediment (i.e., sediment with chemical concentrations greater than cleanup levels) at Area A Wetland-Site 2B will be removed.

Community input is integral to the removal action selection process. The public is encouraged to review the Proposed Plan for the Sediment at Area A Wetland-2B at the following Information Repositories during normal hours of operation:

Groton Public Library	52 Newton Road	Groton, CT 06340	860-441-6750
Bill Library	718 Colonel Ledyard Highway	Ledyard, CT 06339	860-464-9912

The public can provide either oral or written comments on the Proposed Plan for the Sediment at Area A Wetland-Site 2B. Oral comments should be provided during the formal public hearing, scheduled for June 17, 2010 at 6:30 pm at the Best Western Olympic Inn, Route 12, Groton, Connecticut. Written comments should be submitted to either of the Navy contacts listed below, and must be postmarked no later than July 9, 2010.

Mr. Richard Conant, Installation Restoration Program Manager
Naval Submarine Base-New London Building 439, Box 400, Room 104, Groton, CT 06340
Tel: 860-694-5649 Email: richard.conant@navy.mil

Mr. Jim Gravette, Remedial Project Manager (Code OPTE3-1), Naval Facilities Engineering Command, Mid-Atlantic
Building Z-144, 9742 Maryland Avenue, Norfolk, VA 23511-3095
Tel: 757-341-2014 Email: james.gravette@navy.mil

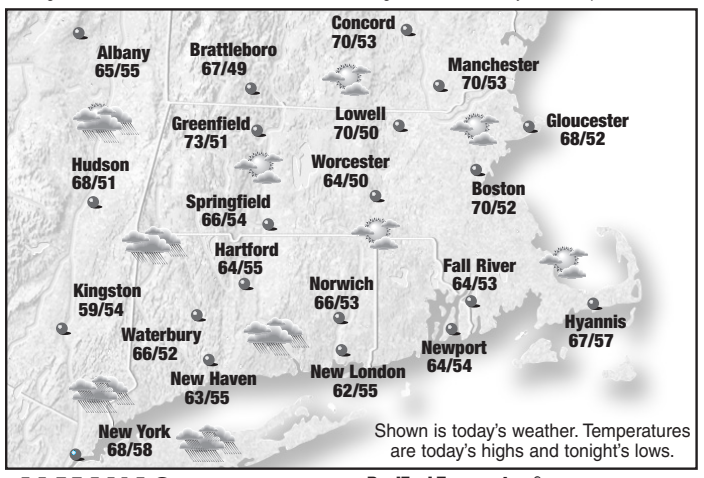
Weather

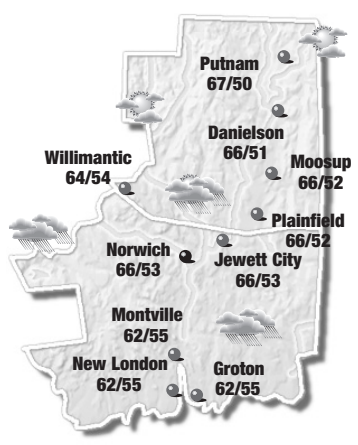
FIVE-DAY FORECAST FOR NORWICH

norwichbulletin.com

Today	Thursday	Friday	Saturday	Sunday
A bit of rain this afternoon	Cloudy and breezy with a shower	Mostly sunny and warmer	More humid with some sun	Clouds and sun, a t-storm possible
UV Index: 6	**UV Index: 2**	**UV Index: 8**	**UV Index: 5**	**UV Index: 6**
High 66, Low 53	**High 64, Low 49**	**High 73, Low 60**	**High 78, Low 67**	**High 81, Low 65**

The higher the **AccuWeather.com UV Index™** number, the greater the need for eye and skin protection. 0-2: Low; 3-5: Moderate; 6-7: High; 7-9: Very High; 11+: Extreme





Forecasts and graphics provided by **AccuWeather, Inc.** ©2010
AccuWeather.com

ALMANAC

Hartford through 7 p.m. yesterday

Temperature
High/Low 72/50

Precipitation
24 hrs ending 7 p.m. yest. ..... 0.00"
Month to date ..... 1.92"
Year to date ..... 18.95"

Air Quality
Yesterday ..... 38, Ozone
Connecticut Depart. of Enviro. Protection

0-50 Good, **51-100** Moderate, **101-150** Unhealthy for sensitive groups, **151-200** Unhealthy, **201-300** Very Unhealthy, **301-500** Hazardous

RealFeel Temperature®
The patented **AccuWeather.com RealFeel Temperature** is an exclusive index of the effects of temperature, wind, humidity, sunshine intensity, cloudiness, precipitation, pressure and elevation on the human body.

Predicted temperatures are in parenthesis.
8 a.m. ..... 57 (55) 4 p.m. 61 (62)
Noon ..... 69 (63) 8 p.m. 50 (57)

Sun and Moon

	Today	Thu.
Sunrise	5:14 a.m.	5:14 a.m.
Sunset	8:21 p.m.	8:21 p.m.
Moonrise	2:46 a.m.	3:23 a.m.
Moonset	5:44 p.m.	6:52 p.m.

New	First	Full	Last
June 12	June 19	June 26	July 4

RIVER STAGES

Flood: flood stage. **Stage:** stage in feet as of 7 a.m. yesterday.

Thames River Basin

Station	Flood	Stage
Little Riv. near Hanover	--	1.74
Natchaug Riv. at Willimantic	--	2.17
Quinebaug Riv. at Jewett City	18	5.56
Quinebaug Riv. at Quinebaug	--	2.93
Quinebaug Riv. at Putnam	10	2.99
Shetucket Riv. near Willimantic	13	2.83
Willimantic Riv. near Coventry	12	3.27
Yantic Riv. at Yantic	9	1.48

MARINE OUTLOOK

Wind: SSE at 6 to 12 knots
Waves: 1-2 feet
Water temperature: Long Island 61
Offshore 62

TIDES FOR TODAY

Station	Highs	Lows
Watch Hill	6:32a/6:52p	1:02a/12:34p
Westerly	7:24a/7:39p	2:01a/1:44p
Stonington	9:07a/9:18p	2:58a/3:04p
New London	7:45a/8:00p	1:58a/1:41p

REGIONAL CITIES

City	Today Hi	Lo	W	Thu. Hi	Lo	W
Bridgeport	64	57	r	65	56	c
Bristol	67	52	r	63	50	c
Danbury	66	53	r	69	48	c
Enfield	66	55	r	66	51	c
Greenwich	66	56	r	67	53	c
Groton	62	55	r	63	50	c
Hartford	64	55	r	66	51	c
New Britain	67	54	r	63	51	c
New Haven	63	55	r	66	52	c
New London	62	55	r	63	50	c
Stamford	66	55	r	67	53	c
Waterbury	66	52	r	63	49	c

WORLD CITIES

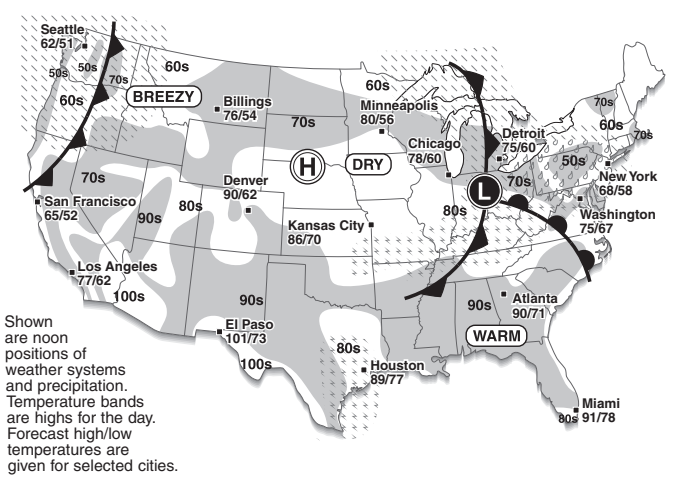
City	Today Hi	Lo	W	Thu. Hi	Lo	W	City	Today Hi	Lo	W	Thu. Hi	Lo	W
Amsterdam	68	60	r	74	60	r	Jerusalem	73	56	s	76	57	s
Athens	85	72	pc	87	72	s	London	71	54	r	64	54	r
Beijing	83	67	c	84	69	s	Montreal	72	56	pc	71	56	c
Berlin	84	69	t	92	73	pc	Moscow	70	48	c	64	54	r
Bermuda	76	71	pc	78	71	pc	Paris	67	61	r	74	56	r
Calgary	53	42	r	48	39	r	Rome	83	66	s	84	66	c
Dublin	61	48	sh	63	46	pc	Tokyo	72	64	r	75	63	s
Hong Kong	89	82	r	90	81	r	Warsaw	85	64	s	90	64	s

NATIONAL CITIES

City	Today Hi	Lo	W	Thu. Hi	Lo	W	City	Today Hi	Lo	W	Thu. Hi	Lo	W
Anchorage	60	46	c	62	46	c	Kansas City	86	70	pc	88	72	t
Atlanta	90	71	t	93	72	t	Los Angeles	77	62	pc	74	60	pc
Baltimore	71	59	r	81	57	pc	Miami	91	78	t	90	77	t
Boston	70	52	pc	61	52	r	New Orleans	92	77	pc	93	78	t
Chicago	78	60	pc	76	64	s	New York	68	58	r	74	59	pc
Dallas	88	75	t	95	79	t	Oklahoma City	89	72	t	90	76	s
Denver	90	62	pc	96	59	pc	San Francisco	65	52	pc	70	51	pc
Honolulu	86	75	s	87	75	s	Washington, DC	75	67	r	82	66	pc

Legend: W-weather, s-sunny, pc-partly cloudy, c-cloudy, sh-showers, t-thunderstorms, r-rain, sf-snow flurries, sn-snow, i-ice.

TODAY'S NATIONAL WEATHER



Shown are noon positions of weather systems and precipitation. Temperature bands are highs for the day. Forecast high/low temperatures are given for selected cities.

National Summary: Thunderstorms, some strong, will spread from the Ohio and Tennessee Valleys into the mid-Atlantic today, while soaking rain spreads over areas farther north. Thunderstorms are also on tap for the southern Plains. Meanwhile, rain will advance through the Northwest.

Appendix C
Public Meeting Transcript

PROPOSED PLAN

AREA A WETLAND - SITE 2B

AT

NAVAL SUBMARINE BASE - NEW LONDON

Public Meeting regarding the Naval Submarine Base - New London taken at the Best Western Olympic Inn, Route 12, Groton, Connecticut, before Clifford Edwards, LSR, Connecticut License No. SHR.407, a Professional Shorthand Reporter and Notary Public, in and for the State of Connecticut on June 17, 2010, at 6:38 p.m.

DEL VECCHIO REPORTING SERVICES, LLC
PROFESSIONAL SHORTHAND REPORTERS
117 RANDI DRIVE
MADISON, CT 06443

HARTFORD NEW HAVEN STAMFORD

A P P E A R A N C E S:

AARON BERNHARDT
COREY RICH
TETRA TECH NUS, INC.
Foster Plaza 7
661 Andersen Drive
Pittsburgh, Pennsylvania 15220
412.921.4040, f: 412.921.8984
Aaron.Bernhardt@TetraTech.com
Corey.Rich@TetraTech.com

RICHARD CONANT
IR PROGRAM MANAGER
NAVAL SUBMARINE BASE - NEW LONDON
Building 439, Box 400, Room 104
Route 12
Groton, Connecticut 06349
860.694.5649
Richard.Conant@Navy.mil

KYMBERLEE KECKLER
REMEDIAL PROJECT MANAGER
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 1
Federal Facilities Superfund Section
1 Congress Street
Boston, Massachusetts 02114
617.918.1385
Keckler.Kymberlee@EPA.gov

A P P E A R A N C E S (CONTINUED):

ALSO PRESENT:

Val Jurka

Nina Balsmo

Mark Lewis

Chris Zendan

Larry Gibson

Andrew Stackpole

John Markowicz

Frank Mulcahy

David Turner

Marc Denno

Judy Bensa

RICHARD CONANT: We wanted to get started a little bit late because there's an accident on 95, but I hope not too many people got gummed up in it.

Thank you all for coming. We've got a busy schedule tonight. We'll try to get you through this and out of here as quickly as possible.

My name is Dick Conant. I run the -- or manage the environmental program as far as the IR, Installation Restoration Program goes at sub base.

I would like to recognize Captain Denno, our skipper at sub base. He's good enough to show up here.

Commander Mulcahy is the public works officer in the back there.

And my counterpart from Norfolk, Jim Gravette, the remedial project manager.

We are going to kick off tonight and we'll get right into it.

Aaron Bernhardt from Tetra Tech NUS is going to give a presentation on what is really the meat of this presentation or this meeting tonight.

And that is the proposed remedial action plan for the Area A Wetland sediments, of what we, the Navy, are proposing to do out there.

And Aaron will essentially kickoff with the meeting here and explain the whole plan and then we'll go right into a public hearing.

Now, we will entertain any type of comments during Aaron's presentation, but if you want something officially on the record, the time to speak up is in the public hearing part at the end of this.

AARON BERNHARDT: Okay.

RICHARD CONANT: Aaron.

AARON BERNHARDT: Again, we have copies of the presentation on the back table if you haven't gotten one, and there's also copies of the proposed plan, as well. Get your copy if you didn't get that.

Okay. So again, the meeting agenda, the introductions, the public meeting is going to be the first part of this. This is the where we'll do the technical

presentation.

We're going to focus on the review and the regulatory process, describe OU 12, which is the Area A Wetland, and then present the proposed plan for the Area A Wetland.

And then, again, as Dick mentioned, we'll have the public hearing where you can give formal comments and I'll give responses, and then the public meeting closeout.

We'll see if this works. There we go.

Okay. Just to kind of give an overview of the whole CERCLA process, the first step is really what's called a preliminary assessment site inspection.

And that's where you're trying to determine initially, is there really a potential problem at the site.

So if you do determine there's some sort of a potential for a problem, then you would conduct a remedial investigation.

And that's really where you're trying

to determine what's there, what chemicals are there, what's the extent of the problem, and then, who's it going to impact? Is it going to impact, you know, humans or ecological receptors.

So if you go through that process, determine there is a problem, you go into what's called the feasibility study.

And that's where you try to determine what are you going to do to address that problem, and I'll address the -- in this case, the contaminated sediment, what are we going to do about it?

And then, in this case, we came up with a proposed plan which presents the preferred alternative to address that problem, and then also to get public input into the process.

Then the next step is called the record of decision, and that's where the final remedy is documented -- that's selected is documented, and then the public input is also entered into that document.

The next step would be the remedial

design, and that's really how are we going to implement that remedy, what are we going to do to physically address that problem?

The remedial action is getting it done. That's where you're going to go and actually dig it up and clean up the area.

And then you may have what's called operation and maintenance, long-term monitoring of the situation to make sure what you did is actually working.

So again, we're going to focus this talk on the proposed plan, so the middle of that process.

So this is a document that's used to facilitate public involvement in the process and just try to get your input on the remedies that were selected.

It's going to present the lead agency, in this case the Navy, the Navy's preferred alternative to address the contamination at the site.

It's going to also present the other alternatives that were looked at and that were evaluated, and then the reasons why

the preferred alternative was recommended.

So you'll see there were a few alternatives that were investigated and then this was the one that was chosen, and it will give that information. And it's required as part of the public participation responsibilities under the NCP.

And then, the record of decision is the document that follows, and that's also prepared by the lead agency in consultation with EPA, in this case the EPA and the Connecticut Department of Environmental Protection. And it documents the selected remedial action for the site.

So that's really where the legal document is and it certifies that the remedy selection process was conducted in accordance with Superfund, or CERCLA, and the NCP, and it's going to contain the technical rationale and the background information that's provided in other documents, kind of a summary of what's already been presented in previous

documents.

But it will provide the technical information necessary to determine, again, the engineering components, and it's going to outline what's called the remedial action objectives, which we'll get into, and also the cleanup levels for the remedy. And it's really a tool to help explain -- help explain the process to the public.

Okay. So now we're going to get into really the meat of it, the Area A Wetland.

The Area A Wetland, it's a 26-acre wetland, which is dominated by a monoculture of phragmites, which is an invasive reed species.

And you'll see, when Dick is going to talk later, that the sub base is actually in the process of doing -- trying to eradicate the whole 26 acres of phragmites under a separate program.

So the wetland was performed -- was created when about 1.2 million cubic yards of dredged material were pumped from the Thames River back in the late '50s into

the man-made structure, basically for disposal and dewatering of the dredged spoils. And we'll show you some aerial figures in a few minutes here.

There's a small pond that's located in the southern portion of the wetland, and sometimes there's standing water, depending how much rainfall there is. Sometimes portions are dry, of the wetland.

So here, this red outlined is the Area A wetland. You can see it's on the far northern part of the sub base. Here's the Thames River, down here.

And here -- you have bigger, larger copies in your document there, as well, in the handout.

This is the -- the area in red is the Area A Wetland. This is the Area A Weapons Center, and you'll see later that some of the contamination in the wetlands came from runoff from the Weapons Center. Here's the Area A Landfill, and some of the damage also came from runoff from the Area A Landfill.

Here's the pond here over here. And here's the -- basically, a dike was built before they pumped the dredged spoils.

They built this dike with a culvert going through the dike, and then they pumped in the dredged spoils into this red area here, and then the water could drain out through the culvert, and then it went down -- eventually reached down to the Thames River again.

Okay. So here's what it looked like in the past until -- you'll see a few slides. Here's the -- wrong one.

Here's the ponded area, and again, this is all grass or the green area here is the wetland. And here's the landfill, covers over here, part of it.

The weapons center would be over -- I guess, would be over this way?

RICHARD CONANT: Yeah. Actually, over to the left of the slide there, all the way over there.

AARON BERNHARDT: Okay.

RICHARD CONANT: Over there, yeah.

AARON BERNHARDT: Okay.

And then, here, you can see how high the phragmites is. It's just -- the picture shows it's 15 feet in the air, it can get up to, or higher.

Then, here's the program I was talking about that Dick's going to get into in more detail.

This is the mowing of the wetlands. They're basically going to mow it and try to eradicate the phragmites in that area.

As you can see, here's where -- this part has been mowed already in this photograph, and this is the part that has not been mowed yet.

I don't want to steal Dick's thunder here. I'll let you talk about that.

There's a few sources of contamination into the wetland. The one source was basically pesticides bricks that were placed on top of the wetland when it was frozen, and then, as the water melted, the bricks would melt and get into the wetland.

That was used, again, for mosquito control back in the day, when that was

still a legal application of the pesticide.

There's also historic runoff from the Area A Landfill and the Area A Weapons Center that discharged to the wetland.

And that occurred from the landfill, at least prior to the capping. Because now that the landfill is capped, there's no longer runoff getting into the wetland.

And then, also, there were some contaminated soil and sediment that was excavated from the weapons center, so that no longer is a source of contamination to the wetland.

And then, there's no plan to use the site for any other purpose other than keeping it as a wetland.

There's no -- it's not going to be very likely that any type of residential or industrial development can occur on the wetland. For one, it's right next to the landfill and the weapons center.

And it's also because it's underlaid by dredged materials, which is more like a clay material, it's not very suitable for

building on top of. And also, it's a wetland, so there's a lot of restrictions for building things in wetlands.

So you can see there's a lot of previous investigations that have been conducted, starting back in the early '90s, the Phase I and the Phase II Remedial Investigations, just a lot of investigations, so we took a little hiatus in there and then came back in 2007, 2008.

So what we submitted most recently was called the Remedial Investigation Update/Feasibility Study. That was just submitted a few weeks ago in June 2010. It was a final document.

And it contained, among others sections, a human health risk assessment, an ecological risk assessment, what's called a remedial action objectives, and then the preliminary remediation goals, which are the cleanup levels. And it also describes and evaluates the remedial alternatives.

So for the human health risk assessment, we looked at various

receptors. We looked at future construction workers and also current and future child trespassers.

Again, we were not looking at residential at that point because no one is living there and it's very unlikely that people would ever live there in the future.

The exposure pathways, either ingestion, dermal contact or inhalation of the soil or sediments. Ingestion or dermal contact of the surface water.

And then, for the construction worker, looking at groundwater ingestion or dermal contact with the groundwater if they are digging in the wetland.

So the human health risk assessment concluded that it's -- noncancer risks are not likely, not anticipated for humans, and also that the cancer risks for the construction worker and the child trespasser were acceptable. So really, you know, basically, no human health risks were identified.

Then we focus on the ecological

portion, and there, the potential receptors were sediment invertebrates, so basically, little organisms living in the sediment.

And then, the reason we focused on those was because the previous risk assessments that were done indicated that the risk to other receptors such as birds and mammals and plants were acceptable, so we didn't need to focus on those receptors.

So what did we do?

We conducted some additional investigations where we collected sediment samples and analyzed them for various chemicals.

We also collected sediment samples, sent them to a laboratory where they put bugs in, and then, basically, to see how many bugs lived and how many died.

And then, based on those results and the chemistry results, we were able to correlate the data and then come up with our cleanup numbers to determine what level are we going to start seeing impacts

to the organisms.

So again, the conclusion was that there were adverse impacts to sediment invertebrates, and then, that's how we developed these preliminary remediation goals, the PRGs, basically our cleanup numbers.

So these were developed in consultation with EPA and Connecticut's DEP, and then the final PRGs are just listed up here.

So we had them for PAHs, which are polyaromatic hydrocarbons. For DDT, which is a pesticide. Total Aroclor -- basically for PCBs.

That's why there was a catchall for the last bullet in there, so basically the samples with ten or more chemicals that exceeded a sediment screening benchmark, what was called the threshold effects concentration, so that captured some of the metals in addition to the PAHs and the DDT and the PCBs.

So based on this -- you have a copy of this, a larger copy in your book there,

as well -- the green ones are locations where the concentrations are less than the PRGs, and the red ones were concentrations were greater than the PRGs.

So you can see, again, some of the red ones are along the landfill here, a couple more were down from the weapons center, and a few are along the dike, and that's where we think they placed some of those pesticides bricks, potentially. That sort of makes sense.

And then you can see the rest of the wetland is pretty much all green, indicating that there's really not a problem in most of the wetland.

So then, we developed what's called remedial action objectives and they're -- in this case, the RAOs were to reduce the risks to sediments invertebrates from the chemicals of concern in the Area A Wetlands to acceptable levels, basically to reduce the levels to less than the chemicals, less than the PRGs.

We also wanted to make sure and mitigate the potential for those chemicals

to migrate downstream.

There is an Area A Downstream from several years ago that did a cleanup right downstream on the other side of that dike.

So we want to make sure that the chemicals aren't going to migrate back down and recontaminate that area, so that's the second objective there.

So we looked at, again, various alternatives. The first alternative, which is a requirement, is something called the No Action alternative, so it just -- basically as a baseline, you look at that alternative.

So if you didn't do anything, what would it cost and what would still be the problem?

So in that case, the No Action alternative still costs money, cost $97,000, because you'd still have to do five-year reviews, so every five years, you'd want to go out there and review the site.

The next alternative that was considered was a soil cover: Soil cover,

wetlands mitigation, and land use controls.

So basically, you take the contaminated area and just put a cap over it, put a soil cover, you know, I think a two-foot cover on top of the contaminated sediment to reduce exposure, so basically, the organisms aren't exposed to contamination.

That had a net present worth of about $2.1 million and that would include constructing 1.3-acre cover system and instituting land use controls to make sure that people aren't digging into that new cover.

And then, because you're losing the wetlands, because you're covering up and losing wetlands and also losing flood storage capacity, you would have so create 2.6 acres of new wetlands.

So basically, two-to-one ratio, so for every 1 acre of wetland we're destroying, you would create two acres of wetlands, of new wetlands.

And then, also, you'd have the

five-year reviews to make sure that it's still protected, that the cover is still there and people aren't digging in it.

The alternative that's selected, though -- again, those are the two that were discussed -- but the alternative that was selected was Alternative 3, and that's excavation, off-site disposal, and then site restoration.

That has a net present worth of $1.9 million, and that includes excavating, digging up the contaminated sediment, taking it off site for disposal, and that's going to be done on a 1-acre area.

The 1.3 acres was a little bit larger for the cap because you'd need to have some slope issues, and it needs to be a little bit larger.

But really, there's 1 acre of contaminated sediments. So that would be dug up down to two feet, down to the dredged materials, which is a lot cleaner and not contaminated.

And then, you would backfill that

with clean soil, clean organic soil. We would seed that area, the newly-filled area with wetland vegetation plant, you know, seeds.

We'd monitor to make sure that the native vegetation was coming back, rather than the invasive species, make sure the phragmites isn't coming back in to what we just cleaned up, and to make sure, again, that the native vegetation is being established.

Also institute land use controls to restrict residential development. As I mentioned, we did the risk assessment, we didn't really look at residential risks.

We still need to do these land use controls just to make sure people aren't building houses there.

RICHARD CONANT: And, Aaron, you might explain that residential development is in the situation where, if we did have a future BRAC, and the Navy closed down the base and it was made available for some type of adaptive re-use --

AARON BERNHARDT: Correct.

RICHARD CONANT: -- then, you know, residential construction would be a possibility.

AARON BERNHARDT: You could say that.

It's actually all about that -- the weapons center, there's an explosive arc safety zone, so really, new development wouldn't be allowed there anyway until that was shut down.

So Dick's right, that wouldn't happen until, down the road, if it was ever transferred to the public.

And again, you'd have five year reviews to just check on the protectiveness of the remedy.

So here's the area, and you showed a larger one of these, as well. This is showing you the area that would be excavated.

These hatched areas here show there's -- there's several hatched areas that right now are proposed, but you'll see in the next slide, I believe.

We are going to be doing what's called a predesign investigation, so

before you go out and dig up this contaminated sediment, we're going to go out there and take additional samples to refine that contamination.

I'll go back one slide.

If you see can here, there's some large gaps between some of the samples, you have several hundred feet, so we're going to try to close those gaps to try and maybe either shrink or, in some of the cases, the size, make it a little bit larger.

The area is going to be cleaned up, just to try to refine those boundaries a little better. And that's what called a predesign investigation.

We're going to be collecting samples again in areas where there's uncertainty in whether or not these -- the sediments exceeding the cleanup goals.

The actual samples can be conducted after the record of decision is signed, and then, again, the results will be used just to refine those limits of excavation.

So the schedule, we have the public

comment period from June 9 to July 9. There was a public notice published in the New London Day and the Norwich Bulletin, both of those, and then there was another -- you said there was an article there --

RICHARD CONANT: There was actually a small announcement of the RAB and the meeting here in The Day, the other day.

AARON BERNHARDT: Right. And the proposed plan was also sent out to, I guess, about 40 people on the RAB.

RICHARD CONANT: Including the repositories, two libraries that have all the IR documents, Bill Library up in Ledyard and Groton main library.

AARON BERNHARDT: Okay. So again, you have up to really through July 9th to submit comments, but you are welcome to do that this evening, as well, when we get to the public hearing part.

Scheduled today is the public meeting. Once we get the comments, we receive comments, we'll prepare what's called a responsiveness summary.

Basically we'll prepare responses to the comments.

Then, we're going to -- in the process, prepare this draft work plan, this draft predesign work plan, and then prepare and submit the final record of decision by -- between August and September 2010. So this fiscal year, our goal is to get that record of decision signed.

Points of contact. We have several all in the room right here. We have Jim Gravette, right over there. Dick Conant's right here.

Kymberlee Keckler is over there. And Mark Lewis is sitting right there, as well. And they're all listed in the proposed plan, as well.

Okay. So now we went through public meeting technical presentation.

Anyone have any questions?

DAVID TURNER: Your cleanup goals --

AARON BERNHARDT: Uh-huh.

DAVID TURNER: -- from this, I'm unclear on if they are Connecticut DEP,

RSR criteria or EPA criteria, or if they are indeed concentrations you calculated for protection of invertebrates.

AARON BERNHARDT: Correct.

They're site-specific numbers that we calculated for protection of the invertebrates. Correct.

COURT REPORTER: Your name, please?

DAVID TURNER: My name is David Turner.

COURT REPORTER: Thank you.

JOHN MARKOWICZ: My name is John Markowicz. I've got two questions.

AARON BERNHARDT: Sure.

JOHN MARKOWICZ: First is: You're not remediating to residential standards, so what standard are you remediating to?

AARON BERNHARDT: Okay. We're remediating to the site-specific standards for the invertebrates, because right now, we don't need to clean up to residential standards since it's not a residential area.

JOHN MARKOWICZ: No, I understand that.

Does that mean it could be an industrial use without additional remediation? I'm trying to get a feel for that.

AARON BERNHARDT: Well, we didn't look at industrial use.

We looked at construction workers and trespassers, so that's what those land use controls would be, to make sure that we wouldn't have a residential use or industrial use.

JOHN MARKOWICZ: I understand that.

So there would be basically no regular human contact, is that --

AARON BERNHARDT: Correct.

JOHN MARKOWICZ: Okay.

AARON BERNHARDT: Yes.

JOHN MARKOWICZ: And the second question is: Will the state DEP be -- do you expect comments from them?

AARON BERNHARDT: On what?

Sorry.

JOHN MARKOWICZ: On -- you got an open period for comments.

Have they informally or formally

agreed to what is being presented --

MARK LEWIS: I'm Mark Lewis from the DEP.

And yes, we've been involved with this selection of this remedy from the very beginning and we have -- well, the final stage is that we will issue a letter saying that we concur with the remedy that's been selected.

We haven't actually formally issued that letter, but we intend to do so.

JOHN MARKOWICZ: So you have been in dialogue?

AARON BERNHARDT: Yeah. They helped prepare the comments on the previous documents.

RICHARD CONANT: Yeah. Actually, Mark has been with us since, well, '94 or '95, I believe.

MARK LEWIS: Something like that.

RICHARD CONANT: He's our point of contact with the DEP for the entire IR Program and has been very supportive over the years.

JIM GRAVETTE: Based on the comments

received or not received, the DEP will decide in the next document whether or not they are going to accept this, so if there's significant comments, it could be revisited.

If there's not, then they would probably say it's a go.

JOHN MARKOWICZ: Yeah.

I was just -- my question was more will DEP -- have they reviewed it and would they comment, and I understand the answer.

Remediate to site-specific what, again?

Say that again?

I never heard that one before.

AARON BERNHARDT: Which one?

JOHN MARKOWICZ: The remediations --

AARON BERNHARDT: Yeah.

It's basically site-specific cleanup goals for invertebrates.

JOHN MARKOWICZ: Okay.

COREY RICH: Can you describe what those are?

AARON BERNHARDT: Well, those are

basically those little organisms that live in the sediment.

JOHN MARKOWICZ: Yeah, I know what they are.

I'm just trying to understand it.

COREY RICH: The State of Connecticut doesn't have maybe --

AARON BERNHARDT: Most states don't have specific numbers like -- like the RSRs, most states have, you know, residential standards or -- so that's why we had to do the special tox testing to develop these site-specific numbers.

JOHN MARKOWICZ: Well, the reason I'm understanding, I'm the guy that he was referring to about what could be a future reuse and --

AARON BERNHARDT: Oh, okay.

JOHN MARKOWICZ: -- I just want to try to understand what the rules are.

RICHARD CONANT: I could see your hackles go up when I mentioned BRAC, but --

JOHN MARKOWICZ: No. No. I just want to know what the rules.

I'm not here -- thank you.

AARON BERNHARDT: Any other questions?

JOHN MARKOWICZ: It's a four-letter word.

AARON BERNHARDT: Yes?

DAVID TURNER: In the proposed excavation areas, what's the depth of the water table, and will you be excavating below the water table or to the water table?

AARON BERNHARDT: Well -- I'm trying to think -- there's -- there's -- I guess the water is going to fluctuate, because it's a wetland.

And so we're going to go down to -- approximately down to two feet, down to the clay materials of the dredged spoils. So there may be some ponded water in there.

But the clay -- the dredged material is pretty thick in a lot of the areas down in the -- in some cases some cases, 30 feet thick, so it's like a -- it's going to -- it will just by like a border,

a boundary.

RICHARD CONANT: The testing determined that the upper organic layer that's formed since we put the dredged spoils out there contains the contamination, and once you get into the dredged spoils, you get past these drivers, these contaminates are driving the ecological cleanup, so --

As far as horizontal extent, the dredged spoils is where we stop -- vertical extent, excuse me. Yeah. Horizontal extent, we still need to confirm with this PDI.

AARON BERNHARDT: Other questions?

CHRISTOPHER ZENDAN: Chris Zendan.

Dick, without stealing too much of your thunder, as you talked about phragmites later on, one, I wanted to ask, because I know in the alternative, selected alternative, we are addressing part of that phragmites issue.

So one, in advance, looking at what you are going to be talking about and, in these alternatives, it's not discussed

certainly how that invasive species got there, so I wanted to ask that, if that's not stealing thunder.

And also, I just wanted to point out that certainly in the selected alternative, it looks like we're taking steps to address that issue that weren't addressed in the other alternative.

RICHARD CONANT: Well, invasive species do what invasive species do, and that is invade.

Phragmites is probably European.

How it came to this country or got into this country, who knows, but it has invaded wetlands all through the east coast and, unfortunately, crowds out native vegetation that has more wildlife value, you get this monoculture that we're dealing with out there.

CHRISTOPHER ZENDAN: Right.

But it may or may not be a result of us putting the dredged spoils there.

RICHARD CONANT: Invasive species love a disturbed environment, and that certainly was a disturbed environment.

So --

And that's why it came in there and thrived in there and, really, has established itself, and unless we take drastic action, as we're starting to get into now, it would just maintain itself over time.

CHRISTOPHER ZENDAN: Great. That's the action we're taking. Thank you.

AARON BERNHARDT: All right. Well, if there's no other questions -- okay. One more?

DAVID TURNER: One more.

AARON BERNHARDT: Sure.

DAVID TURNER: And back to the remedial goals that you're proposing, compared to the Connecticut RSRs, specifically residential direct exposure criteria, are they above or below or comparable?

AARON BERNHARDT: I do not know that.

KYMBERLEE KECKLER: The PCB numbers, I think, are lower, but PAHs may be higher.

And DDT, I don't know if we have a

number for them.

MARK LEWIS: We have a site-specific criterion for DDT that was actually approved for another site at the base, the Area A downstream wetlands, and off the top of my head, I can't remember.

It's certainly within the same order of magnitude.

AARON BERNHARDT: This was actually a little lower, I think, than that one, but again, this -- I don't know what the RSRs are yet.

Maybe if you can ask that question and then you can respond.

Any other questions?

Okay. Thank you.

RICHARD CONANT: Thank you, Aaron.

I think we can segue right over to the public hearing, Jim, if you want to conduct that up here.

Essentially, Jim is going to open the floor for anyone that wants to make a statement, another comment. If you've got another question, that's fine, too.

We've recorded everything to this

date and we will record everything in the public hearing, too, but if you would like to agree, disagree, just make a statement about where this is going, we'd like to entertain that right now.

JIM GRAVETTE: Basically, it's questions again, and some of the questions have been asked, so I think some of them may be answered in full, but that one, we can certainly respond to, if you like.

DAVID TURNER: I would like to have that.

JIM GRAVETTE: So a comparison, I guess the question is a comparison between the human health, the residential cleanup number versus the one we picked for the ecological cleanup for this site.

DAVID TURNER: That is specifically the Connecticut DEP RSR criteria compared to the ones that you're using.

JIM GRAVETTE: Sure. We can certainly respond to that.

It was pretty thorough. I guess there was quite a few questions, but it sounds like most folks got their questions

answered.

RICHARD CONANT: Jim, you might point out that, certainly, if someone does not want to make a statement or a comment, that there's a way to either send us an e-mail, submit something in writing during the comment period, which stretches to July 9th.

JIM GRAVETTE: Again, if you do decide to submit a comment or the comments that we do receive, they will be included in the next document, the record of decision. We'll respond to those.

Obviously, Kymberlee from the EPA and Mark from the state will look at those, as well, in terms of whether or not they are going to concur with this remedy as we move forward.

So like I said, this is the remedy we've all selected internally right now and submitting comments.

AARON BERNHARDT: And the back of the proposed plan, on the last page, you can fill it out and send it in.

RICHARD CONANT: That's right. Thank

you.

AARON BERNHARDT: Yup.

JIM GRAVETTE: It sounds to me like there's no more, at least for the folks here, no comments here to ask, so we can move into the RAB part.

RICHARD CONANT: Yeah. I think we can close down the public hearing of this and move to the restoration advisory board meeting.

(THEREUPON, THE PUBLIC HEARING WAS CONCLUDED AT 7:09 P.M.)

C E R T I F I C A T E

I hereby certify that I am a Notary Public, in and for the State of Connecticut, duly commissioned and qualified to administer oaths.

I further certify that said meeting was taken by me stenographically and reduced to typewriting under my direction, and the foregoing is a true and accurate transcript of the meeting.

I further certify that I am neither of counsel nor attorney to either of the parties to said cause, nor am I an employee of either party to said cause, nor of either counsel in said cause, nor am I interested in the outcome of said cause.

Witness my hand and seal as Notary Public this _____ day of _____ , 2010.

_____

Clifford Edwards

Notary Public

My commission expires: 9/30/2011

Appendix D
Human Health Risk Tables

TABLE 3.1
EXPOSURE POINT CONCENTRATION SUMMARY - SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Soil/Sediment
Exposure Medium: Surface Soil/Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration[1]			
						Value	Units	Statistic	Rationale
Area A - Wetland	BAP EQUIVALENT	mg/kg	1	4	46	4	mg/kg	95% KM[2] (Chebyshev) UCL	Pro-UCL
	4,4'-DDD	mg/kg	0.2	0.4	4.8 J	0.4	mg/kg	95% KM (Chebyshev) UCL	Pro-UCL
	4,4'-DDT	mg/kg	0.1	0.3	2.9	0.3	mg/kg	95% KM (Chebyshev) UCL	Pro-UCL
	AROCLOR-1260	mg/kg	0.2	0.22	1.5	0.22	mg/kg	95% KM (t) UCL	Pro-UCL
	ANTIMONY	mg/kg	1.4	1.1	7.8 J	1.1	mg/kg	95% KM (t) UCL	Pro-UCL
	ARSENIC	mg/kg	11.2	16.5	53.5 J	16.5	mg/kg	95% KM (Chebyshev) UCL	Pro-UCL
	BARIUM	mg/kg	89.2	130	456 J	130	mg/kg	95% Chebyshev(Mean, Std) UCL	Pro-UCL
	BERYLLIUM	mg/kg	0.7	0.84	4.1 J	0.84	mg/kg	95% KM (BCA) UCL	Pro-UCL
	CADMIUM	mg/kg	1.7	3.3	29.5	3.3	mg/kg	95% KM (Chebyshev) UCL	Pro-UCL
	CHROMIUM	mg/kg	41.7	56.1	101	56.1	mg/kg	95% KM (Chebyshev) UCL	Pro-UCL
	MANGANESE	mg/kg	332	510	2640	510	mg/kg	95% Chebyshev(Mean, Std) UCL	Pro-UCL
	THALLIUM	mg/kg	0.4	0.49	1.1 J	0.49	mg/kg	95% KM (Percentile Bootstrap) UCL	Pro-UCL
	VANADIUM	mg/kg	55.5	76.7	289 J	76.7	mg/kg	95% Chebyshev(Mean, Std) UCL	Pro-UCL

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

1. Exposure point concentration is the value recommended by USEPA's ProUCL. The maximum detected concentration is used if the recommended UCL is greater than the maximum or if the dataset contains less than 10 samples.
2. KM = Kaplan-Meier Method

TABLE 3.2
EXPOSURE POINT CONCENTRATION SUMMARY - SUBSURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Subsurface Soil/Sediment
Exposure Medium: Subsurface Soil/Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration[1]			
						Value	Units	Statistic	Rationale
Area A - Wetland	BAP EQUIVALENT (1/2 DL)	mg/kg	0.2	0.5	0.6	0.5	mg/kg	95% KM[2] (Chebyshev) UCL	Pro-UCL
	ARSENIC	mg/kg	7.6	9.7	12.4	9.7	mg/kg	95% Student's-t UCL	Pro-UCL
	CADMIUM	mg/kg	3.5	6.9	11.5 J	6.9	mg/kg	97.5% KM (Chebyshev) UCL	Pro-UCL
	CHROMIUM	mg/kg	46.8	59.5	102	59.5	mg/kg	95% Approximate Gamma UCL	Pro-UCL
	MANGANESE	mg/kg	281	305	379	305	mg/kg	95% Student's-t UCL	Pro-UCL
	THALLIUM	mg/kg	0.64	0.81	0.82 J	0.81	mg/kg	95% KM (Percentile Bootstrap) UCL	Pro-UCL
	VANADIUM	mg/kg	47.1	52.5	75 J	52.5	mg/kg	95% Approximate Gamma UCL	Pro-UCL

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

1. Exposure point concentration is the value recommended by USEPA's ProUCL. The maximum detected concentration is used if the recommended UCL is greater than the maximum or if the dataset contains less than 10 samples.
2. KM = Kaplan-Meier Method

TABLE 3.3
EXPOSURE POINT CONCENTRATION SUMMARY - GROUNDWATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Area A - Wetland	TETRACHLOROETHENE	ug/L	1	NA	1.4	1.4	ug/L	Maximum	(1)
	2-METHYLNAPHTHALENE	ug/L	2	NA	180	180	ug/L	Maximum	(1)
	3&4-METHYLPHENOL	ug/L	4	NA	65.7	65.7	ug/L	Maximum	(1)
	BAP EQUIVALENT	ug/L	0.571	NA	11	11	ug/L	Maximum	(1)
	NAPHTHALENE	ug/L	0.9	NA	29	29	ug/L	Maximum	(1)
	PYRENE	ug/L	2	NA	400	400	ug/L	Maximum	(1)
	BIS(2-ETHYLHEXYL)PHTHALATE	ug/L	4	NA	40	40	ug/L	Maximum	(1)
	4,4'-DDD	ug/L	0.9	NA	52	52	ug/L	Maximum	(1)
	ALUMINUM	ug/L	260.0	NA	4890	4890	ug/L	Maximum	(1)
	ANTIMONY	ug/L	4.6	NA	5	5	ug/L	Maximum	(1)
	ARSENIC	ug/L	11	NA	109	109	ug/L	Maximum	(1)
	BARIUM	ug/L	100	NA	920	920	ug/L	Maximum	(1)
	BERYLLIUM	ug/L	1.1	NA	23.7	23.7	ug/L	Maximum	(1)
	BORON	ug/L	570	NA	3260	3260	ug/L	Maximum	(1)
	CADMIUM	ug/L	1.4	NA	10.9	10.9	ug/L	Maximum	(1)
	CHROMIUM	ug/L	6.3	NA	50	50	ug/L	Maximum	(1)
	COBALT	ug/L	4.3	NA	16.3	16.3	ug/L	Maximum	(1)
	IRON	ug/L	18500	NA	234000	234000	ug/L	Maximum	(1)
	MANGANESE	ug/L	900	NA	9270	9270	ug/L	Maximum	(1)
	MERCURY	ug/L	0.086	NA	1.5	1.5	ug/L	Maximum	(1)
	MOLYBDENUM	ug/L	5.5	NA	50	50	ug/L	Maximum	(1)
	SELENIUM	ug/L	11	NA	155	155	ug/L	Maximum	(1)
	THALLIUM	ug/L	3.8	NA	22.4	22.4	ug/L	Maximum	(1)
	VANADIUM	ug/L	7.6	NA	369	369	ug/L	Maximum	(1)

1. The maximum concentration is used as the exposure point concentration for the RME for groundwater.

TABLE 3.4
EXPOSURE POINT CONCENTRATION SUMMARY - SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration[1]			
						Value	Units	Statistic	Rationale
Area A - Wetland	ETHYLBENZENE	ug/L	1	0.3	2	0.3	ug/L	95% KM[2] (t) UCL	Pro-UCL
	TETRACHLOROETHENE	ug/L	1	2	2	2	ug/L	95% Chebyshev(Mean, Std) UCL	Pro-UCL
	BAP EQUIVALENT	ug/L	0.3	0.2	0.8	0.2	ug/L	95% KM (t) UCL	Pro-UCL
	NAPHTHALENE	ug/L	0.5	0.5	6	0.5	ug/L	95% KM (BCA) UCL	Pro-UCL
	BIS(2-ETHYLHEXYL)PHTHALATE	ug/L	0.004	3	12	3	ug/L	95% KM (% Bootstrap) UCL	Pro-UCL
	4,4'-DDD	ug/L	0.02	0.03	0.31	0.03	ug/L	95% KM (t) UCL	Pro-UCL
	4,4'-DDT	ug/L	0.03	0.09	0.92	0.09	ug/L	95% Chebyshev(Mean, Std) UCL	Pro-UCL
	ALDRIN	ug/L	0.009	0.01	0.02	0.01	ug/L	95% Chebyshev(Mean, Std) UCL	Pro-UCL
	ANTIMONY	ug/L	4.0	1.3	7	1.3	ug/L	95% KM (% Bootstrap) UCL	Pro-UCL
	ARSENIC	ug/L	6.3	9.8	190	9.8	ug/L	95% KM (BCA) UCL	Pro-UCL
	BARIUM	ug/L	62.6	80.2	1100	80.2	ug/L	95% KM (BCA) UCL	Pro-UCL
	CADMIUM	ug/L	1.4	3.2	126	3.2	ug/L	95% KM (Chebyshev) UCL	Pro-UCL
	CHROMIUM	ug/L	3.7	4.4	70	4.4	ug/L	95% KM (BCA) UCL	Pro-UCL
	MANGANESE	ug/L	461	711	3800	711	ug/L	95% KM (Chebyshev) UCL	Pro-UCL
	NICKEL	ug/L	9.9	15.8	132	15.8	ug/L	95% KM (Chebyshev) UCL	Pro-UCL
	THALLIUM	ug/L	2.6	1.2	6.4	1.2	ug/L	95% KM (t) UCL	Pro-UCL
	VANADIUM	ug/L	10.3	15.2	270	15.2	ug/L	95% KM (BCA) UCL	Pro-UCL
	ZINC	ug/L	193	351	3346	351	ug/L	95% KM (Chebyshev) UCL	Pro-UCL

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

1. Exposure point concentration is the value recommended by USEPA's ProUCL. The maximum detected concentration is used if the recommended UCL is greater than the maximum or if the dataset contains less than 10 samples.
2. KM = Kaplan-Meier Method

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 1 OF 2

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds								
Ethylbenzene	1.1E-02	$(mg/kg/day)^{-1}$	1	1.1E-02	$(mg/kg/day)^{-1}$	NA	Cal EPA (1)	11/2007
Tetrachloroethene	5.4E-01	$(mg/kg/day)^{-1}$	1	5.4E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Trichloroethene	1.3E-02	$(mg/kg/day)^{-1}$	1	1.3E-02	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Semivolatile Organic Compounds								
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Benzo(a)anthracene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Benzo(a)pyrene[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	7/2009
Benzo(b)fluoranthene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Benzo(k)fluoranthene[3]	7.3E-02	$(mg/kg/day)^{-1}$	1	7.3E-02	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Bis(2-ethylhexyl)phthalate	1.4E-02	$(mg/kg/day)^{-1}$	1	1.4E-02	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	7/2009
Chrysene[3]	7.3E-03	$(mg/kg/day)^{-1}$	1	7.3E-03	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Dibenzo(a,h)anthracene[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Indeno(1,2,3-cd)pyrene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Naphthalene	NA	NA	NA	NA	NA	C / Inadequate data of carcinogenicity in humans	IRIS	7/2009
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Pesticides/PCBs								
4,4'-DDD	2.4E-01	$(mg/kg/day)^{-1}$	1	2.4E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	7/2009
4,4'-DDE	3.4E-01	$(mg/kg/day)^{-1}$	1	3.4E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	7/2009
4,4'-DDT	3.4E-01	$(mg/kg/day)^{-1}$	1	3.4E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	7/2009
Aldrin	1.7E+01	$(mg/kg/day)^{-1}$	1	1.7E+01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	7/2009
Aroclor-1260	2.0E+00	$(mg/kg/day)^{-1}$	1	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(2)	9/1996
Inorganics								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	7/2009
Barium	NA	NA	NA	NA	NA	D (Not classifiable as to human carcinogenicity)	IRIS	7/2009
Beryllium	NA	NA	NA	NA	NA	B1 / Probable human carcinogen	IRIS	7/2009
Boron	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	B1 / Probable human carcinogen	IRIS	7/2009

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 2 OF 2

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Chromium	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	B2 / Probable human carcinogen	IRIS	7/2009
Manganese	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Mercury	NA	NA	NA	NA	NA	C/ Possible Human Carcinogen	IRIS	7/2009
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009

Notes:
1 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor / Oral Absorption Efficiency for Dermal.
3 - The carcinogenic PAHs are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System.
NA = Not Available.
ORNL = Oak Ridge National Laboratory, Regional Screening Levels for Chemical Contaminants at Superfund Sites, April, 2009, Updated May 19, 2009.
USEPA(1) = USEPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.
USEPA(2) = USEPA, PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September 1996, EPA/600/P-96/001F.
Cal EPA (1) = California Environmental Protection Agency, Notice of Adoption of Unit Risk Value for Ethylbenzene, November 2007.
Cal EPA (2) = California Environmental Protection Agency, Technical Support Document for Describing Cancer Sloper Factors, September 2009.
ATSDR = Agency for Toxic Substances and Disease Registry, Toxicological Profile for Tetrachloroethylene, September 1997.

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 1 OF 2

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds							
Ethylbenzene	2.5E-06	$(ug/m^3)^{-1}$	8.8E-03	$(mg/kg/day)^{-1}$	NA	Cal EPA (1)	11/2007
Tetrachloroethene	5.9E-06	$(ug/m^3)^{-1}$	2.1E-02	$(mg/kg/day)^{-1}$	NA	ATSDR	9/1997
Trichloroethene	2.0E-06	$(ug/m^3)^{-1}$	7.0E-03	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Semivolatile Organic Compounds							
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Benzo(a)anthracene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Benzo(a)pyrene[2]	1.1E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Benzo(b)fluoranthene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Benzo(g,h,i)perylene	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Benzo(k)fluoranthene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA
Chrysene[2]	1.1E-05	$(ug/m^3)^{-1}$	3.9E-02	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Dibenzo(a,h)anthracene[2]	1.2E-03	$(ug/m^3)^{-1}$	4.2E+00	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Indeno(1,2,3-cd)pyrene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA (2)	9/2009
Naphthalene	3.4E-05	$(ug/m3)^{-1}$	1.2E-01	$(mg/kg/day)^{-1}$	C/ Possible Human Carcinogen	Cal EPA (3)	8/2004
Phenanthrene	NA	NA	NA	NA	NA	NA	4/2009
Pyrene	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Pesticides/PCBs							
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	9.7E-05	$(ug/m3)^{-1}$	3.4E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	7/2009
Aldrin	4.9E-03	$(ug/m3)^{-1}$	1.7E+01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	7/2009
Aroclor-1260	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	9/1996
Inorganics							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	7/2009

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 2 OF 2

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[(1)]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Barium	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Beryllium	2.4E-03	$(ug/m^3)^{-1}$	8.4E+00	$(mg/kg/day)^{-1}$	Carcinogenic potential cannot be determined (Oral route)	IRIS	7/2009
Boron	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.8E-03	$(ug/m^3)^{-1}$	6.3E+00	$(mg/kg/day)^{-1}$	B1 / Probable human carcinogen	IRIS	7/2009
Chromium	1.2E-02	$(ug/m^3)^{-1}$	4.2E+01	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	7/2009
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	3.2E+01	$(mg/kg/day)^{-1}$	NA	PPRTV	8/25/2008
Copper	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	B2 / Probable human carcinogen	IRIS	7/2009
Manganese	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Mercury	NA	NA	NA	NA	C/ Possible Human Carcinogen	IRIS	7/2009
Molybdenum	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	7/2009

Notes:
1 - Inhalation CSF = Unit Risk * 70 kg / $20m^3$/day.
2 - The carcinogenic PAHs are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Definitions:
IRIS = Integrated Risk Information System.
NA = Not Available.
ORNL = Oak Ridge National Laboratory, Regional Screening Levels for Chemical Contaminants at Superfund Sites, April, 2009, Updated May 19, 2009.
USEPA(1) = USEPA, PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September 1996, EPA/600/P-96/001F.

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 1 OF 2

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds										
Ethylbenzene	Chronic	1.0E-01	mg/kg/day	1	1.0E-01	mg/kg/day	Liver, Kidney	1000/1	IRIS	7/2009
Tetrachloroethene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Liver	1000/1	IRIS	7/2009
Trichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds										
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene[3]	Chronic	3.0E-02	mg/kg/day	1	3.0E-02	mg/kg/day	Kidney	3000/1	IRIS	7/2009
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Liver	1000/1	IRIS	7/2009
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Body Weight	3000/1	IRIS	7/2009
Phenanthrene[3]	Chronic	3.0E-02	mg/kg/day	1	3.0E-02	mg/kg/day	Kidney	3000/1	IRIS	7/2009
Pyrene	Chronic	3.0E-02	mg/kg/day	1	3.0E-02	mg/kg/day	Kidney	3000/1	IRIS	7/2009
Pesticides/PCBs										
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	Chronic	5.0E-04	mg/kg/day	1	5.0E-04	mg/kg/day	Liver	100/1	IRIS	7/2009
Aldrin	Chronic	3.0E-05	mg/kg/day	1	3.0E-05	mg/kg/day	Liver	1000/1	IRIS	7/2009
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics										
Aluminum	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	CNS	100	PPRTV	10/23/2006
Antimony	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	NA	HEAST	7/1997
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, CVS	3/1	IRIS	7/2009
Barium	Chronic	2.0E-01	mg/kg/day	0.07	1.4E-02	mg/kg/day	Kidney	300/1	IRIS	7/2009
Beryllium	Chronic	2.0E-03	mg/kg/day	0.007	1.4E-05	mg/kg/day	GS	300/1	IRIS	7/2009
Boron	Chronic	2.0E-01	mg/kg/day	1	2.0E-01	mg/kg/day	Developmental	66/1	IRIS	7/2009
Cadmium[4]	Chronic	5.0E-04	mg/kg/day	0.05	2.5E-05	mg/kg/day	Kidney	10/1	IRIS	7/2009
Chromium[5]	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	Fetotoxicity, GS, Bone	300/3	IRIS	7/2009
Cobalt	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Blood	NA	PPRTV	8/25/2008
Copper	Chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	GS	NA	HEAST	7/1997
Iron	Chronic	7.0E-01	mg/kg/day	1	7.0E-01	mg/kg/day	GS	1.5	PPRTV	9/11/2006
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (soil)[6]	Chronic	7.0E-02	mg/kg/day	0.04	2.8E-03	mg/kg/day	CNS	1/1	IRIS	7/2009
Manganese (water)[6]	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	CNS	1/3	IRIS	7/2009
Mercury[7]	Chronic	3.0E-04	mg/kg/day	0.07	2.1E-05	mg/kg/day	Autoimmune	1000/1	IRIS	7/2009
Molybdenum	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	Gout	30/1	IRIS	7/2009
Nickel	Chronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	300/1	IRIS	7/2009
Selenium	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	Hair Loss, Neurological, Skin	3/1	IRIS	7/2009
Thallium	Chronic	6.5E-05	mg/kg/day	1	6.5E-05	mg/kg/day	Liver	3000/1	IRIS	7/2009
Vanadium	Chronic	5.0E-03	mg/kg/day	0.026	1.3E-04	mg/kg/day	Kidney	300	IRIS	7/2009
Zinc	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Blood	3/1	IRIS	7/2009

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Notes:
1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.
3 - Values are for pyrene.
4 - Values are for cadmium - water.
5 - Values are for hexavalent chromium.
6 - Adjusted IRIS value in accordance with USEPA Region I Risk Update Number 4, November 1996.
7 - Values are for mercuric chloride.

Definitions:
CNS = Central Nervous System
CVS = Cardiovascular system
GS = Gastrointestinal
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
NA = Not Available.
ORNL = Oak Ridge National Laboratory, Regional Screening Levels for Chemical Contaminants at Superfund Sites, April, 2009, Updated May 19, 2009.
PPRTV = Provisional Peer Reviewed Toxicity Vale

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 1 OF 2

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Compounds									
Ethylbenzene	Chronic	1.0E+00	mg/m3	2.9E-01	(mg/kg/day)	Developmental	300/1	IRIS	7/2009
Tetrachloroethene	Chronic	2.7E-01	mg/m3	7.7E-02	(mg/kg/day)	Liver	NA	ASTOR	9/1997
Trichloroethene	Chronic	1.0E-02	mg/m3	2.9E-03	(mg/kg/day)	CNS	NA	NYSDOH	10/2006
Vinyl Chloride	Chronic	1.0E-01	mg/m3	2.9E-02	(mg/kg/day)	Liver	30/1	IRIS	7/2009
Semivolatile Organic Compounds									
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene[3]	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	3.0E-03	mg/m^3	8.6E-04	(mg/kg/day)	Respiratory	3000/1	IRIS	7/2009
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs									
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics									
Aluminum	Chronic	5.0E-03	mg/m3	1.4E-03	(mg/kg/day)	CNS	300	PPRTV	10/23/2006
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	Chronic	3.00E-05	mg/m3	8.6E-06	(mg/kg/day)	NA	NA	Cal EPA	9/2009
Barium	Chronic	5.0E-04	mg/m3	1.4E-04	(mg/kg/day)	Fetotoxicity	1000/1	HEAST	9/97
Beryllium	Chronic	2.0E-05	mg/m3	5.7E-06	(mg/kg/day)	Respiratory	10/1	IRIS	7/2009
Boron	Chronic	2.0E-02	mg/m3	5.7E-03	(mg/kg/day)	NA	NA	HEAST	9/97
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Chronic	1.0E-04	mg/m^3	2.9E-05	(mg/kg/day)	Respiratory	300/1	IRIS	7/2009

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 2 OF 2

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Cobalt	Chronic	6.0E-06	mg/m^3	1.7E-06	(mg/kg/day)	Respiratory	NA	PPRTV	8/25/2008
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Chronic	5.0E-05	mg/m^3	1.4E-05	(mg/kg/day)	CNS	1000/1	IRIS	7/2009
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg

Definitions:

CNS = Central Nervous System

HEAST= Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

NA = Not Applicable

NYSDOH = Final Report, Trichloroethene Air Criteria Document, New York State Department of Health, October, 2006.

ORNL = Oak Ridge National Laboratory, Regional Screening Levels for Chemical Contaminants at Superfund Sites, April, 2009, Updated May 19, 2009.

TABLE 8.1 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Surface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	8.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-07
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	8.9E-09	mg/kg-day	2.4E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	6.6E-09	mg/kg-day	3.4E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-09
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	4.9E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.7E-09
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M	2.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	3.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.5E-07
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M	2.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M	1.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	7.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M	1.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M	1.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M	1.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M	1.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.2E-06**
Dermal	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	3.5E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-07
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	8.0E-10	mg/kg-day	2.4E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-10
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	6.0E-10	mg/kg-day	3.4E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-10
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	2.0E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-09
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	3.3E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-08
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	2.2E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.1E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.5E-06**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13	Arsenic - 0.03
PCBs - 0.14	Cadmium - 0.001
4,4'-DDT - 0.03	Other Metals and Volatiles - not evaluated for dermal contact with soil.

8.2. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FOR CONSTRUCTION WORKERS - SURFACE SOIL/SEDIMENT
NEW LONDON NSB
GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Soil/Sediment
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Unit Risk	Cancer Unit Risk Units	Cancer Risk
Inhalation	BARIUM	1.3E+02	mg/kg	9.46E-05	mg/m^3	R	1.5E-07	mg/m^3		$(mg/m^3)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	4.08E-05	mg/m^3	R	6.4E-08	mg/m^3	8.40E+01	$(mg/m^3)^{-1}$	5.4E-06
	MANGANESE	5.1E+02	mg/kg	3.71E-04	mg/m^3	R	5.8E-07	mg/m^3		$(mg/m^3)^{-1}$	
	(total)										5.4E-06
										Total Risk Across All Exposure Routes/Pathways	**5.4E-06**

TABLE 8.3 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OLDER CHILD TRESPASSERS TO SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Surface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Older Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	1.3E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.6E-06
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	4.4E-08	mg/kg-day	2.4E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	3.3E-08	mg/kg-day	3.4E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	2.4E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.8E-08
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M	1.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	1.8E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.7E-06
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M	1.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M	9.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	3.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M	6.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M	5.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M	5.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M	8.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.2E-05
Dermal	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	1.4E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-05
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	1.1E-08	mg/kg-day	2.4E-01	$(mg/kg\text{-}day)^{-1}$	2.5E-09
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	8.0E-09	mg/kg-day	3.4E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-09
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	2.7E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.4E-08
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	4.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.6E-07
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	2.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.1E-05
										Total Risk Across All Exposure Routes/Pathways	2.3E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13	Arsenic - 0.03
PCBs - 0.14	Cadmium - 0.001
4,4'-DDT - 0.03	Other Metals and Volatiles - not evaluated for dermal contact with soil.

TABLE 8.4 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SUBSURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Suburface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BAP EQUIVALENT (1/2 DL)	5.0E-01	mg/kg	5.00E-01	mg/kg	M	1.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.1E-08
	ARSENIC	9.7E+00	mg/kg	9.70E+00	mg/kg	M	2.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-07
	CADMIUM	6.9E+00	mg/kg	6.90E+00	mg/kg	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	6.0E+01	mg/kg	5.95E+01	mg/kg	M	1.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	3.1E+02	mg/kg	3.05E+02	mg/kg	M	6.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	8.1E-01	mg/kg	8.10E-01	mg/kg	M	1.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	5.3E+01	mg/kg	5.25E+01	mg/kg	M	1.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.0E-07**
Dermal	BAP EQUIVALENT (1/2 DL)	5.0E-01	mg/kg	5.00E-01	mg/kg	M	4.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-08
	ARSENIC	9.7E+00	mg/kg	9.70E+00	mg/kg	M	1.9E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-08
	CADMIUM	6.9E+00	mg/kg	6.90E+00	mg/kg	M	4.6E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	6.0E+01	mg/kg	5.95E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	3.1E+02	mg/kg	3.05E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	8.1E-01	mg/kg	8.10E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	5.3E+01	mg/kg	5.25E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.1E-08**
										Total Risk Across All Exposure Routes/Pathways	**4.6E-07**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
PCBs - 0.14
4,4'-DDT - 0.03
4,4'-DDD - 0.1
Arsenic - 0.03
Cadmium - 0.001
Other Metals and Volatiles - not evaluated for dermal contact with soil.

8.5. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FOR CONSTRUCTION WORKERS - SUBSURFACE SOIL/SEDIMENT
NEW LONDON NSB
GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Subsurface Soil/Sediment
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Unit Risk	Cancer Unit Risk Units	Cancer Risk
Inhalation	CHROMIUM	6.0E+01	mg/kg	4.33E-05	mg/m^3	R	6.8E-08	mg/m^3	8.40E+01	$(mg/m^3)^{-1}$	5.7E-06
	MANGANESE	3.1E+02	mg/kg	2.22E-04	mg/m^3	R	3.5E-07	mg/m^3		$(mg/m^3)^{-1}$	
	(total)										5.7E-06
										Total Risk Across All Exposure Routes/Pathways	**5.7E-06**

TABLE 8.6 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO GROUNDWATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	TETRACHLOROETHENE	1.40E-03	mg/L	1.40E-03	mg/L	M	1.4E-08	mg/kg-day	5.40E-01	$(mg/kg-day)^{-1}$	7.7E-09
	2-METHYLNAPHTHALENE	1.80E-01	mg/L	1.80E-01	mg/L	M	4.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	3&4-METHYLPHENOL	6.57E-02	mg/L	6.57E-02	mg/L	M	3.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	BAP EQUIVALENT	1.10E-02	mg/L	1.10E-02	mg/L	M	3.9E-06	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	
	NAPHTHALENE	2.90E-02	mg/L	2.90E-02	mg/L	M	3.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	PYRENE	4.00E-01	mg/L	4.00E-01	mg/L	M	2.8E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	BIS(2-ETHYLHEXYL)PHTHALATE	4.00E-02	mg/L	4.00E-02	mg/L	M	1.0E-06	mg/kg-day	1.40E-02	$(mg/kg-day)^{-1}$	1.4E-08
	4,4'-DDD	5.20E-02	mg/L	5.20E-02	mg/L	M	5.9E-06	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	1.4E-06
	ANTIMONY	5.00E-03	mg/L	5.00E-03	mg/L	M	1.1E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	ARSENIC	1.09E-01	mg/L	1.09E-01	mg/L	M	2.4E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	3.6E-08
	BARIUM	9.20E-01	mg/L	9.20E-01	mg/L	M	2.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	BERYLLIUM	2.37E-02	mg/L	2.37E-02	mg/L	M	5.2E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	BORON	3.26E+00	mg/L	3.26E+00	mg/L	M	7.2E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	CADMIUM	1.09E-02	mg/L	1.09E-02	mg/L	M	2.4E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	CHROMIUM	5.00E-02	mg/L	5.00E-02	mg/L	M	2.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	MANGANESE	9.27E+00	mg/L	9.27E+00	mg/L	M	2.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	MERCURY	1.50E-03	mg/L	1.50E-03	mg/L	M	3.3E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	MOLYBDENUM	5.00E-02	mg/L	5.00E-02	mg/L	M	1.1E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	SELENIUM	1.55E-01	mg/L	1.55E-01	mg/L	M	3.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	THALLIUM	2.24E-02	mg/L	2.24E-02	mg/L	M	5.0E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	VANADIUM	3.69E-01	mg/L	3.69E-01	mg/L	M	8.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										1.5E-06
										Total Risk Across All Exposure Routes/Pathways	1.5E-06

8.7. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FOR CONSTRUCTION WORKERS - INHALATION OF VAPORS FROM GROUNDWATER IN A TRENCH
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Unit Risk	Cancer Unit Risk Units	Cancer Risk
Inhalation	TETRACHLOROTHENE	1.4E+00	ug/L	5.03E-02	ug/m^3	R	9.8E-06	ug/m^3	5.90E-06	$(ug/m^3)^{-1}$	5.8E-11
	2-METHYLNAPHTHALENE	1.8E+02	ug/L	6.32E+00	ug/m^3	R	1.2E-03	ug/m^3		$(ug/m^3)^{-1}$	
	3&4 METHYLPHENOL	6.6E+01	ug/L	3.94E-02	ug/m^3	R	7.7E-06	ug/m^3		$(ug/m^3)^{-1}$	
	NAPHTHALENE	2.9E+01	ug/L	1.06E+00	ug/m^3	R	2.1E-04	ug/m^3	3.40E-05	$(ug/m^3)^{-1}$	7.1E-09
	(total)										7.1E-09
										Total Risk Across All Exposure Routes/Pathways	**7.1E-09**

TABLE 8.8 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	1.4E-08	mg/kg-day	1.10E-02	$(mg/kg-day)^{-1}$	1.6E-10
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	8.2E-08	mg/kg-day	5.40E-01	$(mg/kg-day)^{-1}$	4.4E-08
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	2.8E-07	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	2.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	3.0E-07	mg/kg-day	1.40E-02	$(mg/kg-day)^{-1}$	4.2E-09
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	1.4E-08	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	3.3E-09
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	6.7E-08	mg/kg-day	3.40E-01	$(mg/kg-day)^{-1}$	2.3E-08
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	5.9E-11	mg/kg-day	1.70E+01	$(mg/kg-day)^{-1}$	1.0E-09
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	1.2E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	8.7E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.3E-08
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	7.1E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	2.8E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	7.8E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	6.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	2.8E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	1.1E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	1.3E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	1.9E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										8.9E-08
										Total Risk Across All Exposure Routes/Pathways	**8.9E-08**

TABLE 8.9 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OLDER CHILD TRESPASSERS TO SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Older Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	1.3E-08	mg/kg-day	1.10E-02	$(mg/kg\text{-}day)^{-1}$	1.4E-10
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	8.7E-08	mg/kg-day	5.40E-01	$(mg/kg\text{-}day)^{-1}$	4.7E-08
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	2.6E-08	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	2.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	1.3E-07	mg/kg-day	1.40E-02	$(mg/kg\text{-}day)^{-1}$	1.8E-09
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	1.3E-09	mg/kg-day	2.40E-01	$(mg/kg\text{-}day)^{-1}$	3.1E-10
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	3.9E-09	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-09
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	4.4E-10	mg/kg-day	1.70E+01	$(mg/kg\text{-}day)^{-1}$	7.4E-09
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	5.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	4.3E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	6.4E-07
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	3.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	1.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	1.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	3.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	6.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	5.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	6.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	1.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										8.9E-07
Dermal	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	2.8E-07	mg/kg-day	1.10E-02	$(mg/kg\text{-}day)^{-1}$	3.1E-09
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	1.6E-06	mg/kg-day	5.40E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-07
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	1.7E-05	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	4.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	6.0E-06	mg/kg-day	1.40E-02	$(mg/kg\text{-}day)^{-1}$	8.4E-08
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	2.7E-07	mg/kg-day	2.40E-01	$(mg/kg\text{-}day)^{-1}$	6.5E-08
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	1.3E-06	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-07
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	1.2E-09	mg/kg-day	1.70E+01	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	2.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	1.7E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-07
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	1.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	5.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	1.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	5.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	2.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	2.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	3.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.8E-06
										Total Risk Across All Exposure Routes/Pathways	2.7E-06

TABLE 8.1 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Surface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	3.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-07
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	3.0E-09	mg/kg-day	2.4E-01	$(mg/kg\text{-}day)^{-1}$	7.1E-10
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	2.2E-09	mg/kg-day	3.4E-01	$(mg/kg\text{-}day)^{-1}$	7.5E-10
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	1.6E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-09
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M	8.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	1.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M	9.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M	6.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	2.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M	4.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M	3.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M	3.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M	5.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										4.0E-07
Dermal	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	7.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.6E-08
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	1.8E-10	mg/kg-day	2.4E-01	$(mg/kg\text{-}day)^{-1}$	4.3E-11
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	1.3E-10	mg/kg-day	3.4E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-11
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	4.5E-10	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.1E-10
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	7.3E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	4.9E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										6.8E-08
										Total Risk Across All Exposure Routes/Pathways	4.7E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13	Arsenic - 0.03
PCBs - 0.14	Cadmium - 0.001
4,4'-DDT - 0.03	Other Metals and Volatiles - not evaluated for dermal contact with soil.

8.2. CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FOR CONSTRUCTION WORKERS - SURFACE SOIL/SEDIMENT
NEW LONDON NSB
GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Soil/Sediment
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Unit Risk	Cancer Unit Risk Units	Cancer Risk
Inhalation	BARIUM	1.3E+02	mg/kg	9.46E-05	mg/m^3	R	9.9E-08	mg/m^3		$(mg/m^3)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	4.08E-05	mg/m^3	R	4.3E-08	mg/m^3	8.40E+01	$(mg/m^3)^{-1}$	3.6E-06
	MANGANESE	5.1E+02	mg/kg	3.71E-04	mg/m^3	R	3.9E-07	mg/m^3		$(mg/m^3)^{-1}$	
	(total)										3.6E-06
										Total Risk Across All Exposure Routes/Pathways	**3.6E-06**

TABLE 8.3 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OLDER CHILD TRESPASSERS TO SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Surface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Older Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	2.8E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-07
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	2.8E-09	mg/kg-day	2.4E-01	$(mg/kg\text{-}day)^{-1}$	6.8E-10
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	2.1E-09	mg/kg-day	3.4E-01	$(mg/kg\text{-}day)^{-1}$	7.2E-10
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	1.6E-09	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-09
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M	7.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	1.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M	9.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M	6.0E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	2.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M	4.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M	3.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M	3.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M	5.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										3.9E-07
Dermal	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	1.2E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.7E-08
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	2.8E-10	mg/kg-day	2.4E-01	$(mg/kg\text{-}day)^{-1}$	6.6E-11
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	2.1E-10	mg/kg-day	3.4E-01	$(mg/kg\text{-}day)^{-1}$	7.0E-11
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	7.1E-10	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	1.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	7.6E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.1E-07
										Total Risk Across All Exposure Routes/Pathways	4.9E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
PCBs - 0.14
4,4'-DDT - 0.03
Arsenic - 0.03
Cadmium - 0.001
Other Metals and Volatiles - not evaluated for dermal contact with soil.

TABLE 8.4 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SUBSURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Suburface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BAP EQUIVALENT (1/2 DL)	5.0E-01	mg/kg	5.00E-01	mg/kg	M	3.7E-09	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	2.7E-08
	ARSENIC	9.7E+00	mg/kg	9.70E+00	mg/kg	M	7.2E-08	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	1.1E-07
	CADMIUM	6.9E+00	mg/kg	6.90E+00	mg/kg	M	5.1E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	CHROMIUM	6.0E+01	mg/kg	5.95E+01	mg/kg	M	4.4E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	MANGANESE	3.1E+02	mg/kg	3.05E+02	mg/kg	M	2.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	THALLIUM	8.1E-01	mg/kg	8.10E-01	mg/kg	M	6.0E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	VANADIUM	5.3E+01	mg/kg	5.25E+01	mg/kg	M	3.9E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										1.3E-07
Dermal	BAP EQUIVALENT (1/2 DL)	5.0E-01	mg/kg	5.00E-01	mg/kg	M	9.6E-10	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	7.0E-09
	ARSENIC	9.7E+00	mg/kg	9.70E+00	mg/kg	M	4.3E-09	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	6.4E-09
	CADMIUM	6.9E+00	mg/kg	6.90E+00	mg/kg	M	1.0E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	CHROMIUM	6.0E+01	mg/kg	5.95E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	MANGANESE	3.1E+02	mg/kg	3.05E+02	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	THALLIUM	8.1E-01	mg/kg	8.10E-01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	VANADIUM	5.3E+01	mg/kg	5.25E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										1.3E-08
										Total Risk Across All Exposure Routes/Pathways	1.5E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
PCBs - 0.14
4,4'-DDT - 0.03
4,4'-DDD - 0.1
Arsenic - 0.03
Cadmium - 0.001
Other Metals and Volatiles - not evaluated for dermal contact with soil.

8.5. CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FOR CONSTRUCTION WORKERS - SUBSURFACE SOIL/SEDIMENT
NEW LONDON NSB
GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Subsurface Soil/Sediment
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Unit Risk	Cancer Unit Risk Units	Cancer Risk
Inhalation	CHROMIUM	6.0E+01	mg/kg	4.33E-05	mg/m^3	R	4.5E-08	mg/m^3	8.40E+01	$(mg/m^3)^{-1}$	3.8E-06
	MANGANESE	3.1E+02	mg/kg	2.22E-04	mg/m^3	R	2.3E-07	mg/m^3		$(mg/m^3)^{-1}$	
	(total)										3.8E-06
										Total Risk Across All Exposure Routes/Pathways	**3.8E-06**

TABLE 8.6 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO GROUNDWATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	TETRACHLOROETHENE	1.00E-03	mg/L	1.00E-03	mg/L	M	3.4E-09	mg/kg-day	5.40E-01	$(mg/kg-day)^{-1}$	1.9E-09
	2-METHYLNAPHTHALENE	2.00E-03	mg/L	2.00E-03	mg/L	M	1.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	3&4-METHYLPHENOL	4.00E-03	mg/L	4.00E-03	mg/L	M	5.6E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	BAP EQUIVALENT	5.71E-04	mg/L	5.71E-04	mg/L	M	7.1E-08	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	
	NAPHTHALENE	9.00E-04	mg/L	9.00E-04	mg/L	M	3.5E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	PYRENE	2.00E-03	mg/L	2.00E-03	mg/L	M	5.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	BIS(2-ETHYLHEXYL)PHTHALATE	4.00E-03	mg/L	4.00E-03	mg/L	M	3.5E-08	mg/kg-day	1.40E-02	$(mg/kg-day)^{-1}$	4.9E-10
	4,4'-DDD	9.00E-04	mg/L	9.00E-04	mg/L	M	3.6E-08	mg/kg-day	2.40E-01	$(mg/kg-day)^{-1}$	8.6E-09
	ANTIMONY	4.60E-03	mg/L	4.60E-03	mg/L	M	2.5E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	ARSENIC	1.10E-02	mg/L	1.10E-02	mg/L	M	6.1E-10	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	9.1E-10
	BARIUM	1.00E-01	mg/L	1.00E-01	mg/L	M	5.5E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	BERYLLIUM	1.10E-03	mg/L	1.10E-03	mg/L	M	6.1E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	BORON	5.70E-01	mg/L	5.70E-01	mg/L	M	3.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	CADMIUM	1.40E-03	mg/L	1.40E-03	mg/L	M	7.7E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	CHROMIUM	6.30E-03	mg/L	6.30E-03	mg/L	M	7.0E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	MANGANESE	9.00E-01	mg/L	9.00E-01	mg/L	M	5.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	MERCURY	8.60E-05	mg/L	8.60E-05	mg/L	M	4.8E-12	mg/kg-day		$(mg/kg-day)^{-1}$	
	MOLYBDENUM	5.50E-03	mg/L	5.50E-03	mg/L	M	3.0E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	SELENIUM	1.10E-02	mg/L	1.10E-02	mg/L	M	6.1E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	THALLIUM	3.80E-03	mg/L	3.80E-03	mg/L	M	2.1E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	VANADIUM	7.60E-03	mg/L	7.60E-03	mg/L	M	4.2E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										1.2E-08
										Total Risk Across All Exposure Routes/Pathways	**1.2E-08**

8.7. CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FOR CONSTRUCTION WORKERS - INHALATION OF VAPORS FROM GROUNDWATER IN A TRENCH
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Unit Risk	Cancer Unit Risk Units	Cancer Risk
Inhalation	TETRACHLOROTHENE	1.4E+00	ug/L	5.03E-02	ug/m^3	R	2.5E-06	ug/m^3	5.90E-06	$(ug/m^3)^{-1}$	1.5E-11
	2-METHYLNAPHTHALENE	1.8E+02	ug/L	6.32E+00	ug/m^3	R	3.1E-04	ug/m^3		$(ug/m^3)^{-1}$	
	3&4 METHYLPHENOL	6.6E+01	ug/L	3.94E-02	ug/m^3	R	1.9E-06	ug/m^3		$(ug/m^3)^{-1}$	
	NAPHTHALENE	2.9E+01	ug/L	1.06E+00	ug/m^3	R	5.2E-05	ug/m^3	3.40E-05	$(ug/m^3)^{-1}$	1.8E-09
	(total)										1.8E-09
										Total Risk Across All Exposure Routes/Pathways	**1.8E-09**

TABLE 8.8 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	5.8E-09	mg/kg-day	1.10E-02	$(mg/kg\text{-}day)^{-1}$	6.4E-11
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	3.7E-08	mg/kg-day	5.40E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	1.3E-07	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	1.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	1.4E-07	mg/kg-day	1.40E-02	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	6.4E-09	mg/kg-day	2.40E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-09
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	3.2E-08	mg/kg-day	3.40E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	2.8E-11	mg/kg-day	1.70E+01	$(mg/kg\text{-}day)^{-1}$	4.7E-10
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	3.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	2.9E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	4.3E-09
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	2.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	9.4E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	2.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	2.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	9.3E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	3.5E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	4.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	6.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										3.9E-08
										Total Risk Across All Exposure Routes/Pathways	**3.9E-08**

TABLE 8.9 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OLDER CHILD TRESPASSERS TO SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Older Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	8.5E-10	mg/kg-day	1.10E-02	(mg/kg-day)$^{-1}$	9.4E-12
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	5.7E-09	mg/kg-day	5.40E-01	(mg/kg-day)$^{-1}$	3.1E-09
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	5.7E-10	mg/kg-day	7.30E+00	(mg/kg-day)$^{-1}$	4.1E-09
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	1.4E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	8.5E-09	mg/kg-day	1.40E-02	(mg/kg-day)$^{-1}$	1.2E-10
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	8.5E-11	mg/kg-day	2.40E-01	(mg/kg-day)$^{-1}$	2.0E-11
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	2.6E-10	mg/kg-day	3.40E-01	(mg/kg-day)$^{-1}$	8.7E-11
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	2.8E-11	mg/kg-day	1.70E+01	(mg/kg-day)$^{-1}$	4.8E-10
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	3.7E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	2.8E-08	mg/kg-day	1.50E+00	(mg/kg-day)$^{-1}$	4.2E-08
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	2.3E-07	mg/kg-day		(mg/kg-day)$^{-1}$	
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	9.1E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	1.2E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	2.0E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	4.5E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	3.4E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	4.3E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	1.0E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	(total)										5.0E-08
Dermal	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	2.3E-08	mg/kg-day	1.10E-02	(mg/kg-day)$^{-1}$	2.5E-10
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	1.4E-07	mg/kg-day	5.40E-01	(mg/kg-day)$^{-1}$	7.7E-08
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	5.2E-07	mg/kg-day	7.30E+00	(mg/kg-day)$^{-1}$	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	4.0E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	5.5E-07	mg/kg-day	1.40E-02	(mg/kg-day)$^{-1}$	7.7E-09
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	2.5E-08	mg/kg-day	2.40E-01	(mg/kg-day)$^{-1}$	6.0E-09
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	1.2E-07	mg/kg-day	3.40E-01	(mg/kg-day)$^{-1}$	4.2E-08
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	1.1E-10	mg/kg-day	1.70E+01	(mg/kg-day)$^{-1}$	1.8E-09
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	1.5E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	1.1E-08	mg/kg-day	1.50E+00	(mg/kg-day)$^{-1}$	1.7E-08
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	9.2E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	3.7E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	1.0E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	8.2E-07	mg/kg-day		(mg/kg-day)$^{-1}$	
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	3.6E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	1.4E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	1.7E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	2.4E-07	mg/kg-day		(mg/kg-day)$^{-1}$	
	(total)										1.5E-07
										Total Risk Across All Exposure Routes/Pathways	2.0E-07

TABLE 7.1 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Surface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	6.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	6.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	4.6E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	9.3E-04
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	3.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M	1.7E-06	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	4.3E-03
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	2.6E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.5E-02
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M	2.0E-04	mg/kg-day	2.0E-01	mg/kg-day	NA	NA	1.0E-03
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M	1.3E-06	mg/kg-day	2.0E-03	mg/kg-day	NA	NA	6.5E-04
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	5.1E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.0E-02
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M	8.7E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.9E-02
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M	7.9E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.1E-02
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M	7.6E-07	mg/kg-day	6.5E-05	mg/kg-day	NA	NA	1.2E-02
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M	1.2E-04	mg/kg-day	5.0E-03	mg/kg-day	NA	NA	2.4E-02
	(total)												1.8E-01
Dermal	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	2.4E-06	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	5.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	4.2E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	8.4E-05
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	1.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	2.3E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	7.7E-03
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M		mg/kg-day	1.4E-02	mg/kg-day	NA	NA	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M		mg/kg-day	1.4E-05	mg/kg-day	NA	NA	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	1.5E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	6.1E-04
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M		mg/kg-day	7.5E-05	mg/kg-day	NA	NA	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M		mg/kg-day	6.5E-05	mg/kg-day	NA	NA	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M		mg/kg-day	5.0E-03	mg/kg-day	NA	NA	
	(total)												8.4E-03
												Total Hazard Index Across All Exposure Routes/Pathways	1.9E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13	Arsenic - 0.03
PCBs - 0.14	Cadmium - 0.001
4,4'-DDT - 0.03	Other Metals and Volatiles - not evaluated for dermal contact with soil.

TABLE 7.2. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FOR CONSTRUCTION WORKERS - SURFACE SOIL/SEDIMENT
NEW LONDON NSB
GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Soil/Sediment
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	BARIUM	1.3E+02	mg/kg	9.46E-05	mg/m^3	R	1.0E-05	mg/m^3	5.00E-04	mg/m^3	2.1E-02
	CHROMIUM	5.6E+01	mg/kg	4.08E-05	mg/m^3	R	4.5E-06	mg/m^3	1.00E-04	mg/m^3	4.5E-02
	MANGANESE	5.1E+02	mg/kg	3.71E-04	mg/m^3	R	4.1E-05	mg/m^3	5.00E-05	mg/m^3	8.1E-01
	(total)										8.8E-01
										Total Hazard Index Across All Exposure Routes/Pathways	**8.8E-01**

TABLE 7.3 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OLDER CHILD TRESPASSERS TO SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Surface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Older Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	3.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	3.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	2.3E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.6E-04
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	1.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M	8.4E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	2.1E-03
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	1.3E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.2E-02
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M	9.9E-05	mg/kg-day	2.0E-01	mg/kg-day	NA	NA	5.0E-04
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M	6.4E-07	mg/kg-day	2.0E-03	mg/kg-day	NA	NA	3.2E-04
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	2.5E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	5.0E-03
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M	4.3E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.4E-02
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M	3.9E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.6E-03
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M	3.7E-07	mg/kg-day	6.5E-05	mg/kg-day	NA	NA	5.8E-03
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M	5.9E-05	mg/kg-day	5.0E-03	mg/kg-day	NA	NA	1.2E-02
	(total)												8.8E-02
Dermal	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	3.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	7.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	5.6E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.1E-04
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	1.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	3.1E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.0E-02
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M		mg/kg-day	1.4E-02	mg/kg-day	NA	NA	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M		mg/kg-day	1.4E-05	mg/kg-day	NA	NA	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	2.0E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	8.2E-04
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M		mg/kg-day	7.5E-05	mg/kg-day	NA	NA	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M		mg/kg-day	6.5E-05	mg/kg-day	NA	NA	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M		mg/kg-day	5.0E-03	mg/kg-day	NA	NA	
	(total)												1.1E-02
												Total Hazard Index Across All Exposure Routes/Pathways	9.9E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13	Arsenic - 0.03
PCBs - 0.14	Cadmium - 0.001
4,4'-DDT - 0.03	Other Metals and Volatiles - not evaluated for dermal contact with soil.

TABLE 7.4 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SUBSURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Suburface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BAP EQUIVALENT (1/2 DL)	5.0E-01	mg/kg	5.00E-01	mg/kg	M	7.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	ARSENIC	9.7E+00	mg/kg	9.70E+00	mg/kg	M	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.0E-02
	CADMIUM	6.9E+00	mg/kg	6.90E+00	mg/kg	M	1.1E-05	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.1E-02
	CHROMIUM	6.0E+01	mg/kg	5.95E+01	mg/kg	M	9.2E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.1E-02
	MANGANESE	3.1E+02	mg/kg	3.05E+02	mg/kg	M	4.7E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	6.8E-03
	THALLIUM	8.1E-01	mg/kg	8.10E-01	mg/kg	M	1.3E-06	mg/kg-day	6.5E-05	mg/kg-day	NA	NA	1.9E-02
	VANADIUM	5.3E+01	mg/kg	5.25E+01	mg/kg	M	8.1E-05	mg/kg-day	5.0E-03	mg/kg-day	NA	NA	1.6E-02
	(total)												**1.4E-01**
Dermal	BAP EQUIVALENT (1/2 DL)	5.0E-01	mg/kg	5.00E-01	mg/kg	M	3.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	ARSENIC	9.7E+00	mg/kg	9.70E+00	mg/kg	M	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.5E-03
	CADMIUM	6.9E+00	mg/kg	6.90E+00	mg/kg	M	3.2E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	1.3E-03
	CHROMIUM	6.0E+01	mg/kg	5.95E+01	mg/kg	M		mg/kg-day	7.5E-05	mg/kg-day	NA	NA	
	MANGANESE	3.1E+02	mg/kg	3.05E+02	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	THALLIUM	8.1E-01	mg/kg	8.10E-01	mg/kg	M		mg/kg-day	6.5E-05	mg/kg-day	NA	NA	
	VANADIUM	5.3E+01	mg/kg	5.25E+01	mg/kg	M		mg/kg-day	5.0E-03	mg/kg-day	NA	NA	
	(total)												**5.8E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.5E-01**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
PCBs - 0.14
4,4'-DDT - 0.03
4,4'-DDD - 0.1
Arsenic - 0.03
Cadmium - 0.001
Other Metals and Volatiles - not evaluated for dermal contact with soil.

TABLE 7.5. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FOR CONSTRUCTION WORKERS - SUBSURFACE SOIL/SEDIMENT
NEW LONDON NSB
GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Subsurface Soil/Sediment
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	CHROMIUM	6.0E+01	mg/kg	4.33E-05	mg/m^3	R	4.7E-06	mg/m^3	1.00E-04	mg/m^3	4.7E-02
	MANGANESE	3.1E+02	mg/kg	2.22E-04	mg/m^3	R	2.4E-05	mg/m^3	5.00E-05	mg/m^3	4.9E-01
	(total)										5.3E-01
										Total Hazard Index Across All Exposure Routes/Pathways	**5.3E-01**

TABLE 7.6 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO GROUNDWATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	TETRACHLOROETHENE	1.40E-03	mg/L	1.40E-03	mg/L	M	1.0E-06	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	1.0E-04
	2-METHYLNAPHTHALENE	1.80E-01	mg/L	1.80E-01	mg/L	M	2.9E-04	mg/kg-day	4.00E-03	mg/kg-day	NA	NA	7.2E-02
	3&4-METHYLPHENOL	6.57E-02	mg/L	6.57E-02	mg/L	M	2.2E-05	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	4.4E-03
	BAP EQUIVALENT	1.10E-02	mg/L	1.10E-02	mg/L	M	2.7E-04	mg/kg-day		mg/kg-day	NA	NA	
	NAPHTHALENE	2.90E-02	mg/L	2.90E-02	mg/L	M	2.4E-05	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.2E-03
	PYRENE	4.00E-01	mg/L	4.00E-01	mg/L	M	2.0E-03	mg/kg-day	3.00E-02	mg/kg-day	NA	NA	6.6E-02
	BIS(2-ETHYLHEXYL)PHTHALATE	4.00E-02	mg/L	4.00E-02	mg/L	M	7.0E-05	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	3.5E-03
	4,4'-DDD	5.20E-02	mg/L	5.20E-02	mg/L	M	4.1E-04	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	5.00E-03	mg/L	5.00E-03	mg/L	M	7.7E-08	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	1.3E-03
	ARSENIC	1.09E-01	mg/L	1.09E-01	mg/L	M	1.7E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	5.6E-03
	BARIUM	9.20E-01	mg/L	9.20E-01	mg/L	M	1.4E-05	mg/kg-day	1.40E-02	mg/kg-day	NA	NA	1.0E-03
	BERYLLIUM	2.37E-02	mg/L	2.37E-02	mg/L	M	3.7E-07	mg/kg-day	2.80E-06	mg/kg-day	NA	NA	1.3E-01
	BORON	3.26E+00	mg/L	3.26E+00	mg/L	M	5.1E-05	mg/kg-day	2.00E-01	mg/kg-day	NA	NA	2.5E-04
	CADMIUM	1.09E-02	mg/L	1.09E-02	mg/L	M	1.7E-07	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	6.8E-03
	CHROMIUM	5.00E-02	mg/L	5.00E-02	mg/L	M	1.5E-06	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	2.1E-02
	MANGANESE	9.27E+00	mg/L	9.27E+00	mg/L	M	1.4E-04	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	1.5E-01
	MERCURY	1.50E-03	mg/L	1.50E-03	mg/L	M	2.3E-08	mg/kg-day	2.10E-05	mg/kg-day	NA	NA	1.1E-03
	MOLYBDENUM	5.00E-02	mg/L	5.00E-02	mg/L	M	7.7E-07	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	1.5E-04
	SELENIUM	1.55E-01	mg/L	1.55E-01	mg/L	M	2.4E-06	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	4.8E-04
	THALLIUM	2.24E-02	mg/L	2.24E-02	mg/L	M	3.5E-07	mg/kg-day	6.50E-05	mg/kg-day	NA	NA	5.3E-03
	VANADIUM	3.69E-01	mg/L	3.69E-01	mg/L	M	5.7E-06	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	1.1E-03
	(total)												4.7E-01
												Total Hazard Index Across All Exposure Routes/Pathways	**4.7E-01**

TABLE 7.7. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FOR CONSTRUCTION WORKERS - INHALATION OF VAPORS FROM GROUNDWATER IN A TRENCH
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	TETRACHLOROTHENE	1.4E+00	ug/L	5.03E-05	mg/m^3	R	6.9E-07	mg/m^3	2.70E-01	mg/m^3	2.6E-06
	2-METHYLNAPHTHALENE	1.8E+02	ug/L	6.32E-03	mg/m^3	R	8.7E-05	mg/m^3		mg/m^3	
	3&4 METHYLPHENOL	6.6E+01	ug/L	3.94E-05	mg/m^3	R	5.4E-07	mg/m^3		mg/m^3	
	NAPHTHALENE	2.9E+01	ug/L	1.06E-03	mg/m^3	R	1.5E-05	mg/m^3	3.00E-03	mg/m^3	4.9E-03
	(total)										4.9E-03
										Total Hazard Index Across All Exposure Routes/Pathways	**4.9E-03**

TABLE 7.8 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	1.0E-06	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	1.0E-05
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	5.7E-06	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	5.7E-04
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	2.0E-05	mg/kg-day		mg/kg-day	NA	NA	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	1.7E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	8.4E-05
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	2.1E-05	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.0E-03
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	9.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	4.7E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	9.4E-03
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	4.1E-09	mg/kg-day	3.00E-05	mg/kg-day	NA	NA	1.4E-04
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	8.1E-08	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	1.3E-03
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	6.1E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.0E-03
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	5.0E-06	mg/kg-day	1.40E-02	mg/kg-day	NA	NA	3.6E-04
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	2.0E-07	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	7.9E-03
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	5.5E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	7.3E-03
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	4.4E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	4.6E-02
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	2.0E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	2.4E-04
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	7.4E-08	mg/kg-day	6.50E-05	mg/kg-day	NA	NA	1.1E-03
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	9.4E-07	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	1.9E-04
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	1.3E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	4.4E-05
	(total)												7.8E-02

Total Hazard Index Across All Exposure Routes/Pathways **7.8E-02**

TABLE 7.9 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OLDER CHILD TRESPASSERS TO SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Older Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	9.2E-08	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	9.2E-07
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	6.1E-07	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	6.1E-05
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	6.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	1.5E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	7.6E-06
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	9.2E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	4.6E-05
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	9.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	2.8E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	5.5E-05
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	3.1E-09	mg/kg-day	3.00E-05	mg/kg-day	NA	NA	1.0E-04
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	4.0E-07	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	9.9E-04
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	3.0E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.0E-02
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	2.5E-05	mg/kg-day	2.00E-01	mg/kg-day	NA	NA	1.2E-04
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	9.8E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.0E-03
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	1.3E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	4.5E-04
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	2.2E-04	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	9.1E-03
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	4.8E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.4E-04
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	3.7E-07	mg/kg-day	6.50E-05	mg/kg-day	NA	NA	5.6E-03
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	4.6E-06	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	9.3E-04
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	1.1E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.6E-04
	(total)												3.0E-02
Dermal	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	2.0E-06	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	2.0E-05
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	1.1E-05	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	1.1E-03
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	3.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	3.4E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.7E-04
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	4.2E-05	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.1E-03
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	1.9E-06	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	9.4E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.9E-02
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	8.3E-09	mg/kg-day	3.00E-05	mg/kg-day	NA	NA	2.8E-04
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	1.6E-07	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	2.7E-03
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	1.2E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.0E-03
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	9.9E-06	mg/kg-day	1.40E-02	mg/kg-day	NA	NA	7.1E-04
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	4.0E-07	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	1.6E-02
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	1.1E-06	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	1.5E-02
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	8.8E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	9.2E-02
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	3.9E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	4.9E-04
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	1.5E-07	mg/kg-day	6.50E-05	mg/kg-day	NA	NA	2.3E-03
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	1.9E-06	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	3.8E-04
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	2.6E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	8.7E-05
	(total)												1.6E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.9E-01

TABLE 7.1 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Surface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	2.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	2.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	1.5E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.1E-04
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M	5.7E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	1.4E-03
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	8.5E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.8E-02
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M	6.7E-05	mg/kg-day	2.0E-01	mg/kg-day	NA	NA	3.4E-04
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M	4.3E-07	mg/kg-day	2.0E-03	mg/kg-day	NA	NA	2.2E-04
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	1.7E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.4E-03
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M	2.9E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	9.7E-03
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M	2.6E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	3.8E-03
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M	2.5E-07	mg/kg-day	6.5E-05	mg/kg-day	NA	NA	3.9E-03
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M	4.0E-05	mg/kg-day	5.0E-03	mg/kg-day	NA	NA	7.9E-03
	(total)												5.9E-02
Dermal	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	5.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	1.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	9.3E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.9E-05
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	3.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	5.1E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.7E-03
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M		mg/kg-day	1.4E-02	mg/kg-day	NA	NA	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M		mg/kg-day	1.4E-05	mg/kg-day	NA	NA	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	3.4E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	1.4E-04
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M		mg/kg-day	7.5E-05	mg/kg-day	NA	NA	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M		mg/kg-day	6.5E-05	mg/kg-day	NA	NA	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M		mg/kg-day	5.0E-03	mg/kg-day	NA	NA	
	(total)												1.9E-03
												Total Hazard Index Across All Exposure Routes/Pathways	6.1E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03
PCBs - 0.14 Cadmium - 0.001
4,4'-DDT - 0.03 Other Metals and Volatiles - not evaluated for dermal contact with soil.

TABLE 7.2. CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FOR CONSTRUCTION WORKERS - SURFACE SOIL/SEDIMENT
NEW LONDON NSB
GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Soil/Sediment
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	BARIUM	1.3E+02	mg/kg	9.46E-05	mg/m^3	R	6.9E-06	mg/m^3	5.00E-04	mg/m^3	1.4E-02
	CHROMIUM	5.6E+01	mg/kg	4.08E-05	mg/m^3	R	3.0E-06	mg/m^3	1.00E-04	mg/m^3	3.0E-02
	MANGANESE	5.1E+02	mg/kg	3.71E-04	mg/m^3	R	2.7E-05	mg/m^3	5.00E-05	mg/m^3	5.4E-01
	(total)										5.9E-01
										Total Hazard Index Across All Exposure Routes/Pathways	**5.9E-01**

TABLE 7.3 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OLDER CHILD TRESPASSERS TO SURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Surface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Older Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	6.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	6.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	5.0E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	9.9E-05
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	3.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	4.6E-04
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	9.1E-03
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M	2.2E-05	mg/kg-day	2.0E-01	mg/kg-day	NA	NA	1.1E-04
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M	1.4E-07	mg/kg-day	2.0E-03	mg/kg-day	NA	NA	7.0E-05
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	5.5E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.1E-03
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M	9.3E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.1E-03
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M	8.4E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.2E-03
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M	8.1E-08	mg/kg-day	6.5E-05	mg/kg-day	NA	NA	1.2E-03
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M	1.3E-05	mg/kg-day	5.0E-03	mg/kg-day	NA	NA	2.5E-03
	(total)												**1.9E-02**
Dermal	BAP EQUIVALENT (1/2 DL)	4.0E+00	mg/kg	4.00E+00	mg/kg	M	2.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDD	4.0E-01	mg/kg	4.00E-01	mg/kg	M	6.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	3.0E-01	mg/kg	3.00E-01	mg/kg	M	4.8E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	9.7E-06
	AROCLOR-1260	2.2E-01	mg/kg	2.20E-01	mg/kg	M	1.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	1.1E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	ARSENIC	1.7E+01	mg/kg	1.65E+01	mg/kg	M	2.7E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.9E-04
	BARIUM	1.3E+02	mg/kg	1.30E+02	mg/kg	M		mg/kg-day	1.4E-02	mg/kg-day	NA	NA	
	BERYLLIUM	8.4E-01	mg/kg	8.40E-01	mg/kg	M		mg/kg-day	1.4E-05	mg/kg-day	NA	NA	
	CADMIUM	3.3E+00	mg/kg	3.30E+00	mg/kg	M	1.8E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	7.1E-05
	CHROMIUM	5.6E+01	mg/kg	5.61E+01	mg/kg	M		mg/kg-day	7.5E-05	mg/kg-day	NA	NA	
	MANGANESE	5.1E+02	mg/kg	5.10E+02	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	THALLIUM	4.9E-01	mg/kg	4.90E-01	mg/kg	M		mg/kg-day	6.5E-05	mg/kg-day	NA	NA	
	VANADIUM	7.7E+01	mg/kg	7.67E+01	mg/kg	M		mg/kg-day	5.0E-03	mg/kg-day	NA	NA	
	(total)												9.7E-04
												Total Hazard Index Across All Exposure Routes/Pathways	**2.0E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13	Arsenic - 0.03
PCBs - 0.14	Cadmium - 0.001
4,4'-DDT - 0.03	Other Metals and Volatiles - not evaluated for dermal contact with soil.

TABLE 7.4 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SUBSURFACE SOIL/SEDIMENT
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Soil/Sediment
Exposure Medium: Suburface Soil/Sediment
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BAP EQUIVALENT (1/2 DL)	5.0E-01	mg/kg	5.00E-01	mg/kg	M	2.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	ARSENIC	9.7E+00	mg/kg	9.70E+00	mg/kg	M	5.0E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.7E-02
	CADMIUM	6.9E+00	mg/kg	6.90E+00	mg/kg	M	3.6E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	7.1E-03
	CHROMIUM	6.0E+01	mg/kg	5.95E+01	mg/kg	M	3.1E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.0E-02
	MANGANESE	3.1E+02	mg/kg	3.05E+02	mg/kg	M	1.6E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.3E-03
	THALLIUM	8.1E-01	mg/kg	8.10E-01	mg/kg	M	4.2E-07	mg/kg-day	6.5E-05	mg/kg-day	NA	NA	6.4E-03
	VANADIUM	5.3E+01	mg/kg	5.25E+01	mg/kg	M	2.7E-05	mg/kg-day	5.0E-03	mg/kg-day	NA	NA	5.4E-03
	(total)												**4.8E-02**
Dermal	BAP EQUIVALENT (1/2 DL)	5.0E-01	mg/kg	5.00E-01	mg/kg	M	6.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	ARSENIC	9.7E+00	mg/kg	9.70E+00	mg/kg	M	3.0E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.0E-03
	CADMIUM	6.9E+00	mg/kg	6.90E+00	mg/kg	M	7.1E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	2.9E-04
	CHROMIUM	6.0E+01	mg/kg	5.95E+01	mg/kg	M		mg/kg-day	7.5E-05	mg/kg-day	NA	NA	
	MANGANESE	3.1E+02	mg/kg	3.05E+02	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	THALLIUM	8.1E-01	mg/kg	8.10E-01	mg/kg	M		mg/kg-day	6.5E-05	mg/kg-day	NA	NA	
	VANADIUM	5.3E+01	mg/kg	5.25E+01	mg/kg	M		mg/kg-day	5.0E-03	mg/kg-day	NA	NA	
	(total)												**1.3E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**4.9E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
PCBs - 0.14
4,4'-DDT - 0.03
4,4'-DDD - 0.1
Arsenic - 0.03
Cadmium - 0.001
Other Metals and Volatiles - not evaluated for dermal contact with soil.

TABLE 7.5. CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FOR CONSTRUCTION WORKERS - SUBSURFACE SOIL/SEDIMENT
NEW LONDON NSB
GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Subsurface Soil/Sediment
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	CHROMIUM	6.0E+01	mg/kg	4.33E-05	mg/m^3	R	3.2E-06	mg/m^3	1.00E-04	mg/m^3	3.2E-02
	MANGANESE	3.1E+02	mg/kg	2.22E-04	mg/m^3	R	1.6E-05	mg/m^3	5.00E-05	mg/m^3	3.2E-01
	(total)										3.6E-01
										Total Hazard Index Across All Exposure Routes/Pathways	**3.6E-01**

TABLE 7.6 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO GROUNDWATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	TETRACHLOROETHENE	1.00E-03	mg/L	1.00E-03	mg/L	M	2.4E-07	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	2.4E-05
	2-METHYLNAPHTHALENE	2.00E-03	mg/L	2.00E-03	mg/L	M	1.1E-06	mg/kg-day	4.00E-03	mg/kg-day	NA	NA	2.8E-04
	3&4-METHYLPHENOL	4.00E-03	mg/L	4.00E-03	mg/L	M	3.9E-07	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	7.9E-05
	BAP EQUIVALENT	5.71E-04	mg/L	5.71E-04	mg/L	M	5.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	NAPHTHALENE	9.00E-04	mg/L	9.00E-04	mg/L	M	2.4E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	
	PYRENE	2.00E-03	mg/L	2.00E-03	mg/L	M	3.5E-06	mg/kg-day	3.00E-02	mg/kg-day	NA	NA	
	BIS(2-ETHYLHEXYL)PHTHALATE	4.00E-03	mg/L	4.00E-03	mg/L	M	2.5E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.2E-04
	4,4'-DDD	9.00E-04	mg/L	9.00E-04	mg/L	M	2.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	ANTIMONY	4.60E-03	mg/L	4.60E-03	mg/L	M	1.8E-08	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	3.0E-04
	ARSENIC	1.10E-02	mg/L	1.10E-02	mg/L	M	4.3E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.4E-04
	BARIUM	1.00E-01	mg/L	1.00E-01	mg/L	M	3.9E-07	mg/kg-day	1.40E-02	mg/kg-day	NA	NA	2.8E-05
	BERYLLIUM	1.10E-03	mg/L	1.10E-03	mg/L	M	4.3E-09	mg/kg-day	2.80E-06	mg/kg-day	NA	NA	1.5E-03
	BORON	5.70E-01	mg/L	5.70E-01	mg/L	M	2.2E-06	mg/kg-day	2.00E-01	mg/kg-day	NA	NA	1.1E-05
	CADMIUM	1.40E-03	mg/L	1.40E-03	mg/L	M	5.4E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	2.2E-04
	CHROMIUM	6.30E-03	mg/L	6.30E-03	mg/L	M	4.9E-08	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	6.5E-04
	MANGANESE	9.00E-01	mg/L	9.00E-01	mg/L	M	3.5E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	3.6E-03
	MERCURY	8.60E-05	mg/L	8.60E-05	mg/L	M	3.3E-10	mg/kg-day	2.10E-05	mg/kg-day	NA	NA	1.6E-05
	MOLYBDENUM	5.50E-03	mg/L	5.50E-03	mg/L	M	2.1E-08	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	4.3E-06
	SELENIUM	1.10E-02	mg/L	1.10E-02	mg/L	M	4.3E-08	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	8.5E-06
	THALLIUM	3.80E-03	mg/L	3.80E-03	mg/L	M	1.5E-08	mg/kg-day	6.50E-05	mg/kg-day	NA	NA	2.3E-04
	VANADIUM	7.60E-03	mg/L	7.60E-03	mg/L	M	2.9E-08	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	
	(total)												7.3E-03

Total Hazard Index Across All Exposure Routes/Pathways **7.3E-03**

TABLE 7.7. CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FOR CONSTRUCTION WORKERS - INHALATION OF VAPORS FROM GROUNDWATER IN A TRENCH
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	TETRACHLOROTHENE	1.4E+00	ug/L	5.03E-05	mg/m^3	R	1.7E-07	mg/m^3	2.70E-01	mg/m^3	6.4E-07
	2-METHYLNAPHTHALENE	1.8E+02	ug/L	6.32E-03	mg/m^3	R	2.2E-05	mg/m^3		mg/m^3	
	3&4 METHYLPHENOL	6.6E+01	ug/L	3.94E-05	mg/m^3	R	1.3E-07	mg/m^3		mg/m^3	
	NAPHTHALENE	2.9E+01	ug/L	1.06E-03	mg/m^3	R	3.6E-06	mg/m^3	3.00E-03	mg/m^3	1.2E-03
	(total)										1.2E-03
										Total Hazard Index Across All Exposure Routes/Pathways	**1.2E-03**

TABLE 7.8 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	4.1E-07	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	4.1E-06
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	2.6E-06	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	2.6E-04
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	9.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	7.2E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	3.6E-05
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	9.9E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	4.9E-04
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	4.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	2.2E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	4.4E-03
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	2.0E-09	mg/kg-day	3.00E-05	mg/kg-day	NA	NA	6.5E-05
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	2.7E-08	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	4.5E-04
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	2.0E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	6.8E-04
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	1.7E-06	mg/kg-day	1.40E-02	mg/kg-day	NA	NA	1.2E-04
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	6.6E-08	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	2.6E-03
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	1.8E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	2.4E-03
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	1.5E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	1.5E-02
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	6.5E-08	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	8.2E-05
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	2.5E-08	mg/kg-day	6.50E-05	mg/kg-day	NA	NA	3.8E-04
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	3.1E-07	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	6.3E-05
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	4.4E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.5E-05
	(total)												2.7E-02

Total Hazard Index Across All Exposure Routes/Pathways **2.7E-02**

TABLE 7.9 - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OLDER CHILD TRESPASSERS TO SURFACE WATER
SITE 2B - AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Entire Site
Receptor Population: Trespasser
Receptor Age: Older Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	2.0E-08	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	2.0E-07
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	1.3E-07	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	1.3E-05
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	1.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	3.3E-08	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.7E-06
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	2.0E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	9.9E-06
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	2.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	6.0E-09	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.2E-05
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	6.6E-10	mg/kg-day	3.00E-05	mg/kg-day	NA	NA	2.2E-05
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	8.6E-08	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	2.2E-04
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	6.5E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.2E-03
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	5.3E-06	mg/kg-day	2.00E-01	mg/kg-day	NA	NA	2.7E-05
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	2.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	4.2E-04
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	2.9E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	9.7E-05
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	4.7E-05	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	2.0E-03
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	1.0E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	5.2E-05
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	8.0E-08	mg/kg-day	6.50E-05	mg/kg-day	NA	NA	1.2E-03
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	1.0E-06	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	2.0E-04
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	2.3E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	7.8E-05
	(total)												6.5E-03
Dermal	ETHYLBENZENE	3.00E-04	mg/L	3.00E-04	mg/L	M	5.3E-07	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	5.3E-06
	TETRACHLOROETHENE	2.00E-03	mg/L	2.00E-03	mg/L	M	3.3E-06	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	3.3E-04
	BAP EQUIVALENT	2.00E-04	mg/L	2.00E-04	mg/L	M	1.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	NAPHTHALENE	5.00E-04	mg/L	5.00E-04	mg/L	M	9.4E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	4.7E-05
	BIS(2-ETHYLHEXYL)PHTHALATE	3.00E-03	mg/L	3.00E-03	mg/L	M	1.3E-05	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	6.4E-04
	4,4'-DDD	3.00E-05	mg/L	3.00E-05	mg/L	M	5.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	4,4'-DDT	9.00E-05	mg/L	9.00E-05	mg/L	M	2.9E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	5.7E-03
	ALDRIN	1.00E-05	mg/L	1.00E-05	mg/L	M	2.5E-09	mg/kg-day	3.00E-05	mg/kg-day	NA	NA	8.5E-05
	ANTIMONY	1.30E-03	mg/L	1.30E-03	mg/L	M	3.5E-08	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	5.8E-04
	ARSENIC	9.80E-03	mg/L	9.80E-03	mg/L	M	2.6E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	8.8E-04
	BARIUM	8.02E-02	mg/L	8.02E-02	mg/L	M	2.2E-06	mg/kg-day	1.40E-02	mg/kg-day	NA	NA	1.5E-04
	CADMIUM	3.20E-03	mg/L	3.20E-03	mg/L	M	8.6E-08	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	3.4E-03
	CHROMIUM	4.40E-03	mg/L	4.40E-03	mg/L	M	2.4E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	3.1E-03
	MANGANESE	7.11E-01	mg/L	7.11E-01	mg/L	M	1.9E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	2.0E-02
	NICKEL	1.58E-02	mg/L	1.58E-02	mg/L	M	8.5E-08	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	1.1E-04
	THALLIUM	1.20E-03	mg/L	1.20E-03	mg/L	M	3.2E-08	mg/kg-day	6.50E-05	mg/kg-day	NA	NA	5.0E-04
	VANADIUM	1.52E-02	mg/L	1.52E-02	mg/L	M	4.1E-07	mg/kg-day	5.00E-03	mg/kg-day	NA	NA	8.2E-05
	ZINC	3.51E-01	mg/L	3.51E-01	mg/L	M	5.7E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.9E-05
	(total)												3.6E-02
												Total Hazard Index Across All Exposure Routes/Pathways	4.2E-02

Appendix E
ARARs

TABLE E.1

ALTERNATIVE 3: EXCAVATION, OFF-SITE DISPOSAL AND SITE RESTORATION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs AND TBCs
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Cancer Slope Factors	None	To be considered (TBC)	These are guidance values used in Human Health Risk Assessment (HHRA) to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Primary basis for evaluating carcinogenic human health risks at these sites from contaminated sediment and groundwater. Excavation, off-site disposal, and LUCs will address risks identified using these standards.
Reference Doses	None	TBC	These are guidance values used in HHRA to evaluate the potential non-carcinogenic hazard caused by exposure to contaminants.	Primary basis for evaluating noncarcinogenic human health risks at these sites to contaminated sediment and groundwater. Excavation, off-site disposal, and LUCs will address risks identified using these standards.
Guidelines for Carcinogen Risk Assessment	EPA/630/P-03/001F (March 2005)	TBC	These guidelines are used to perform HHRA. They provide a framework for assessing possible cancer risks from exposures to pollutants or other agents in the environment.	Primary basis for evaluating carcinogenic human health risks at these sites from contaminated sediment and groundwater. Excavation, off-site disposal, and LUCs will address risks identified using these standards.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F (March 2005)	TBC	These guidelines are used to perform HHRA and address a number of issues pertaining to cancer risks associated with early-life exposures in general and provide specific guidance on potency adjustment for carcinogens acting through a mutagenic mode of action.	Primary basis for evaluating carcinogenic human health risks at these sites from contaminated sediment and groundwater. Excavation, off-site disposal, and LUCs will address risks identified using these standards.

TABLE E.1

ALTERNATIVE 3: EXCAVATION, OFF-SITE DISPOSAL AND SITE RESTORATION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs AND TBCs
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Threshold Effects Concentrations	MacDonald, et al., 2000	TBC	Provide guidance values for identifying potential risk to ecological receptors exposed to contaminated sediments.	Primary basis for evaluating risk to aquatic ecological receptors. Guidance were used to establish one of the PRGs. Excavation, off-site disposal, and LUCs will address risks identified using these standards.
STATE CHEMICAL-SPECIFIC ARARS AND TBCs				
Connecticut Remediation Standard Regulations	Connecticut General Statutes (CGS) 22a-133k; Regulations of Connecticut State Agencies (RCSA) 22a-133k-1 through 3 (Appendices A through E)	Relevant and Appropriate for sediment standards; Applicable for groundwater standards.	These regulations establish Direct Exposure Criteria and Pollutant Mobility Criteria for contaminated soil based on either industrial or residential use of the site. The regulations also establish remediation standards for groundwater. The groundwater remediation standards are based on the GB classification of groundwater at the site.	The sediment excavation remedy and LUCs would address any contaminant risks posed from sediment at the site.
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Fish and Wildlife Coordination Act	16 United States Code (USC) Part 661 et seq.; 40 Code of Federal Regulations (CFR) 122.49	Applicable	Requires consultation with federal and state fish and wildlife resource agencies to protect fish and wildlife from projects affecting streams or rivers.	Contaminated surface water may migrate into downstream watercourses during the removal activities. United States Fish and Wildlife Service and appropriate Connecticut departments will be coordinated with to minimize impacts of any remedial activities on any wildlife that may be dependent on Area A Wetland.

TABLE E.1

ALTERNATIVE 3: EXCAVATION, OFF-SITE DISPOSAL AND SITE RESTORATION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs AND TBCs
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 3 OF 7

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Clean Water Act (CWA), Section 404, Guidelines for Specification of Disposal Sites for Dredged or Fill Material	33 USC 1344; Section 404(b)(1) 40 CFR Part 230, 231 and 33 CFR Parts 320-323	Applicable	These regulations outline the requirements for the discharge of dredged or fill materials into surface waters including Federal jurisdictional wetlands. No activity that impacts waters of the United States shall be permitted if a practicable alternative that has less adverse impact exists. If there is no other practicable alternative, the impacts must be mitigated.	Because the remedial action involves filling of federal jurisdictional wetlands through restoration action and includes monitoring activities, the Selected Remedy will comply with the requirement to minimize wetland impact. The least environmentally damaging practicable alternative was selected.
STATE LOCATION-SPECIFIC ARARs and TBCs				
Inland Wetlands and Watercourses Act and Regulations	CGS 22a-37 through 45 RCSA 22a-39-1 through 15	Applicable	These rules regulate activities in State jurisdictional wetlands and watercourses.	Remedial alternatives considered for Area A Wetland sediment include removal activities in state jurisdictional wetlands. The substantive requirements of the standards will be met for any alteration of state jurisdictional wetlands and to any watercourse.
FEDERAL ACTION-SPECIFIC ARARs and TBCs				
CWA, Section 402, National Pollution Discharge Elimination System (NPDES)	33 USC 1342; 40 CFR 122 through 125, 131	Applicable	NPDES permits are required for any discharges to navigable waters. If remedial activities include such a discharge, the NPDES standards would be ARARs. Standards would be enforced through the State Program.	If water management is required during sediment excavation and the water is to be discharged directly to a surface water body, then treatment in accordance with these regulations will likely be required.

TABLE E.1

ALTERNATIVE 3: EXCAVATION, OFF-SITE DISPOSAL AND SITE RESTORATION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs AND TBCs
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 4 OF 7

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
CWA Pretreatment Regulations	40 CFR Part 403	Applicable	General pretreatment requirements for discharge to publicly-owned treatment works. If remedial activities include such a discharge to the local sanitary sewer, pretreatment standards would be ARARs. Standards would be enforced through the State program.	If water management is required during sediment excavation and the water is to be discharged to a sanitary sewer system, then treatment in accordance with these regulations may be required.
CWA National Recommended Water Quality Criteria	33 USC 1251 *et seq.*; 40 CFR § 122.44	Relevant and Appropriate	Used to establish water quality standards for the protection of aquatic life.	Water quality monitoring would be conducted to ensure that these criteria are not exceeded during excavation activities
Toxic Substances Control Act (TSCA); PCB Remediation Waste	15 USC 2601 *et seq.*; 40 CFR 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the ecological risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, United States Environmental Protection Agency Region 1.	This remedy includes a finding that the PCB cleanup level of 532 µg/kg under TSCA risk-based standards would not pose an unreasonable risk of injury to health or the environment. All PCB contaminated sediment exceeding the cleanup level will be excavated and disposed of at a licensed off-site disposal facility.

TABLE E.1

ALTERNATIVE 3: EXCAVATION, OFF-SITE DISPOSAL AND SITE RESTORATION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs AND TBCs
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT
PAGE 5 OF 7

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Management of Undesirable Plants on Federal Lands	7 USC 2814	Relevant and Appropriate	Requires federal agencies to establish integrated management systems to control or contain undesirable plant species on federal lands under the agency's jurisdiction.	Measures will be taken to control the reestablishment of *Phragmites* within the remediated area of wetland. Such measures may include seeding the excavated area with wetland vegetation and controlling *Phragmites* in that area. This will be helped by controlling *Phragmites* in the entire wetland as part of the natural resources program. An invasive species control plan will be developed as part of the long-term O&M for this site.
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste Management: Generator Standards	RCSA 22a-449(c) 100 through 102	Applicable	Connecticut is delegated to administer the Federal Resource Conservation and Recovery Act statute through its state regulations. These sections establish standards for listing and identification of hazardous waste. The standards of 40 CFR 260-262 are incorporated by reference	Excavated sediments would be tested for hazardous waste characteristics (i.e. TCLP criteria). If sediments were determined to be a hazardous waste, then they would be excavated, stored, transported, and disposed off site in accordance with hazardous waste regulations.
Solid Waste Management Regulations	RCSA 22A-209-1 through 15	Relevant and Appropriate	These sections establish standards for management of non-hazardous waste.	Excavated sediment that is determined to be non-hazardous will be managed and disposed off-site in accordance with these standards.

TABLE E.1

ALTERNATIVE 3: EXCAVATION, OFF-SITE DISPOSAL AND SITE RESTORATION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs AND TBCs
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Water Pollution Control	RCSA 22a-430-1 through 8 and 416 through 599	Applicable	The regulations govern the treatment and discharge of water into surface water bodies in the state.	If water management is required during sediment excavation and the water is to be discharged directly to a surface water body, then treatment in accordance with these regulations will likely be required. If water is to be discharged to a POTW, then the applicable pre-treatment sections of the POTW permit would apply.
Water Quality Standards	CGS 22a-426	Applicable	Connecticut's Water Quality Standards establish specific numeric criteria, designated uses, and anti-degradation policies for surface water.	Discharges of treated water to a surface water body may occur for alternatives that would require water management during sediment excavation. The substantive requirements would be met if any discharges of treated water to surface water bodies are required.
Connecticut Invasive Plant Act, Prohibited Actions Concerning Certain Invasive Plants	CGS 22a-381d	Applicable	Prohibited actions concerning certain invasive plants. No person shall import, move, sell, purchase, transplant, cultivate or distribute any of the following invasive plants:…(29) common reed (*Phragmites australis*)….	Measures will be taken to control the re-establishment of *Phragmites* within the remediated area of wetland. Such measures may include seeding the excavated area with wetland vegetation and controlling *Phragmites* in that area. This will be helped by controlling *Phragmites* in the entire wetland as part of the natural resources program.

TABLE E.1

ALTERNATIVE 3: EXCAVATION, OFF-SITE DISPOSAL AND SITE RESTORATION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs AND TBCs
AREA A WETLAND
NSB-NLON, GROTON, CONNECTICUT

Requirement	Citation	Status	Synopsis of Requirement	Evaluation/Action to Be Taken
Connecticut Non-Native Plant Species Policy	None	TBC	This policy provides guidance for any activities that could introduce or cause the spread of invasive species in the State. Department activities involving soil or vegetation disturbances shall consider and, to the extent practical, minimize the spread of non-native invasive populations either within or adjacent to an area to be modified.	Measures will be taken to control the re-establishment of *Phragmites* within the remediated area of wetland. Such measures may include seeding the excavated area with wetland vegetation and controlling *Phragmites* in that area. This will be helped by controlling *Phragmites* in the entire wetland as part of the natural resources program.
Control of Airborne Particulate Matter and Fugitive Particulate Matter	RCSA 22a-174-18c	Applicable	This regulation requires that reasonable precautions be implemented to prevent particulate matter from becoming airborne.	These guidelines would be incorporated into any remedial design for the Area A Wetland that would involve excavation activities. An appropriate dust control program, if required, would be developed and would comply with this guidance.
Connecticut Guidelines for Sediment Erosion and Sediment Control	Connecticut Council on Soil and Water Conservation	TBC	Technical and administrative guidance for development, adoption and implementation of erosion and sediment control program.	The excavation activities associated with the remedy will include an appropriate erosion and sedimentation control program that would comply with this guidance.

ARAR	Applicable or Relevant and Appropriate Requirement	POTW	Publicly-owned Treatment Works
CFR	Code of Federal Regulations	RCSA	Regulations of Connecticut State Agencies
CGS	Connecticut General Statutes	TBC	To be considered
CWA	Clean Water Act	TSCA	Toxic Substances Control Act
NPDES	National Pollution Discharge Elimination System	USC	United States Code

Appendix F
Alternative Calculations and Cost Estimates

CLIENT: NSB NEW LONDON		JOB NUMBER: 112G00811	
SUBJECT: Area A Wetland FS Volume Calculations			
BASED ON: Figures 11-1, 11-2, 11-3, and 11-4		DRAWING NUMBER:	
BY: TWS Date: 04-20-10	CHECKED BY: TJR Date: 4/22/10	APPROVED BY:	DATE:

Area and Volume of Contaminated Material Requiring Remediation

Contaminated sediment with COC concentrations greater than PRGs are found in 5 areas across the Area A Wetland (Figure 8-1)

Figure scale: 1.91" = 100 ft or 1 inch sq = 2,741.15 sf

Area	Planimeter Area (si)	Calculated Area (sf)	
southwest	1.581	4,334	
southeast	0.243	665	
west	8.138	22,308	
north	4.239	11,620	
northeast	1.736	4,759	
		43,685	sf
		1.00	acres

Excavation Depth = 2 ft

Volume of Contaminated Sediment = 87,370 cf
3,236 cy

Alternative 2 Cover Material Quantities and Wetland Mitigation

The area of the cover required to create a barrier over the contaminated sediment is equal to the area of contamination plus the required cover run-out area. The area of the cover run-out is equal to the perimeter of each cover are times the length of the run-out (6 feet).

Area	Perimeter (in)	Scale (1" = 85')	Perimeter (ft)	Run-out Area (sf)	Cover Area (sf)
southwest	4.4	85	374	2,244	6,578
southeast	0.2	85	16	99	764
west	9.0	85	765	4,590	26,898
north	6.3	85	536	3,213	14,833
northeast	5.8	85	493	2,958	7,717

Total Square Footage of Cover Area = 56,789 sf

Area of Geotextile needed for Cover Areas = 56,789 sf
6,310 sy

CLIENT: NSB NEW LONDON		JOB NUMBER: 112G00811	
SUBJECT: Area A Wetland FS Volume Calculations			
BASED ON: Figures 11-1, 11-2, 11-3, and 11-4		DRAWING NUMBER:	
BY: TWS Date: 04-20-10	CHECKED BY: TSR Date: 4/20/10	APPROVED BY:	DATE:

Soil volume needed for the cover construction is equal to the thickness of the required soil layer plus the run-out. For purposes of the FS the total volume for a 2 foot cover is calculated. The required common fill volume will equal 3/4 of the total volume (18 inches of the 24 inch thick layer) and the required topsoil volume will equal 1/4 of the total volume (6 inches of the 24 inch thick layer).

For each cover are the run-out volume equals the 1/2 times the area of the run-out time the thickness of the cover.

Area	Run-out Area (sf)	Cover Thickness (ft)	Run-Out Volume (cf)	Run-Out Volume (cy)
southwest	2,244.0	2	2,244	83
southeast	98.9	2	99	4
west	4,590.0	2	4,590	170
north	3,213.0	2	3,213	119
northeast	2,958.0	2	2,958	110

Volume of Soil Layer over each contamination area.

Area	Cover Area (sf)	Cover Thickness (ft)	Cover Volume (cf)	Cover Volume (cy)
southwest	4,333.8	2	8,668	321
southeast	665.3	2	1,331	49
west	22,307.5	2	44,615	1,652
north	11,619.7	2	23,239	861
northeast	4,758.6	2	9,517	352

Total Cover Volume

Area	Cover Volume (cy)
southwest	404
southeast	53
west	1,822
north	980
northeast	462

Total volume =	3,721	cy
Total volume of common fill =	2,791	cy
Total volume of topsoil =	930	cy

CLIENT: NSB NEW LONDON			JOB NUMBER: 112G00811
SUBJECT: Area A Wetland FS Volume Calculations			
BASED ON: Figures 11-1, 11-2, 11-3, and 11-4			DRAWING NUMBER:
BY:	TWS	CHECKED BY: TJR	APPROVED BY: DATE:
Date:	04-20-10	Date: 4/20/10	

To mitigate the disturbed wetlands, it is assumed that wetlands can be mitigated at a rate of 2 to 1 (for ever 1 acre of lost wetland 2 acres will be constructed.

Area of Wetlands Lost due to Covering = 1.30 acres
Area of Wetlands To Construct = 2.60 acres

For the purposes of this calculation it is assumed that a sufficient area can be found adjacent to the Area A wetland to perform the wetland mitigation. As indicated above the wetland mitigation ratio is 2:1. It is also assumed that this wetland can be constructed by excavating an average of 4 feet of soil across the wetland creation area and that the created wetland would be an upland emergent wetland.

Total Volume of Soil to be Excavated = 453,024 cf
Total Volume of Soil to be Excavated = 16,779 cy

Volume of Topsoil Backfill (6 inches thick) = 56,628 cf
Volume of Topsoil Backfill (6 inches thick) = 2,097 cy

Area to be Vegetated = 113,256 sf
Area to be Vegetated = 12,584 sy

Alternative 3 Excavation and Backfill Volume

The volume of material requiring excavation equals the total area of contaminated sediment times the depth of excavation (2 feet).

Area	Excavation Area (sf)	Excavation Thickness (ft)	Excavation Volume (cf)	Excavation Volume (cy)
southwest	4,333.8	2	8,668	321
southeast	665.3	2	1,331	49
west	22,307.5	2	44,615	1,652
north	11,619.7	2	23,239	861
northeast	4,758.6	2	9,517	352

Total Excavation Volume = 3,236 cy

CLIENT: NSB NEW LONDON		JOB NUMBER: 112G00811	
SUBJECT: Area A Wetland FS Volume Calculations			
BASED ON: Figures 11-1, 11-2, 11-3, and 11-4		DRAWING NUMBER:	
BY: TWS Date: 04-20-10	CHECKED BY: TJR Date: 4/20/10	APPROVED BY:	DATE:

Following excavation the and verification of contaminant removal to acceptable concentrations, the excavation will be backfilled with clean off-site borrow material. It is estimated on average that the backfill would include 18 inches of common fill and 6 inches of topsoil.

Total volume excavated =	3,236 cy
Volume of common fill needed =	2,427 cy
Volume of topsoil needed =	809 cy
Wetland Area vegetation =	43,685 sf
Wetland Area vegetation =	4,854 sy

CLIENT: NAVAL SUBMARINE BASE NEW LONDON			JOB NUMBER: 112G02625 - FS.DF
SUBJECT: Area A Wetland Cost Assumptions			
BASED ON:			DRAWING NUMBER:
BY: TJR Date: 4-2010		CHECKED BY: Date: 5/14/10	APPROVED BY: DATE:

Alternative 1 - No Action

Annual Cost

5-year review: assume $23,000

Alternative 2 - Soil Cover with LUCs

Capital Cost

Haul Road

Clear for road: 700 lf by 20 ft wide = 14,000 sf or 1,560 sy
Road: 1,300 lf by 15 ft wide = 19,500 sf or 2,170 sy
Gravel: 19,500 sf by 8" deep = 480 cy or 720 tons

Cover

Cover 5 areas with 2 feet of soil (18" common fill & 6" topsoil)
Load materials onto off-road trucks and haul to areas to be covered
Materials needed:

geotextile:	6,310 sy
common fill	3,155 cy
topsoil:	1,050 cy
cover vegetation:	56,790 sf or 57 msf

Site Restoration

Remove haul road & dispose as construction debris: 720 tons
Reseed haul road
19,500 sf or
20 msf

Wetland Mitigation

Construct of new wetlands on the Subase or adjacent Navy property (2:1 mitigation)
Size: 2.6 acres
Assume 4' of clean soil excavation is required. Haul excavated soil 5 miles for storage.
volume: 16,800 cy
Place 6" of topsoil for wetlands
volume: 2,100 cy
Seed area for wetlands

CLIENT: NAVAL SUBMARINE BASE NEW LONDON			JOB NUMBER: 112G02625 - FS.DF
SUBJECT: Area A Wetland Cost Assumptions			
BASED ON:			DRAWING NUMBER:
BY: TJR Date: 4-2010		CHECKED BY: Date: 5/14/10	APPROVED BY: DATE:

Time to complete work

Mob & Setup	5 days
Clear & Install Road	10 days
Cover Placement	15 days
Well Replacement	5 days
Road Removal & Site Restoration	5 days
Wetland Mitigation	35 days
Demob	5 days
	80 days
or	16 Weeks
or	4 Month

Annual Cost

Yearly Site Inspection/Visit for LUCs implementation (1 person)

Assume in town travel to site.

Car	$100	
Hours	$1,200	(16 hours * $75/hr)
Misc	$150	
	$1,450	

Annual Report: Document site visit $800

Cover Maintenance

General maintenance (mowing) to be conducted by Subase.

Every 3 years, topsoil and reseeding part of the cover.

Subcontractor Mob/demob	$500
Soil & seed	$2,500
	$3,000
G & A, Fees, etc.	$600
	$3,600

Wetland Maintenance (year 1, 2, & 3)

Assume maintenance is 20% of installation cost for year 1 & 10% for years 2 & 3.

	year 1	years 2 & 3
Subcontractor Mob/demob	$1,500	$1,500
Wetland reseeding	$9,030	$4,515
	$10,530	$6,015
G & A, Fees, etc.	$2,106	$1,203
	$12,636	$7,218

Wetland Delineation (year 3)

	$9,500
G & A, Fees, etc.	$1,900
	$11,400

CLIENT: NAVAL SUBMARINE BASE NEW LONDON			JOB NUMBER: 112G02625 - FS.DF
SUBJECT: Area A Wetland Cost Assumptions			
BASED ON:			DRAWING NUMBER:
BY:	TJR	CHECKED BY:	APPROVED BY: DATE:
Date:	4-2010	Date: 5/14/10	

Sampling
Labor & Materials, collect 5 sediment samples
Assume 1 day to sample with 2 people, local plus 1 day of preparations

2 people @ $70.00 per hour for 10 hours per for 3 days =	$2,800
car for 2 days =	$200
report @ $65.00 per hour for 20 hours =	$1,300
IDW disposal =	$250
Misc supplies, copying, etc. =	$400
	$4,950

Analytical, per round for 30 years
Collect 5 sediment samples and analyze for PAHs, PCBs, DDT, DDD, DDE, & metals

type	cost each	number	total
PAHs	$150	5	$750
PCBs	$80	5	$400
DDT, DDD, DDE	$100	5	$500
metals	$130	5	$650
			$2,300
40% QA/QC & Data Validation			$920
			$3,220

Sampling report assume $1,500 per round $1,500

5-year review: assume $23,000

Alternative 3 - Excavation, Off-Site Disposal, and Restoration

Capital Cost

Haul Road
Clear for road: 700 lf by 20 ft wide = 14,000 sf or 1,560 sy
Road: 1,300 lf by 15 ft wide = 19,500 sf or 2,170 sy
Gravel: 19,500 sf by 8" deep = 480 cy or 720 tons

Dewatering Pad
Pad 100' by 100' = 10,000 sf
Assume 5,000 gallons of water from pad for treatment

Excavation
Excavate 3,240 cy
Load onto off-road trucks and haul to material handling pad
Assume 25% is wet excavation
Mix wet material with 5% drying material

CLIENT: NAVAL SUBMARINE BASE NEW LONDON			JOB NUMBER: 112G02625 - FS.DF
SUBJECT: Area A Wetland Cost Assumptions			
BASED ON:			DRAWING NUMBER:
BY: TJR Date: 4-2010		CHECKED BY: TJR Date: 5/14/10	APPROVED BY: DATE:

3,240 cy
25%
810 cy
5%
41 cy or
1,028 cwt (100 pounds)

Total Disposed Material
3,240 cy
41 cy
3,281 cy or
4,921 ton (1.5 tons per cy)

Site Restoration

Remove haul road & dispose as Subtitle D: 720 tons

Reseed haul road
19,500 sf or
20 msf

Backfill excavation: 18" of common fill & 6" topsoil
common fill 2,430 cy
topsoil 810 cy

Seed Wetland: 1.3 acres

Time to complete work

Mob & Setup	5 days
Clear & Install Road	10 days
Excavation & Haul	15 days
Backfill	5 days
Road Removal & Site Restoration	5 days
Wetlands Replacement	5 days
Demob	5 days
	50 days
or	10 Weeks
or	3 Month

CLIENT: NAVAL SUBMARINE BASE NEW LONDON			JOB NUMBER: 112G02625 - FS.DF
SUBJECT: Area A Wetland Cost Assumptions			
BASED ON:			DRAWING NUMBER:
BY: TJR Date: 4-2010		CHECKED BY: Date: 5/14/10	APPROVED BY: DATE:

Annual Cost

Wetland Maintenance (year 1, 2, & 3)

Assume maintenance is 20% of installation cost for year 1 & 10% for years 2 & 3.

	year 1	years 2 & 3
Subcontractor Mob/demob	$1,500	$1,500
Wetland reseeding	$4,530	$2,280
	$6,030	$3,780
G & A, Fees, etc.	$1,206	$756
	$7,236	$4,536

Wetland Delineation (year 3)

	$9,500
G & A, Fees, etc.	$1,900
	$11,400

5-year review: assume $23,000

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 1: No Action
Annual Cost

3/17/2010 11:47 AM

Item	Item Cost every 5 years	Notes
Five-Year Review	$23,000	
Subtotal	$23,000	
Contingency @ 10%	$2,300	
TOTAL	**$25,300**	

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 1: No Action
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.7%	Present Worth
0	$0		$0	1.000	$0
1			$0	0.974	$0
2			$0	0.948	$0
3			$0	0.923	$0
4			$0	0.899	$0
5		$25,300	$25,300	0.875	$22,145
6			$0	0.852	$0
7			$0	0.830	$0
8			$0	0.808	$0
9			$0	0.787	$0
10		$25,300	$25,300	0.766	$19,383
11			$0	0.746	$0
12			$0	0.726	$0
13			$0	0.707	$0
14			$0	0.689	$0
15		$25,300	$25,300	0.671	$16,965
16			$0	0.653	$0
17			$0	0.636	$0
18			$0	0.619	$0
19			$0	0.603	$0
20		$25,300	$25,300	0.587	$14,849
21			$0	0.572	$0
22			$0	0.556	$0
23			$0	0.542	$0
24			$0	0.528	$0
25		$25,300	$25,300	0.514	$12,997
26			$0	0.500	$0
27			$0	0.487	$0
28			$0	0.474	$0
29			$0	0.462	$0
30		$25,300	$25,300	0.450	$11,376
				TOTAL PRESENT WORTH	**$97,716**

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 2: Soil Cover with LUCs
Capital Cost

5/13/2010 2:01 PM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Construction/Work Plans	300	hr			$37.00		$0	$0	$11,100	$0	$11,100
1.2 Prepare LUC Documents	200	hr			$37.00		$0	$0	$7,400	$0	$7,400
2 MOBILIZATION, DEMOBILIZATION AND FIELD SUPPORT											
2.1 Office Trailer	4	mo				$375.00	$0	$0	$0	$1,500	$1,500
2.2 Storage Trailer (2)	4	mo				$99.00	$0	$0	$0	$396	$396
2.3 Field Office Support	4	mo		$85.00		$155.00	$0	$340	$0	$620	$960
2.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500
2.5 Site Utilities	4	mo	$230.00				$920	$0	$0	$0	$920
2.6 Underground Utility Clearances	1	ls	$7,350.00				$7,350	$0	$0	$0	$7,350
2.7 Construction Survey Support	7	day	$1,050.00				$7,350	$0	$0	$0	$7,350
2.8 Equipment Mobilization/Demobilization	9	ea			$170.00	$522.00	$0	$0	$1,530	$4,698	$6,228
2.9 Site Superintendent	80	day		$162.00	$375.00		$0	$12,960	$30,000	$0	$42,960
2.10 Site Health & Safety and QA/QC	80	day		$162.00	$355.00		$0	$12,960	$28,400	$0	$41,360
2.11 Wetland Delineation	1	ls	$9,500.00				$9,500	$0	$0	$0	$9,500
3 DECONTAMINATION											
3.1 Decontamination Services	2	mo		$1,250.00	$2,350.00	$1,550.00	$0	$2,500	$4,700	$3,100	$10,300
3.2 Equipment Decon Pad	1	ls		$4,500.00	$3,000.00	$725.00	$0	$4,500	$3,000	$725	$8,225
3.3 Decon Water	2,000	gal		$0.20			$0	$400	$0	$0	$400
3.4 Decon Water Storage Tank, 6,000 gallon	2	mo				$784.00	$0	$0	$0	$1,568	$1,568
3.5 Clean Water Storage Tank, 4,000 gallon	2	mo				$705.00	$0	$0	$0	$1,410	$1,410
3.6 Disposal of Decon Waste (liquid & solid)	2	mo	$1,085.00				$2,170	$0	$0	$0	$2,170
4 SITE PREPARATION											
4.1 Clear & Grub: Dozer	10	day			$330.80	$682.00	$0	$0	$3,308	$6,820	$10,128
4.2 Clear & Grub: Chipper	10	day			$225.60	$312.40	$0	$0	$2,256	$3,124	$5,380
4.3 Clear & Grub: Labor (3)	30	day			$309.60		$0	$0	$9,288	$0	$9,288
4.4 Haul Road, Gravel	2,170	sy		$9.95	$2.59	$0.48	$0	$21,592	$5,620	$1,042	$28,253
4.5 Haul Road, Geotextile	2,170	sy		$1.45			$0	$3,147	$0	$0	$3,147
4.6 Temporary Stream Crossing, 24" HDPE	60	lf		$19.20			$0	$1,152	$0	$0	$1,152
5 SOIL COVER											
5.1 Geotextile	6,310	sy		$1.45			$0	$9,150	$0	$0	$9,150
5.2 Common Fill	3,155	cy		$12.50			$0	$39,438	$0	$0	$39,438
5.3 Topsoil	1,050	cy		$22.50			$0	$23,625	$0	$0	$23,625
5.4 Dump Trucks, off road (2 each)	30	day			$334.00	$1,280.00	$0	$0	$10,020	$38,400	$48,420
5.5 Dozer	15	day			$416.88	$682.00	$0	$0	$6,253	$10,230	$16,483
5.6 Front End Loader, 5 cy	15	day			$854.40	$406.24	$0	$0	$12,816	$6,094	$18,910
5.7 Labor (3)	45	day			$309.60		$0	$0	$13,932	$0	$13,932
5.8 Seed/Mulch Cover	57	msf	$75.50				$4,304	$0	$0	$0	$4,304
6 SITE RESTORATION											
6.1 Excavator, 2 cy	5	day			$422.96	$1,182.00	$0	$0	$2,115	$5,910	$8,025
6.2 Dozer	5	day			$416.88	$682.00	$0	$0	$2,084	$3,410	$5,494
6.3 Dump Truck, off road	5	day			$334.00	$1,280.00	$0	$0	$1,670	$6,400	$8,070
6.4 Labor (3)	15	day			$309.60		$0	$0	$4,644	$0	$4,644
6.5 Off Site Disposal, Support Facilities Material	720	ton	$35.00				$25,200	$0	$0	$0	$25,200
6.6 Reseed/Mulch Support Areas	20	msf	$75.50				$1,510	$0	$0	$0	$1,510
7 MONITORING WELLS											
7.1 DPT Mobilization/Demobilization	1	ea	$2,000.00				$2,000	$0	$0	$0	$2,000
7.2 Well Removal, 2" PVC, 3 wells, 10' deep	30	lf	$6.00				$180	$0	$0	$0	$180
7.3 IDW Disposal	1	drum	$165.00				$165	$0	$0	$0	$165

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 2: Soil Cover with LUCs
Capital Cost

5/13/2010 2:01 PM

Item	Quantity	Unit	Unit Cost Subcontract	Material	Labor	Equipment	Extended Cost Subcontract	Material	Labor	Equipment	Subtotal
8 WETLAND MITIGATION											
8.1 Excavator, 2 cy	35	day			$422.96	$1,182.00	$0	$0	$14,804	$41,370	$56,174
8.2 Dozer	35	day			$416.88	$682.00	$0	$0	$14,591	$23,870	$38,461
8.3 Labor	35	day			$309.60		$0	$0	$10,836	$0	$10,836
8.4 Haul Excavated Soil, 10 miles R/T	16,800	cy			$1.40	$3.27	$0	$0	$23,520	$54,936	$78,456
8.5 Topsoil & Vegetation, non-tidal wetland	2.6	ac	$17,300.00				$44,980	$0	$0	$0	$44,980
9 POST CONSTRUCTION COST											
9.1 Contractor Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
9.2 Remedial Action Closeout Report	200	hr			$37.00		$0	$0	$7,400	$0	$7,400
Subtotal							$107,129	$131,762	$225,737	$215,622	$680,250
Overhead on Labor Cost @ 30%									$67,721		$67,721
G & A on Labor, Material, Equipment, & Subs Cost @ 10%							$10,713	$13,176	$22,574	$21,562	$68,025
Tax on Materials and Equipment Cost @ 6%								$7,906		$12,937	$20,843
Total Direct Cost							$117,841	$152,844	$316,032	$250,122	$836,839
Indirects on Total Direct Cost @ 30%											$251,052
Profit on Total Direct Cost @ 10%											$83,684
Subtotal											$1,171,575
Health & Safety Monitoring @ 1%											$11,716
Total Field Cost											$1,183,290
Contingency on Total Field Costs @ 25%											$295,823
Engineering Services: Predesign Investigation $75,000											$75,000
Engineering on Total Field Cost @ 10%											$118,329
TOTAL CAPITAL COST											**$1,672,442**

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 2: Soil Cover with LUCs
Annual Cost

5/13/2010 2:01 PM

Item	Item Cost Year 1	Item Cost Year 2	Item Cost Year 3	Item Cost Years 4- 30	Item Cost every 3 years	Item Cost every 5 years	Notes
Yearly Site Inspection (LUCs)	$1,450	$1,450	$1,450	$1,450			One-day visit to verify LUCs
Site Inspection: Report	$800	$800	$800	$800			
Cover Maintenance					$3,600		Labor, equipment, & materials to repair cover every 3 years.
Wetlands Maintenance	$12,636	$7,218	$7,218				Labor, equipment, & materials to maintain wetland years 1, 2, & 3.
Wetland Delineation			$11,400				
Sampling	$4,950	$4,950	$4,950	$4,950			Labor and supplies to collect samples using a crew of two, once a year for years 1 through 30.
Analysis Sediment	$3,220	$3,220	$3,220	$3,220			Analyze samples for PAHs, PCBs, DDT, DDD, DDE, and metals.
Sampling Report	$1,500	$1,500	$1,500	$1,500			
Five-Year Review						$23,000	
Subtotal	$24,556	$19,138	$30,538	$11,920	$3,600	$23,000	
Contingency @ 10%	$2,456	$1,914	$3,054	$1,192	$360	$2,300	
TOTAL	**$27,012**	**$21,052**	**$33,592**	**$13,112**	**$3,960**	**$25,300**	

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 2: Soil Cover with LUCs
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.7%	Present Worth
0	$1,672,442		$1,672,442	1.000	$1,672,442
1		$27,012	$27,012	0.974	$26,301
2		$21,052	$21,052	0.948	$19,959
3		$37,552	$37,552	0.923	$34,667
4		$13,112	$13,112	0.899	$11,787
5		$38,412	$38,412	0.875	$33,621
6		$17,072	$17,072	0.852	$14,550
7		$13,112	$13,112	0.830	$10,881
8		$13,112	$13,112	0.808	$10,595
9		$17,072	$17,072	0.787	$13,432
10		$38,412	$38,412	0.766	$29,428
11		$13,112	$13,112	0.746	$9,781
12		$17,072	$17,072	0.726	$12,400
13		$13,112	$13,112	0.707	$9,274
14		$13,112	$13,112	0.689	$9,030
15		$42,372	$42,372	0.671	$28,413
16		$13,112	$13,112	0.653	$8,561
17		$13,112	$13,112	0.636	$8,336
18		$17,072	$17,072	0.619	$10,569
19		$13,112	$13,112	0.603	$7,904
20		$38,412	$38,412	0.587	$22,545
21		$17,072	$17,072	0.572	$9,757
22		$13,112	$13,112	0.556	$7,297
23		$13,112	$13,112	0.542	$7,105
24		$17,072	$17,072	0.528	$9,007
25		$38,412	$38,412	0.514	$19,734
26		$13,112	$13,112	0.500	$6,559
27		$17,072	$17,072	0.487	$8,315
28		$13,112	$13,112	0.474	$6,219
29		$13,112	$13,112	0.462	$6,055
30		$42,372	$42,372	0.450	$19,053
				TOTAL PRESENT WORTH	**$2,103,579**

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 3: Excavation, Off-Site Disposal, and Restoration
Capital Cost

5/10/2010 10:13 AM

Item	Quantity	Unit	Unit Cost				Extended Cost				
			Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Construction/Work Plans	300	hr			$37.00		$0	$0	$11,100	$0	$11,100
1.2 Prepare LUC Documents	200	hr			$37.00		$0	$0	$7,400	$0	$7,400
2 MOBILIZATION, DEMOBILIZATION AND FIELD SUPPORT											
2.1 Office Trailer	3	mo				$375.00	$0	$0	$0	$1,125	$1,125
2.2 Storage Trailer (2)	3	mo				$99.00	$0	$0	$0	$297	$297
2.3 Field Office Support	3	mo		$85.00		$155.00	$0	$255	$0	$465	$720
2.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500
2.5 Site Utilities	3	mo	$230.00				$690	$0	$0	$0	$690
2.6 Underground Utility Clearances	1	ls	$7,350.00				$7,350	$0	$0	$0	$7,350
2.7 Construction Survey Support	7	day	$1,050.00				$7,350	$0	$0	$0	$7,350
2.8 Equipment Mobilization/Demobilization	9	ea			$170.00	$522.00	$0	$0	$1,530	$4,698	$6,228
2.9 Site Superintendent	50	day		$162.00	$375.00		$0	$8,100	$18,750	$0	$26,850
2.10 Site Health & Safety and QA/QC	50	day		$162.00	$355.00		$0	$8,100	$17,750	$0	$25,850
2.11 Wetland Delineation	1	ls	$9,500.00				$9,500	$0	$0	$0	$9,500
3 DECONTAMINATION											
3.1 Decontamination Services	2	mo		$1,250.00	$2,350.00	$1,550.00	$0	$2,500	$4,700	$3,100	$10,300
3.2 Equipment Decon Pad	1	ls		$4,500.00	$3,000.00	$725.00	$0	$4,500	$3,000	$725	$8,225
3.3 Decon Water	2,000	gal		$0.20			$0	$400	$0	$0	$400
3.4 Decon Water Storage Tank, 6,000 gallon	2	mo				$784.00	$0	$0	$0	$1,568	$1,568
3.5 Clean Water Storage Tank, 4,000 gallon	2	mo				$705.00	$0	$0	$0	$1,410	$1,410
3.6 Disposal of Decon Waste (liquid & solid)	2	mo	$1,085.00				$2,170	$0	$0	$0	$2,170
4 SITE PREPARATION											
4.1 Clear & Grub: Dozer	10	day			$330.80	$682.00	$0	$0	$3,308	$6,820	$10,128
4.2 Clear & Grub: Chipper	10	day			$225.60	$312.40	$0	$0	$2,256	$3,124	$5,380
4.3 Clear & Grub: Labor (3)	30	day			$309.60		$0	$0	$9,288	$0	$9,288
4.4 Haul Road, Gravel	2,170	sy		$9.95	$2.59	$0.48	$0	$21,592	$5,620	$1,042	$28,253
4.5 Haul Road, Geotextile	2,170	sy		$1.45			$0	$3,147	$0	$0	$3,147
4.6 Temporary Stream Crossing, 24" HDPE	60	lf		$19.20			$0	$1,152	$0	$0	$1,152
5 EXCAVATION											
5.1 Excavator, 2 cy	15	day			$422.96	$1,182.00	$0	$0	$6,344	$17,730	$24,074
5.2 Dozer	15	day			$416.88	$682.00	$0	$0	$6,253	$10,230	$16,483
5.3 Labor (3)	45	day				$309.60	$0	$0	$0	$13,932	$13,932
5.4 Dump Trucks, off road (2 each)	30	day			$334.00	$1,280.00	$0	$0	$10,020	$38,400	$48,420
5.5 Drying Material, portland cement	1,028	cwt		$6.95			$0	$7,145	$0	$0	$7,145
6 OFF-SITE DISPOSAL											
6.1 Dewatering Pad, 100' by 100'	10,000	sf		$4.51	$0.42	$1.14	$0	$45,100	$4,200	$11,400	$60,700
6.2 Off Site Disposal, Dewatering Liquid	5,000	gal	$1.85				$9,250	$0	$0	$0	$9,250
6.3 Front End Loader, 5 cy	15	day			$854.40	$406.24	$0	$0	$12,816	$6,094	$18,910
6.4 Off Site Disposal, Subtitle D Material	4,921	ton	$48.80				$240,145	$0	$0	$0	$240,145
6.5 Characterization Sampling	6	ea	$285.00	$15.00	$30.00	$30.00	$1,710	$90	$180	$180	$2,160
7 SITE RESTORATION											
7.1 Excavator, 2 cy	10	day			$422.96	$1,182.00	$0	$0	$4,230	$11,820	$16,050
7.2 Dozer	10	day			$416.88	$682.00	$0	$0	$4,169	$6,820	$10,989
7.3 Dump Truck, off road	10	day			$334.00	$1,280.00	$0	$0	$3,340	$12,800	$16,140
7.4 Labor (3)	30	day				$309.60	$0	$0	$0	$9,288	$9,288
7.5 Off Site Disposal, Support Facilities Material	720	ton	$48.80				$35,136	$0	$0	$0	$35,136
7.6 Common Fill	2,430	cy		$12.50			$0	$30,375	$0	$0	$30,375
7.7 Topsoil	810	cy		$22.50			$0	$18,225	$0	$0	$18,225
7.8 Reseed/Mulch Support Areas	20	msf	$75.50				$1,510	$0	$0	$0	$1,510

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 3: Excavation, Off-Site Disposal, and Restoration
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
8 WETLAND REPLACEMENT											
8.1 Excavator, 2 cy	5	day			$422.96	$1,182.00	$0	$0	$2,115	$5,910	$8,025
8.2 Dozer	5	day			$416.88	$682.00	$0	$0	$2,084	$3,410	$5,494
8.3 Labor	5	day			$309.60		$0	$0	$1,548	$0	$1,548
8.4 Topsoil & Vegetation, non-tidal wetland	1.3	ac	$17,300.00				$22,490	$0	$0	$0	$22,490
9 MONITORING WELLS											
9.1 DPT Mobilization/Demobilization	1	ea	$2,000.00				$2,000	$0	$0	$0	$2,000
9.2 Well Removal, 2" PVC, 3 wells, 10' deep	30	lf	$6.00				$180	$0	$0	$0	$180
9.3 IDW Disposal	1	drum	$165.00				$165	$0	$0	$0	$165
10 POST CONSTRUCTION COST											
10.1 Contractor Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
10.2 Remedial Action Closeout Report	200	hr			$37.00		$0	$0	$7,400	$0	$7,400
Subtotal							$341,146	$150,680	$143,852	$172,387	$808,064
Overhead on Labor Cost @ 30%									$43,155		$43,155
G & A on Labor, Material, Equipment, & Subs Cost @ 10%							$34,115	$15,068	$14,385	$17,239	$80,806
Tax on Materials and Equipment Cost @ 6%								$9,041		$10,343	$19,384
Total Direct Cost							$375,260	$174,788	$201,392	$199,969	$951,410
Indirects on Total Direct Cost @ 30% (excluding transportation and disposal cost)											$199,363
Profit on Total Direct Cost @ 10%											$95,141
Subtotal											$1,245,914
Health & Safety Monitoring @ 1%											$12,459
Total Field Cost											$1,258,373
Contingency on Total Field Costs @ 25%											$314,593
Engineering Services: Predesign Investigation $75,000											$75,000
Engineering on Total Field Cost @ 10%											$125,837
TOTAL CAPITAL COST											**$1,773,804**

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 3: Excavation, Off-Site Disposal, and Restoration
Annual Cost

5/10/2010 10:13 AM

Item	Item Cost Year 1	Item Cost Year 2	Item Cost Year 3	Item Cost every 5 years	Notes
Wetlands Maintenance	$7,236	$4,536	$4,536		Labor, equipment, & materials to maintain wetland years 1, 2, & 3.
Wetland Delineation			$11,400		
Five-Year Review				$23,000	
Subtotal	$7,236	$4,536	$15,936	$23,000	
Contingency @ 10%	$724	$454	$1,594	$2,300	
TOTAL	**$7,960**	**$4,990**	**$17,530**	**$25,300**	

NAVAL SUBMARINE BASE NEW LONDON
Groton, Connecticut
Area A Wetland
Alternative 3: Excavation, Off-Site Disposal, and Restoration
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.7%	Present Worth
0	$1,773,804		$1,773,804	1.000	$1,773,804
1		$7,960	$7,960	0.974	$7,750
2		$4,990	$4,990	0.948	$4,731
3		$17,530	$17,530	0.923	$16,183
4			$0	0.899	$0
5		$25,300	$25,300	0.875	$22,145
6			$0	0.852	$0
7			$0	0.830	$0
8			$0	0.808	$0
9			$0	0.787	$0
10		$25,300	$25,300	0.766	$19,383
11			$0	0.746	$0
12			$0	0.726	$0
13			$0	0.707	$0
14			$0	0.689	$0
15		$25,300	$25,300	0.671	$16,965
16			$0	0.653	$0
17			$0	0.636	$0
18			$0	0.619	$0
19			$0	0.603	$0
20		$25,300	$25,300	0.587	$14,849
21			$0	0.572	$0
22			$0	0.556	$0
23			$0	0.542	$0
24			$0	0.528	$0
25		$25,300	$25,300	0.514	$12,997
26			$0	0.500	$0
27			$0	0.487	$0
28			$0	0.474	$0
29			$0	0.462	$0
30		$25,300	$25,300	0.450	$11,376
				TOTAL PRESENT WORTH	**$1,900,184**