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FINAL SITE MANAGEMENT PLAN WITH TRANSMITTAL NSB NEW LONDON CT  
10/22/2012  
RESOLUTION CONSULTANTS

October 22, 2012

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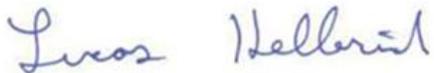
Subject: Final Site Management Plan (SMP)  
NSB New London, CT  
Contract No. N62470-11-8013, CTO WE13

Dear Mr. O'Connor:

Resolution Consultants has prepared the enclosed CD and hard copy Final SMP for the Naval Submarine Base, New London, CT (NSB – NLON). Electronic and hard copies of this document have also been sent to the individuals listed below.

Any questions regarding this correspondence should be directed to Ms. Michelle Snyder, Task Order Manager, at 978-905-2409, or Mr. Lucas Hellerich, Activity Coordinator, at 860-263-5783. Thank you.

Sincerely,



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Activity Coordinator, NSB NLON

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**SITE MANAGEMENT PLAN FOR  
NAVAL SUBMARINE BASE – NEW LONDON  
GROTON, CONNECTICUT**

**REV 00**

**Prepared for:**



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**Comprehensive Long-Term Environmental Action Navy  
Contract Number N62470-11-D-8013**

**CTO WE13**

**Prepared by:**



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**October 22, 2012**

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## List of Acronyms and Abbreviations

µg/kg	Microgram per kilogram
µg/L	Microgram per liter
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
AS	Air sparging
Atlantic	Atlantic Environmental Services, Inc.
AVS	Acid volatile sulfide
AWQC	Ambient Water Quality Criterion
B&RE	Brown & Root Environmental
BERA	Baseline Ecological Risk Assessment
BGOURI	Basewide Groundwater Operable Unit RI
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CBU	Construction Battalion Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIF	Controlled Industrial Facility
CIP	Community Involvement Plan
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of concern
COPC	Contaminant of potential concern
CTDEEP	Connecticut Department of Energy and Environmental Protection
CTO	Contract Task Order
DDD	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane
DDE	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene
DDT	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
DDTR	Total DDT isomers (DDT, DDD, and DDE)

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DGI	Data gap investigation
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
ECC	Environmental Chemical Corporation
EE/CA	Engineering Evaluation/Cost Analysis
Envirodyne	Envirodyne Engineers, Inc.
ER	Environmental Restoration
ESD	Explanation of Significant Difference
ESQD	Explosive Safety Quantity Distance
FFA	Federal Facility Agreement
FFS	Focused FS
FS	Feasibility Study
FWEC	Foster Wheeler Environmental Corporation
GMR	Groundwater Monitoring Report
GZA	Goldberg-Zoino & Associates
H&S	H&S Environmental, Inc.
HHRA	Human Health Risk Assessment
HI	Hazard Index
HNUS	Halliburton NUS
HQ	Hazard Quotient
IAG	Interagency Agreement
IAS	Initial Assessment Study
ICR	Incremental Cancer Risk
IR	Installation Restoration
LIR	Landfill Inspection Report
LNAPL	Light non-aqueous phase liquid

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LTMgt	Long-Term Management
LUC	Land Use Control
MCL	Maximum Concentration Level
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
MWR	Morale, Welfare, and Recreation
NACIP	Naval Assessment and Control of Installation Pollutants
NAVFAC	Naval Facilities Engineering Command
NEESA	Naval Energy and Environmental Support Activity
NESO	Naval Environmental Support Office
NEX	Naval Exchange
NFA	No Further Action
NFESC	Naval Facilities Engineering Service Center
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NSA	New Source Area
NSB-NLON	Naval Submarine Base - New London
NTCRA	Non-time-critical removal action
O&M	Operations and maintenance
OBDA	Overbank Disposal Area
OBDA NE	Overbank Disposal Area Northeast
OHM	OHM Remediation Services Corp.
OU	Operable Unit
OVA	Organic vapor analyzer
PA	Preliminary Assessment
PAH	Polynuclear aromatic hydrocarbon

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PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
PDI	Pre-Design Investigation
PRG	Preliminary remediation goal
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RA-C	Remedial Action - Construction
RAB	Restoration Advisory Board
RAC	Remedial Action Contractor
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RG	Remedial goal
RI	Remedial Investigation
RIP	Remedy in Place
RME	Reasonable maximum exposure
RSR	Remediation Standard Regulations (Connecticut)
ROD	Record of Decision
SAIC	Science Application International Corporation
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SASDA	Spent Acid Storage and Disposal Area
SASE	Site Assessment Screening Evaluation

SC	Site Closeout
SDI	Specialty Devices, Inc
SEM	Simultaneously extracted metals
SI	Site Inspection
SIAS	Supplement to the Initial Assessment Study
SMP	Site Management Plan
Sovereign	Sovereign Consulting, Inc.
SOPA	Standard Operating Procedure - Administrative
SVE	Soil vapor extraction
SVOC	Semivolatile organic compound
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCRA	Time-critical removal action
TIE	Toxicity Identification Evaluation
TPH	Total petroleum hydrocarbons
Tetra Tech EC	Tetra Tech EC, Inc.
Tetra Tech	Tetra Tech NUS, Inc.
USEPA	United States Environmental Protection Agency
UST	Underground storage tank
VOC	Volatile organic compound
Wehran	Wehran Engineering, Inc.

## **1.0 INTRODUCTION**

This Site Management Plan (SMP) for the Naval Submarine Base - New London (NSB-NLON), Groton, Connecticut, was prepared for the United States Department of the Navy by Resolution Consultants under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract, Contract Number N62470-11-D-8013, Contract Task Order (CTO) WE13. Please refer to Figure 1-1 of Appendix B for a Facility Location Map. The SMP serves as a management tool for planning, reviewing, and setting priorities for environmental investigative and remedial response activities to be conducted at NSB-NLON under the Navy's Installation Restoration (IR) Program, now part of the Environmental Restoration Program (ER) (Navy, 2006a). Ultimately, the SMP serves as the schedule for implementation of the IR Program at NSB-NLON. The SMP is updated regularly to revise priorities and schedules of activities as additional information (including funding availability) becomes available.

This version of the SMP presents the rationale for the sequence of future investigation and remediation activities and the estimated schedule for completion of these activities, with detailed schedules presented through Fiscal Year 2016. The use of an SMP allows for adjustment of scheduled activities for reasons such as federal budgetary constraints, changes in scope of investigation/remediation activities, or other unanticipated events. A Federal Facility Agreement (FFA) has been developed for NSB-NLON that establishes the roles and responsibilities of the Navy, United States Environmental Protection Agency (USEPA), and State of Connecticut Department of Energy and Environmental Protection (CTDEEP) and serves as an Interagency Agreement (IAG) for the completion of all necessary investigation and remedial actions at NSB-NLON (USEPA, 1995). Prior to July 1, 2011, the CTDEEP was known as the Connecticut Department of Environmental Protection (CTDEP) and therefore was referenced as such in previous Site documents.

The FFA provides durations for specific process activities. The FFA durations are presented in Appendix A (Table 1-1), and a description of the information contained in Table 1-1 is presented in Section 3.0.

### **1.1 Site Management Plan Sites**

Although various site designation numbers have been used in the past, an updated site designation list has been established for NSB-NLON. These designations were originally defined during the Phase II RI and have been used during subsequent activities, including this SMP. The site number does not imply that the site is an Area of Concern (AOC). The following sites are addressed in this SMP (see Figure 1-2 in Appendix B):

- 
- Site 1 - Former CBU Drum Storage Area
  - Site 2 - Area A Landfill and Area A Wetland
  - Site 3 - Area A Downstream Water Courses/OBDA Pond and Former OBDA
  - Site 4 - Former Rubble Fill Area at Bunker A-86
  - Site 6 - Former DRMO
  - Site 7 - Torpedo Shops
  - Site 8 - Goss Cove Landfill
  - Site 9 - Former Oily Wastewater Tank (OT-5)
  - Site 10 - Lower Subbase - Fuel Storage Tanks and Former Tank 54-H
  - Site 11 - Lower Subbase - Power Plant Oil Tanks
  - Site 13 - Lower Subbase - Building 79 Former Waste Oil Pit
  - Site 14 - OBDANE
  - Site 15 - Former SASDA
  - Site 16 - Former Hospital Incinerators
  - Site 17 - Lower Subbase - Former Hazardous Materials/Solvent Storage Area (Former Building 31)
  - Site 18 - Solvent Storage Area (Building 33)
  - Site 19 - Lower Subbase - Former Solvent Storage Area (Former Building 316)
  - Site 20 - Area A Weapons Center
  - Site 21 - Lower Subbase - Berth 16
  - Site 22 - Lower Subbase - Pier 33
  - Site 23 - Former Fuel Farm
  - Site 24 - Lower Subbase - Central Paint Accumulation Area (Building 174)
  - Site 25 - Lower Subbase - Former Classified Materials Incinerator

Site 5 (Hazardous Waste Storage Facility at Bunker A-85) is not addressed in this SMP because activities at the site were conducted under the Resource Conservation and Recovery Act (RCRA) Part A Permit for NSB-NLON. Site 12 (Building 428 Gas Tanks) is also not addressed in this SMP because it is not a CERCLA site and was evaluated under the CTDEEP's Underground Storage Tank (UST) Program.

Soil and groundwater at Site 23 (Former Fuel Farm) are addressed in Section 2.0 of this SMP. However, the soil was investigated and remediated under CTDEEP's UST Program and is not discussed in subsequent sections of this SMP. Groundwater at Site 23 was investigated under

CERCLA as part of the BGOURI and is included in this SMP. The groundwater at Site 9, which is located within Site 23, is being collectively investigated with the Site 23 groundwater.

Medium-specific Operable Units (OUs) have been defined for IR Program sites, as listed in Table 1-2.

Because of the investigations and remedial actions completed at NSB-NLON under the IR Program, the sites are in various phases of the Site Closeout process [e.g., NFA, Remedy in Place (RIP), Response Complete (RC), or Site Closeout (SC)]. An RIP determination requires that remedial action construction (RA-C) be complete for a site and that the remedy is functioning as designed.

An RC designation signifies that cleanup goals have been met. Sites classified as RC are those for which a DoD component deems that NFA is required, with the possible exception of long-term management (LTMgt). An RC determination requires that one of the following apply: (1) there is no evidence that contaminants were released at the site, (2) no contaminants were detected at the site other than at background concentrations, (3) contaminants attributable to the site are less than action levels used for risk screening, (4) the results of a baseline risk assessment demonstrate that cumulative risks posed by the site are less than established thresholds, or (5) removal and/or RAOs at a site have been implemented, completed, and are the final action for the site. Activities for LTMgt include operations, maintenance, and monitoring. An SC determination signifies that the remedy is protective of human health and the environment, no restrictions on future land use are needed, and no additional funds are expected to be expended. The Site Closeout phase for each IR Program site is provided in Table 1-2.

TABLE 1-2

SITE CLOSEOUT STATUS OF IR PROGRAM SITES  
 2012 SITE MANAGEMENT PLAN  
 NSB-NLON, GROTON, CONNECTICUT  
 PAGE 1 OF 4

Site/Zone	Medium	Operable Unit	Latest Core Document Completed	Milestones Completed	Core Documents Needed	Current Phase	Comments
Site 1 – Former CBU Drum Storage Area <sup>(1)</sup>	Soil	OU1	LUC RD, NFA DD	RC	None	NA	
Site 2A – Area A Landfill	Soil	OU1	CCR	RC	LUC RD, RACR <sup>(2)</sup>	LTMgt	Will not achieve SC.
	Groundwater	OU1, OU9	RACR, LUC RD	RC	None	LTMgt	Might not achieve SC.
Site 2B - Area A Wetland	Wetland Sediment	OU9, OU12	ROD, LUC RD	ROD	RACR	PDI, RD	Might not achieve SC.
Site 3 – Area A Downstream Watercourses and Former OBDA	ROD Soil and Sediment	OU3	CCR	RC	RACR <sup>(2)</sup>	NA	Will not achieve SC.
	ESD Soil and Sediment	OU3	CCR	RC	LUC RD, RACR <sup>(2)</sup>	LTMgt	Will not achieve SC.
	Former OBDA	OU3	CCR	RC	RACR <sup>(2)</sup>	NA	Will be SC after RACR.
	NSA Soil	OU3	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	Completed under CTDEEP RSRs.
	Groundwater	OU9	RACR, LUC RD	RIP	None	RA-O	Might not achieve SC.
Site 4 – Former Rubble Fill at Bunker A-86	Soil	OU10	NFA ROD	RC, SC	None	NA	
Site 6 – Former DRMO	Soil	OU2	RACR <sup>(4)</sup>	RC	LUC RD, RACR	LTMgt	Will not achieve SC.
	Groundwater	OU2	RACR <sup>(4)</sup>	RC	LUC RD, RACR	LTMgt	Might not achieve SC.
Site 7 – Torpedo Shops	Soil	OU8	CCR	RC, SC	RACR <sup>(2)</sup>	NA	
	Groundwater	OU9	RACR	RC, SC	None	NA	
Site 8 – Goss Cove Landfill	Soil	OU5	CCR	RC	LUC RD, RACR <sup>(2)</sup>	LTMgt	Will not achieve SC.
	Sediment	OU5	NFA ROD	SC	None	SC	
	Surface Water	OU5	NFA PRAP <sup>(5)</sup>	SC	None	SC	
	Groundwater	OU5	CCR	RC	LUC RD, RACR <sup>(2)</sup>	LTMgt	Might not achieve SC.
Site 9 – Former Oily Wastewater Tank OT-5 <sup>(6)</sup>	Soil	NA	NA	NA	None under CERCLA <sup>(8)</sup>	NA	Additional work under CTDEEP RSRs.
	Groundwater	OU9	RACR, LUC RD	RC	None	NA	Might not achieve SC.
Site 10/Zone 1 – Lower Subase – Fuel Storage Tanks and Former Tank 54-H	Soil	OU4	ROD	ROD	LUC RD, GMP, RACR	RD, LUC RD	Additional work under CTDEEP RSRs.
	Groundwater	OU4	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	Additional work under CTDEEP RSRs.
	Thames River Sediment	OU4	NFA ROD	SC	None	SC	
	LNAPL	OU4	None	None	None under CERCLA	NA	Additional work under CTDEEP RSRs.

TABLE 1-2

**SITE CLOSEOUT STATUS OF IR PROGRAM SITES  
2012 SITE MANAGEMENT PLAN  
NSB-NLON, GROTON, CONNECTICUT  
PAGE 2 OF 4**

Site/Zone	Medium	Operable Unit	Latest Core Document Completed	Milestones Completed	Core Documents Needed	Current Phase	Comments
Site 11/Zone 1 – Lower Subase – Power Plant Oil Tanks	Soil	OU4	ROD	ROD	LUC RD, GMP, RACR	RD, LUC RD	Additional work under CTDEEP RSRs.
	Groundwater	OU4	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	Additional work under CTDEEP RSRs.
	Surface Water	OU4	NFA ROD	SC	None	SC	
	Thames River Sediment	OU4	NFA ROD	SC	None	SC	
	LNAPL	OU4	None	None	None under CERCLA	NA	Additional work under CTDEEP RSRs.
Site 13/Zone 4 – Lower Subase – Building 79 Former Waste Oil Pit	Soil	OU4	ROD	ROD	ROD, RD, LUC RD, GMP, RACR	RD, LUC RD	Additional work under CTDEEP RSRs.
	Groundwater	OU4	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	Additional work under CTDEEP RSRs
	Surface Water	OU4	NFA ROD	SC	None	SC	
	Thames River Sediment (Zone 4, IP1, and OP1)	OU4	IP1 Phase I CCR; Zone 4 ROD	ROD	IP 1 Removal Action, RD, LUC RD, LTM, RACR	RD	Phase II Removal Action for IP1 in 2012.
Site 14 – Former Overbank Disposal Area Northeast	Soil	OU8	NFA ROD	SC	None	NA	
	Groundwater	OU9	NFA ROD	SC	None	NA	
Site 15 – Former Spent Acid Storage and Disposal Area	Soil	OU6	NFA ROD	SC	None	NA	
	Groundwater	OU9	NFA ROD	SC	None	NA	
Site 16 – Former Hospital Incinerators	Soil	OU11	NFA ROD	SC	None	NA	
Site 17/Zone 3 – Lower Subase – Former Hazardous Materials /Solvent Storage Area (Former Building 31)	Soil	OU4	ROD	ROD	RD, LUC RD, GMP, RACR	RD, LUC RD	Additional work under CTDEEP RSRs.
	Groundwater	OU4	NFA ROD	SC	None	SC	
	Surface Water	OU4	NFA ROD	SC	None	SC	
	Thames River Sediment	OU4	NFA ROD	SC	None	SC	
Site 18 – Solvent Storage Area (Building 33)	Soil	OU11	NFA ROD	SC	None	NA	
	Groundwater	OU9	NFA ROD	SC	None	NA	

TABLE 1-2

**SITE CLOSEOUT STATUS OF IR PROGRAM SITES  
2012 SITE MANAGEMENT PLAN  
NSB-NLON, GROTON, CONNECTICUT  
PAGE 3 OF 4**

Site/Zone	Medium	Operable Unit	Latest Core Document Completed	Milestones Completed	Core Documents Needed	Current Phase	Comments
Site 19/Zone 4 – Lower Subbase – Former Solvent Storage Area (Former Building 316)	Soil	OU4	NFA ROD <sup>(7)</sup>	SC <sup>(7)</sup>		SC <sup>(7)</sup>	Outside of residential LUC boundary for Zone 4
	Surface Water	OU4	NFA ROD	SC	None	SC	
	Groundwater	OU4	NFA ROD	SC	None	SC	
Site 20 – Area A Weapons Center	Soil and Sediment	OU7	CCR	RC, SC	RACR <sup>(2)</sup>	NA	
	Groundwater	OU9	NFA ROD	SC	None	NA	
Site 21/Zone 7 – Lower Subbase – Berth 16	Soil	OU4	ROD	ROD	RD, LUC RD, GMP, RACR	RD, LUC RD	Additional work under CTDEEP RSRs.
	Groundwater	OU4	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	CTDEEP RSRs
	Surface Water	OU4	NFA ROD	SC		SC	
	Thames River Sediment	OU4	NFA ROD	SC		SC	
Site 22/Zone 5 – Lower Subbase – Pier 33	Soil	OU4	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	Additional work under CTDEEP RSRs.
	Groundwater	OU4	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	
	Surface Water	OU4	NFA ROD	SC	None	SC	
	Thames River Sediment	OU4	NFA ROD	SC	None	SC	
Site 23 – Former Fuel Farm	Soil	NA	NA	NA	None under CERCLA <sup>(8)</sup>	NA	Additional work under CTDEEP RSRs.
	Free Product	NA	NA	NA	None under CERCLA <sup>(8)</sup>	NA	Additional work under CTDEEP RSRs.
	Groundwater	OU9	RACR, LUC RD	RIP	None	LTMgt	Might not achieve SC.
Site 24/Zone 6 – Lower Subbase – Central Paint Accumulation Area (Building 174)	Soil	OU4	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	Additional work under CTDEEP RSRs.
	Groundwater	OU4	NFA ROD	SC	None	SC	
	Surface Water	OU4	NFA ROD	SC	None	SC	
	Thames River Sediment	OU4	NFA ROD	SC	None	SC	
Site 25/Zone 7 – Lower Subbase – Former Classified Materials Incinerator	Soil	OU4	ROD	ROD	RD, LUC RD, GMP, RACR	RD, LUC RD	Additional work under CTDEEP RSRs.
	Groundwater	OU4	NFA ROD <sup>(3)</sup>	ROD	None under CERCLA	NA	Additional work under CTDEEP RSRs
	Surface Water	OU4	NFA ROD	SC		SC	
	Thames River Sediment	OU4	NFA ROD	SC		SC	

TABLE 1-2

SITE CLOSEOUT STATUS OF IR PROGRAM SITES  
2012 SITE MANAGEMENT PLAN  
NSB-NLON, GROTON, CONNECTICUT  
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- (1) Site 1 formerly located within Site 2 boundary.
- (2) RACR is needed only if Construction Completion Report is deemed unacceptable as a RACR.
- (3) NFA under CERCLA. Petroleum-contaminated soil or groundwater being addressed under applicable CTDEEP RSRs.
- (4) Draft RACR.
- (5)  
Site 8 PRAP proposed NFA for surface water. ROD does not state NFA for surface water, but states monitoring may be expanded to include surface water.
- (6) Site 9 is within Site 23.
- (7) Site 19 is within Zone 4; The ROD indicates NFA for Site 19, other areas of Zone 4 require an RD and LUC RD
- (8) Pending completion of Site Assessment Screening Evaluation (SASE)

CBU	Construction Battalion Unit
CCR	Construction Completion Report.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CTDEEP	Connecticut Department of Energy and Environmental Protection
DD	Decision Document
DRMO	Defense Reutilization and Marketing Office
GMP	Groundwater Monitoring Plan
LTM	Long-Term Monitoring
LTMgt	Long-Term Management
LUC RD	Land Use Control Remedial Design
NA	Not Applicable
NFA	No Further Action
IP1	Inner Pier 1
OBDA	Overbank Disposal Area
OP1	Outer Pier 1
OT	Oil Tank
OU	Operable Unit
PRAP	Proposed Remedial Action Plan
RACR	Remedial Action Completion Report
RA-O	Remedial Action Operation
RC	Response Complete
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
RIP	Remedy in Place
ROD	Record of Decision
RSRs	Remediation Standard Regulations
SC	Site Closeout
UST	Underground Storage Tanks

## **1.2 Report Organization**

The SMP is organized as follows:

- Section 1.0 consists of this introduction.
- Section 2.0 describes the history and status of sites at NSB-NLON with forthcoming actions in the next two to four years.
- Section 3.0 presents the sequence of activities and target dates for primary and secondary documents along with a discussion of their development.
- Section 4.0 provides the names and responsibilities of cleanup team members.
- References for in-text citations are provided in the Reference Section.
- Appendix A presents Table 1-1, Preparation and Review Schedule for Primary, Secondary, and Other Documents Per the Federal Facility Agreement.
- Appendix B presents Figures discussed in the text.
- Appendix C presents NSB New London Background and Site Descriptions.
- Appendix D presents Summary and Detailed Schedules.

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## 2.0 SITE GROUPINGS, WORK IN PROGRESS AND FORTHCOMING ACTIONS

This section presents a brief status for each site addressed in this SMP with forthcoming actions in the next 2 to 4 years. Additional historical details are further discussed in the 2011 SMP. Site maps are provided as Figures 2-1 through 2-25 in Appendix B and descriptions are provided in text form in Appendix C. Table 2-1, Current and Projected Activities, provides a summary of each existing task order, as well as task orders anticipated for 2013 and 2014.

### 2.1 Site Groupings

Several sites are located in the area of NSB-NLON referred to as the Lower Subbase, also known as Operable Unit 4 (OU4). The Lower Subbase site is bounded on the west by the Thames River and to the east by the Providence and Worcester Railroad. The Lower Subbase extends from Pier 1 in the south to Pier 33 in the north. The Lower Subbase is the original Subbase and the history of its use dates back to 1867. Most of the construction at the Lower Subbase took place in the early 1900s, with a major expansion from 1935 to 1945. Sites in the Lower Subbase have been grouped together to facilitate additional investigation. The following sites are included in the Lower Subbase:

- Site 10 - Lower Subbase - Fuel Storage Tanks and Tank 54-H
- Site 11 - Lower Subbase - Power Plant Oil Tanks
- Site 13 - Lower Subbase - Building 79 Waste Oil Pit
- Site 17 - Lower Subbase - Hazardous Materials/Solvent Storage Area (Building 31)
- Site 19 - Lower Subbase - Solvent Storage Area (Building 316)
- Site 21 - Lower Subbase - Berth 16
- Site 22 - Lower Subbase - Pier 33
- Site 24 - Lower Subbase - Central Paint Accumulation Area (Building 174)
- Site 25 - Lower Subbase - Classified Materials Incinerator

In the Lower Subbase RI and FS documents, the Lower Subbase is divided into seven Zones. Sites are included in the Lower Subbase zones as follows:

- Zone 1 - Sites 10 and 11
- Zone 2 - Former fuel distribution lines
- Zone 3 - Site 17
- Zone 4 - Sites 13 and 19, Quay Wall Study Area, and Thames River sediment adjacent to Zone 4 and the outermost area of Pier 1
- Zone 5 - Site 22
- Zone 6 - Site 24
- Zone 7 - Sites 21 and 25

**TABLE 2-1  
CURRENT AND PROJECTED ACTIVITIES  
2012 SITE MANAGEMENT PLAN  
NSB-NLON, GROTON, CONNECTICUT  
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FY	SITE / OU	WORK ACTION	MEDIA	CONTRACTOR	CONTRACT NUMBER	CTO/MOD	SCOPE OF WORK	PROJECT MANAGER (S)	SAMPLE FREQUENCY	COCs	REMEDIAL GOALS EXCEEDED
<b>EXISTING AWARDS AS OF JULY 2012</b>											
11	BASEWIDE	BASEWIDE SUPPORT	ALL	TT INC	N6247008D1001	WE 33	2011 SMP & 5 YEAR REVIEW AND 2012 O&M MANUAL UPDATE	COREY RICH Corey.Rich@tetratech.com 412-921-8984	NA	NA	NA
11	OU-4	SEDIMENT PDI & SAP	SEDIMENT	TT INC	N6247008D1001	WE 34	SEDIMENT PDI SAP	COREY RICH Corey.Rich@tetratech.com 412-921-8984	NA	PAHs, DDT, PCBs, metals	ERM-Q and TSCA RBL
12	SITE 8 AST	SITE 8 AST INVESTIGATION	SOIL AND GW	TT INC	N6247008D1001	WE 36	AST BUILD VIOLATED ICS. INVESTIGATION (PROVED CAP NOT IMPACTED).	SCOTT NESBIT Scott.Nesbit@tetratech.com	NA	VOCs, SVOCs, PAHs, metals	Site 6 and 8 = SWPC, GWVC, AWQS, WQS-ALS
11	SITE 2B	PDI AND CLOSURE DOCUMENTS	WETLAND SEDIMENT	TT INC	N6247008D1001	WE 55	WETLAND PDI SAMPLING & REPORT / PRAP / ROD / RD / LUC RD	COREY RICH / NINA BALSAMO Nina.Balsamo@tetratech.com / SCOTT NESBIT	NA	PAHs, PCBs, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, arsenic, cadmium, chromium, copper, lead, nickel, and zinc.	SED = TEC
11	OU-4	PDI AND CLOSURE DOCUMENTS	SOIL, GW & SEDIMENT	TT INC	N6247008D1001	WE 67 OI AND MOD 1	PDI REPORT / FS ADDENDUM / PRAP / ROD	COREY RICH / NINA BALSAMO / ARRON BERNHARDT 412 921 8433	NA	PAHs, DDT, PCBs, metals	ERM-Q and TSCA RBL
11	SITE 2B	RD	WETLAND SEDIMENT	TT INC	N6247008D1001	WE 70	WETLAND EXCAVATE-DISPOSAL RD	SCOTT NESBIT Scott.Nesbit@tetratech.com	NA	PAHs, PCBs, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, arsenic, cadmium, chromium, copper, lead, nickel, and zinc.	SED = TEC
11	PIER 1	PHASE II NTCRA DREDGE	SEDIMENT	PRIME: AGVIO - CH2MHILL DREDGE SUB - PALMER FEDERAL	N62470081006	WE 27	DREDGE ALL SEDIMENT TO BEDROCK	AGVIO - ED DULLIGHAN 757 213 8590 PALMER FEDERAL - JAMES PALMER	NA	PAHs, metals, PCBs, DDX	ERM-Q and TSCA RBL
12	SITE 2B	RA EXCAVATE & OFF SITE DISPOSAL	WETLAND SEDIMENT	SHAW	N6247008D1007	WE 37	WORKPLAN & FIELDWORK - EXCAVATE 5 DISCRETE AREAS AND CCR	MARK PISARCIK	NA	PAHs, PCBs, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, arsenic, cadmium, chromium, copper, lead, nickel, and zinc.	SED = TEC
12	PIER 1	BATHYMETRY	SEDIMENT	N/A	N/A	N/A	COORDINATE SUB SDI	JEFF KILPATRICK NAVFAC ESC Port Hueneme, CA 805/982-1002 Office 805/402-0250 Cell	NA	NA	NA
12	SITES 2, 3, 6 & 8	2012 LTM	ALL	H&S	N4008510D9409	TBD	RIP SITES LTM SAMPLING AND INSPECTIONS FOR 2012	BILL GALLAGHER BGallagher@hsenv.com 508-366-7442	Sites 2, 3, 8 - Annually Site 6 - Biennially	VOCs, SVOCs, PAHs, metals	Site 2A GW = WQS-ALC Site 2A SW = SWPC Site 2B SED = TEC Site 3 GW = MCL, GWVC Site 6 and 8 = SWPC, GWVC, AWQS, WQS-ALS
12	OU-4	PDI FIELDWORK	SEDIMENT	TT INC	N6247008D1001	WE 74	PDI SAMPLING AND REPORT CERCLA SEDIMENT DESIGN	ARRON BERNHARDT ROB MCCARTHY rmccarthy@ensafe.com 860-665-1140	NA	PAHs, DDT, PCBs, metals	ERM-Q and TSCA RBL
12	OU-4	SEDIMENT RD	SEDIMENT	RESOLUTION (AECOM/ENSAFE)	N6247011D8013	WE 11			NA	PAHs, DDT, PCBs, metals	ERM-Q and TSCA RBL
12	OU-4	SOIL RD	SOIL	RESOLUTION (AECOM/ENSAFE)	N6247011D8013	WE 10	CERCLA SOIL DESIGN	ROB MCCARTHY rmccarthy@ensafe.com 860-665-1140	NA	PAHs, Lead, Mercury	Zone 1 - RDEC Zone 3, 4, 7 - RDEC and I/C DEC
12	SITES 2A, 3, 6, 7, 8, 9, 20 & 23	LUC RDS/RACRS/SASES	ALL	RESOLUTION (AECOM/ENSAFE)	N6247011D8013	WE 4	LUC RDS & RACRS SITES 2A, 3, 6, 7, 8, 9, 20 & 23. SASES SITES 9 & 23	SARAH PERHALA Sarah.Perhala@aecom.com 860-263-5746	NA	VOCs, SVOCs, PAHs, metals	Site 2A GW = WQS-ALC Site 2A SW = SWPC Site 3 GW = MCL, GWVC Site 6 and 8 = SWPC, GWVC, AWQS, WQS-ALS
12	ALL	BASEWIDE SUPPORT	ALL	RESOLUTION (AECOM/ENSAFE)	N6247011D8013	WE 13	PROJ. MGMT RABS/SMP/OM&M	MICHELLE SNYDER michelle.snyder@aecom.com 978-905-2409	NA	NA	NA
12	OU-4	OU-4 NON-CERCLA DESIGN	SOIL AND GW	RESOLUTION (AECOM/ENSAFE)	N6247011D8013	WE 12	NON-CERCLA SITES OU-4 DESIGN FROM CAPS ZONES 1-7	MATHEW PANCIERA Matthew.Pancierera@aecom.com 860-263-5742	NA	Diesel, #2 & #6 fuel oil, waste lubricants	CT RSRs

TABLE 2-1  
**CURRENT AND PROJECTED ACTIVITIES**  
**2012 SITE MANAGEMENT PLAN**  
**NSB-NLON, GROTON, CONNECTICUT**  
**PAGE 2 OF 2**

FY	SITE / OU	WORK ACTION	MEDIA	CONTRACTOR	CONTRACT NUMBER	CTO/MOD	SCOPE OF WORK	PROJECT MANAGER (S)	SAMPLE FREQUENCY	COCs	REMEDIAL GOALS EXCEEDED
<b>FY 2013 AWARDS</b>											
13	OU-4	OU-4 NON-CERCLA SITES WORKPLAN	SOIL AND GW	AGVIQ	N62470-12-D-7004	TBD	NON-CERCLA SITES WORKPLAN	RAC TBD	NA	Diesel, #2 & #6 fuel oil, waste lubricants	CT RSRs
13	OU-4	OU-4 CERCLA SITES WORKPLAN	SOIL AND SEDIMENT	AGVIQ	N6247012D7004	TBD	CERCLA SITES WORKPLAN	RAC TBD	NA	PAHs, Lead, Mercury	Zone 1 - RDEC Zone 3, 4, 7 - RDEC and I/C DEC
13	OU-4	OU-4 NON-CERCLA SITES FIELDWORK	SOIL AND GW	RAC TBD	RAC TBD	TBD	ISCO/ORC/SURFACTANT INJECTION, SOME EXCAVATION AND CCR	RAC TBD	NA	Diesel, #2 & #6 fuel oil, waste lubricants	CT RSRs
13	OU-4	OU-4 CERCLA SITES FIELDWORK	SOIL AND SEDIMENT	RAC TBD	RAC TBD	TBD	EXCAVATE 1780 CY SOIL/245 ASPHALT AND DREDGE SEDIMENT AND CCR	RAC TBD	NA	PAHs, Lead, Mercury	Zone 1 - RDEC Zone 3, 4, 7 - RDEC and I/C DEC
13	OU-4	RACR	ALL	RESOLUTION (AECOM/ENSAFE)	N6247011D8013	TBD	OU4 RACRs	TBD	NA	PAHs, Lead, Mercury	OU-4 = ERM-Q and TSCA RBL
13	SITES 2, 3, 6, 8 & OU-4	UPDATE OM&M TO INCLUDE OU-4 SAMPLING/INSPECTION IAW DESIGN	ALL	RESOLUTION (AECOM/ENSAFE)	N6247011D8013	TBD	PLAN IS TO INCLUDE ALL NEW LTM (ZONES 1-7) IN ONE UPDATE.	TBD	NA	NA	Site 2A GW = WQS-ALC Site 2A SW = SWPC Site 2B SED = TEC Site 3 GW = MCL, GWVC Site 6 and 8 = SWPC, GWVC, AWQS, WQS-ALS OU-4 = ERM-Q and TSCA RBL
13	SITES 2, 3, 6 & 8	2013 LTM	ALL	SMALL BUSINESS RAC EMAC / TBD	SMALL BUSINESS RAC EMAC / TBD	TBD	LIMITED TO 2,3,6,& 8 IN FY-13 SINCE BEFORE WE START MONITORING WE NEED RD, THEN O&MM REVISION, THEN CONTRACT RFP AND AWARD. GOAL IS TO START OU-4 LTM ROD SIGN + 15 MOS = NOV 2013 (FY 14)	SMALL BUSINESS RAC EMAC / TBD	Sites 2, 3, 8 - Annually Site 6 - Biennially	VOCS, SVOCs, PAHs, metals	Site 2A GW = WQS-ALC Site 2A SW = SWPC Site 2B SED = TEC Site 3 GW = MCL for trichloroethene, GWVC for vinyl chloride Site 6 and 8 = SWPC, GWVC, AWQS, WQS-ALS
<b>FY 2014 AWARDS</b>											
14	SITES 2, 3, 6, 8 & OU-4	2014 LTM	ALL	SMALL BUSINESS RAC EMAC / TBD	SMALL BUSINESS RAC EMAC / TBD	TBD	LIMITED TO 2,3,6,& 8 IN FY-13 SINCE BEFORE WE START MONITORING WE NEED RD, THEN O&MM REVISION, THEN CONTRACT RFP AND AWARD. GOAL IS TO START OU-4 LTM ROD SIGN + 15 MOS = NOV 2013 (FY 14)	TBD	Sites 2, 3, 8 - Annually Site 6 - Biennially	VOCS, SVOCs, PAHs, metals	Site 2A GW = WQS-ALC Site 2A SW = SWPC Site 2B SED = TEC Site 3 GW = MCL, GWVC Site 6 and 8 = SWPC, GWVC, AWQS, WQS-ALS OU-4 = ERM-Q and TSCA RBL

**Notes:**  
AWQS = Federal Ambient Water Quality Standards  
ERM-Q = Composite Value Addressing Applicable Contaminants  
GW = Groundwater  
TEC = Threshold Effects Concentration  
SED = Sediment  
SW = Surface Water  
SWPC = Surface Water Protection Criteria  
TSCA RBL = Toxic Substance Control Act Risk Based Level  
WQS-ALC = Connecticut Water Quality Standards Aquatic Life Criteria

## **2.2 Work in Progress and Forthcoming Actions**

### **2.2.1 Site 2 - Area A Landfill and Area A Wetland**

#### **Site 2A - Area A Landfill**

Currently, the Area A Landfill has been closed and capped with a low-permeability engineered cap including pavement. The surface is flat. Use of the top of the landfill includes miscellaneous material storage and a crane test area.

As presented in Table 1-2, the status of Area A Landfill soil and groundwater are RC and the current phase is long-term management (LTMgt). Groundwater at Site 2B was addressed as part of OU 9. As documented in the OU9 ROD signed in September 2008 (Navy 2008b), groundwater monitoring at Site 2A will continue as required by the Area A Landfill, OU1 ROD (Atlantic, 1995e) and the O&M Manual (Tetra Tech, 2008g, 2010f, 2011g). Surface water at Site 2A is currently monitored under the Area A Landfill long-term monitoring program (OU1) and the O&M Manual (Tetra Tech, 2008g, 2010f, 2011g). Groundwater and surface water are currently monitored annually, and Year 12 (Round 24) of groundwater and surface water monitoring were performed in April 2011. Monitored COCs for groundwater and surface water include selected SVOCs, polynuclear aromatic hydrocarbons (PAHs), and metals. The primary monitoring criteria for groundwater are based upon the aquatic life criteria in Appendix D of the Connecticut Department of Environmental Protection (CTDEP) Water Quality Standards. The primary monitoring criteria for surface water are based upon the CTDEP Surface Water Protection Criteria. Monitoring criteria were established in the Basewide Groundwater OU Remedial Investigation (Tetra Tech, 2002a). The 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following groundwater exceedances: copper (2 samples). The 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following surface water exceedances: cadmium (1 sample), chromium (1 sample), copper (5 samples), lead (5 samples), zinc (4 samples), and dissolved lead (1 sample). The annual site inspection was performed in spring 2011 and routine maintenance will be performed as needed. A RACR and LUC RD are being developed for Site 2A in 2012, and are expected to be finalized in 2013.

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## Site 2B - Area A Wetland

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. However, the Navy is in the process of removing the reed from the area under their Natural Resources Program by mowing the plants, and treating them with a herbicide.

Groundwater at Area A Wetland -Site 2B was addressed as part of OU 9. As documented in the OU9 ROD signed in September 2008 (Navy 2008b), groundwater monitoring at Site 2B will continue as part of Site 2A monitoring as required by the Area A Landfill, OU1 ROD (Atlantic, 1995e) and the O&M Manual (Tetra Tech, 2008g, 2010f, 2011g). Surface water at the Area A Wetland is currently monitored as part of Site 2A under the Area A Landfill long-term monitoring program (OU1) and the and the O&M Manual (Tetra Tech, 2008g, 2010f, 2011g). The O&M Manual is expected to be revised in 2012 to include Site 2B monitoring requirements. The status of Site 2B groundwater and surface water is RIP. See Section 2.2.1.1 for additional groundwater information.

Wetland sediment at Site 2B is addressed as the OU12 Area A Wetland ROD (Navy, 2010b). COPCs for wetland sediments at Site 2B include PAHs (target compound list), PCBs (by Aroclor), 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and select metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc). The analytical COPCs were chosen based on the PRGs developed in the RI Update/FS Report (Tetra Tech, 2010b). Analytical concentration data are compared with the project action limits reported in the Final Sampling and Analysis Plan (Tetra Tech, 2011d). The project action limits are set at the Threshold Effects Concentration (TEC), or other similar screening levels (Tetra Tech, 2011d). As reported in the ROD (Navy, 2010b), PAHs, pesticides, PCBs, and metals were detected in several sediment samples at concentrations that exceed ecological sediment benchmarks. The selected remedy indicated in the ROD (Navy, 2010b) includes excavation of soils to meet project action limits, site restoration, LUCs, monitoring, and five-year reviews. As shown in Table 1-2, the most recent Site 2B milestone is the LUC RD for OU12 (Tetra Tech, 2012c).

### 2.2.2 Site 3 - Area A Downstream Water Courses/OBDA Pond and Former OBDA

Site 3 includes undeveloped wooded areas with several small ponds, streams, wetlands, and recreational areas, including a golf course and swimming lake. Surface water bodies within Site 3 include several small ponds and interconnected streams that convey surface water to the Thames River. Most of Site 3 is within designated Explosive Safety Quantity Distance (ESQD) arcs of Site 20 (Area A Weapons Center); therefore, further development is not planned for this area. Navy

Regulations prohibit construction of inhabited buildings or structures within these arcs and, although existing buildings operate under a waiver of these regulations, no further construction is planned.

The ROD for OU9, Basewide Groundwater was completed in September 2008 (Navy, 2008b). The final selected remedy for groundwater at Site 3 is Institutional Controls with Monitoring. Tetra Tech Volume II (Groundwater Monitoring Plan) of the O&M Manual was revised in 2008 (Rev 2 Draft) and 2010 (Rev 2 Draft Final) to update information for Site 3 (Tetra Tech, 2008g; 2010f).

As shown in Table 1-2, the most recent milestone completed for Site 3 groundwater is RIP. Groundwater will continue to be monitored for natural attenuation until remedial goals (RGs) are met; therefore, the current phase is Remedial Action Operation (RA-O). Groundwater is currently being monitored annually, and Year 6 (Round 13) of groundwater monitoring was performed in April 2011. Groundwater monitoring focused on trichloroethene and vinyl chloride, as identified in the ROD for OU9 – Basewide Groundwater (Navy, 2008b). The analytical results are compared to Groundwater Monitoring Plan (GMP) (2006a) selected groundwater criterion identified in the ROD (Navy, 2008b). The cleanup goal for trichloroethene is based on the federal and state Maximum Contaminant Level. The cleanup goal for vinyl chloride is based on the Connecticut groundwater volatilization criteria. Site 3 groundwater results for trichloroethene and vinyl chloride exceeded criteria in 2009, but have not exceeded criteria in 2010 or 2011. After 4 years of annual monitoring are performed with all results less than RGs, the monitoring program can be discontinued and groundwater LUCs can be eliminated. A RACR and LUC RD are being developed for Site 3 soil and sediment as part of OU3 in 2012, and are expected to be finalized in 2013.

### **2.2.3 Site 6 - Former DRMO**

A majority of the Site 6 is paved with an asphalt layer, and the site features include buildings, a weighing scale, and miscellaneous storage piles. Currently, the DRMO is used as a storage and collection facility for items such as computers, file cabinets, and other office equipment to be sold during auctions and sales held periodically during the year.

An RA Completion Report was prepared to document implementation of the soil and groundwater remedies at the site (Tetra Tech, 2007a). As shown on Table 1-2, the most recent milestone completed for Site 6 soil and groundwater is RC, and the current phase is LTMgt. A RACR and LUC RD are being developed for Site 6 soil and groundwater as part of OU 2 in 2012, and are expected to be finalized in 2013. Groundwater is currently being monitored biennially, and the most recent monitoring event was Round 22 (Year 14) in 2012. The overall objective of groundwater

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monitoring is to evaluate the effectiveness of the cap and to confirm that contamination is not migrating through the soil, into the groundwater, and ultimately discharging to the Thames River. Groundwater is analyzed for selected TCL VOCs, TCL SVOCs, TCL PAHs, and TAL metals (total and dissolved). As reported in the ROD (Navy, 2006b) and GMP (Tetra Tech, 2006a) two types of monitoring criteria (primary and secondary) are applied to groundwater at Site 6. Primary monitoring criteria include CTDEP SWPCs, site-specific SWPCs, and CTDEP volatilization criteria. Secondary monitoring criteria include federal AWQCs and Connecticut WQs [i.e. aquatic life criteria developed for chronic (long-term) exposure of aquatic receptors in saltwater and human health criteria for consumption of organisms]. Results 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following secondary monitoring criteria exceedances: bis(2-ethylhexyl)phthalate (4 samples), total arsenic (7 samples), copper (1 sample), and lead (2 samples). There were no exceedances of primary screening criteria reported in the 2010 report (H&S, 2011b). The annual site inspection was performed in April 2011 and routine maintenance will be performed as needed.

#### **2.2.4 Site 7 - Torpedo Shops**

The Navy conducts maintenance activities on torpedoes at Site 7. The Navy currently manages the use, storage, and disposal of hazardous material and waste at Site 7 in accordance with Resource Conservation and Recovery Act (RCRA) regulations.

The RD for LUCs on Basewide Groundwater OU9 documented NFA for Site 7 (Tetra Tech, 2009e) and the RACR for OU9 acknowledged that the RA is complete and that monitoring, LUCs, and five-year reviews have been discontinued (Tetra Tech, 2009b). The completion of the groundwater remedial action at Site 7 was documented in the RACR for OU9 that was completed in 2010 and in the Third Five-Year Review Report that was completed in 2011. A RACR is being developed for Site 7 soil as part of OU 8 in 2012, and are expected to be finalized in 2013. The RC milestone has been achieved and Site 7 has achieved SC (see Table 1-2).

#### **2.2.5 Site 8 - Goss Cove Landfill**

Site 8 is currently developed with the Nautilus Museum and its associated paved parking lot. The Nautilus Museum is open to the public as a submarine museum operated by the US Navy.

As documented in Table 1-2, the status of Site 8 soil and groundwater is RC and the current phase is LTMgt. The status of Site 8 surface water and sediment is SC. Groundwater is monitored annually, and Year 10 (Round 23) of the monitoring was performed in April 2011. Groundwater monitoring has been conducted to evaluate whether the engineered cap has been effective in

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minimizing contaminant migration from the landfill to downgradient locations. Monitored groundwater COCs include selected VOCs, SVOCs, PAHs, and metals. As reported in GMP (Tetra Tech, 2006a) two types of monitoring criteria (primary and secondary) are applied to groundwater at Site 8. Primary monitoring criteria include CTDEP SWPCs, site-specific SWPCs, and CTDEP volatilization criteria. Secondary monitoring criteria include federal AWQCs and Connecticut WQSS [i.e. aquatic life criteria developed for chronic (long-term) exposure of aquatic receptors in saltwater and human health criteria for consumption of organisms]. Results reported in the 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following exceedances of primary screening criteria: total and dissolved arsenic (2 samples). Results in the 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following exceedances of secondary screening criteria: tetrachloroethene (2 samples), benzo(a)pyrene (3 samples), fluoranthene (2 samples), total arsenic (7 samples), total beryllium (1 sample), total copper (9 samples), dissolved arsenic (7 samples), and dissolved copper (2 samples). The annual site inspection was performed in April 2011 and found that an aboveground storage tank (AST), its foundation (concrete pad), and associated piping were installed on the cap without prior knowledge or approval from the IRP Manager. An investigation was conducted confirming that the installation of the AST did not impact the Site 8 engineered cap system (Tetra Tech, 2012). A RACR and LUC RD are being developed for Site 8 soil and groundwater as part of OU 5 in 2012, and are expected to be finalized in 2013.

#### **2.2.6 Site 9 - Former Oily Wastewater Tank (OT-5)**

Site 9, located within the limits of the Former Tank Farm (Site 23) is currently developed as a recreation area which includes baseball fields.

The status of Site 9 groundwater is RC (see Table 1-1). Site 9 is located within Site 23 and inspections, and five-year reviews are planned for Site 23 until groundwater meets criteria for unrestricted use and unlimited exposure. See Section 2.2.14 for additional information on groundwater at Site 23. As reported in the RACR for OU 9 (Tetra Tech 2009b) the soil at Site 9 was investigated and remediated under the CTDEP RCRA UST Program; therefore, no decision documents have been prepared for the soil at Site 9. Screening Evaluation (SASEs) for Sites 9 and 23, which include an assessment of soil compliance, are currently being developed and will be finalized in 2013.

#### **2.2.7 Zone 1 – Lower Subbase - Site 10 and Site 11**

Zone 1 includes Site 10 – Fuel Storage Tanks and Tank 54-H and Site 11 – Power Plant Oil Tanks. A majority of Zone 1 is paved with concrete or an asphalt layer, and the site features include

buildings, driveway, and parking areas. The main building in Zone 1 is the Power Plant Building (Building 29). The ground surface slopes gently toward the Thames River.

Previously, fuel oil from the Tank Farm (Site 23) was distributed to storage tanks in Zone 1 through subsurface fuel oil distribution lines. The distribution lines have been abandoned and fuel is currently delivered to Zone 1 by tanker truck. Other utilities that run throughout Zone 1 include steam/condensate, water, sanitary sewer, storm sewer, natural gas, and electric.

TPH was not included in the FS Addendum evaluations and alternatives for Zone 1 because TPH was not commingled with CERCLA contaminants. TPH and LNAPL contamination at Zone 1 will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP Remediation Standard Regulations (RSRs).

The remedy for Zone 1 soil was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, PAHs and mercury were detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria. The remedial alternative identified in the ROD is LUCs and monitoring. The LUC components will include restricting residential land use, restricting disturbance of contaminated soil, and maintaining a protective cover layer to provide CERCLA risk-based engineering controls. A LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

The current site closeout phase of Zone 1 (Site 10 and Site 11) is RD and LUC RD.

#### **2.2.8 Zone 4 - Lower Subbase – Site 13 and Site 19**

Zone 4 includes Site 13 – Building 79 Waste Oil Pit and Site 19 – Former Solvent Storage Area (Building 316). Zone 4 is covered entirely with asphalt pavement, concrete, or buildings and the ground surface slopes gently toward the Thames River. Fuel oil distribution lines formerly ran throughout Zone 4; however, they have been abandoned. Former Pier 1 is located in the Thames River, southeast of Pier 2 adjacent to Zone 4. In the western part of Zone 4, a wooden pier and quay wall constructed in the 1940's underlies the paved driveway.

#### **Zone 4 Soil and Groundwater**

The remedy for Zone 4 soil was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, PAHs were detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria and lead was detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria and Industrial/Commercial Target Action Levels provided in the ROD. The

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alternative identified in the ROD is excavation to meet I/C RGs, LUCs, including CERCLA risk-based engineering controls, institutional controls, and inspections, and long-term monitoring. The LUC components will include restricting residential land use, restricting disturbance of contaminated soil, and maintaining a 36,000 sf protective cover layer that meets CTDEEP RSR standards for I/C use. An RD, LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

TPH is commingled with CERCLA contaminants in a portion of the Site 13 and will be collaterally addressed with the CERCLA contaminants when the remedy is implemented for Site 13 soil. In addition, non-commingled TPH contamination is present in Site 13 media and will be evaluated in a future Corrective Action Plan that will be developed to meet CTDEEP RSRs.

No major contamination was found at Site 19 and the site is outside the Zone 4 residential LUC boundary identified in the Lower Subbase FS Addendum, indicating no unacceptable risks were associated with the site.

The current site closeout phase of Zone 4 is RD and LUC RD.

#### **Zone 4 – Thames River Sediment**

The Zone 4 sediment area includes the Thames River along the Zone 4 Quay Wall and at the outermost portion of Outer Pier 1. The area extends from Pier 1 (south) up to Pier 6 (north).

As part of a non-time critical removal action, the majority of the contaminated sediment in Inner and Outer Pier 1 was removed through mechanical dredging in March 2010. An additional phase of hydraulic dredging is expected to be completed at Inner Pier 1 in Fall of 2012.

The final remedy for Zone 4 sediment was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, unacceptable ecological risks were estimated for benthic invertebrates and piscivorous birds exposed to metals, PAHs, pesticides, and PCBs in Zone 4 and Outer Pier 1 sediment. The alternative identified in the ROD is dredging to meet RGs in the majority of Zone 4, LUCs, including institutional controls and inspections in Zone 4 and Outer Pier 1, long-term monitoring in Zone 4 and Outer Pier 1, and five-year reviews for Zone 4 and Outer Pier 1. The LUC components will include prohibiting disturbance of sediment over the 13,500 sf area in Outer Pier 1 and adjacent to the quay wall and existing pier structure in Zone 4 and yearly inspections to ensure the cover is preventing exposure. An RD, LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

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### **2.2.9 Zone 3 - Lower Subbase – Site 17 Former Hazardous Materials/Solvent Storage Area (Former Building 31)**

Zone 3 includes Site 17 – Hazardous Materials/Solvent Storage Area (Former Building 31). The ground surface of Zone 3 slopes gently to the Thames River and is paved or covered with buildings. Building 31 was used as a battery overhaul shop until the 1950s and then as a hazardous materials storage area from the 1970s to the 1990s.

The final remedy for Zone 3 soil was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, benzo(a)anthracene was detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria and lead was detected in soil at concentrations that exceed CT Residential and Industrial/Commercial Direct Exposure Criteria. The remedial alternative identified in the ROD is LUCs and monitoring. The LUC components will include restricting residential land use, restricting disturbance of contaminated soil, and maintaining a protective cover layer to provide CERCLA risk-based engineering controls and CTDEEP engineered controls. A LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

TPH was not included in the FS Addendum evaluations and alternatives for Zone 3 (Site 17) because TPH was not commingled with CERCLA contaminants. TPH contamination at Zone 3 (Site 17) will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP RSRs.

The current site closeout phase of Zone 3 (Site 17) is RD and LUC RD (see Table 1-2).

### **2.2.10 Site 20 - Area A Weapons Center**

Site 20 is currently a high-security, restricted access area which consists of Building 524 and the southern bunker area, which is located southeast and downhill from Building 524. Building 524 was historically used for administration, minor torpedo assembly, and storage of simulator torpedoes. Chemicals, including cleaning and lubricating compounds, paints, adhesives, and liquid fuels, were used and stored in relatively small amounts at the site. Currently, the bunkers are used for storage of live and simulator torpedoes and missiles.

Potential risks resulting from exposures to chemicals that have volatilized from groundwater and migrated through building foundations into indoor air were evaluated in a 2008 memorandum by comparing concentrations of volatile chemicals detected in groundwater to USEPA and CTDEP screening criteria for vapor intrusion. Concentrations of TCE exceeded the USEPA screening criterion and it was further evaluated using the USEPA Johnson and Ettinger Vapor Intrusion Model. Modeling results showed that cancer risks were within USEPA and CTDEP acceptable levels and

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vapor intrusion is not an issue at Site 20. As a result, NFA was selected for Site 20 groundwater in the Final OU9 ROD (Navy, 2008b). A final remedy of NFA for Site 20 groundwater was also documented in the RACR for OU9 (Tetra Tech, 2009b). The status of Site 20 groundwater is considered SC (see Table 1-1). A RACR for Site 20 soil and sediment as part of OU 7 are currently being developed and will be finalized in 2013.

#### **2.2.11 Zone 7 - Lower Subbase - Site 21 and Site 25**

Zone 7 includes Site 21 - Berth 16, Site 25 – Classified Materials Incinerator, and transformers at Building 157, Vault 31. A majority of Zone 7 is paved with concrete or an asphalt layer, and the site features include buildings, driveway, and parking areas. Subsurface fuel oil distribution lines were historically located in Zone 7 but have been abandoned. The following structures are present within Site 21: Building 106, currently used for storage; Building 157, currently the Optical Shop; Building 173, currently used for electrical distribution, and Buildings 457 and 478, which were originally and are currently used to house maintenance Shops.

The final remedy for Zone 7 soil was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, PAHs and arsenic were detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria and lead was detected in soil at concentrations that exceed CT Residential and Industrial/Commercial Direct Exposure Criteria. Additionally, antimony, copper, and hexavalent chromium were detected in soil at concentrations that exceed residential Human Health Risk Assessment (HHRA) values provided in the ROD. The remedial alternative identified in the ROD is LUCs and monitoring. The LUC components will include restricting residential land use, restricting disturbance of contaminated soil, and maintaining a protective cover layer to provide CERCLA risk-based engineering controls and CTDEEP engineered controls. A LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

TPH was not included in the FS Addendum evaluations and alternatives for Zone 7 because TPH was not commingled with CERCLA contaminants. TPH contamination at Zone 7 will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP RSRs.

The current site closeout phase of Site 21 and Site 25 (Zone 7) is RD and LUC RD (see Table 1-2).

#### **2.2.12 Site 22 - Lower Subbase - Pier 33**

The Lower Subbase FS was prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subbase sites. The final Lower Subbase FS was issued in December 2010 (Tetra Tech, 2010g) and a Soil and Groundwater

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PDI Completion Report and FS Addendum (Tetra Tech, 2012a) were issued in January 2012. At Site 22, arsenic, copper, and lead concentrations detected during the Groundwater PDI were much less than their respective criteria; therefore, groundwater remediation is not required for CERCLA contaminants at Site 22.

The final remedy for Zone 5 (Site 22) soil was selected in the OU4 ROD which was finalized in August 2012. The ROD indicates that NFA (under CERCLA) is applicable for Zone 5 (Site 22).

TPH was not included in the FS Addendum evaluations and alternatives for Site 22 because TPH was not commingled with CERCLA contaminants. TPH contamination at Site 22 will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP RSRs.

The current site closeout phase of Site 22 is SC (see Table 1-2).

### **2.2.13 Site 23 - Former Fuel Farm**

Site 23, which includes Site 9, is currently developed as a recreation area which includes baseball fields.

Based on the Final ROD for OU9, an RD for LUCs on Basewide Groundwater OU9 was prepared. The Site 23 underdrain metering pit was sampled after construction and quarterly for a period of 1 year starting in June 2007 (Tetra Tech, 2008d). The metering pit collects groundwater from the Site 23 area underdrains from four former tanks. As reported in the LUC RD for OU 9 (Tetra Tech 2010b) all relevant concentrations were less than established Connecticut criteria (with the exception of anomalous results as discussed the Final ROD). Based on these results, as reported in SOPA 5090.25 (Navy, 2009b) Site 23 groundwater (including Site 9 groundwater) being collected and conveyed in the storm sewer system does not pose a significant threat to human health or the environment under the current (not-potable) use scenario; however, risks would be unacceptable if groundwater at the site was used as a drinking water supply. Therefore, LUCs at Site 23 are to prevent the withdrawal and/or use of groundwater for potable water purposes until concentrations in groundwater meet criteria acceptable for unrestricted use and unlimited exposure and ensure that groundwater extracted during construction dewatering activities is properly handled, stored, and disposed (Tetra Tech, 2009e). The RACR for OU9 was prepared to document completion of site remedies and LUCs at OU9, including Site 23 (Tetra Tech, 2009b).

As indicated in Table 1-2, the status of Site 23 groundwater is RIP. LUC inspections and five-year reviews are planned for Site 23 until groundwater meets criteria for unrestricted use and unlimited exposure; therefore, the current phase is LTMgt. As reported in the RACR for OU 9 (Tetra Tech

2009b) the soil at Site 23 was investigated and remediated under the CTDEP RCRA UST Program; therefore, no decision documents have been prepared for the soil at Site 23. Site Assessment Screening Evaluation (SASEs) for Sites 9 and 23, which include an assessment of soil compliance are, are currently being developed and will be finalized in 2013. The O&M Manual is expected to be revised in 2012 to include Site 23 monitoring requirements.

#### **2.2.14 Site 24 - Lower Subbase - Central Paint Accumulation Area (Building 174)**

The Lower Subbase FS was prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subbase sites. The final Lower Subbase FS was issued in December 2010 (Tetra Tech, 2010g) and a Soil and Groundwater PDI Completion Report and FS Addendum (Tetra Tech, 2012a) were issued in January 2012. The final remedy for Zone 6 (Site 24) soil was selected in the OU4 ROD which was finalized in August 2012. The ROD indicates that NFA (under CERCLA) will be applicable for Zone 6 (Site 24).

TPH was not included in the FS Addendum evaluations and alternatives for Zone 6 (Site 24) because TPH was not commingled with CERCLA contaminants. TPH contamination at Site 24 will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP RSRs.

The current site closeout phase of Site 24 is SC (see Table 1-2).

#### **2.2.15 Site 25 - Lower Subbase Zone 7**

Please refer to Section 2.2.12 - Site 21 and Site 25 - Lower Subbase Zone 7.

### **3.0 SCHEDULE**

A schedule of milestones and a detailed schedule that covers all active IR Program sites in the SMP are included in Appendix D. The schedules for historical CERCLA activities at the sites have generally been removed from the schedule and only recent and future events are presented.

#### **3.1 Schedule Development**

The schedules were developed using the current status of activity for each site at NSB-NLON, anticipated activities, and projected funding availability. Line item durations were typically developed using the FFA, which provides durations for specific process activities. The FFA durations are presented on Table 1-1 in Appendix A.

In some cases, due to requests from regulators, accelerated durations were used for scheduling. The "deliverables" required during the remedial process are separated into two categories: primary and secondary. A description of each of these deliverables is provided below.

##### **3.1.1 Primary Documents**

According to the FFA, Primary Documents are developed by the Navy and initially submitted as drafts. The draft Primary Documents are subject to review by the USEPA, CTDEEP, and other stakeholders [Natural Resources Trustees (NOAA and USF&W) and Restoration Advisory Board (RAB)]. Following the Navy's response to and resolution of USEPA, CTDEEP, and stakeholder comments on draft Primary Documents, draft final versions of the Primary Documents are prepared. Following a regulator concurrence period, the final Primary Documents are prepared and issued. Primary Documents are summarized in Table 1-1.

##### **3.1.2 Secondary Documents**

Secondary Documents include those documents that are discrete portions of Primary Documents and are typically input or feeder documents. Secondary Documents are issued by the Navy in draft and are subject to review and comment by the USEPA and CTDEEP. Although the Navy will respond to comments received, the draft Secondary Documents may be finalized in the context of the corresponding draft final Primary Documents. Secondary Documents are summarized in Table 1-1.

##### **3.1.3 Durations**

The FFA (USEPA, 1995) defines review, response, and revision time frames for Primary and Secondary documents and those time frames are summarized in Table 1-1. The FFA also provides a provision to extend a timetable, deadline, or schedule for good cause. The review cycle for other

documents, including the SMP, Engineering Evaluation/Cost Analyses (EE/CAs), Removal Action Work Plans, Construction Completion Reports (Remedial and Removal), Land Use Control Remedial Designs (LUC RDs), and Remedial Action Completion Reports (RACRs) are also defined in Table 1-1 and include a 30-day period of review and comment by regulators, followed by a 30-day period for the Navy to respond to comments.

#### **4.0 NSB-NLON CLEANUP TEAM**

The names, addresses, and responsibilities of the cleanup team provided below in Sections 4.1 through 4.3. Please refer to Table 2-1 for contact information for Navy contractors currently managing task orders.

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## 5.0 REFERENCES

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

Atlantic, 1993. Work Plan, Field Sampling Plan, QA/QC Plan, Health and Safety Plan, Phase II Remedial Investigation. Colchester, Connecticut. May.

Atlantic, 1994a. Draft Focused Feasibility Study, Defense Reutilization Marketing Office, Installation Restoration Program, Naval Submarine Base-New London, Groton, Connecticut. Colchester, Connecticut. March.

Atlantic, 1994b. Draft Focused Feasibility Study, Spent Acid Storage and Disposal Area, Installation Restoration Program, Naval Submarine Base - New London, Groton, Connecticut. Colchester, Connecticut. March.

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

Atlantic, 1995a. Final Site Inspection Report, Pier 33 and Berth 16/Former Incinerator, Installation Restoration Program, Naval Submarine Base - New London, Groton, Connecticut. Colchester, Connecticut. February.

Atlantic, 1995b. Action Memorandum for the Defense Reutilization and Marketing Office and the Spent Acid Storage and Disposal Area. Colchester, Connecticut. March.

Atlantic, 1995c. Final Focused Feasibility Study, Area A Landfill, Installation Restoration Program, Naval Submarine Base – New London, Groton, Connecticut. Colchester, Connecticut. May.

Atlantic, 1995d. Proposed Plan for the Area A Landfill, Naval Submarine Base – New London, Groton, Connecticut. Colchester, Connecticut. June.

Atlantic, 1995e. Record of Decision for the Area A Landfill, Naval Submarine Base – New London, Groton, Connecticut. Colchester, Connecticut. September.

B&RE (Brown & Root Environmental), 1996a. Final Site Characterization Report for OT-10, Building 325, and Building 89, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. June.

B&RE, 1996b. Revised Design Analysis Report, Area A Landfill Remedial Design, Naval Submarine Base – New London, Groton, Connecticut. Wayne, Pennsylvania. December.

B&RE, 1997a. Existing Data Summary Report for the Lower Subbase Remedial Investigation, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. March.

B&RE, 1997b. Phase II Remedial Investigation Report for Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. March.

B&RE, 1997c. Verification Sampling Report for Site 4 Removal Action, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. June.

B&RE, 1997d. Proposed Plan for Area A Downstream/OBDA (Site 3), Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. July.

B&RE, 1997e. Data Gap Investigation Report for Goss Cove Landfill, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. August.

B&RE, 1997f. Final Lower Subbase Remedial Investigation Work Plan and Sampling and Analysis Plan, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

B&RE, 1997g. Feasibility Study for the Defense Reutilization and Marketing Office, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

B&RE, 1997h. Proposed Plan for the Defense Reutilization and Marketing Office, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

B&RE, 1997i. Site Investigation Report for Tank Farm Investigation for Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

B&RE, 1997j. Feasibility Study for Soil and Sediment, Area A Downstream/OBDA (Site 3), Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. December.

B&RE, 1998a. Groundwater Monitoring Plan for Defense Reutilization and Marketing Office, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. February.

B&RE, 1998b. Final Report for Interim Remedial Action at Area A Landfill, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

---

- B&RE, 1998c. Record of Decision for Area A Downstream Watercourses/Overbank Disposal Area, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.
- Battelle, 2003. Final Thames River Rapid Sediment Characterization Pilot Study Survey Report for Naval Submarine Base – New London, Groton, Connecticut. Duxbury, Massachusetts.
- Battelle, 2004a. Final Thames River Validation Study Work Plan, Sampling and Analysis Plan, and Screening Level Environmental Risk Assessment. Duxbury, Massachusetts. October
- Battelle, 2004b. Field Survey Report, Thames River Validation Study for Naval Submarine Base – New London, Groton, Connecticut. Duxbury, Massachusetts.
- Battelle, 2007. Field Survey Report, Thames River Validation Study Supplemental Sampling for Naval Submarine Base – New London, Groton, Connecticut. Duxbury, Massachusetts.
- Battelle, 2008a. Final Thames River Validation Study Report, Naval Submarine Base – New London, Groton, Connecticut. Duxbury, Massachusetts. March.
- Battelle, 2008b. Final Engineering Evaluation/Cost Analysis for Pier 1 Inner Area, Naval Submarine Base - New London, Groton, Connecticut. Duxbury, Massachusetts. March.
- Connecticut College, 1998. Draft Wetland Functions and Values Assessment: The Ecological Evaluation of Vegetation Along Goss Cove. September.
- CTDEP (Connecticut Department of Environmental Protection), 1999. Phase I/II Environmental Site Assessment Report for Fosconi Dry Cleaners. Bureau of Water Management, Permitting, Enforcement and Remediation Division, Hartford, Connecticut.
- DoD (United States Department of Defense), 1996. Relative Risk Site Evaluation Primer. Office of the Deputy Under Secretary of Defense, Summer, 1996, Revised Edition.
- ECC (Environmental Chemical Corporation), 2004a. Annual Landfill Inspection Report for Area A Landfill (2003), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. November.
- ECC, 2004b. Annual Landfill Inspection Report for Defense Reutilization and Marketing Office (DRMO) (2003), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. November.

ECC, 2004c. Annual Landfill Inspection Report for Goss Cove Landfill (2003), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. November.

ECC, 2004d. Year 2 Annual Groundwater Monitoring Report for the Goss Cove Landfill, New London, Groton, Connecticut. Marlborough, Massachusetts. December.

ECC, 2004e. Year 4 Annual Groundwater Monitoring Report for the Area A Landfill, New London, Groton, Connecticut. Marlborough, Massachusetts. December.

ECC, 2004f. Year 5 Annual Groundwater Monitoring Report for the DRMO, New London, Groton, Connecticut. Marlborough, Massachusetts. December.

ECC, 2005a. Box Culvert Video Inspection, August 6, 2004, Goss Cove Landfill, Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. February.

ECC, 2005b. Year 3 Annual Groundwater Monitoring Report for Goss Cove Landfill, Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. August.

ECC, 2005c. Year 5 Annual Groundwater Monitoring Report for Area A Landfill, Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. August.

ECC, 2005d. Year 6 Annual Groundwater Monitoring Report for Defense Reutilization and Marketing Office (DRMO), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. August.

ECC, 2005e. Annual Landfill Inspection Report for Area A Landfill (2004), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. September.

ECC, 2005f. Annual Landfill Inspection Report for Defense Reutilization and Marketing Office (DRMO) (2004), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. September.

ECC, 2005g. Annual Landfill Inspection Report for Goss Cove Landfill (2004), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. September.

ECC, 2005h. Annual Landfill Inspection Report for Area A Landfill (2005), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. October.

ECC, 2005i. Annual Landfill Inspection Report for Defense Reutilization and Marketing Office (DRMO) (2005), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. October.

ECC, 2005j. Annual Landfill Inspection Report for Goss Cove Landfill (2005), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. October.

ECC, 2006a. Draft Annual Groundwater Monitoring Report for DRMO Year 7 (Draft Acting as Final), Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. February.

ECC, 2006b. Goss Cove Stormwater Culvert Video Inspection, 9 November 2005, Naval Submarine Base – New London, Connecticut. Marlborough, Massachusetts. Araco Pipeline Services, Subcontractor. February.

ECC, 2006c. Year 4 Annual Groundwater Monitoring Report for Goss Cove Landfill, New London, Groton, Connecticut. Marlborough, Massachusetts. June.

ECC, 2006d. Year 6 Annual Groundwater Monitoring Report for Area A Landfill, New London, Groton, Connecticut. Marlborough, Massachusetts. July.

ECC, 2007a. Goss Cove Landfill, 2007 Video Culvert Inspection, 5 November 2007, Naval Submarine Base New London, Connecticut. Part 1 (Box Culvert Video) and Part 2 (CB-2, CB-8, CB-9 Videos), Marlborough, Massachusetts. Inland Waters Pipeline Services of Johnston, Rhode Island, Subcontractor. November.

ECC, 2007b. Field Notes for Abandoning Monitoring Wells, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. December.

ECC, 2008a. Year 5 Annual Groundwater Monitoring Report for Goss Cove Landfill, Naval Submarine Base – New London, Groton, Connecticut. Marlborough, Massachusetts. June.

ECC, 2008b. Year 7 Annual Groundwater Monitoring Report for Area A Landfill, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. June

ECC, 2008c. Year 8 Annual Groundwater Monitoring Report for Defense Reutilization and Marketing Office (DRMO), Naval Submarine Base – New London, Groton, Connecticut. Marlborough, Massachusetts. June.

ECC, 2008d. 2006 Annual Landfill Inspection Report for Area A Landfill, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. June.

ECC, 2008e. 2006 Annual Landfill Inspection Report, Defense Reutilization and Marketing Office (DRMO), Naval Submarine Base – New London, Groton, Connecticut. Marlborough, Massachusetts. June.

ECC, 2008f. 2006 Annual Landfill Inspection Report for Goss Cove Landfill (including January 31, 2007, Box Culvert Video Camera Inspection), Naval Submarine Base – New London, Groton, Connecticut. Marlborough, Massachusetts. June.

ECC, 2008g. Year 2 Groundwater Monitoring Report for Sites 3 and 7, Naval Submarine Base – New London, Groton, Connecticut. Marlborough, Massachusetts. July.

ECC, 2008h. Year 9 Annual Groundwater Monitoring Report for Defense Reutilization and Marketing Office, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. July.

ECC, 2008i. 2007 Annual Landfill Inspection Report, Defense Reutilization and Marketing Office (DRMO), Naval Submarine Base – New London, Groton, Connecticut. Marlborough, Massachusetts. August.

ECC, 2008j. 2007 Annual Landfill Inspection Report, Goss Cove Landfill, Naval Submarine Base – New London, Groton, Connecticut. Marlborough, Massachusetts. August.

ECC, 2008k. 2007 Annual Landfill Inspection Report, Area A Landfill, Naval Submarine Base New London, Groton, Connecticut. August.

ECC, 2008l. 2008 Goss Cove Landfill Video Inspection, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. August.

ECC, 2008m. Year 6 Annual Groundwater Monitoring Report, Goss Cove Landfill, Naval Submarine Base – New London, Groton, Connecticut. Marlborough, Massachusetts. October.

ECC, 2008n. Year 8 Annual Groundwater Monitoring Report for Area A Landfill, Naval Submarine Base, New London, Groton, Connecticut. Marlborough, Massachusetts. October.

ECC, 2009a. Year 7 Annual Groundwater Monitoring Report Goss Cove Landfill, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. May.

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ECC, 2009b. 2008 Annual Landfill Inspection Report for Area A Landfill, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. May.

ECC, 2009c. 2008 Annual Landfill Inspection Report for Defense Reutilization and Marketing Office (DRMO), Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. May.

ECC, 2009d. 2008 Annual Landfill Inspection Report for Goss Cove Landfill, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. May.

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

ECC, 2009f. Final Year 11 Annual Groundwater Monitoring Report for Defense Reutilization and Marketing Office, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. September.

ECC, 2009g. 2009 Annual Box Culvert and Catch Basin Inlet Inspections for Goss Cove Landfill, Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. September.

ECC, 2009h. Final Year 2 Monitoring Report for Site 23 Underdrain Metering Pit Sampling, Naval Submarine Base - New London, Groton, Connecticut. Marlborough, Massachusetts. October.

ECC, 2009i. 2009 Annual Inspection Report for Site 2A Area A, Site 6 Defense Reutilization and Marketing Office (DRMO) and Site 8 Goss Cove Landfills and Site 3 Concrete Encapsulated Contaminated Soil (CECS), Naval Submarine Base New London, Groton, Connecticut. Marlborough, Massachusetts. October.

Envirodyne (Envirodyne Engineers, Inc.), 1983. Final Initial Assessment Study of Naval Submarine Base - New London, Groton, Connecticut. Prepared for Navy Assessment and Control of Installation Pollutants (NACIP) Department, Naval Energy and Environmental Support Activity (NEESA), 13-025, Port Hueneme, California. St. Louis, Missouri. March.

FWEC (Foster Wheeler Environmental Corporation), 1997a. Final Work Plan for Area A Landfill Cap, Naval Submarine Base - New London, Groton, Connecticut. Boston, Massachusetts. February.

FWEC, 1997b. Final Post Removal Report for Site 4 - Rubble Fill at Bunker A-86, Naval Submarine Base - New London, Groton, Connecticut. Boston, Massachusetts. July.

FWEC, 1997c. Final Post Removal Report for Over Bank Disposal Area, Naval Submarine Base - New London, Groton, Connecticut. Boston, Massachusetts. July.

FWEC, 2000. 100% Design, Area A/OBDA, Naval Submarine Base New London, Groton, Connecticut. Boston, Massachusetts. April.

FWEC, 2001. Remedial Action Completion Report, Area A Downstream/OBDA Remediation, Naval Submarine Base New London, Groton, Connecticut. Boston, Massachusetts. February.

FWEC, 2002a. Final Remedial Action Report for Over Bank Disposal Area Northeast Remediation, Naval Submarine Base New London, Groton, Connecticut. Boston, Massachusetts. February.

FWEC, 2002b. Final Remedial Action Report for Soil and Sediment Removal at Operable Unit 7 - Area A Weapons Center (Site 20) at Naval Submarine Base - New London, Groton, Connecticut. Langhorn, Pennsylvania. June.

FWEC, 2002c. Final Remedial Action Report for Site 8 - Goss Cove Landfill, Naval Submarine Base - New London, Groton, Connecticut. Langhorn, Pennsylvania. September.

GZA (Goldberg-Zoino & Associates), 1988. DRMO Conforming Storage Facility Report.

HNUS (Halliburton NUS Corporation), 1993. Action Memorandum for Building 31, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. May.

HNUS, 1994a. Site Characterization Report for Waste Oil Tank 5, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. May.

HNUS, 1994b. Post Removal Action Report for Waste Oil Tank No. 5, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. December.

HNUS, 1995a. Post-Removal Action Report for Building 31 Lead Remediation, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. January.

HNUS, 1995b. Final Action Memorandum for Quay Wall Site - Response to Discharge of Petroleum Product, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. January.

HNUS, 1995c. 100% Design Document for Area A Landfill Interim Remedial Action, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. May.

HNUS, 1995d. Removal Site Evaluation for Quay Wall, Naval Submarine Base - New London, Groton, Connecticut. Wayne, Pennsylvania. May

H&S Environmental, Inc. (H&S), 2010. 2009 Annual Groundwater Monitoring Report, Sites 2, 3, and 8. Naval Submarine Base New London, Groton, Connecticut. Westborough, Massachusetts. August.

H&S, 2011a. 2010 Annual Inspection Report for Site 2A Area A, Site 6 Defense Reutilization and Marketing Office and Site 8 Goss Cove Landfills and Site 3 Concrete Encapsulated Contaminated Soil, Naval Submarine Base New London, Groton, Connecticut. Westborough, Massachusetts. January.

H&S, 2011b. 2010 Groundwater Monitoring Report for Sites 2A, 3, 6, and 8, Naval Submarine Base New London, Groton, Connecticut. Westborough, Massachusetts. March.

Navy, 1997a. Proposed Plan for the Spent Acid Storage and Disposal Area, Naval Submarine Base - New London, Groton, Connecticut. Northern Division, Lester, Pennsylvania. July.

Navy, 1997b. Action Memorandum for Over Bank Disposal Area, Naval Submarine Base - New London, Groton, Connecticut. Northern Division, Lester, Pennsylvania. July.

Navy, 1997c. Record of Decision for the Spent Acid Storage and Disposal Area, Naval Submarine Base - New London, Groton, Connecticut. Northern Division, Lester, Pennsylvania. September.

Navy, 1997d. Action Memorandum for Site 4 - Rubble Fill at Bunker A-86, Naval Submarine Base - New London, Groton, Connecticut. Northern Division, Lester, Pennsylvania. September.

Navy, 1998a. Final Interim Record of Decision for the Defense Reutilization and Marketing Office, Naval Submarine Base - New London, Groton, Connecticut. Northern Division, Lester, Pennsylvania. March.

Navy, 1998b. Final Record of Decision for Soil and Sediment, Area A Downstream Water Courses/Overbank Disposal Area, Naval Submarine Base - New London, Groton, Connecticut. Northern Division, Lester, Pennsylvania. March.

Navy, 1998c. Proposed Plan for Site 4 Bunker A-86, Naval Submarine Base - New London, Groton, Connecticut. Northern Division, Lester, Pennsylvania. April.

Navy, 1998d. Record of Decision for Site 4, Source Control for Soil OU, Naval Submarine Base - New London, Groton, Connecticut. Northern Division, Lester, Pennsylvania. June.

Navy, 1999. Record of Decision for Site 8, Naval Submarine Base, New London, Groton, Connecticut. Engineering Field Activity Northeast, Naval Facilities Engineering Command, Lester, Pennsylvania. September.

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

Navy, 2004a. Record of Decision for Site 3 - New Source Area Soil (OU3), Naval Submarine Base, New London, Groton, Connecticut. Engineering Field Activity Northeast, Naval Facilities Engineering Command, Lester, Pennsylvania. September.

Navy, 2004b. Record of Decision for Site 7 - Torpedo Shops and Site 14 - Overbank Disposal Area Northeast Soil (OU8), Naval Submarine Base, New London, Groton, Connecticut. Engineering Field Activity Northeast, Naval Facilities Engineering Command, Lester, Pennsylvania. September.

Navy, 2004c. Record of Decision for Sites 16 and 18 Soil (Operable Unit 11), Naval Submarine Base, New London, Groton, Connecticut. Engineering Field Activity Northeast, Naval Facilities Engineering Command, Lester, Pennsylvania. September.

Navy, 2004d. Interim Record of Decision for Sites 3, 7, 14, 15, 18, and 20 Groundwater, Naval Submarine Base, New London, Groton, Connecticut. Engineering Field Activity Northeast, Naval Facilities Engineering Command, Lester, Pennsylvania. December.

Navy, 2006a. Department of the Navy Environmental Restoration Program Manual. August.

Navy, 2006b. Record of Decision for Operable Unit 2 - Site 6 and Groundwater, Naval Submarine Base New London, Groton, Connecticut. Naval Facilities Engineering Command Mid-Atlantic, Norfolk, Virginia. December.

Navy, 2006c. SOPA (ADMIN) New London Instruction 5090.18C - Installation Site Use Restrictions at Naval Submarine Base New London, Mark S. Ginda, Commanding Officer, Naval Submarine Base New London, Groton, Connecticut. December.

Navy, 2007. Explanation of Significant Difference for the Record of Decision for Soil and Sediment, Area A Downstream Watercourses/Overbank Disposal Area, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Navy, 2008a. Proposed Plan for Basewide Groundwater Operable Unit 9, Naval Submarine Base – New London, Groton, Connecticut. June.

Navy, 2008b. Record of Decision of Operable Unit 9 Basewide Groundwater, Naval Submarine Base – New London, Groton, Connecticut. Naval Facilities Engineering Command Mid-Atlantic. September.

Navy, 2008c. SOPA (ADMIN) New London Instruction 5090.18D - Installation Restoration Site Use Restrictions at Naval Submarine Base New London. D. M. Rossler, Commander, Executive Officer, Naval Submarine Base New London, Groton, Connecticut. September.

Navy, 2009a. Naval Submarine Base, New London; Monitoring Well 2DMW29S, Installation Restoration Site 3. Letter to Mr. Mark Lewis, State of Connecticut, Department of Environmental Protection, from M. S. Ginda, Captain, Commanding Officer. March 19.

Navy, 2009b. SOPA (ADMIN) New London Instruction 5090.25 – Establishment and Maintenance of Environmental Restoration (ER) Land Use Controls and Restrictions at Naval Submarine Base, New London. D. M. Rossler, Commander, Executive Officer, Naval Submarine Base New London, Groton, Connecticut. June 4.

Navy, 2009c. Naval Submarine Base New London (SUBASENLON) Environmental Restoration Program (ERP) Land and Groundwater Use Restrictions. Letter to Town of Ledyard, Connecticut from M. W. Denno, Captain, Commanding Officer. September 1.

Navy, 2009d. Naval Submarine Base New London (SUBASENLON) Environmental Restoration Program (ERP) Land and Groundwater Use Restrictions. Letter to Town of Groton, Connecticut from Andrew J. Stackpole, by Direction of the Commanding Officer. September 14.

Navy, 2010a. Proposed Plan for Sediment at Area A Wetland – Site 2B, OU12, Naval Submarine Base – New London, Groton, Connecticut. June.

Navy, 2010b. Record of Decision for Site 2B - Area A Wetland, Naval Submarine Base - New London, Groton, Connecticut. August.

NESO (Naval Environmental Support Office), 1979. Oil Contamination of the Ground Water at SUBASE. 1-026. February.

NFESC (Naval Facilities Engineer Service Center), 1995. Draft Final Supplement to Initial Assessment Study, Naval Submarine Base, New London, Groton, Connecticut. Port Hueneme, California. April.

OHM (OHM Remediation Services Corp.), 1995a. Final Report for Interim Remedial Action, Site 6, Naval Submarine Base, New London, Groton, Connecticut. Hopkinton, Massachusetts. September.

OHM, 1995b. Final Report for Soil Remediation, Spent Acid Storage and Disposal Area, Naval Submarine Base, New London, Groton, Connecticut. Hopkinton, Massachusetts. September.

SAIC (Science Applications International Corporation), 1998. Evaluation of Chemical and Toxicological Data for Goss Cove, Naval Submarine Base, Groton, Connecticut. Narragansett, Rhode Island. December.

Specialty Devices, Inc. (SDI), 2010. Hydrographic and Sub-Bottom Survey, Submarine Base Pier 1, Groton, Connecticut. Wylie, Texas. November.

Sovereign Consulting Inc., 2012. Draft Final 2011 Annual Monitoring Report Sites 2A, 3, AND 8. Naval Submarine Base New London, Groton, Connecticut. Mansfield, Massachusetts. February.

Tetra Tech EC, Inc. (Tetra Tech EC), 2006a. Final Completion Report for Soil Excavation at Torpedo Shops, Operable Unit 8 – Site 7, Naval Submarine Base New London, Groton, Connecticut. Langhorne, Pennsylvania. December.

Tetra Tech EC, 2006b. Remedial Action Work Plan for Site 7 Soil. Naval Submarine Base New London, Groton, Connecticut. Langhorne, Pennsylvania. December.

Tetra Tech EC, 2009. Final Non-Time Critical Removal Action Work Plan for Sediment Removal at Pier 1 Inner and Outer Areas. Naval Submarine Base - New London, Groton, Connecticut. Langhorne, Pennsylvania. October.

Tetra Tech EC, 2010. Draft Non-Time Critical Removal Action Completion Report for Sediment Removal at Peir 1 Inner and Outer Areas. Naval Submarine Base - New London, Groton, Connecticut. Langhorne, Pennsylvania. May.

---

Tetra Tech (Tetra Tech NUS, Inc.), 1998. Existing Data Summary Report for the Basewide Groundwater Operable Unit Remedial Investigation, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. December.

Tetra Tech, 1999a. Groundwater Monitoring Plan for the Area A Landfill, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania, Draft Final. January.

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

Tetra Tech, 1999c. Feasibility Study for Goss Cove Landfill, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

Tetra Tech, 1999d. Tank Farm Site Investigation Report Addendum, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. November.

Tetra Tech, 1999e. Annual Groundwater Monitoring Report for Defense Reutilization and Marketing Office (DRMO), Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania, Draft. November.

Tetra Tech, 2000a. Year 2 Groundwater Monitoring Report for Defense Reutilization and Marketing Office (DRMO), Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania, Draft. October.

Tetra Tech, 2000b. Bidding Document Submission (REV 01) of the Remedial Design for Goss Cove Landfill (Site 8), Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. November.

Tetra Tech, 2001a. Groundwater Monitoring Plan for the Goss Cove Landfill, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Tetra Tech, 2001b. Year 1 Annual Groundwater Monitoring Report for the Area A Landfill, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. May.

Tetra Tech, 2002a. Basewide Groundwater Operable Unit Remedial Investigation, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. January.

Tetra Tech, 2002b. Year 3 Groundwater Monitoring Report for DRMO, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

---

Tetra Tech, 2002c. Operations and Maintenance Manual for Installation Restoration Program Sites at Naval Submarine Base – New London, Groton, Connecticut. Volumes I, III, IV, and V. King of Prussia, Pennsylvania. September.

Tetra Tech, 2002d. Year 2 Annual Groundwater Monitoring Report for the Area A Landfill, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. December.

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

Tetra Tech, 2003b. Year 4 Groundwater Monitoring Report for DRMO, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. August.

Tetra Tech, 2003c. Year 1 Annual Groundwater Monitoring Report for the Goss Cove Landfill, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. August.

Tetra Tech, 2004. Basewide Groundwater Operable Unit Remedial Investigation Update/Feasibility Study, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Tetra Tech, 2005. Land Use Control (LUC) Remedial Design for Sites 3 and 7 Groundwater, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. June

Tetra Tech, 2006a. Operations and Maintenance Manual for Installation Restoration Program Sites at Naval Submarine Base – New London, Groton, Connecticut. Volumes I, II, III, IV, and V. King of Prussia, Pennsylvania. January.

Tetra Tech, 2006b. Work Plan for Remedial Action at Sites 3 and 7, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Tetra Tech, 2006c. Second Five-Year Review Report for CERCLA Sites at Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. December.

Tetra Tech, 2007a. Remedial Action Completion Report for Operable Unit 2 – Site 6 Defense Reutilization and Marketing Office, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. August.

Tetra Tech, 2007b. Monitoring Well Inventory Report and Abandonment Plan, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

---

Tetra Tech, 2007c. Year 1 Annual Groundwater Monitoring Report for Site 3 and 7, Naval Submarine Base – New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

Tetra Tech, 2008a. Letter Report for Additional Monitoring Well Inventory and Abandonment Activities. Naval Submarine Base New London, Groton, Connecticut. Pittsburgh, Pennsylvania. January.

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

Tetra Tech, 2008c. Lower Subbase Feasibility Study (Draft), Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Tetra Tech, 2008d. Year 1 Monitoring Report for Site 23 Underdrain Metering Pit Sampling ,Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

Tetra Tech, 2008e. Sampling and Analysis Plan Addendum for Area A Wetland – Site 2B, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. October.

Tetra Tech, 2008f. Sampling and Analysis Plan, Thames River Sediment Sampling at Zone 4, Pier 1, and Outer Pier 1, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. October.

Tetra Tech, 2008g. Operations and Maintenance Manual for Installation Restoration Program Sites at Naval Submarine Base – New London (Rev 2, Draft), Groton, Connecticut. Volumes I, II, III, IV, and V. King of Prussia, Pennsylvania. November.

Tetra Tech, 2008h. Round 9 Groundwater Monitoring Report for Sites 3 and 7, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. November.

Tetra Tech, 2009a. Final Sampling and Analysis Plan, Thames River Pre-Design Sediment Sampling at Inner Pier 1 for Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

Tetra Tech, 2009b. Remedial Action Completion Report for Operable Unit 9 Basewide Groundwater, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. September.

Tetra Tech, 2009c. Engineering Evaluation/Cost Analysis for Inner and Outer Pier 1, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. October.

Tetra Tech, 2009d. Action Memorandum, Inner and Outer Pier 1, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. November.

Tetra Tech, 2009e. Remedial Design for Land Use Controls on Basewide Groundwater Operable Unit 9 for Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. November.

Tetra Tech, 2010a. Feasibility Study for Operable Unit 4, Lower Subbase (Draft Final), Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. January.

Tetra Tech, 2010b. Remedial Investigation Update/Feasibility Study for Sediment at Area A Wetland – Site 2B at Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. June.

Tetra Tech, 2010c. Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan), Pre-Design Investigation for Groundwater at Lower Subbase, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. April.

Tetra Tech, 2010d. Remedial Action Completion Report for Operable Unit 9 Basewide Groundwater, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. June.

Tetra Tech, 2010e. Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan), Pre-Design Investigation for Soil at Lower Subbase, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. August.

Tetra Tech, 2010f. Operations and Maintenance Manual for Installation Restoration Program Sites at Naval Submarine Base – New London (Rev 2, Draft Final), Groton, Connecticut. Volumes I, II, III, IV, and V. King of Prussia, Pennsylvania. November.

Tetra Tech, 2010g. Feasibility Study for Operable Unit 4, Lower Subbase, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. December.

Tetra Tech, 2011a. Draft Removal Action Design for Pier 1 Inner Area, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. January.

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Tetra Tech, 2011b. Lower Subbase (Operable Unit 4) Soil and Groundwater Pre-Design Investigation Completion Report and Feasibility Study Addendum, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Tetra Tech, 2011c. Community Involvement Plan, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Tetra Tech, 2011d. Field Sampling and Analysis Plan, Pre-Design Investigation for Sediment for Area A Wetland – Site 2B, Naval Submarine Base - New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Tetra Tech, 2011e. Draft Final Removal Action Design for Pier 1 Inner Area, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. March.

Tetra Tech, 2011f. Final Removal Action Design for Pier 1 Inner Area, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. April.

Tetra Tech, 2011g. Final Operation and Maintenance Manual for Installation Restoration Sites at Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. July

Tetra Tech, 2012a. Lower Subbase (Operable Unit 4) Soil and Groundwater Pre-Design Investigation Completion Report and Feasibility Study Addendum, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. January.

Tetra Tech, 2012b. Sampling and Analysis Plan for Pre-Design Investigation for Zone 4 and Outer Pier 1 Sediment, Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. January.

Tetra Tech, 2012c. Final Land Use Control Remedial Design for Sediment Site 2B Area A Wetland. Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. January.

Tetra Tech, 2012d. Results of Investigation of Impacts to Site 8 Goss Cove Landfill Cap. Naval Submarine Base New London, Groton, Connecticut. King of Prussia, Pennsylvania. February.

USEPA (United States Environmental Protection Agency), 1995. Federal Facility Agreement Under CERCLA 120, In the Matter of The US Department of the Navy, Naval Submarine Base - New London, Groton, Connecticut. January.

USEPA, 1996. CBU Drum Storage Area No Further Action Decision Document, Naval Submarine Base - New London, Groton, Connecticut. Region I, Boston, Massachusetts. September.

USEPA, 2010a. Email from Kymberlee Keckler, USEPA to James Gravette, Navy, Subject: Re: New London - GW SAP and Site 2 Position Paper. April 13.

USEPA, 2010b. Email from Kymberlee Keckler, USEPA to James Gravette, Navy, Subject: Now that the dredged material wells will be gone.... April 14.

Wehran (Wehran Engineering Corporation), 1987. Site Investigation - Subsurface Oil Contamination - Lower Subbase: Naval Submarine Base - New London, Groton, Connecticut. Methuen, Massachusetts.

Wehran Engineering, Inc., 1988. Verification Study, Naval Submarine Base - New London, Groton, Connecticut. Methuen, Massachusetts.

**Appendix A**

**Table 1-1**

**Preparation and Review Schedule for Primary, Secondary, and Other Documents Per  
the Federal Facility Agreement**

TABLE 1-1

PREPARATION AND REVIEW SCHEDULE FOR PRIMARY, SECONDARY, AND OTHER DOCUMENTS PER THE FEDERAL FACILITY AGREEMENT  
2012 SITE MANAGEMENT PLAN  
NSB-NLON, GROTON, CONNECTICUT

Deliverable Document	Schedule					
	Draft			Draft Final		Final
	Navy Preparation	USEPA/ State Review	Navy Response to Comments	Navy Preparation	USEPA/ State Review	Navy Preparation
Primary <sup>1</sup>  Preliminary Assessment Report Site Inspection Report Remedial Investigation Scope of Work, Work Plan, and Report Feasibility Study Scope of Work, Work Plan, and Report  Proposed Plan  Record of Decision and Responsiveness Summary  Remedial Design Scope of Work, Work Plan, 60%, and 100% Remedial Action Scope of Work  Project Closeout Report  Five-Year Review Report	NR NR Submit draft report for each Site/OU within 540 days of final work plan. Submit draft report for each Site/OU within 540 days of final work plan. Submit draft report for each Site/OU within 30 days of draft final RI/FS. Submit draft for each Site/OU within 45 days of conclusion of public comment period on Proposed  NR NR NR NR	60 days	45 days	45 days	30 days to issue concurrence letter or initiate dispute resolution	60 days after submittal of draft final document          45 days after dispute resolution          Propose deadlines for these reports within 21 days of issuance of ROD. Remedial Action shall begin within 450 days of signing the ROD by EPA. Propose deadline for this report within 21 days of issuance of ROD.
Secondary <sup>1</sup> Initial Screening of Alternatives Detailed Analysis of Alternatives Treatability Study Work Plan and Report Pilot Study Work Plan and Report Sampling and Data Results Remedial Action Work Plan Pre-Final Remedial Design (85 Percent)	NR	60 days	45 days	45 days	NR	NR
Other <sup>2</sup> Site Management Plan Engineering Evaluation/Cost Analysis Removal Action Work Plan Construction Completion Report (Remedial and Removal)  Land Use Control Remedial Designs Remedial Action Completion Reports	NR	30 days	30 days		NR	NR

1: Reference: USEPA, 1995. Federal Facility Agreement under CERCLA 120, In the Matter of the US Department of the Navy, Naval Submarine Base - New London, Groton, Connecticut. January.

2: Not referenced in the 1995 Federal Facility Agreement.

NR: No Federal Facility Agreement requirements.

## **Appendix B**

### **Figures**

## List of Figures

Figure 1-1 Facility Location Map

Figure 1-2 Site Location Map

Figure 2-1 Site 1 Site Plan – CBU Drum Storage Area

(Source: Figure 2-1 Tetra Tech, Site Map Site 1 CBU Drum Storage Area, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

Figure 2-2 Site 2A Site Plan – Area A Landfill

(Source: Figure 2-2 Tetra Tech, Site Plan for Site 2A – Area A Landfill, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

Figure 2-3 Site 2B Site Plan – Area A Wetland Site Plan

Figure 2-4 Site 3 Site Plan – Area A Downstream Watercourses/OBDA

(Source: Figure 2-4 Tetra Tech, Site Map Site 3 – Area a Downstream Watercourses/OBDA, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

Figure 2-5 Site 4 Site Plan – Rubble Fill Area at Bunker A86

(Source: Figure 2-5 Tetra Tech, Site Map Site 4 - Rubble Fill Area at Bunker A86, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

Figure 2-6 Site 6 Site Plan - Former DRMO

(Source: Figure 2-6 Tetra Tech, Site Plan for Site 6, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

Figure 2-7 Site 7 Site Plan – Torpedo Shops

(Source: Figure 2-7 Tetra Tech, Site Map Site 7 – Torpedo Shops, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

Figure 2-8 Site 8 Site Plan – Goss Cove Landfill

(Source: Figure 2-8 Tetra Tech, Site Plan for Site 8 – Goss Cover Landfill, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

Figure 2-9 Sites 9 & 23 Site Plan –Former OT-5 and Former Fuel Farm Limits of Remedial Actions (CERCLA and NON-CERCLA)

Figure 2-10 Site 10 & 11 Site Plan – Fuel Storage Tanks/Tank 54-H and Power Plant Oil Tanks

(Source: Figure 2-10 Tetra Tech, Site Map Site 10 – Fuel Storage Tanks and Tank 54-H and Site 11 – Power Plant Oil Tanks, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-11 Zones 1, 2, 3 and 4 Soil Site Plan – Limits of Remedial Actions (CERCLA and NON-CERCLA)**

(Source: Figure 1 Tetra Tech, Site Limits of Remedial Actions for Zones 1, 2, 3 and 4 Soil, Naval Submarine Base New London, Groton, Connecticut, July 2012)

**Figure 2-12 Site 13 & 19 Site Plan – Building 79 Former Waste Oil Pit and Former Solvent Storage Area (Former Building 316), and Pier 1**

(Source: Figure 2-11 Tetra Tech, Site Map Site 13 – Building 79 Former Waste Oil Pit, and Site 19 – Former Solvent Storage area ( Former building 316), and Pier 1, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-13 Zone 4 and Outer Pier 1 Sediment Site Plan (CERCLA and NON-CERCLA)**

(Source: Figure 2 Tetra Tech, Site Limits of Remedial Actions for Zone 4 and Outer Pier 1 Sediment, Naval Submarine Base New London, Groton, Connecticut, July 2012)

**Figure 2-14 Inner Pier I Site Plan**

**Figure 2-15 Site 14 Site Plan – OBDANE**

(Source: Figure 2-12 Tetra Tech, Site Map Site 14 – OBDANE, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-16 Site 15 Site Plan – Spent Acid Storage and Disposal Area**

(Source: Figure 2-13 Tetra Tech, Site Map Site 15 – Spent Acid Storage and Disposal Area, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-17 Site 16 Site Plan – Hospital Incinerators**

(Source: Figure 2-14 Tetra Tech, Site Map Site 16 – Hospital Incinerators, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-18 Site 17 Site Plan – Former Hazardous Materials/ Solvent Storage Area (Former Building 31)**

(Source: Figure 2-15 Tetra Tech, Site Map Site 17 – Former Hazardous Materials/ Solvent Storage Area (Former Building 31), Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-19 Site 17 – Areas of Remediation (Source)**

(Source: Figure 2-16 Tetra Tech, Site Map Areas of Remediation at Site 17, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-20 Site 18 Site Plan – Solvent Storage Area (Building 33)**

(Source: Figure 2-17 Tetra Tech, Site Map Site 18 – Solvent Storage Area (Building 33), Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-21 Site 20 Site Plan – Area A Weapons Center**

(Source: Figure 2-18 Tetra Tech, Site Map Site 20 – Area A Weapons Center, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-22 Site 21 & 25 Site Plan – Berth 16 and Former Classified Materials Incinerator**

(Source: Figure 2-19 Tetra Tech, Site Map Site 21 – Berth 16 and Site 25 Former Classified Materials Incinerator, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-23 Site 22 Site Plan – Pier 33**

(Source: Figure 2-20 Tetra Tech, Site Map Site 22 – Pier 33, Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-24 Site 24 Site Plan – Central Paint Accumulation (Building 174)**

(Source: Figure 2-21 Tetra Tech, Site Map Site 24 – Central Paint Accumulation (Building 174), Site Management Plan, Naval Submarine Base New London, Groton, Connecticut, June 2011)

**Figure 2-25 Zones 5, 6, and 7 Soil - Limits of Remedial Actions (CERCLA and NON-CERCLA)**

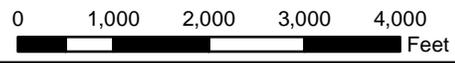
(Source: Figure 3 Tetra Tech, Site Limits of Remedial Actions for Zones 5, 6, and 7 Soil, Naval Submarine Base New London, Groton, Connecticut, July 2012)



**FIGURE 1-1**  
**FACILITY LOCATION MAP**  
**NEW LONDON SUBMARINE BASE**  
**GROTON, CONNECTICUT**

1 inch = 2,000 feet

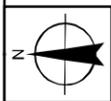
INSTALLATION AREA



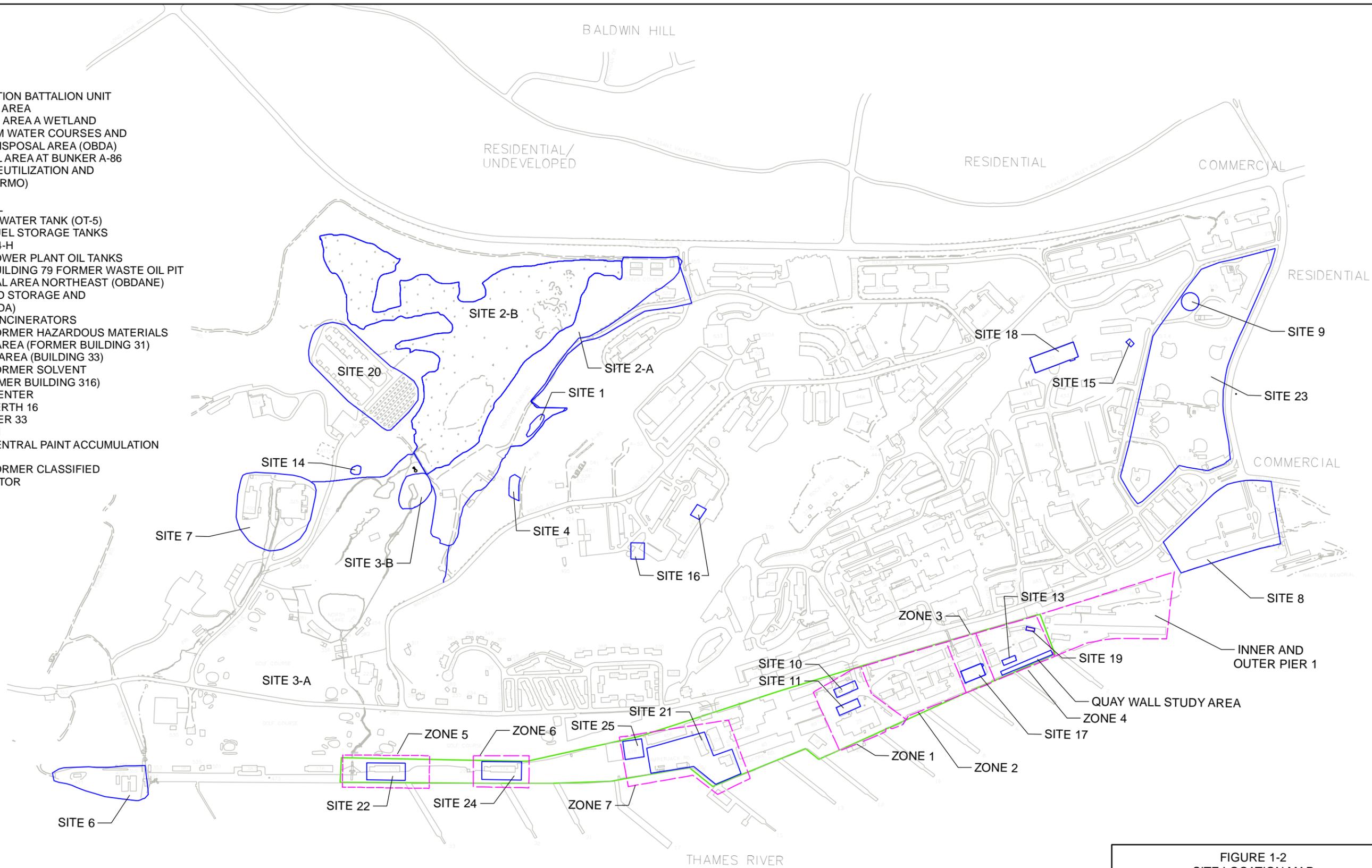
REQUESTED BY: P. GRATTON		DATE: 9/26/2012	
DRAWN BY: A. ZIMMERMAN		TASK ORDER NUMBER: XW10	

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SOURCE: ARCGIS ONLINE BING AERIAL (c) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS



- SITE 1 - FORMER CONSTRUCTION BATTALION UNIT (CBU) DRUM STORAGE AREA
- SITE 2 - AREA A LANDFILL AND AREA A WETLAND
- SITE 3 - AREA A DOWNSTREAM WATER COURSES AND FORMER OVBANK DISPOSAL AREA (OBDA)
- SITE 4 - FORMER RUBBLE FILL AREA AT BUNKER A-86
- SITE 6 - FORMER DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)
- SITE 7 - TORPEDO SHOPS
- SITE 8 - GOSS COVE LANDFILL
- SITE 9 - FORMER OILY WASTEWATER TANK (OT-5)
- SITE 10 - LOWER SUBASE - FUEL STORAGE TANKS AND FORMER TANK 54-H
- SITE 11 - LOWER SUBASE - POWER PLANT OIL TANKS
- SITE 13 - LOWER SUBASE - BUILDING 79 FORMER WASTE OIL PIT
- SITE 14 - OVBANK DISPOSAL AREA NORTHEAST (OBDANE)
- SITE 15 - FORMER SPENT ACID STORAGE AND DISPOSAL AREA (SASDA)
- SITE 16 - FORMER HOSPITAL INCINERATORS
- SITE 17 - LOWER SUBASE - FORMER HAZARDOUS MATERIALS /SOLVENT STORAGE AREA (FORMER BUILDING 31)
- SITE 18 - SOLVENT STORAGE AREA (BUILDING 33)
- SITE 19 - LOWER SUBASE - FORMER SOLVENT STORAGE AREA (FORMER BUILDING 316)
- SITE 20 - AREA A WEAPONS CENTER
- SITE 21 - LOWER SUBASE - BERTH 16
- SITE 22 - LOWER SUBASE - PIER 33
- SITE 23 - FORMER FUEL FARM
- SITE 24 - LOWER SUBASE - CENTRAL PAINT ACCUMULATION AREA (BUILDING 174)
- SITE 25 - LOWER SUBASE - FORMER CLASSIFIED MATERIALS INCINERATOR



- SITE BOUNDARY
- ZONE BOUNDARY
- LOWER SUBBASE BOUNDARY

1 inch = 850 feet

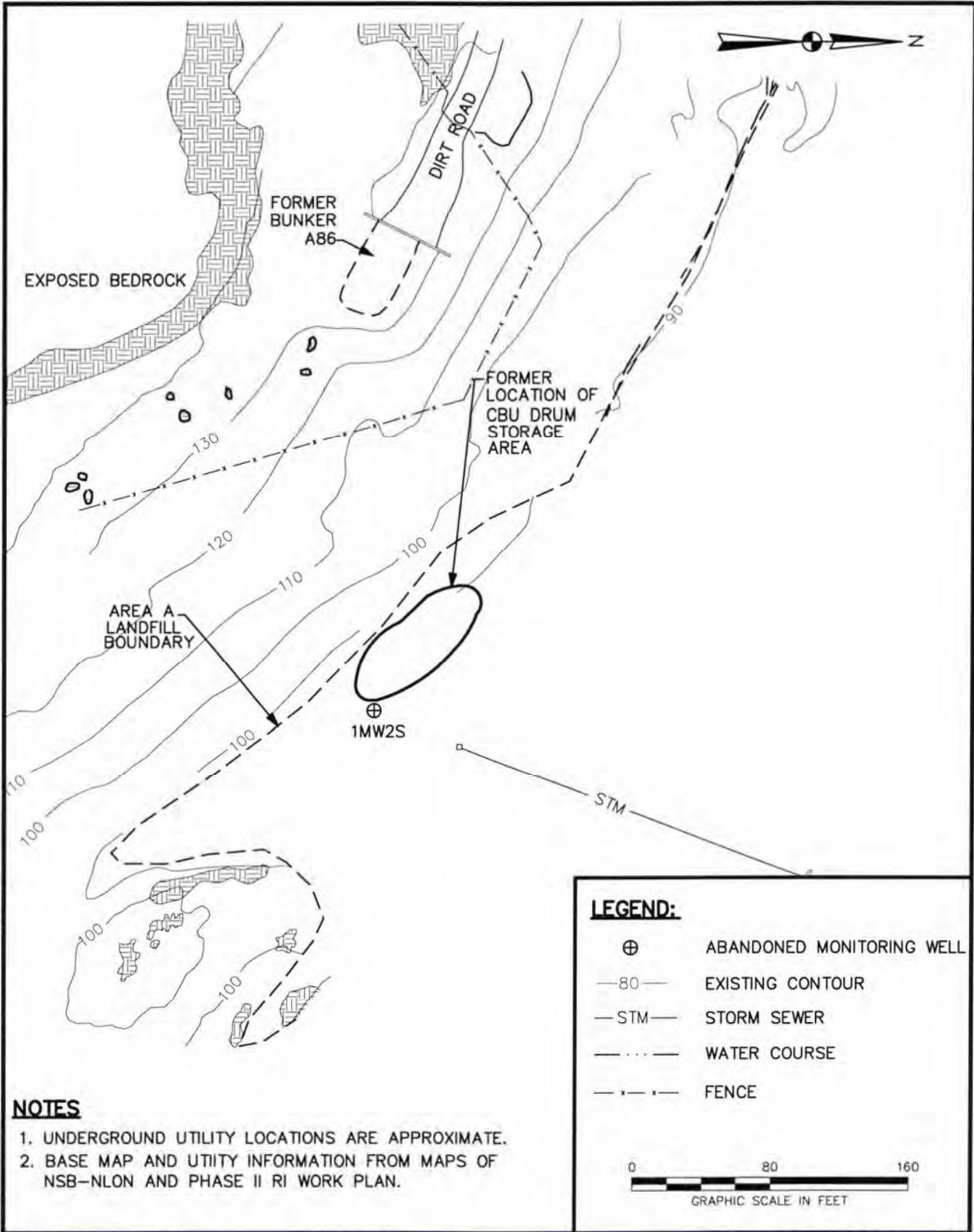
**FIGURE 1-2**  
**SITE LOCATION MAP**  
**NEW LONDON SUBMARINE BASE**  
**GROTON, CONNECTICUT**




REQUESTED BY: R. MCCARTHY	DATE: 9/26/2012
DRAWN BY: A. ZIMMERMAN	TASK ORDER NUMBER:

X:\Navy\New\_London\_Sub\_Base\SiteOverview.mxd

R:\1484\Figures\1484CM01.dwg PIT BEN.HOPPE 11/25/2008



- NOTES**
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
  2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN.

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REVISED BY	DATE
SCALE AS NOTED	



**SITE MAP**  
**SITE 1 - CBU DRUM STORAGE AREA**  
**NSB-NLON**  
**GROTON, CONNECTICUT**

CONTRACT NO. 1484	
OWNER NO. 134	
APPROVED BY <i>[Signature]</i>	DATE 12/3/08
DRAWING NO. FIGURE 2-1	REV. 1

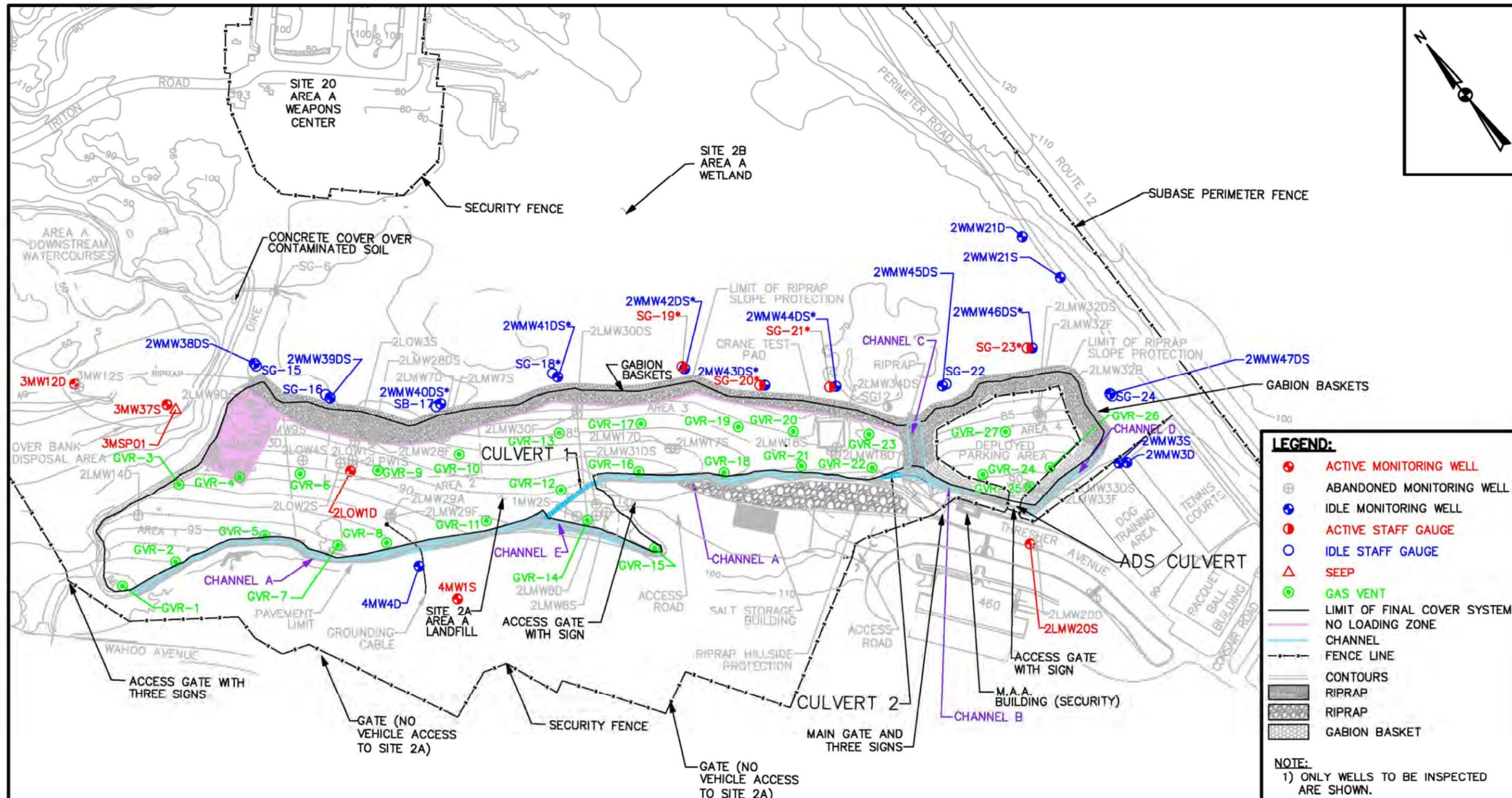


NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT  
 60249706.SP.SP

DATE: 08/09/12    DRWN: J.E.B.

FIGURE 2-1  
 SITE 1 SITE PLAN  
 CBU DRUM STORAGE AREA

Path: W:\Govt\Projects\Navy CLEAN AECOM-EnSafe JV\New London\GIS\Projects\SMP\_Report\Figure 2-2\_Site 2A\_Site Plan\_Area A\_Landfill.mxd



**LEGEND:**

- ACTIVE MONITORING WELL
- ⊕ ABANDONED MONITORING WELL
- IDLE MONITORING WELL
- ACTIVE STAFF GAUGE
- IDLE STAFF GAUGE
- △ SEEP
- ⊙ GAS VENT
- LIMIT OF FINAL COVER SYSTEM
- NO LOADING ZONE
- CHANNEL
- FENCE LINE
- CONTOURS
- ▨ RIPRAP
- ▨ RIPRAP
- ▨ GABION BASKET

**NOTE:**

- ONLY WELLS TO BE INSPECTED ARE SHOWN.
- FENCE LINES PROVIDED BY H&S (2010).

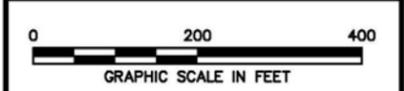
\*WELL/STAFF GAUGE SHOWN OUT OF POSITION FOR ILLUSTRATION PURPOSE

**SOURCES:**

- BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN (ATLANTIC, 1993).
- GAS VENT COORDINATE INFORMATION FROM SAI SURVEY CO. FOSTER WHEELER AS-BUILT REPORT 11-1-97.

**NOTE:**

MONITORING WELL 3MW12D REINSTALLED OCTOBER 2002 DURING ROUND 11 MONITORING ACTIVITIES



DRAWN BY	DATE
CK	3/10/10
CHECKED BY	DATE
NJB	4/12/11
REVISED BY	DATE
CW	10/20/10
SCALE	AS NOTED



SITE PLAN FOR  
SITE 2A - AREA A LANDFILL  
NSB-NLON  
GROTON, CONNECTICUT

CONTRACT NO. WE33	
OWNER NO. 3386	
APPROVED BY CAR	DATE 4/12/11
DRAWING NO. FIGURE 2-2	REV. 2

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NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP  
DATE: 08/09/12 DRWN: J.E.B.

FIGURE 2-2  
SITE 2A SITE PLAN - AREA A LANDFILL

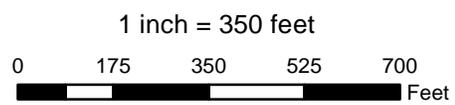


**Site 2B – Area A Wetlands**  
**Source:** Storage and dumping of materials adjacent and into wetlands  
**Contaminant:** PAHs, PCBs, pesticides, and metals  
**Remedy:** Excavation and off-site disposal of 6,900 cy of sediment; Site restoration and monitoring; LUCs  
**FY13 Cost:** \$1,773,000

Upland Area

FIGURE 2-3  
 SITE 2-B SITE PLAN - AREA A WETLAND  
 NEW LONDON SUBMARINE BASE  
 GROTON, CONNECTICUT

 SITE BOUNDARY

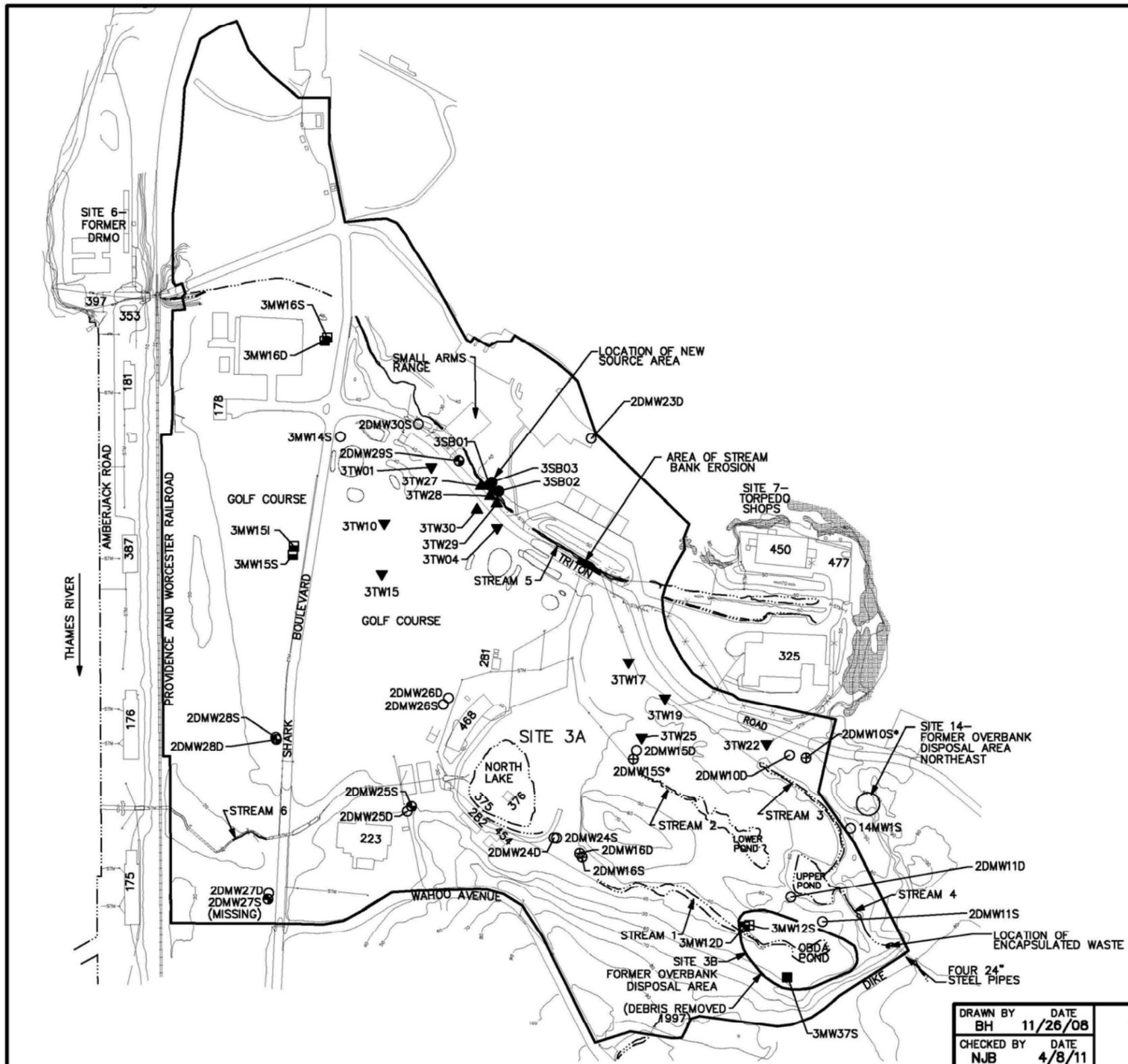


REQUESTED BY: R. MCCARTHY  
 DRAWN BY: A. ZIMMERMAN

DATE: 9/26/2012  
 TASK ORDER NUMBER:

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Path: W:\Govt\Projects\Navy CLEAN AECOM-EnSafe JV\New London\GIS\Projects\SMP\_Report\Figure\_2-4\_Site\_3\_Site\_Plan\_Area\_A\_Downstream\_Watercourses\_OBDA.mxd



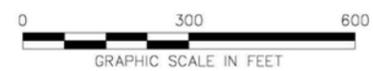
**NOTES**

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN, (ATLANTIC, MAY 1993).
3. \*-2DMW10S AND 2DMW15S WERE NOT COMPLETED DUE TO A LACK OF GROUNDWATER. SOIL SAMPLES WERE COLLECTED FROM THESE BORINGS.
4. 3MW12S AND 3MW12D WERE DESTROYED DURING THE SOIL AND SEDIMENT OU3 REMEDIAL ACTION. 3MW12D WAS SUBSEQUENTLY REPLACED DURING ROUND 11 (2002) OF THE AREA A LANDFILL GROUNDWATER MONITORING PROGRAM.



**LEGEND:**

- AREA A LANDFILL GROUNDWATER MONITORING PROGRAM MONITORING WELL
- ▼ 3MW37S
- ▲ 3TW1
- ▲ 3TW27
- 3SB01
- 3SB01
- 3MW12D
- 3MW12S
- ⊕ 2DMW25D
- ⊕ 2DMW26D
- 3MW16S
- 2DMW25D
- 10— TOPOGRAPHIC CONTOUR
- 123 BUILDING No.
- WATERCOURSE
- STM--- STORM SEWER AND CATCH BASIN
- EXPOSED BEDROCK
- ×× FENCE
- SITE 3 BOUNDARY



BASE MAP SOURCE: PREPARED BY THE NAVAL SUBMARINE BASE PUBLIC WORKS DEPT., ENGINEERING DIVISION. MARCH 2006, DRAWING NO. A-667.

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BH	11/26/08
CHECKED BY	DATE
NJB	4/8/11
REVISED BY	DATE
SCALE AS NOTED	



**SITE MAP**  
**SITE 3 - AREA A DOWNSTREAM**  
**WATERCOURSES/OBDA**  
**NSB-NLON**  
**GROTON, CONNECTICUT**

CONTRACT NO. WE33	
OWNER NO. 3386	
APPROVED BY	DATE
CAR	4/8/11
DRAWING NO. FIGURE 2-4	REV. 1

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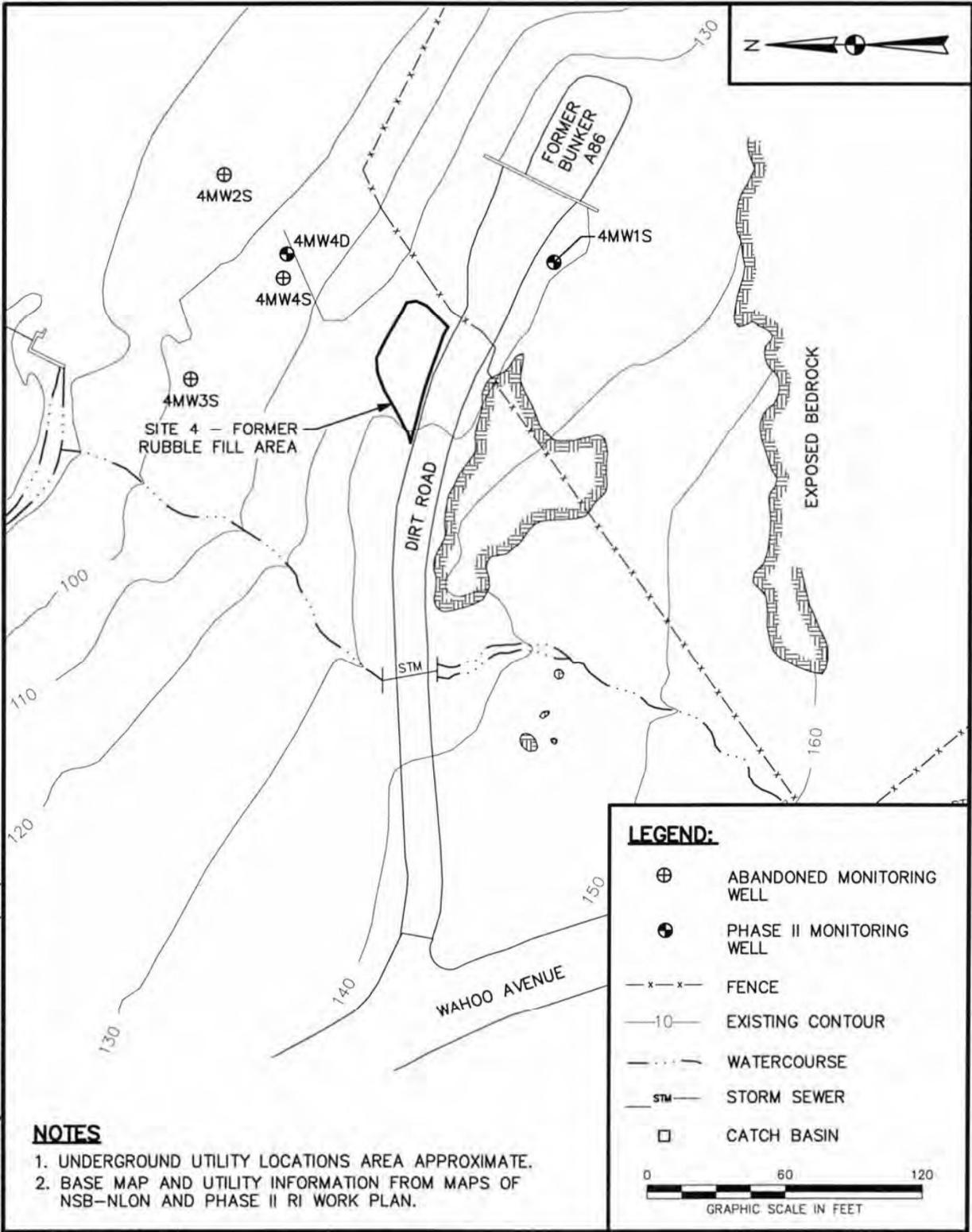


NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT  
 60249706.SP.SP

FIGURE 2-4  
 SITE 3 SITE PLAN - AREA A DOWNSTREAM  
 WATERCOURSES/OBDA

DATE: 08/09/12 DRWN: J.E.B.

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**NOTES**

1. UNDERGROUND UTILITY LOCATIONS AREA APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN.

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CHECKED BY <i>[Signature]</i>	DATE 11/26/08
REVISED BY	DATE
SCALE AS NOTED	



**SITE MAP**  
**SITE 4 - RUBBLE FILL AREA AT BUNKER A86**  
**NSB-NLON**  
**GROTON, CONNECTICUT**

CONTRACT NO. 1484	
OWNER NO. 134	
APPROVED BY <i>[Signature]</i>	DATE 12/3/08
DRAWING NO. FIGURE 2-5	REV. 1



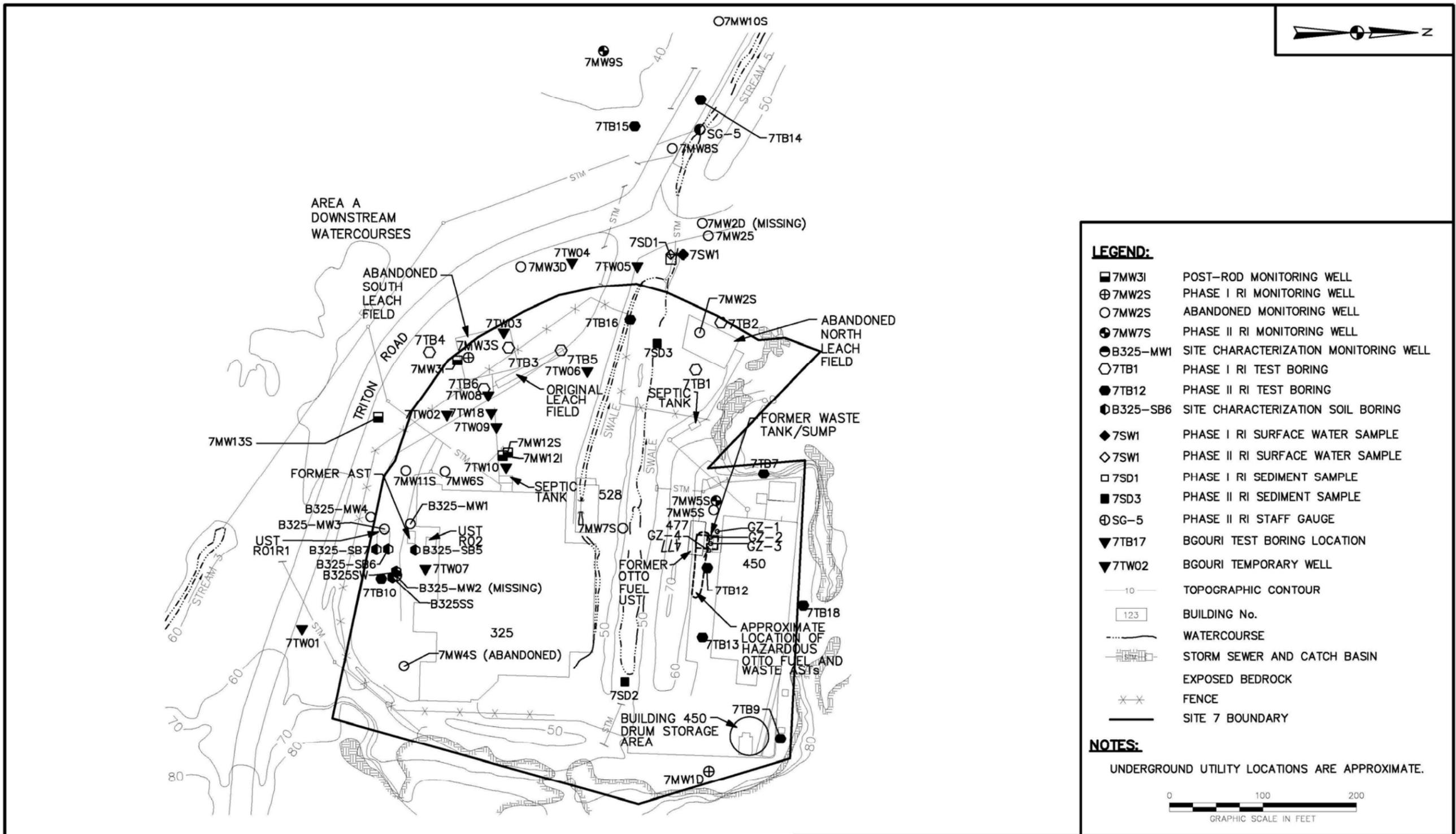
NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP

FIGURE 2-5  
SITE 4 SITE PLAN  
RUBBLE FILL AREA AT BUNKER A86

DATE: 08/09/12 DRWN: J.E.B.



Path: W:\Gov\Projects\Navy CLEAN AECOM-EnSafe JV\New London\GIS\Projects\SMP\_Report\Figure\_2-7\_Site\_7\_Site\_Plan\_Torpedo\_Shops.mxd



BASE MAP SOURCE: PREPARED BY THE NAVAL SUBMARINE BASE PUBLIC WORKS DEPT., ENGINEERING DIVISION. MARCH 2006, DRAWING NO. A-667.

DRAWN BY	DATE
BH	11/26/08
CHECKED BY	DATE
NJB	4/8/11
REVISED BY	DATE
SCALE AS NOTED	



**SITE MAP**  
**SITE 7 - TORPEDO SHOPS**  
**NSB-NLON**  
**GROTON, CONNECTICUT**

CONTRACT NO.	
WE33	
OWNER NO.	
3386	
APPROVED BY	DATE
CAR	4/8/11
DRAWING NO.	REV.
FIGURE 2-7	1

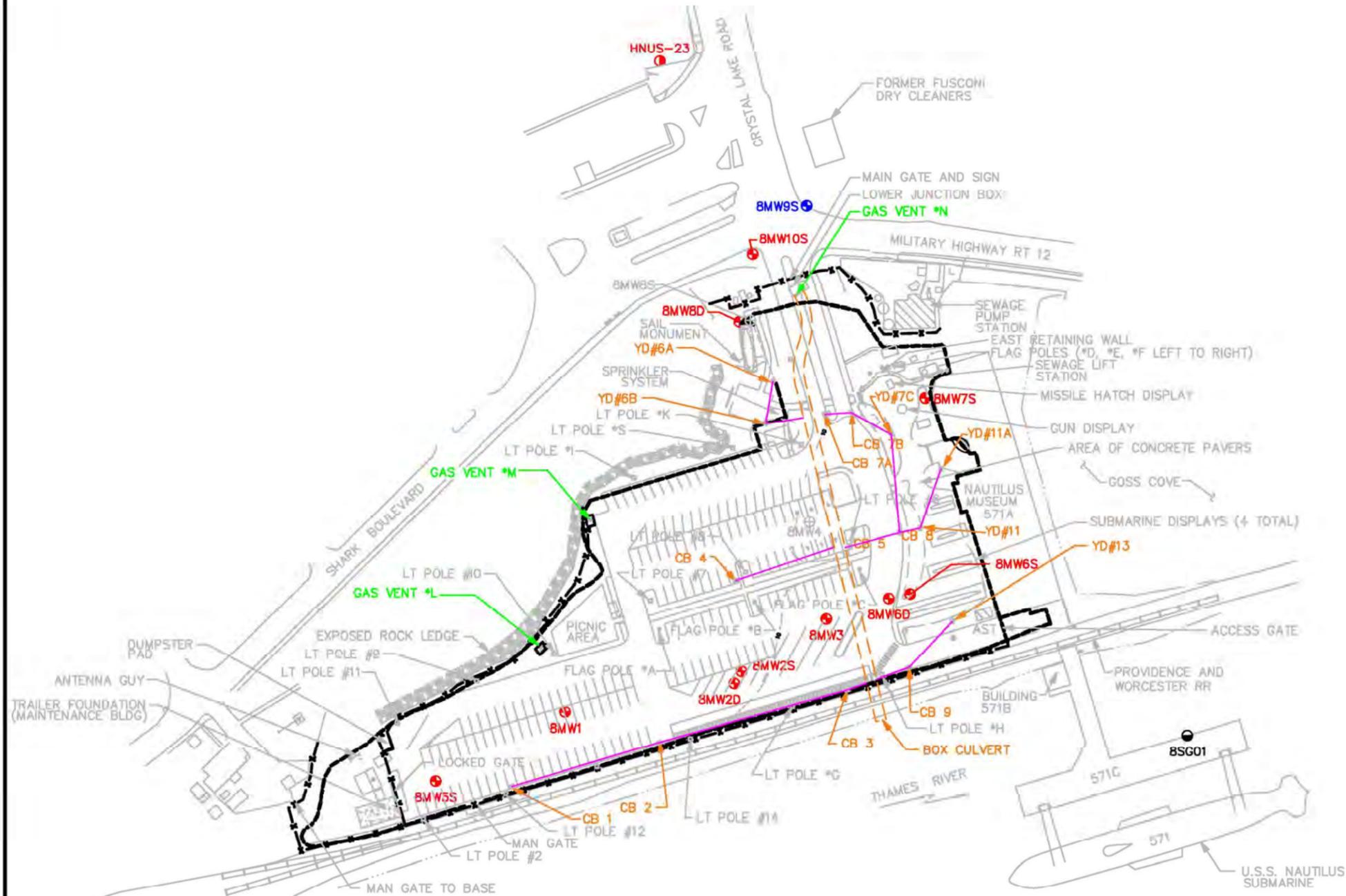
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NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT  
 60249706.SP.SP  
 DATE: 08/09/12 DRWN: J.E.B.

FIGURE 2-7  
 SITE 7 SITE PLAN - TORPEDO SHOPS



Path: W:\Gov\Projects\Navy CLEAN AECOM-EnSafe JV\New London\GIS\Projects\SMP\_Report\Figure\_2-8\_Site\_8\_Site\_Plan\_Goss\_Cove\_Landfill.mxd



**LEGEND:**

- IDLE MONITORING WELL
- ACTIVE MONITORING WELL
- ⊖ ABANDONED MONITORING WELL
- TANK FARM MONITORING WELL
- HISTORICAL STAFF GAUGE
- STORM DRAIN LINES
- EXISTING SHORELINE
- ASPHALT PAVEMENT AREA CAP SYSTEM BOUNDARY
- 10 TOPOGRAPHIC ELEVATION
- CONTOUR (NAVD 88)
- CHAIN LINK FENCE
- BOX CULVERT
- LT LIGHT
- CB CATCH BASIN
- YD YARD DRAIN

**NOTES:**

- IDENTIFICATION NUMBER/LETTER WITH AN ASTERISK INDICATES AN ARBITRARY DESIGNATION BECAUSE NONE WAS PROVIDED IN THE DESIGN OR AS-BUILT DOCUMENTATION.
- ALL MONITORING WELLS TO BE INSPECTED ARE SHOWN

0 100 200  
SCALE IN FEET

REF: BOX CULVERT LOCATION TAKEN FROM BIDDING DOCUMENT DRAWING TITLED "GOSS COVE LANDFILL (SITE 8) CAP, STORM SEWER PLAN AND PROFILE", NAVFAC DRAWING NO. 2204124, DIS. SH. NO. C-10, SEPTEMBER 4, 2001 REVISION.

REVISIONS			
NO.	DATE	INL	REMARKS
1	12-16-08	BH	UPDATED TO SHOW ABANDONED WELLS, LOCATION OF LOWER JUNCTION BOX, BOX CULVERT AND CURRENT GUN DISPLAY.
2	10-19-10	ND	MAN GATE NEAR LIGHT POLE REMOVED, TWO GATES ADDED, COLOR CODING ADDED, DELETED STAFF GAUGE.
3	3-29-11	ND	CORRECTED LOCATION OF BOX CULVERT, ADDED STORM DRAIN LINES.
4	6-24-11	CK	ADDED AST

DRAWN BY BH	DATE 12/16/08
CHECKED BY NJB	DATE 4/8/11
REVISED BY	DATE
SCALE AS NOTED	



SITE PLAN FOR  
SITE 8 - GOSS COVE LANDFILL  
NSB-NLON  
GROTON, CONNECTICUT

CONTRACT NO. WE.33	
OWNER NO. 3386	
APPROVED BY CAR	DATE 4/8/11
DRAWING NO. FIGURE 2-8	REV. 2

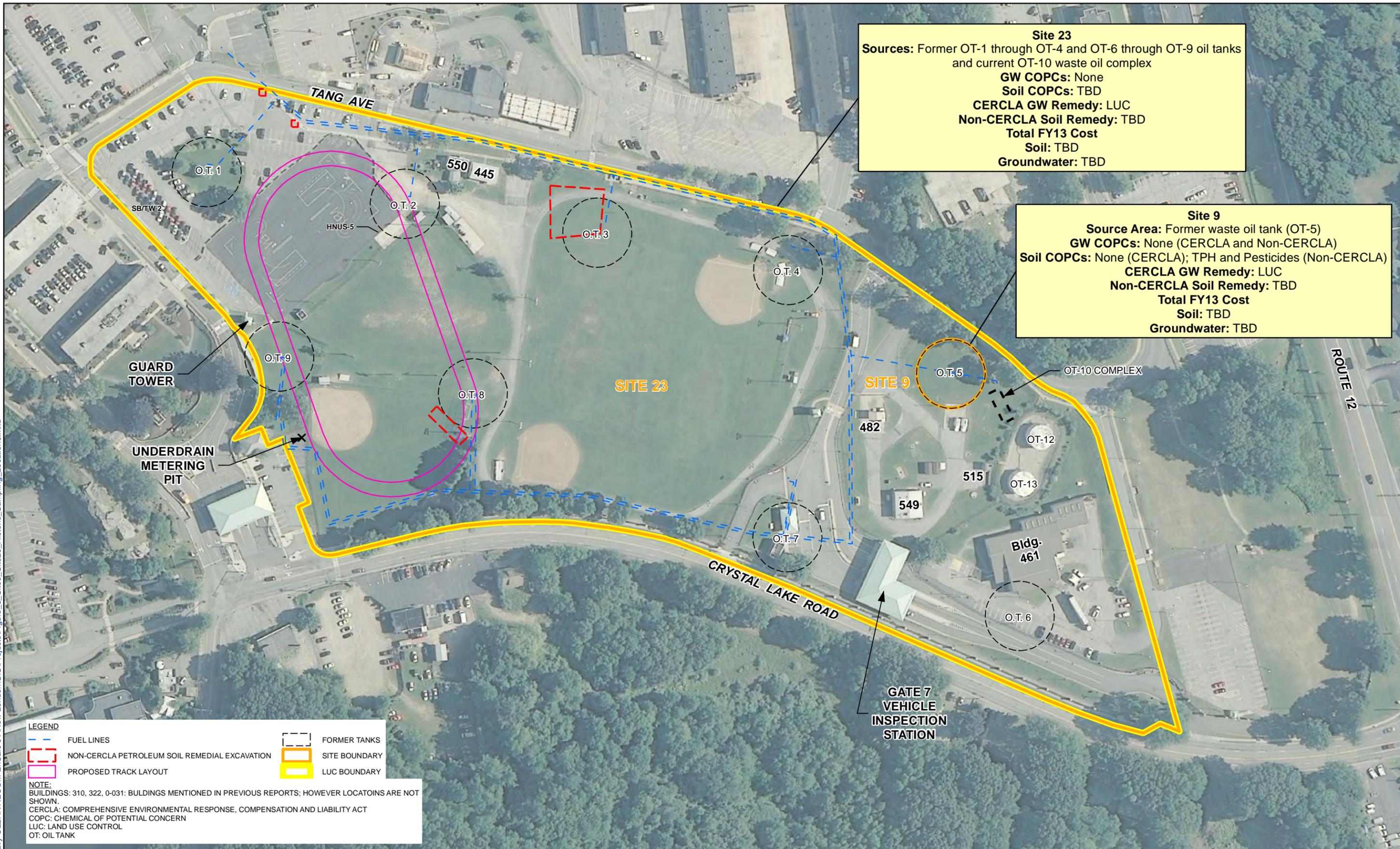
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NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP  
DATE: 08/09/12 DRWN: J.E.B.

FIGURE 2-8  
SITE 8 SITE PLAN - GOSS COVE LANDFILL

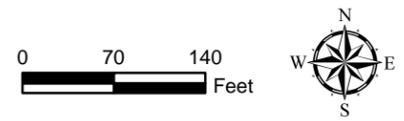


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LEGEND	
	FUEL LINES
	NON-CERCLA PETROLEUM SOIL REMEDIAL EXCAVATION
	PROPOSED TRACK LAYOUT
	FORMER TANKS
	SITE BOUNDARY
	LUC BOUNDARY

NOTE:  
 BUILDINGS: 310, 322, 0-031: BUILDINGS MENTIONED IN PREVIOUS REPORTS; HOWEVER LOCATIONS ARE NOT SHOWN.  
 CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT  
 COPC: CHEMICAL OF POTENTIAL CONCERN  
 LUC: LAND USE CONTROL  
 OT: OIL TANK



NAVAL SUBMARINE BASE NEW LONDON  
 GROTON, CONNECTICUT  
 60249706.SP.SP  
 DATE: 08/07/12 | DRWN: J.E.B.

FIGURE 2-9  
 SITES 9 & 23 SITE PLAN  
 FORMER FUEL LIMITS OF REMEDIAL ACTIONS  
 (CERCLA AND NON- CERCLA)

PGH P:\GIS\NLON\MAPDOCS\MXD\SITES10\_11\_SITEMAP\_APR11\_2.MXD 06/27/11 SS



DRAWN BY J. ENGLISH	DATE 05/20/11
CHECKED BY N. BALSAMO	DATE 06/27/11
COST/SCHEDULE-AREA	
SCALE AS NOTED	

**Tetra Tech NUS, Inc.**

**SITE MAP**  
**SITE 10 - FUEL STORAGE TANKS AND TANK 54-H**  
**AND SITE 11 - POWER PLANT OIL TANKS**  
 NSB-NLON, GROTON, CONNECTICUT

CONTRACT NUMBER WE33	OWNER NUMBER 3386
APPROVED BY CAR	DATE 05/23/11
APPROVED BY	DATE
DRAWING NO. FIGURE 2-10	REV 0

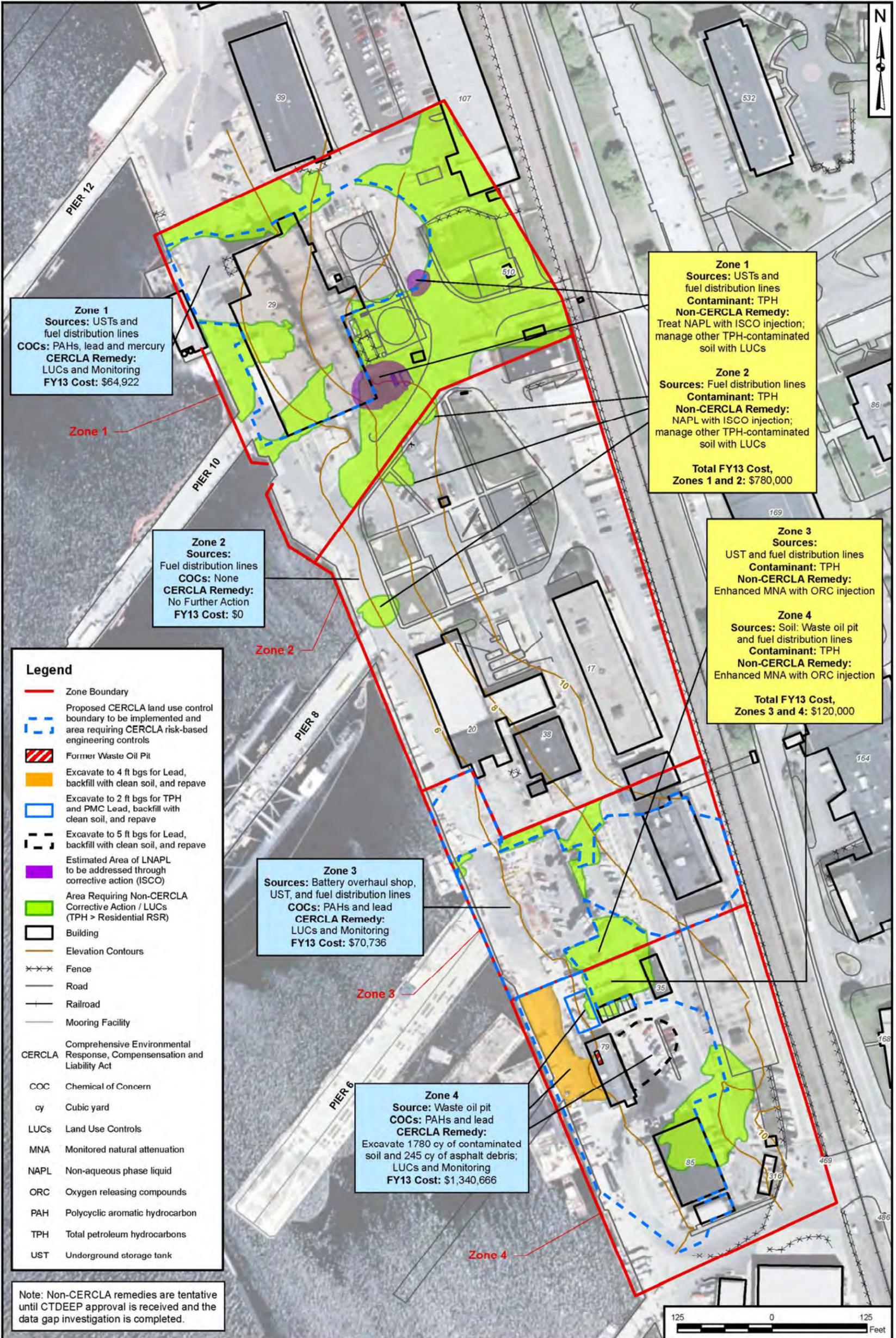


NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT  
 60249706.SP.SP

FIGURE 2-10  
 SITE 10 & 11 SITE PLAN  
 FUEL STORAGE TANKS/TANK 54-H  
 AND POWER PLANT OIL TANKS

DATE: 08/09/12      DRWN: J.E.B.

PGH: P:\GIS\NLONMAPDOCS\MXD\ZONE1234\_REMEDIAL\_ACTION.MXD 07/12/2012 JEE



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K. MOORE	05/30/12
CHECKED BY	DATE
C. RICH	07/12/12
REVISED BY	DATE
SCALE	
AS NOTED	



LIMITS OF REMEDIAL ACTIONS FOR ZONES 1, 2, 3, AND 4 SOIL  
(CERCLA AND NON-CERCLA)  
NSB-NLON, GROTON, CONNECTICUT

CONTRACT NUMBER	CTO NUMBER
	WE67
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FIGURE NO.	REV
FIGURE 1	0

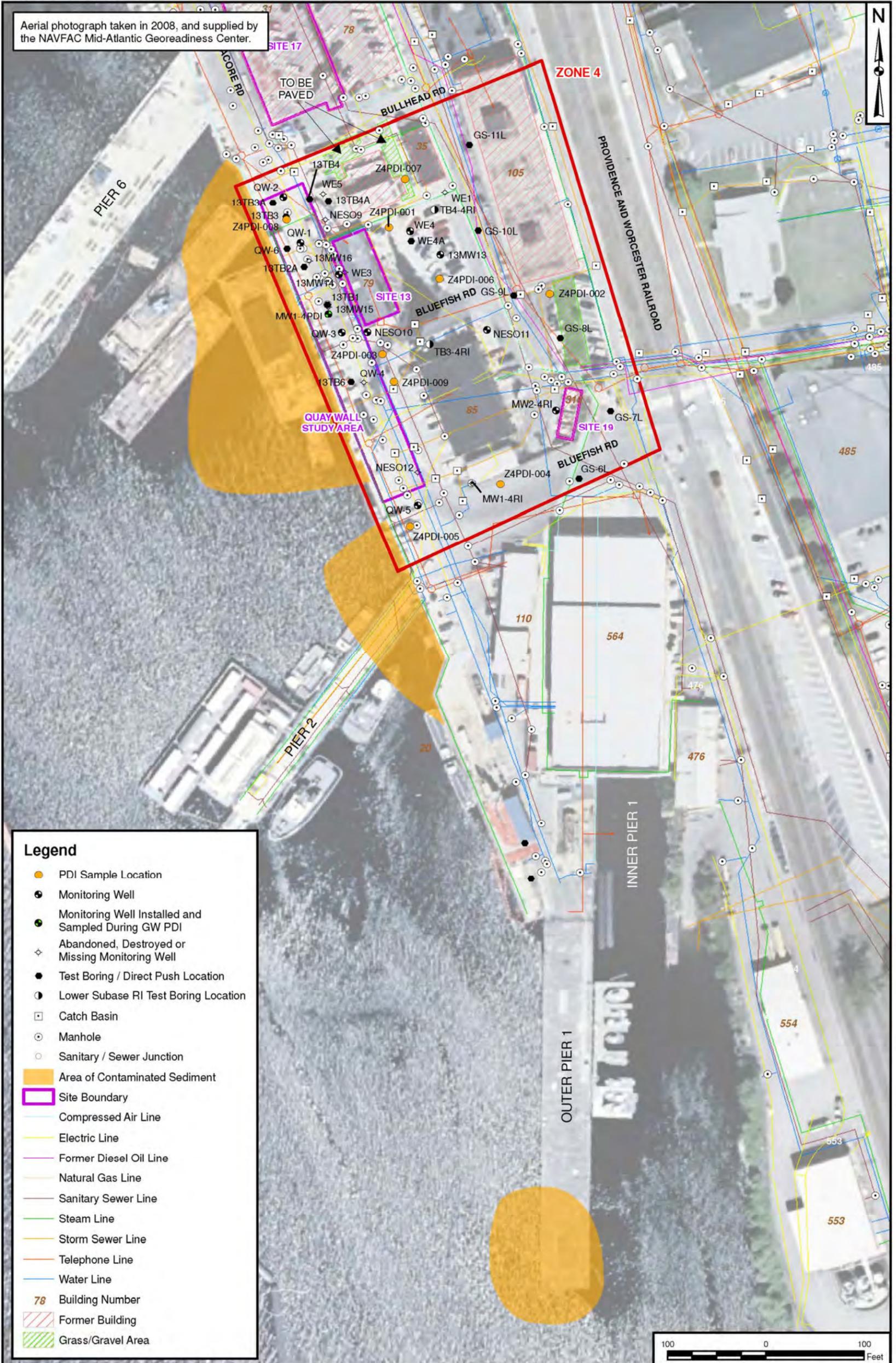


NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP

FIGURE 2-11  
ZONES 1, 2, 3 AND 4 SOIL SITE PLAN  
LIMITS OF REMEDIAL ACTIONS  
(CERCLA AND NON-CERCLA)

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Aerial photograph taken in 2008, and supplied by the NAVFAC Mid-Atlantic Georeadiness Center.



Legend	
	PDI Sample Location
	Monitoring Well
	Monitoring Well Installed and Sampled During GW PDI
	Abandoned, Destroyed or Missing Monitoring Well
	Test Boring / Direct Push Location
	Lower Subbase RI Test Boring Location
	Catch Basin
	Manhole
	Sanitary / Sewer Junction
	Area of Contaminated Sediment
	Site Boundary
	Compressed Air Line
	Electric Line
	Former Diesel Oil Line
	Natural Gas Line
	Sanitary Sewer Line
	Steam Line
	Storm Sewer Line
	Telephone Line
	Water Line
	Building Number
	Former Building
	Grass/Gravel Area

DRAWN BY J. ENGLISH	DATE 05/20/11
CHECKED BY N. BALSAMO	DATE 06/27/11
COST/SCHEDULE-AREA	
SCALE AS NOTED	

Tetra Tech NUS, Inc.	
SITE MAP	
SITE 13 - BUILDING 79 FORMER WASTE OIL PIT, AND	
SITE 19 - FORMER SOLVENT STORAGE AREA (FORMER BUILDING 316), AND PIER 1	
NSB-NLON, GROTON, CONNECTICUT	

CONTRACT NUMBER WE33	OWNER NUMBER 3386
APPROVED BY CAR	DATE 05/23/11
APPROVED BY	DATE
DRAWING NO. FIGURE 2-11	REV 0

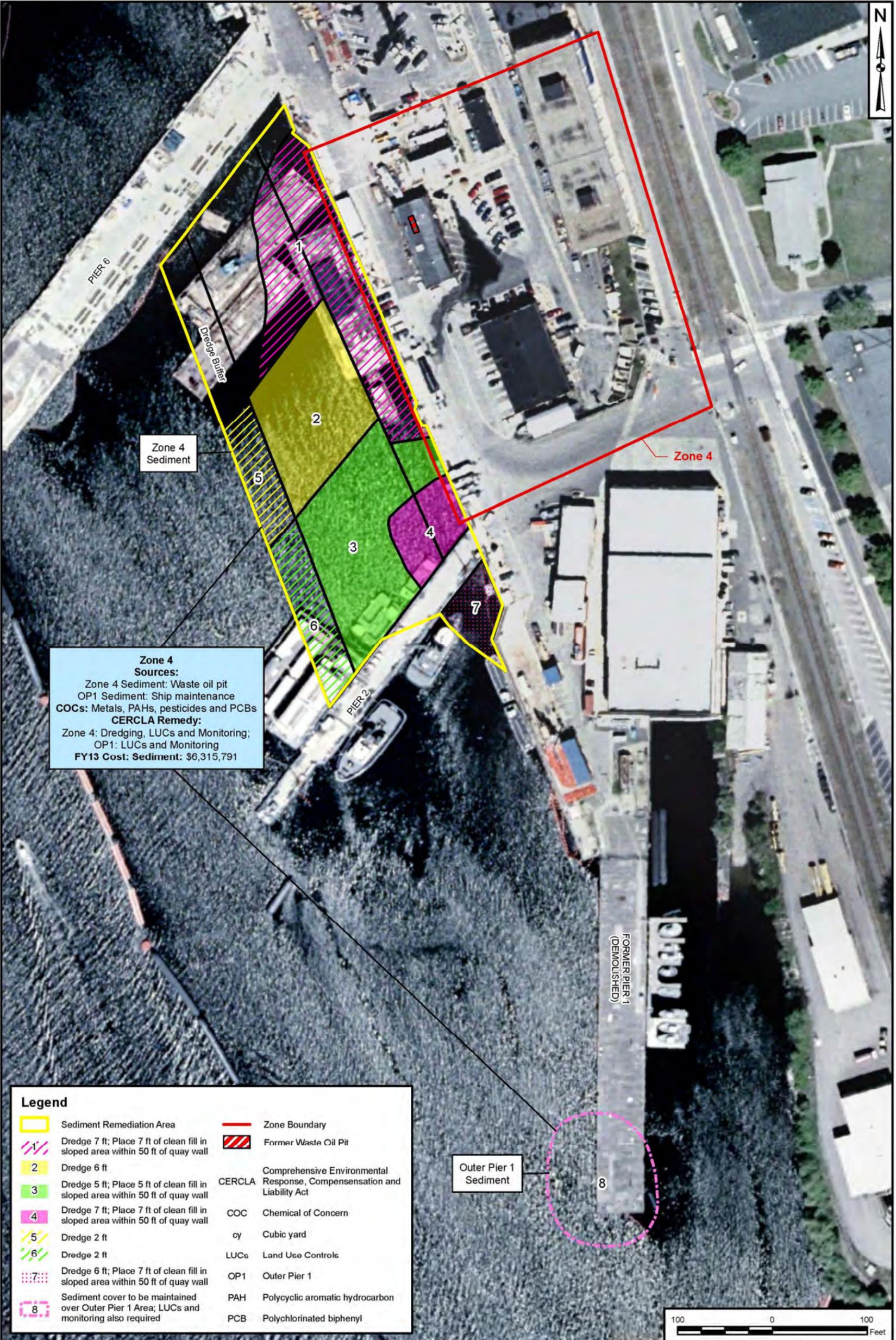


NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP

DATE: 08/09/12      DRWN: J.E.B.

FIGURE 2-12  
SITE 13 & 19 SITE PLAN  
BUILDING 79 FORMER WASTE OIL PIT  
AND FORMER SOLVENT STORAGE AREA  
(FORMER BUILDING 316), AND PIER 1

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**Zone 4 Sources:**  
 Zone 4 Sediment: Waste oil pit  
 OP1 Sediment: Ship maintenance  
**COCs:** Metals, PAHs, pesticides and PCBs  
**CERCLA Remedy:**  
 Zone 4: Dredging, LUCs and Monitoring;  
 OP1: LUCs and Monitoring  
**FY13 Cost: Sediment: \$6,315,791**

Legend	
	Sediment Remediation Area
	Dredge 7 ft; Place 7 ft of clean fill in sloped area within 50 ft of quay wall
	Dredge 6 ft
	Dredge 5 ft; Place 5 ft of clean fill in sloped area within 50 ft of quay wall
	Dredge 7 ft; Place 7 ft of clean fill in sloped area within 50 ft of quay wall
	Dredge 2 ft
	Dredge 2 ft
	Dredge 6 ft; Place 7 ft of clean fill in sloped area within 50 ft of quay wall
	Sediment cover to be maintained over Outer Pier 1 Area; LUCs and monitoring also required
	Zone Boundary
	Former Waste Oil Pit
	CERCLA Comprehensive Environmental Response, Compensation and Liability Act
	COC Chemical of Concern
	cy Cubic yard
	LUCe Land Use Controls
	OP1 Outer Pier 1
	PAH Polycyclic aromatic hydrocarbon
	PCB Polychlorinated biphenyl

DRAWN BY	DATE
K. MOORE	05/30/12
CHECKED BY	DATE
C. RICH	07/12/12
REVISED BY	DATE
SCALE	AS NOTED



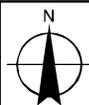
**LIMITS OF REMEDIAL ACTIONS FOR ZONE 4 AND OUTER PIER 1 SEDIMENT  
 (CERCLA AND NON-CERCLA)  
 NSB-NLON, GROTON, CONNECTICUT**

CONTRACT NUMBER	CTO NUMBER
	WE67
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO.	REV
FIGURE 2	0



NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT  
 60249706.SP.SP  
 DATE: 08/09/12      DRWN: J.E.B.

FIGURE 2-13  
 ZONE 4 AND OUTER PIER 1 SEDIMENT SITE PLAN  
 (CERCLA AND NON-CERCLA)

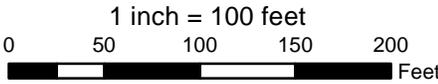


**Inner Pier 1**  
**Source:** Ship maintenance activities, paint scraping, sandblasting  
**Contaminant:** PAHs, PCBs, pesticides, metals  
**Remedy:** Dredging and off-site disposal of 392 cy sediment  
 FY13 Cost: \$\$

Former Pier 1

FIGURE 2-14  
 INNER PIER 1  
 NEW LONDON SUBMARINE BASE  
 GROTON, CONNECTICUT

 SITE BOUNDARY



REQUESTED BY: R. MCCARTHY

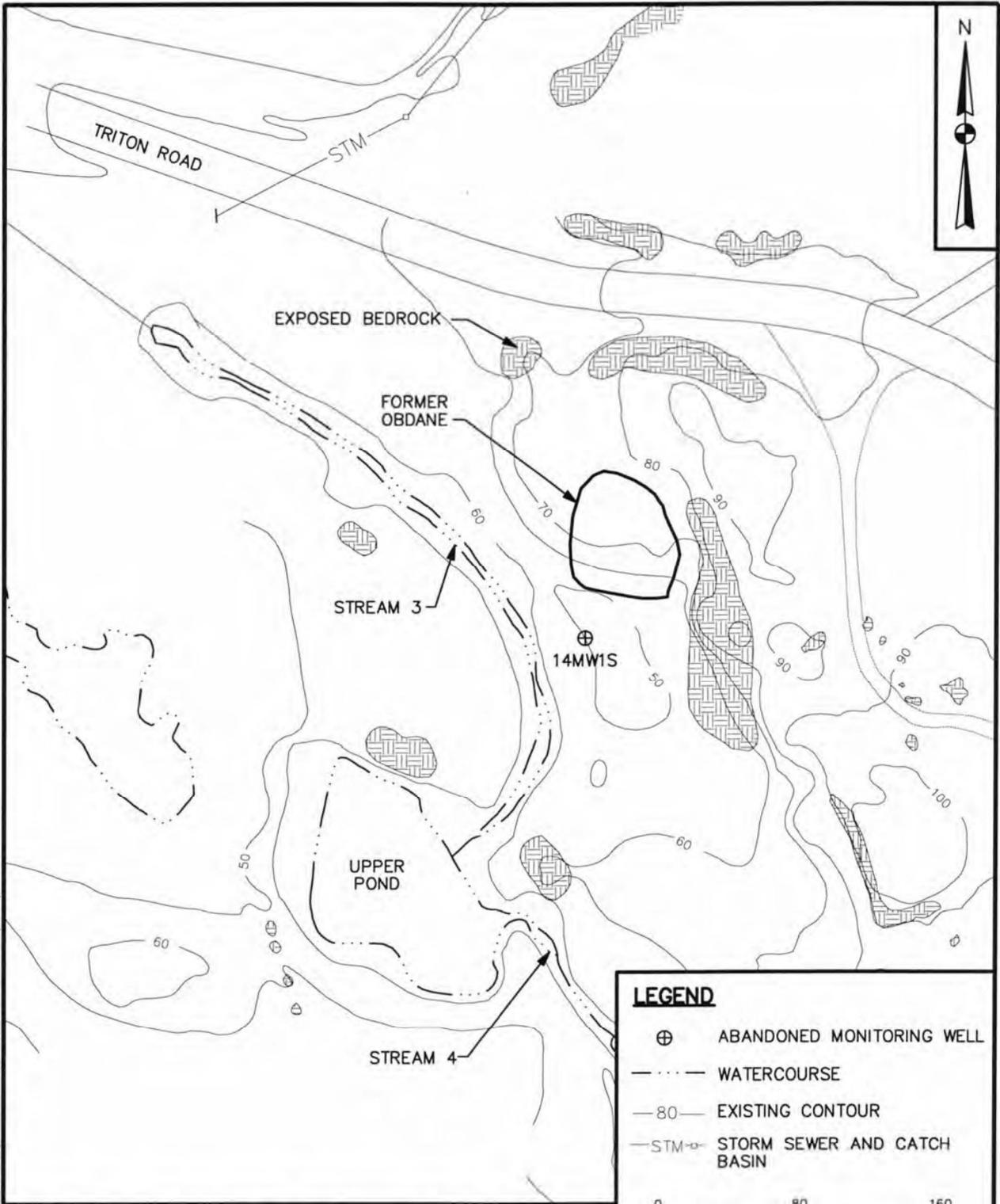
DATE: 9/26/2012

DRAWN BY: A. ZIMMERMAN

TASK ORDER NUMBER:

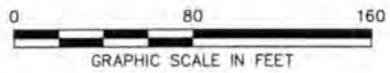
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**LEGEND**

- ⊕ ABANDONED MONITORING WELL
- · - · - WATERCOURSE
- 80 - EXISTING CONTOUR
- STM - STORM SEWER AND CATCH BASIN



BASE MAP SOURCE: PREPARED BY THE NAVAL SUBMARINE BASE PUBLIC WORKS DEPT., ENGINEERING DIVISION, MARCH 2006, DRAWING NO. A-667.

DRAWN BY	DATE
BH	11/26/08
CHECKED BY	DATE
<i>[Signature]</i>	11/26/08
REVISED BY	DATE
SCALE AS NOTED	



**SITE MAP  
SITE 14 - OBDANE  
NSB-NLON  
GROTON, CONNECTICUT**

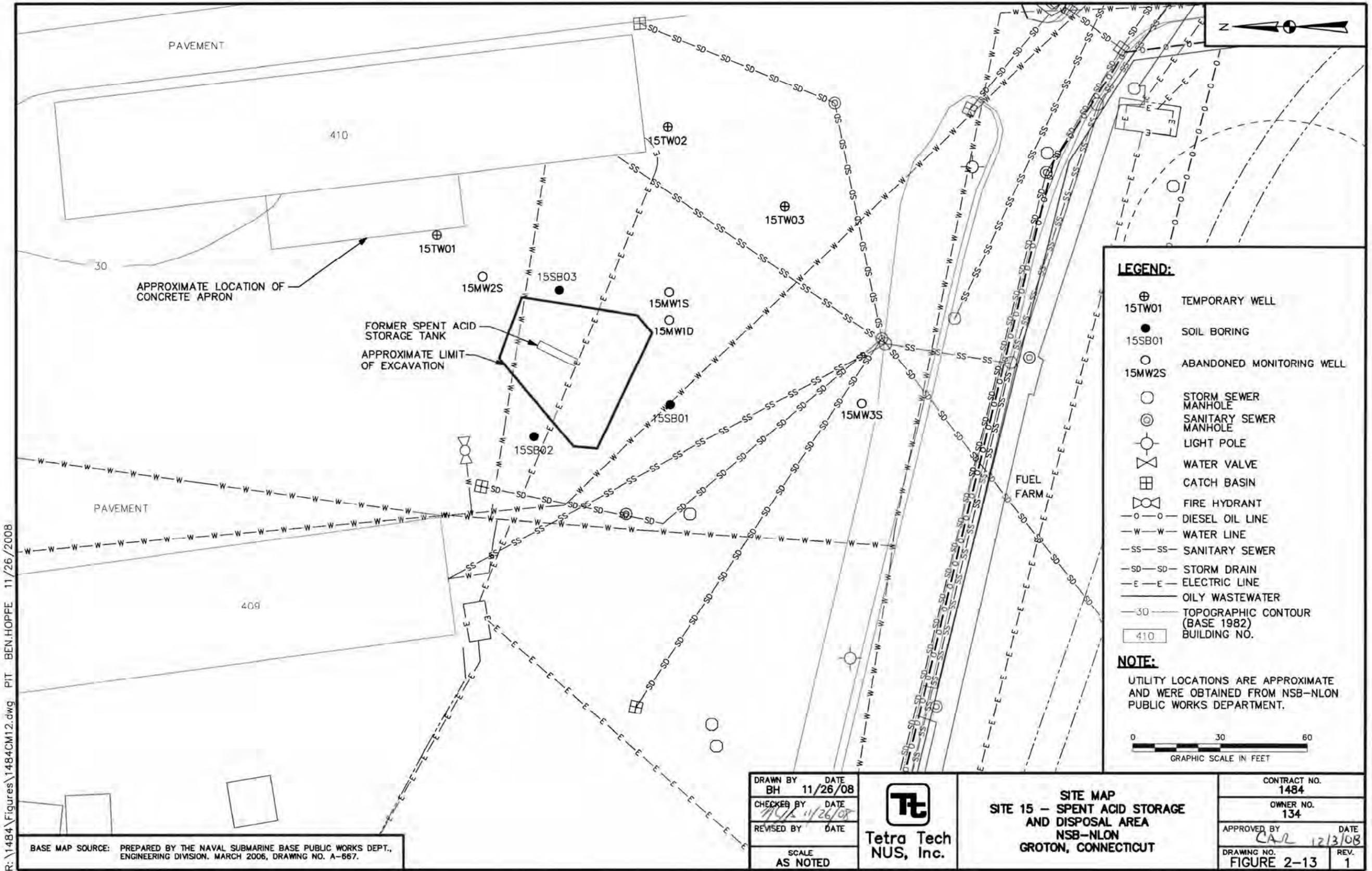
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OWNER NO. <b>134</b>	
APPROVED BY	DATE
<i>[Signature]</i>	12/3/08
DRAWING NO. <b>FIGURE 2-12</b>	REV. <b>1</b>



NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP  
DATE: 08/09/12 DRWN: J.E.B.

**FIGURE 2-15  
SITE 14 SITE PLAN - OBDANE**

Path: W:\Govt\Projects\Navy CLEAN AECOM-EnSafe JV\New London\GIS\Projects\SMP\_Report\Figure 2-16\_Site\_15\_Site\_Plan\_Spent\_Acid\_Storage\_and\_Disposal\_Area.mxd



**LEGEND:**

- ⊕ 15TW01 TEMPORARY WELL
- 15SB01 SOIL BORING
- 15MW2S ABANDONED MONITORING WELL
- STORM SEWER MANHOLE
- ⊙ SANITARY SEWER MANHOLE
- ⊙ LIGHT POLE
- ⊕ WATER VALVE
- ⊕ CATCH BASIN
- ⊕ FIRE HYDRANT
- DIESEL OIL LINE
- W-W- WATER LINE
- SS-SS- SANITARY SEWER
- SD-SD- STORM DRAIN
- E-E- ELECTRIC LINE
- - - OILY WASTEWATER
- 30- TOPOGRAPHIC CONTOUR (BASE 1982)
- 410 BUILDING NO.

**NOTE:**  
UTILITY LOCATIONS ARE APPROXIMATE AND WERE OBTAINED FROM NSB-NLON PUBLIC WORKS DEPARTMENT.

0 30 60  
GRAPHIC SCALE IN FEET

R:\1484\Figures\1484CM12.dwg PIT BEN.HOPPE 11/26/2008

BASE MAP SOURCE: PREPARED BY THE NAVAL SUBMARINE BASE PUBLIC WORKS DEPT., ENGINEERING DIVISION. MARCH 2006, DRAWING NO. A-667.

DRAWN BY	DATE
BH	11/26/08
CHECKER BY	DATE
REVISOR BY	DATE



**SITE MAP**  
**SITE 15 - SPENT ACID STORAGE AND DISPOSAL AREA**  
**NSB-NLON**  
**GROTON, CONNECTICUT**

CONTRACT NO.	
1484	
OWNER NO.	
134	
APPROVED BY	DATE
CAR	12/3/08
DRAWING NO.	REV.
FIGURE 2-13	1

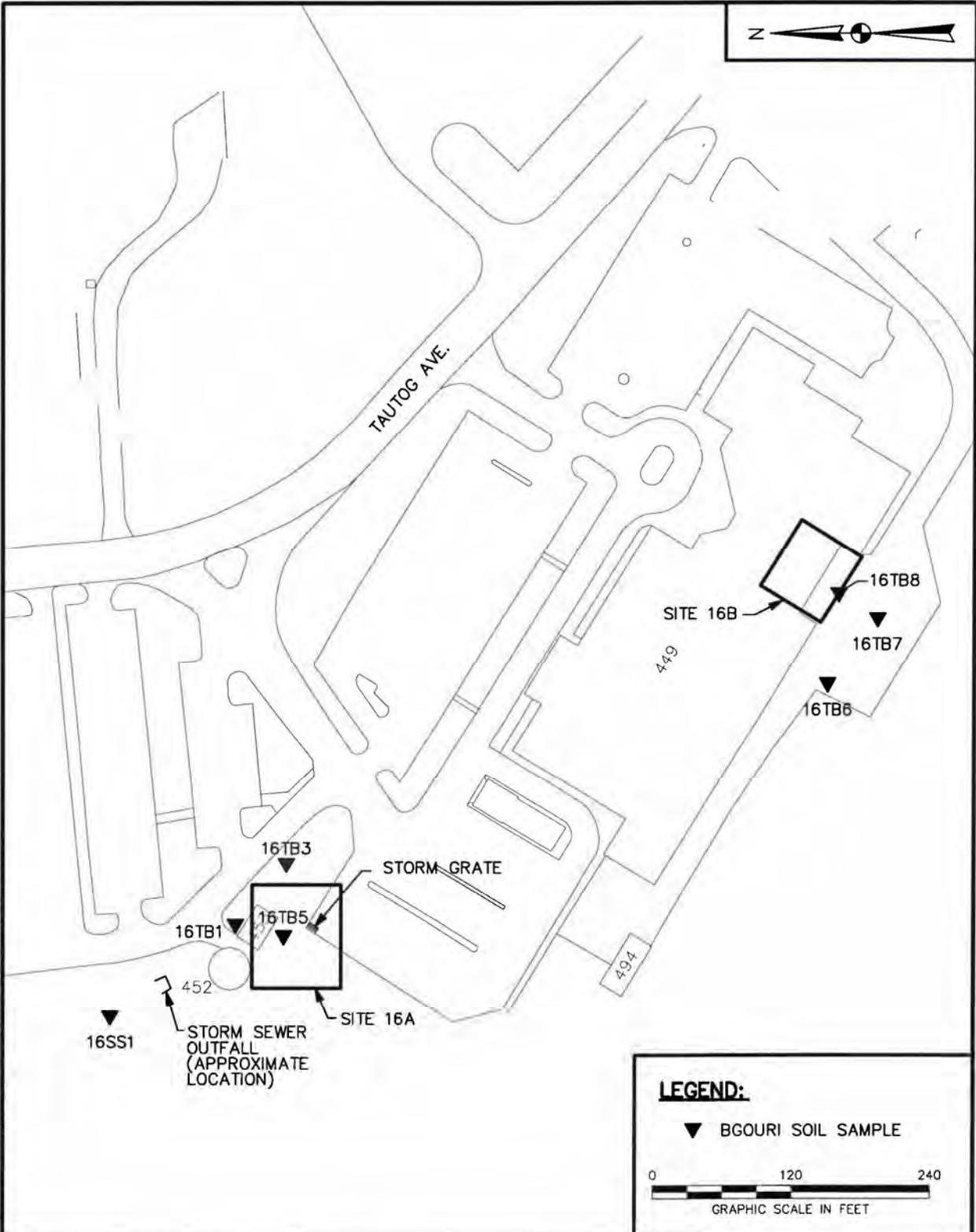
NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP

DATE: 08/09/12 | DRWN: J.E.B.

FIGURE 2-16  
SITE 15 SITE PLAN - SPENT ACID STORAGE AND DISPOSAL AREA



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CHECKED BY <i>MHS</i>	DATE 11/26/08
REVISED BY	DATE
SCALE AS NOTED	



**SITE MAP  
SITE 16 - HOSPITAL INCINERATORS  
NSB-NLON  
GROTON, CONNECTICUT**

CONTRACT NO. <b>1484</b>	
OWNER NO. <b>134</b>	
APPROVED BY <i>CAR</i>	DATE <i>12/3/08</i>
DRAWING NO. <b>FIGURE 2-14</b>	REV. <b>0</b>

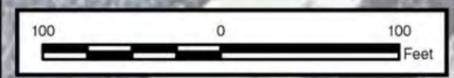
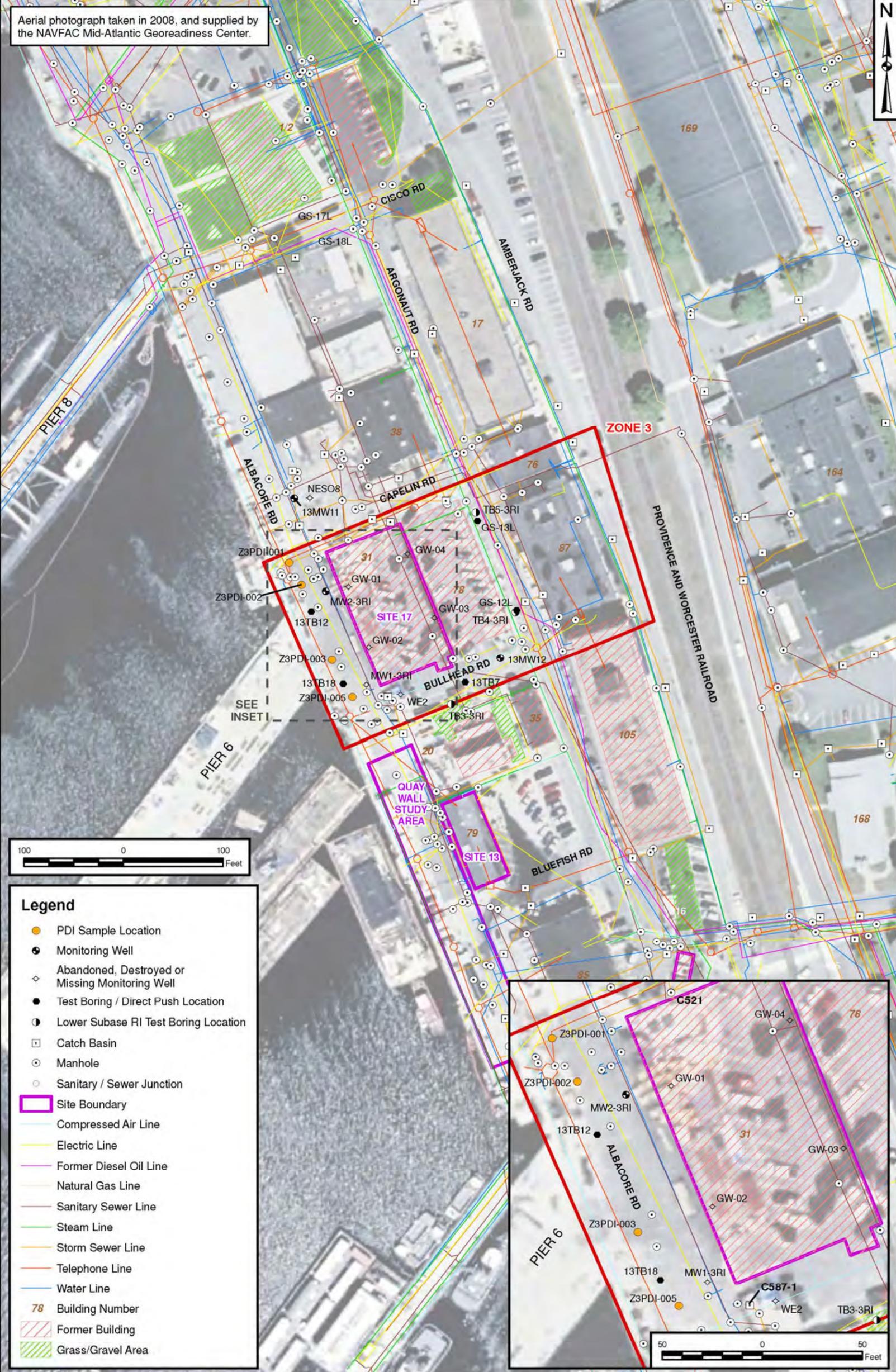


NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP

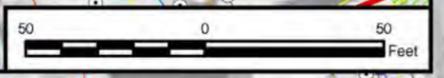
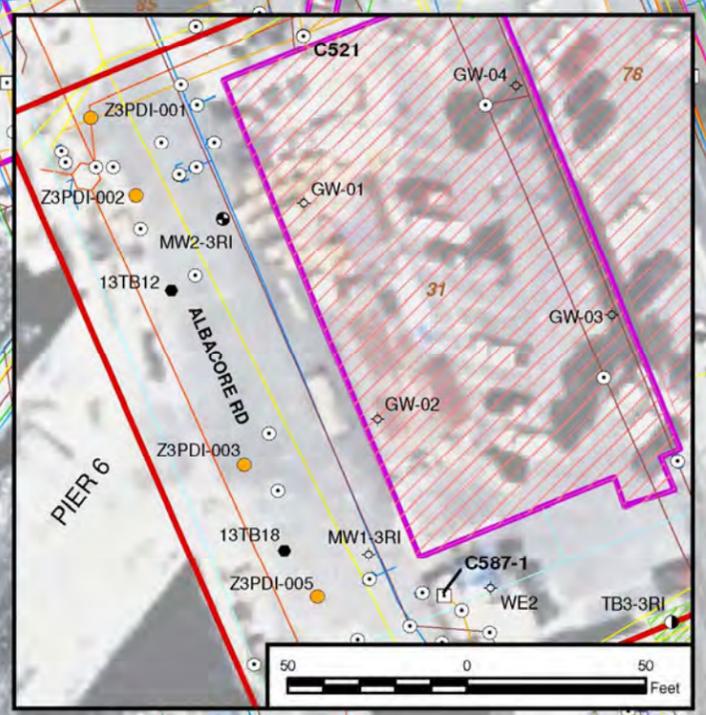
DATE: 08/09/12	DRWN: J.E.B.
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**FIGURE 2-17  
SITE 16 SITE PLAN  
HOSPITAL INCINERATORS**

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Legend	
<span style="color: orange;">●</span>	PDI Sample Location
<span style="color: black;">●</span>	Monitoring Well
<span style="color: grey;">◇</span>	Abandoned, Destroyed or Missing Monitoring Well
<span style="color: black;">●</span>	Test Boring / Direct Push Location
<span style="color: black;">●</span>	Lower Subbase RI Test Boring Location
<span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span>	Catch Basin
<span style="border: 1px solid black; border-radius: 50%; display: inline-block; width: 10px; height: 10px;"></span>	Manhole
<span style="border: 1px solid black; border-radius: 50%; border-style: dashed; display: inline-block; width: 10px; height: 10px;"></span>	Sanitary / Sewer Junction
<span style="border: 2px solid purple; display: inline-block; width: 20px; height: 10px;"></span>	Site Boundary
<span style="border-bottom: 1px solid cyan; width: 20px; display: inline-block;"></span>	Compressed Air Line
<span style="border-bottom: 1px solid yellow; width: 20px; display: inline-block;"></span>	Electric Line
<span style="border-bottom: 1px solid magenta; width: 20px; display: inline-block;"></span>	Former Diesel Oil Line
<span style="border-bottom: 1px solid grey; width: 20px; display: inline-block;"></span>	Natural Gas Line
<span style="border-bottom: 1px solid brown; width: 20px; display: inline-block;"></span>	Sanitary Sewer Line
<span style="border-bottom: 1px solid green; width: 20px; display: inline-block;"></span>	Steam Line
<span style="border-bottom: 1px solid orange; width: 20px; display: inline-block;"></span>	Storm Sewer Line
<span style="border-bottom: 1px solid blue; width: 20px; display: inline-block;"></span>	Telephone Line
<span style="border-bottom: 1px solid cyan; width: 20px; display: inline-block;"></span>	Water Line
<span style="color: brown;">78</span>	Building Number
<span style="background-color: #f0f0f0; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span>	Former Building
<span style="background-color: #90ee90; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span>	Grass/Gravel Area



DRAWN BY J. ENGLISH	DATE 04/14/11
CHECKED BY N. BALSAMO	DATE 06/27/11
COST/SCHEDULE-AREA	
SCALE AS NOTED	

**Tetra Tech NUS, Inc.**

**SITE MAP**  
SITE 17 - FORMER HAZARDOUS MATERIALS /  
SOLVENT STORAGE AREA (FORMER BUILDING 31)  
NSB-NLON, GROTON, CONNECTICUT

CONTRACT NUMBER WE33	OWNER NUMBER 3386
APPROVED BY CAR	DATE 05/23/11
APPROVED BY	DATE
DRAWING NO. FIGURE 2-15	REV 0



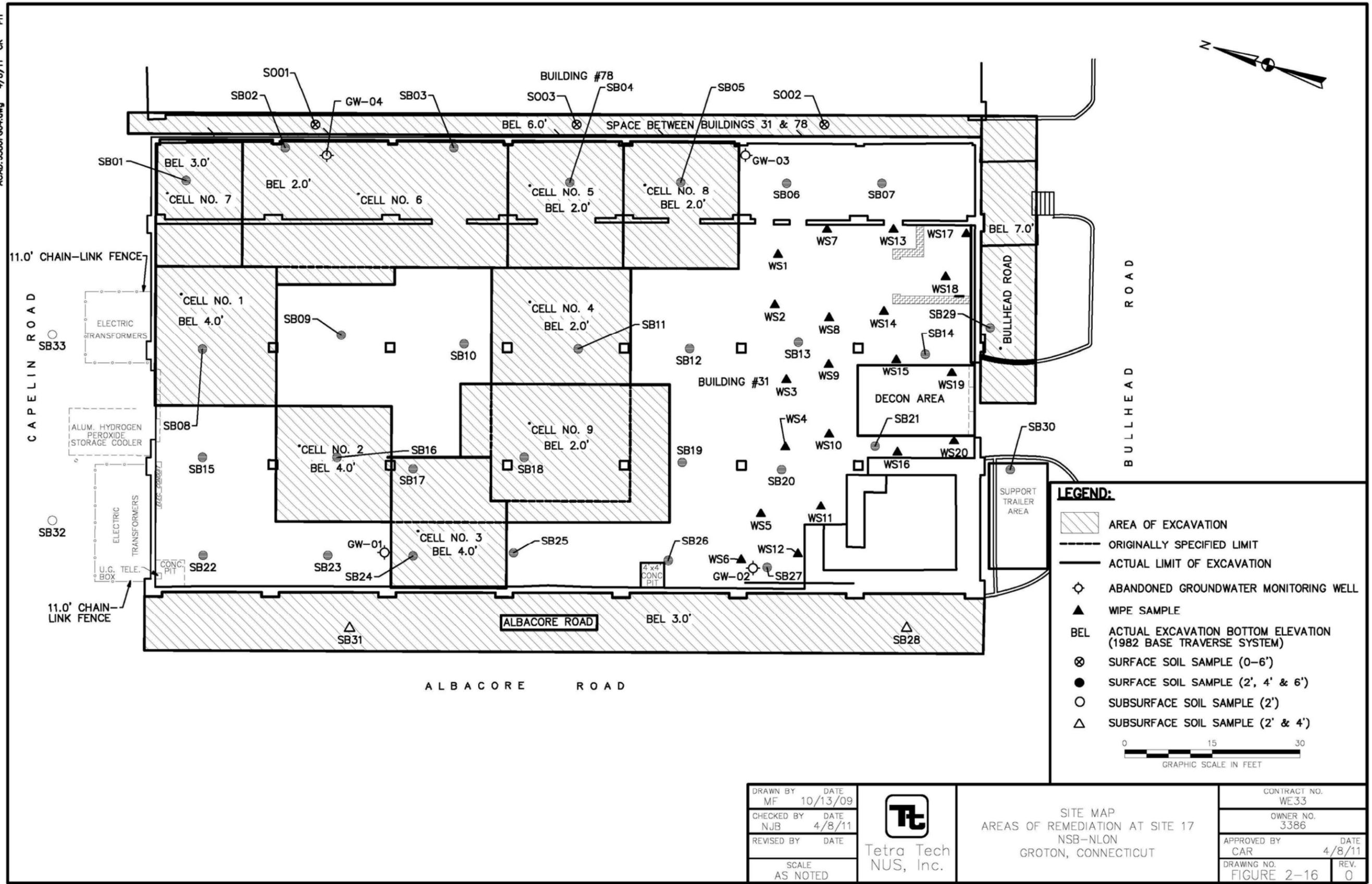
NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP

DATE: 08/09/12      DRWN: J.E.B.

FIGURE 2-18  
SITE 17 SITE PLAN  
FORMER HAZARDOUS MATERIALS/  
SOLVENT STORAGE AREA (FORMER BUILDING 31)

Path: W:\Govt\Projects\Navy CLEAN AECOM-EnSafe -JV\New London\GIS\Projects\SMP\_Report\Figure\_2-19\_Site\_17\_Areas\_of\_Remediation.mxd

ACAD:3386FG04.dwg 4/8/11 CK PIT



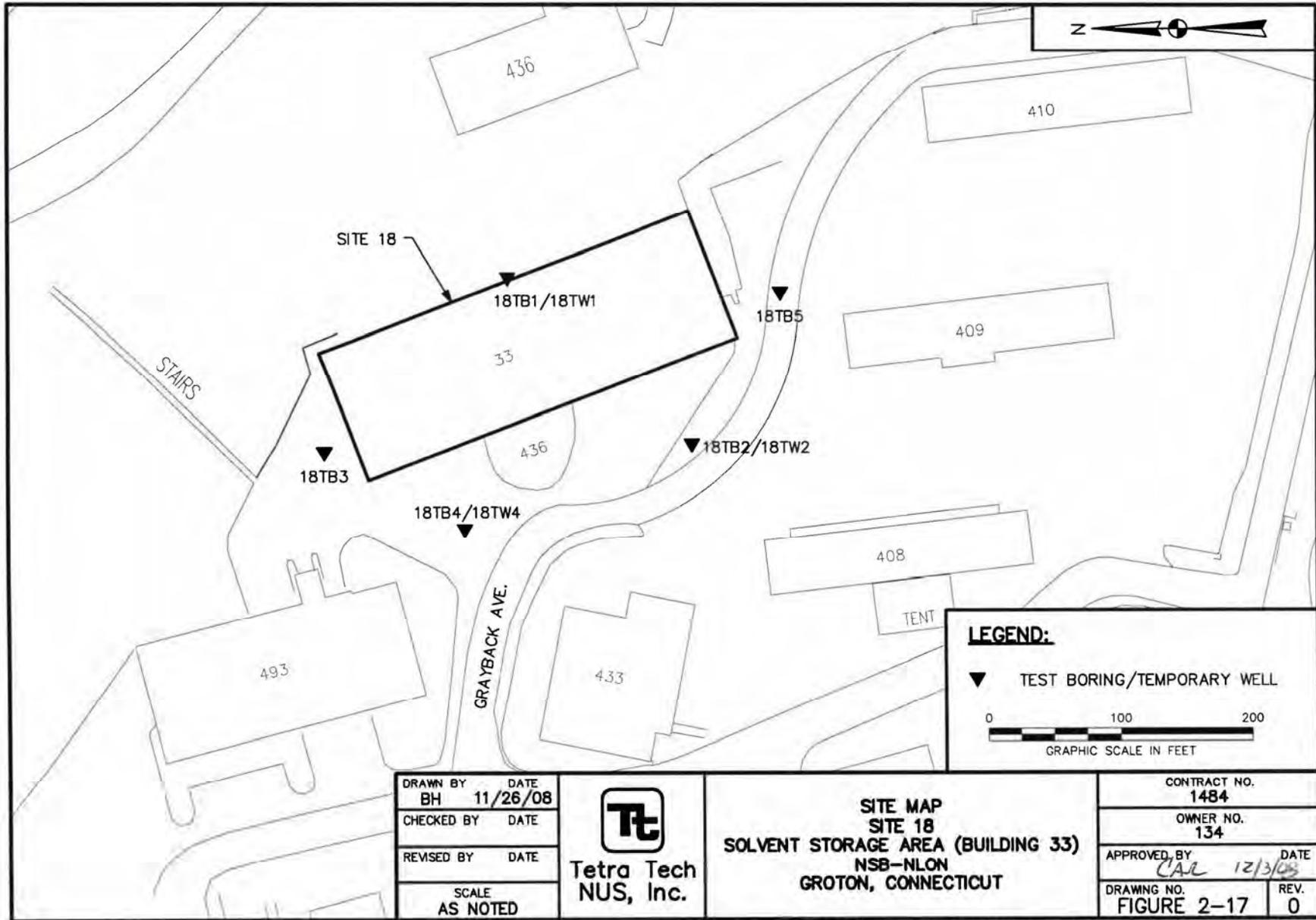
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NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT  
 60249706.SP.SP

FIGURE 2-19  
 SITE 17 - AREAS OF REMEDIATION

DATE: 08/09/12 DRWN: J.E.B.



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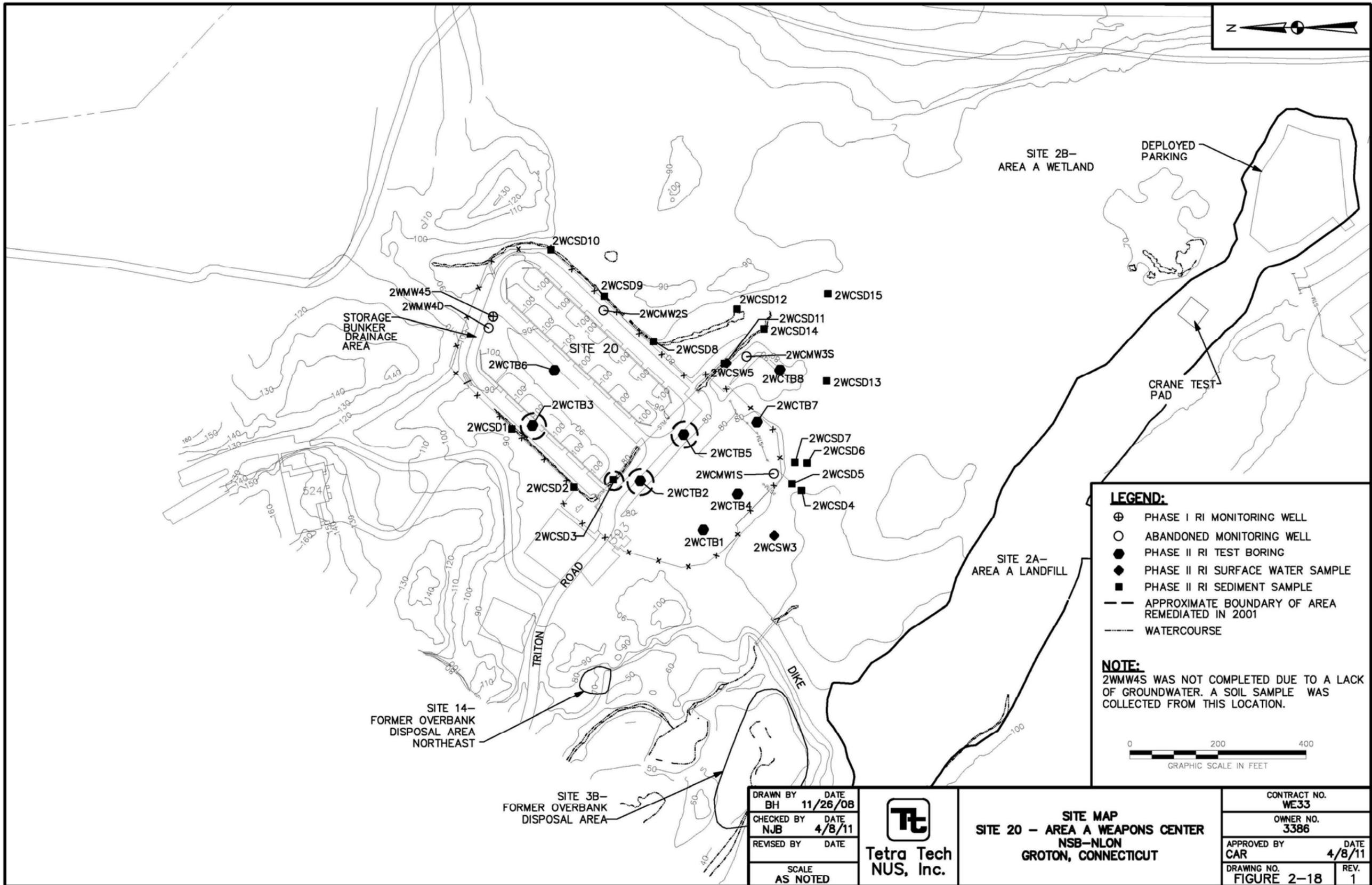
NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT

60249706.SP.SP

FIGURE 2-20  
 SITE 18 SITE PLAN  
 SOLVENT STORAGE AREA (BUILDING 33)

DATE: 08/09/12

DRWN: J.E.B.



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BH	11/26/08
CHECKED BY	DATE
NJB	4/8/11
REVISED BY	DATE
SCALE	AS NOTED



**SITE MAP**  
**SITE 20 - AREA A WEAPONS CENTER**  
 NSB-NLON  
 GROTON, CONNECTICUT

CONTRACT NO.	
WE33	
OWNER NO.	
3386	
APPROVED BY	DATE
CAR	4/8/11
DRAWING NO.	REV.
FIGURE 2-18	1

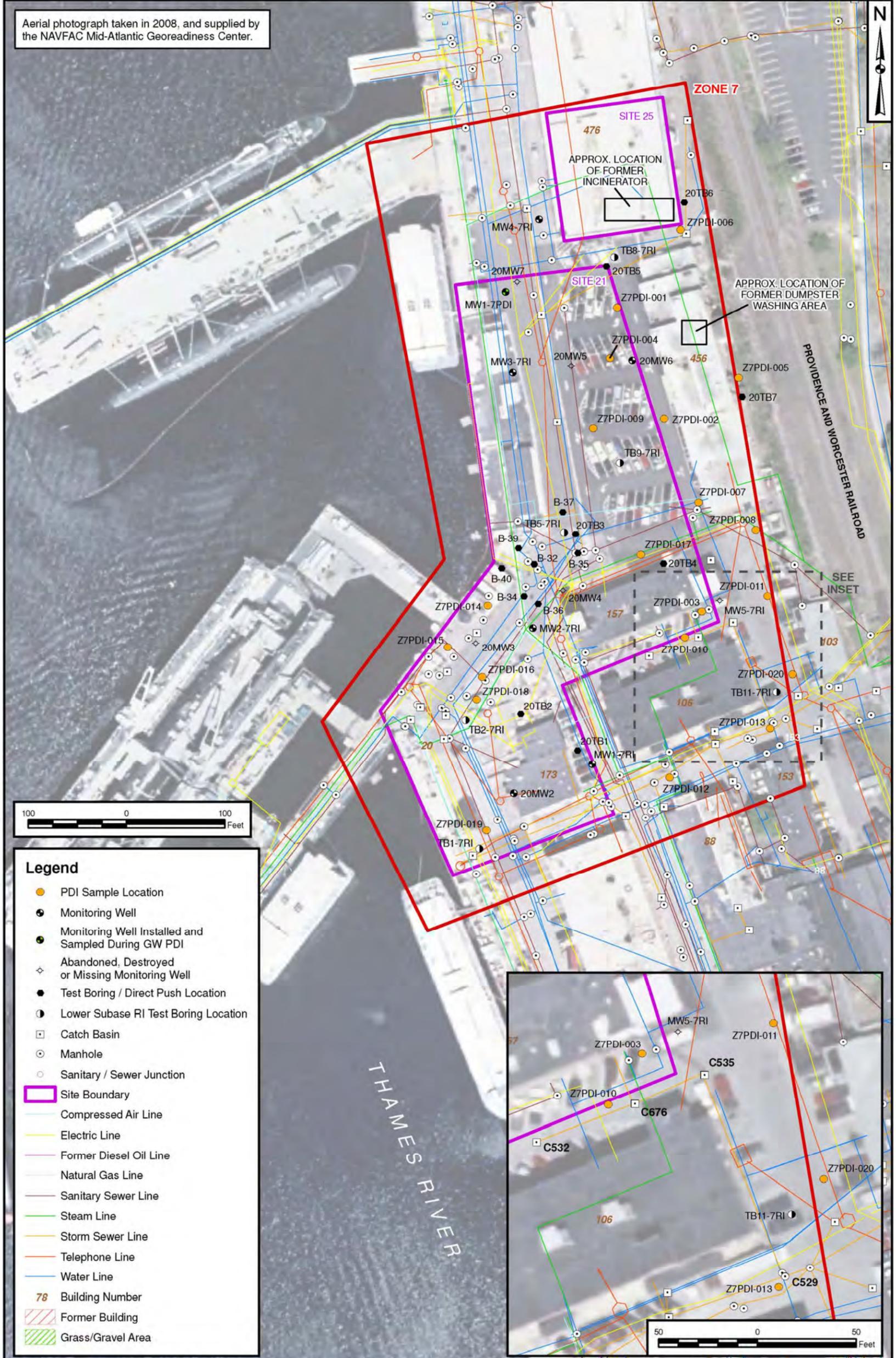
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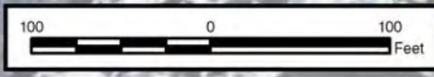
NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT  
 60249706.SP.SP  
 DATE: 08/09/12 DRWN: J.E.B.

FIGURE 2-21  
 SITE 20 SITE PLAN - AREA A WEAPONS CENTER

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Aerial photograph taken in 2008, and supplied by the NAVFAC Mid-Atlantic Georeadiness Center.



- Legend**
- PDI Sample Location
  - Monitoring Well
  - Monitoring Well Installed and Sampled During GW PDI
  - ◇ Abandoned, Destroyed or Missing Monitoring Well
  - Test Boring / Direct Push Location
  - Lower Subbase RI Test Boring Location
  - Catch Basin
  - Manhole
  - Sanitary / Sewer Junction
  - ▭ Site Boundary
  - Compressed Air Line
  - Electric Line
  - Former Diesel Oil Line
  - Natural Gas Line
  - Sanitary Sewer Line
  - Steam Line
  - Storm Sewer Line
  - Telephone Line
  - Water Line
  - 78 Building Number
  - ▨ Former Building
  - ▨ Grass/Gravel Area

DRAWN BY J. ENGLISH	DATE 05/20/11
CHECKED BY N. BALSAMO	DATE 06/27/11
COST/SCHEDULE-AREA	
SCALE AS NOTED	

Tetra Tech NUS, Inc.

**SITE MAP**  
**SITE 21 - BERTH 16 AND**  
**SITE 25 - FORMER CLASSIFIED MATERIALS INCINERATOR**  
 NSB-NLON, GROTON, CONNECTICUT

CONTRACT NUMBER WE33	OWNER NUMBER 3386
APPROVED BY CAR	DATE 05/23/11
APPROVED BY	DATE
DRAWING NO. FIGURE 2-19	REV 0



NAVAL SUBMARINE BASE  
 NEW LONDON, GROTON, CONNECTICUT  
 60249706.SP.SP  
 DATE: 08/09/12    DRWN: J.E.B.

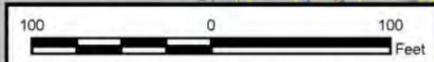
FIGURE 2-22  
 SITE 21 & 25 SITE PLAN  
 BERTH 16 AND FORMER CLASSIFIED  
 MATERIALS INCINERATOR

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**Legend**

- PDI Sample Location
- Monitoring Well
- Monitoring Well Installed and Sampled During GW PDI
- ◇ Abandoned, Destroyed or Missing Monitoring Well
- Test Boring / Direct Push Location
- Lower Subbase RI Test Boring Location
- △ Historic Soil Sample Location
- Catch Basin
- Manhole
- Sanitary / Sewer Junction
- Compressed Air Line
- Electric Line
- Former Diesel Oil Line
- Natural Gas Line
- Sanitary Sewer Line
- Steam Line
- Storm Sewer Line
- Telephone Line
- Water Line
- 78 Building Number
- ▨ Former Building
- ▭ Site Boundary
- ▨ Grass/Gravel Area



DRAWN BY J. ENGLISH	DATE 04/14/11
CHECKED BY N. BALSAMO	DATE 04/20/11
COST/SCHEDULE-AREA	
SCALE AS NOTED	

  
**SITE MAP**  
**SITE 22 - PIER 33**  
**NSB-NLON, GROTON, CONNECTICUT**

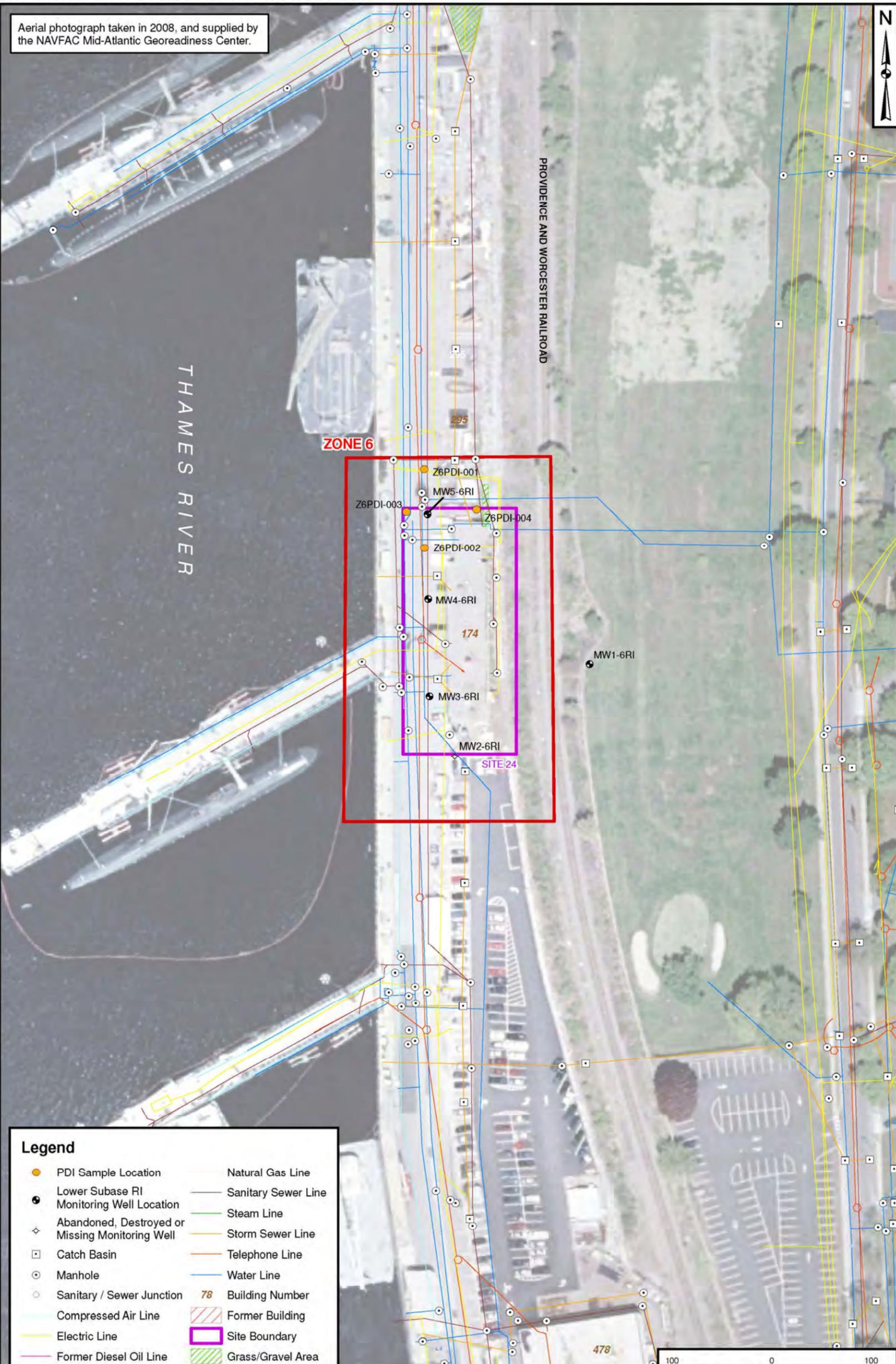
CONTRACT NUMBER WE33	OWNER NUMBER 3386
APPROVED BY CAR	DATE 04/14/11
APPROVED BY	DATE
DRAWING NO. FIGURE 2-20	REV 0



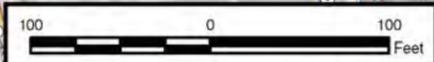
**NAVAL SUBMARINE BASE**  
**NEW LONDON, GROTON, CONNECTICUT**  
 60249706.SP.SP  
 DATE: 08/09/12      DRWN: J.E.B.

FIGURE 2-23  
SITE 22 SITE PLAN - PIER 33

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Legend	
● PDI Sample Location	— Natural Gas Line
● Lower Subbase RI Monitoring Well Location	— Sanitary Sewer Line
◇ Abandoned, Destroyed or Missing Monitoring Well	— Steam Line
□ Catch Basin	— Storm Sewer Line
○ Manhole	— Telephone Line
○ Sanitary / Sewer Junction	— Water Line
— Compressed Air Line	78 Building Number
— Electric Line	▨ Former Building
— Former Diesel Oil Line	▭ Site Boundary
	▨ Grass/Gravel Area



DRAWN BY J. ENGLISH	DATE 05/20/11
CHECKED BY N. BALSAMO	DATE 05/23/11
COST/SCHEDULE-AREA	
SCALE AS NOTED	

Tetra Tech NUS, Inc.  
**SITE MAP**  
**SITE 24 - CENTRAL PAINT ACCUMULATION**  
**(BUILDING 174)**  
**NSB-NLON, GROTON, CONNECTICUT**

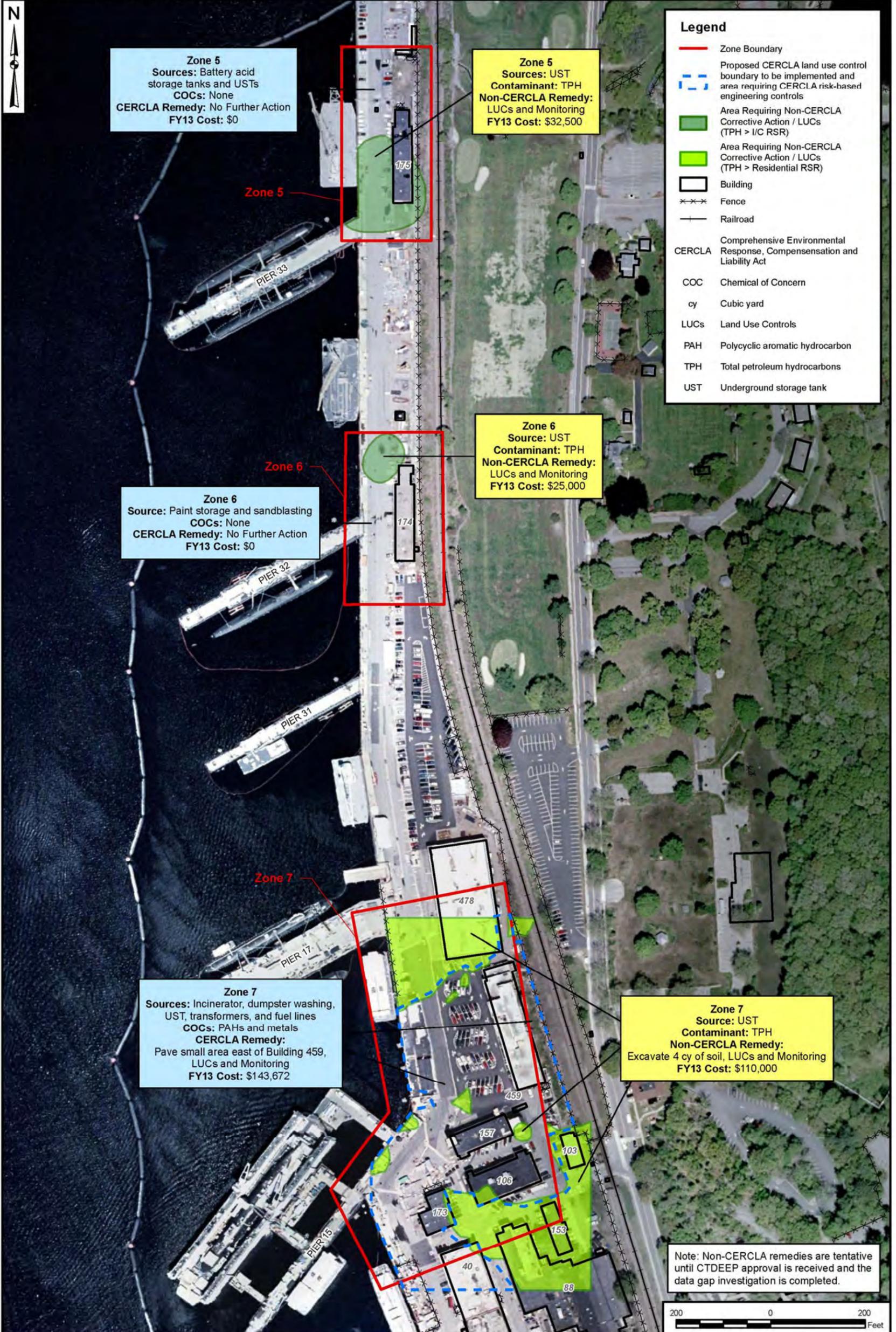
CONTRACT NUMBER WE33	OWNER NUMBER 3386
APPROVED BY CAR	DATE 05/23/11
APPROVED BY	DATE
DRAWING NO. FIGURE 2-21	REV 0



**NAVAL SUBMARINE BASE**  
**NEW LONDON, GROTON, CONNECTICUT**  
 60249706.SP.SP  
 DATE: 08/09/12      DRWN: J.E.B.

**FIGURE 2-24**  
**SITE 24 SITE PLAN**  
**CENTRAL PAINT ACCUMULATION (BUILDING 174)**

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DRAWN BY	DATE
K. MOORE	05/30/12
CHECKED BY	DATE
C. RICH	07/12/12
REVISED BY	DATE
SCALE	AS NOTED



LIMITS OF REMEDIAL ACTIONS FOR ZONES 5, 6, AND 7 SOIL  
(CERCLA AND NON-CERCLA)  
NSB-NLON, GROTON, CONNECTICUT

CONTRACT NUMBER	CTO NUMBER
	WEG7
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO.	REV
FIGURE 3	0



NAVAL SUBMARINE BASE  
NEW LONDON, GROTON, CONNECTICUT  
60249706.SP.SP  
DATE: 08/09/12 DRWN: J.E.B.

FIGURE 2-25  
ZONES 5, 6 AND 7 SOIL  
LIMITS OF REMEDIAL ACTIONS  
(CERCLA AND NON-CERCLA)

## **Appendix C**

### **NSB New London Background and Site Descriptions**

## Appendix C

### NSB New London Background and Site Descriptions

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## **C.1 NSB NEW LONDON BACKGROUND**

As detailed in the FFA and subsequent documents, NSB-NLON includes approximately 687 acres of property located on the eastern bank of the Thames River in the Towns of Groton and Ledyard, Connecticut, approximately 6 miles north of Long Island Sound, as depicted on Figures 1-1 and 1-2 in Appendix B. Previously, NSB-NLON also included the Nautilus Memorial and Navy family housing plans commonly known as Polaris Park, Nautilus Park, Trident Park, Conning Towers, and Dolphin Gardens, but these have been privatized and are no longer operated by the Navy.

### **C.1.1 Base Description**

NSB-NLON is bounded on the east by Connecticut Route 12, on the south by Crystal Lake Road, and on the west by the Thames River. The northern border is a low ridge that trends approximately east-southeast from the Thames River to Baldwin Hill.

NSB-NLON currently provides a base command for submarine activities in the Atlantic Ocean. It also provides housing for Navy personnel and their families, support submarine training facilities, military offices, medical facilities, and facilities for submarine maintenance, repair, and overhaul.

Currently, NSB-NLON consists of over 207 buildings on 687 acres. The density of buildings is high along the central bedrock high, in the southern valley, and along the Thames River. In the northern valley are streams, a wetland, and a golf course. The northern bedrock high is not heavily developed except along the southern face at the Area A Weapons Center and Torpedo Shops. The areas on top of the northern ridges are wooded and undeveloped.

Land use adjacent to the base is residential and commercial. Residential development along Military Highway, Sleepy Hollow, Long Cove Road, and Pinelock Drive borders the site to the north and extends northward into the Gales Ferry section of Ledyard. Property along Route 12, east of NSB-NLON, consists of widely spaced private homes and open, wooded land. Development is mixed commercial and residential farther south on Route 12. This area includes a church, automobile sales and repair facilities, convenience stores, restaurants, and a gas station. Private residences, an automobile service station, and a former dry cleaner are located along the southern side of Crystal Lake Road. Housing for Navy personnel exists farther south of Crystal Lake Road.

### **C.1.2 Base History**

In 1867, the State of Connecticut donated a 112-acre parcel of land on the eastern bank of the Thames River to the Navy. The Navy did not use the property until 1868 when it officially designated the property a Navy Yard. The site was then used to moor small craft and obsolete

warships, and served as a coaling station for the Atlantic fleet. The Department of the Navy designated the site a Submarine Base in 1916. During World War I, facilities were expanded extensively; six piers and 81 buildings were added. In 1917, a submarine school was established, and in 1918 the Submarine Medical Center was founded.

NSB-NLON underwent another period of growth during World War II. Between 1935 and 1945, the Navy built more than 180 buildings and acquired adjacent land to expand NSB-NLON from 112 to 497 acres. The growth of NSB-NLON continued after World War II. A Medical Research Laboratory was established at the base in 1946.

In 1968, the status of the Submarine School was changed from an activity to a command and became the largest tenant on the base. The Naval Submarine Support Facility was established in 1974, and the Naval Undersea Medical Institute was established the following year.

### **C.1.3 Environmental History**

The Navy initiated the Naval Assessment and Control of Installation Pollutants (NACIP) Program on September 11, 1980, to identify and control environmental contaminants from past use and disposal of hazardous substances. Subsequently, the Initial Assessment Study (IAS), [Envirodyne Engineers, Inc. (Envirodyne), 1983], completed in March 1983, identified several potential disposal areas. The results of the IAS lead to the inclusion of NSB-NLON on the Federal Agency Hazardous Waste Compliance Docket on February 12, 1988, the formation of a Technical Review Committee, USEPA's proposal for inclusion of NSB-NLON on the National Priorities List (NPL) on October 25, 1989, and the placement of NSB-NLON on the NPL on August 30, 1990.

Previous investigations and enforcement histories for NSB-NLON are summarized as follows:

- Final IAS (Envirodyne, 1983). The purpose of the IAS was to identify and evaluate past waste disposal practices at NSB-NLON and to assess the potential for environmental impacts.
- IR Program, 1986. In response to the growing awareness of the potential effects of hazardous materials on human health and the environment, the United States Department of Defense (DoD) developed the IR Program to investigate and clean up potential problem areas created by past events at federal facilities. The IR Program was the catalyst for environmental investigations at the NSB-NLON. The IR Program was renamed the ER Program in August 2006.

- Verification Study, [Wehran Engineering, Inc. (Wehran), 1988]. The purpose of the Verification Study was to determine whether toxic and hazardous materials identified during the IAS were present on site and to recommend whether additional study was warranted.
- Placement of NSB-NLON on the NPL by the USEPA, 1990.
- Phase I Remedial Investigation (RI) NSB-NLON [Atlantic Environmental Services, Inc. (Atlantic), 1992]. In May 1990, Atlantic initiated an IR study of NSB-NLON for the Navy. The scope of work for this IR study included a Phase I RI of the following 11 sites located at NSB-NLON:
  - Site 1 - Construction Battalion Unit (CBU) Drum Storage Area
  - Site 2 - Area A (Area Landfill, Area A Wetland, and Area A Downstream Watercourses)
  - Site 3 - Overbank Disposal Area (OBDA)
  - Site 4 - Rubble Fill at Bunker A-86
  - Site 6 – Former Defense Reutilization and Marketing Office (DRMO)
  - Site 7 - Torpedo Shops
  - Site 8 - Goss Cove Landfill
  - Site 13 - Lower Subase
  - Site 14 - Overbank Disposal Area Northeast (OBDANE)
  - Site 15 - Spent Acid Storage and Disposal Area (SASDA)
  - Site 18 - Former Gasoline Station

The sites were initially identified and assigned site numbers in the IAS (Envirodyne, 1983).

Elements of this RI report included a review of the physical characteristics, characterization of the nature and extent of contamination, characterization of contaminant fate and transport, and human health and ecological risk assessments of contaminants contained within each of the 11 sites.

- Supplement to IAS (SIAS) (Draft Final) [Naval Facilities Engineering Service Center (NFESC), 1995]. The IAS, prepared for the Naval Energy and Environmental Support Activity (NEESA) by Envirodyne, investigated potential hazardous substance release sites at NSB-NLON (Envirodyne,

1983). An SIAS was prepared in April 1995 by the NFESC following completion of the Phase I and Phase II RIs and a Verification Study (NFESC, 1995). The purpose of the SIAS was to update the IAS for the period between 1983 and 1995. The scope of the SIAS included identification of all hazardous waste storage areas and all releases of hazardous substances within NSB-NLON.

The field team for the SIAS used on-base record searches, site visits, and employee interviews to develop information for the report. The following sites were included in the evaluation:

- DRMO, Building 355
  - Building 450, Otto Fuel Wastewater Tank
  - Building 450, Drum Storage Area
  - Pesticide Use: Golf Course
  - Pesticide Use: Public Works
  - Transformer at Building 157, Vault 31
  - Paint Residue from Repainting Potable Water Tank 99
  - Paint Residue from Repainting Potable Water Tank 326
  - Paint Residue from Repainting Potable Water Tank 444
  - Paint Residue from Repainting Potable Water Tank 452
  - Paint Residue from Repainting Potable Water Tank 480
  - DRMO Scrap Metal Storage Area
  - Hazardous Waste Accumulation Areas
- 
- FFA for NSB-NLON (USEPA, 1995). The Navy entered into an FFA with the USEPA and CTDEEP regarding the cleanup of environmental contamination at NSB-NLON. The document was signed by all three parties and became effective on January 11, 1995. The FFA established the roles and responsibilities of each agency, set deadlines for the investigation and cleanup of hazardous waste sites, and established a mechanism for the resolution of disputes among the agencies.

- Phase II RI [B&R Environmental (B&RE), 1997b]. A Phase II RI for 13 sites at NSB-NLON was completed by B&RE for the Navy. The 13 sites included 10 of the 11 sites investigated during the Phase I RI, the Thames River, and the Area A Weapons Center (Site 20). Site 18, the Former Gasoline Station, was not investigated in the Phase II RI, but it was generally discussed for informational purposes. According to the Navy, the designation for Site 18 was changed to refer to the Solvent Storage Area (Building 33), as presented in the Phase II RI Report, and not to the Former Gasoline Station, as presented in the Phase I RI Report (Atlantic, 1992).
  - The Phase II RI was conducted to further develop the elements of the Phase I RI, including the physical characteristics, nature and extent of contamination, contaminant fate and transport, and risk assessments (human health and ecological) for each of the sites. Remedial Action Objectives (RAOs) were identified for each of the sites in the Phase II RI Report. These objectives were used to support No Further Action (NFA), further characterization, or Feasibility Study (FS) recommendations for sites.
  
- Lower Subbase RI (Tetra Tech, 1999b). The Lower Subbase RI was completed by Tetra Tech for the Navy on seven distinct zones of the Lower Subbase at NSB-NLON. Each zone included various IR Program sites. The zones and sites included in the investigation are as follows:
  - Zone 1: Site 10 - Fuel Storage Tanks and Tank 54-H; Site 11 - Power Plant Oil Tanks; Building 89 UST; and the Fuel Pipeline and Steam and Condensate Lines
  - Zone 2: Fuel Pipeline and Steam and Condensate Lines
  - Zone 3: Site 17 - Hazardous Materials/Solvent Storage Area (Building 31) and the Fuel Pipeline and Steam and Condensate Lines
  - Zone 4: Site 13 - Building 79 Waste Oil Pit; Site 19 - Solvent Storage Area (Building 316); the Quay Wall Study Area; and the Fuel Pipeline and Steam and Condensate Lines
  - Zone 5: Site 22 - Pier 33, Building 175 (Battery Acid Aboveground Storage Tanks) and adjacent property
  - Zone 6: Site 24 - Central Paint Accumulation Area (Building 174)
  - Zone 7: Site 21 - Berth 16; Site 25 - Classified Materials Incinerator; Transformers at Building 157, Vault 31.

The objectives of the investigation, performed in October and November 1997, were to characterize the subsurface conditions at the Lower Subbase, to further characterize the quality of the sediment

in the Thames River adjacent to the Lower Subbase, and to provide data pertinent to identifying site-specific remedial alternatives.

The data collected during this RI, in conjunction with data collected from previous investigations, were used to: identify sources of soil and groundwater contamination; define major contaminant migration pathways; define the nature and extent of contamination within groundwater and soils at seven zones of investigation within the Lower Subbase; to define the nature and extent of contamination in sediments of the adjacent Thames River; to provide supplemental data to develop a revised human health risk assessment; to provide supplemental data to develop a revised screening-level ecological risk assessment for the Thames River; and to provide sufficient information to identify proper recommendations for future action at each zone under the IR Program.

- Basewide Groundwater Operable Unit RI (BGOURI) (Tetra Tech, 2002a). The BGOURI was conducted by Tetra Tech for the Navy. Ten IR Program sites (Sites 2, 3, 7, 8, 14, 15, 16, 18, 20, and 23) were included in the BGOURI, and the fieldwork for the BGOURI was conducted from June to August 2000. The objectives of the investigation were: to further characterize the nature and extent of contamination and hydrogeologic conditions within the groundwater aquifers at each site; to further characterize the nature and extent of soil contamination at Site 7; to perform preliminary investigations at two sites (Sites 16 and 18); to determine background groundwater conditions; to determine human health risks associated with each site; to identify and evaluate the factors affecting organic and inorganic contaminant migration; and to provide data pertinent to identifying potential site-specific remedial alternatives (e.g., natural attenuation).

The following recommendations were made in the BGOURI Report:

- NFA is required for Site 7 soil and for Sites 16 and 18.
- An FS should be completed for groundwater at Sites 3, 7, 14, 15, and 20.
- The existing groundwater monitoring programs for Sites 2, 8, and 23 should continue until sufficient data are collected to characterize the sites.
- BGOURI Update/FS (Tetra Tech, 2004). The BGOURI Update/FS included a data gap investigation (DGI), an update of the RI based on the results of the DGI, and FSs for Site 3 soil, Sites 3 and 7 groundwater, and Site 7 soil and groundwater. Although Site 7 soil was not recommended for an FS in the BGOURI, subsequent discussions between the Navy and regulators resulted in the decision to evaluate both soil and groundwater as part of the Site 7

FS to verify that migration from soil to groundwater was not occurring. The DGI was conducted by Tetra Tech for the Navy in October 2002 at Sites 3, 15, and 20, prior to proceeding with FSs for these and other sites. One objective of the DGI was to collect additional data to further define the nature and extent of contamination. Another objective was to characterize Site 3 - New Source Area (NSA), a new site identified during the remediation of contaminated sediment in Stream 5 of the Area A Downstream Watercourses. The results of the updated BGOURI indicated that there was no need to modify the existing Records of Decisions (RODs) for soil at Sites 15 and 20. In addition, the report recommended NFA for groundwater at Sites 14, 15, and 20, preparation of FSs for soil at Site 3 - NSA and Site 7, and preparation of an FS for groundwater associated with Sites 3 and 7. The FSs for Site 3 soil, Sites 3 and 7 groundwater, and Site 7 soil and groundwater were subsequently completed as part of the BGOURI Update/FS.

- Investigation of the Thames River. Battelle conducted an investigation of Thames River sediment that included sampling and ecological risk evaluations for Zones 4 and 7 and a new site at Pier 1. The Pier 1 site was identified based on the results of sampling conducted in the area by SAIC in 1999 and by the Navy in association with the siting of the Controlled Industrial Facility Building. Battelle completed a Rapid Sediment Characterization Pilot Study in 2003 to supplement existing data in the area, and a Validation Study was completed in 2008 to evaluate potential ecological impacts due to contaminant migration from onshore source areas or activities associated with the berthing of submarines and ships in the pier areas (Battelle 2003; 2008a). The results of the Validation Study were used to develop a Baseline Ecological Risk Assessment (BERA). The results of the BERA were used to develop cleanup goals for remedial alternatives being developed as part of the Lower Subbase FS. The Pier 1 site will be incorporated into Zone 4 of the Lower Subbase, the zone in closest proximity, for future evaluations.
- Lower Subbase FS (Tetra Tech, 2010g) and Soil and Groundwater Pre-Design Investigation (PDI) Completion Report and FS Addendum (Tetra Tech, 2011a). The FS was developed to evaluate remedial alternatives for addressing impacted media (soil, groundwater, and sediment) in the IRP sites and the Thames River adjacent to the Lower Subbase (see Lower Subbase RI) based on information obtained during previous and ongoing investigations. The final Lower Subbase FS was issued in December 2010 with the understanding that additional data collected as part of Soil and Groundwater PDIs that might impact the findings of the FS would be incorporated in the FS Addendum. The goal of the FS Addendum was to provide sufficient supplemental documentation for the PDIs and to perform additional evaluation and refinement of the remedial alternatives included in the final Lower Subbase FS. Sections of the FS were updated as necessary to complete the FS Addendum so that appropriate remedial alternatives were

developed for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) contaminants. Total petroleum hydrocarbons (TPH) were included in the FS Addendum evaluations and alternatives only where TPH was commingled with CERCLA contaminants. The draft Soil and Groundwater PDI Completion Report and FS Addendum was completed in March 2011 (Tetra Tech, 2011a).

- Standard Operating Procedure - Administrative (SOPA) (ADMIN) The site use restrictions document was updated in 2006 [New London Instruction 5090.18C] (Navy, 2006c), 2008 [New London Instruction 5090.18D] (Navy 2008c), and 2009 [New London Instruction 5090.25] (Navy 2009b). The 2008 update included maps of existing and abandoned wells and an updated map of soil and groundwater LUCs. The 2009 update was completed in order to meet the LUC requirements in the OU-9 Basewide Groundwater ROD (Navy, 2008b). Additionally, in 2009, a table and map were filed in the land record offices of the Towns of Groton and Ledyard, Connecticut to show the location of monitoring wells, note the remedy in place, and list contaminants of concern and LUCs imposed at Sites 2A, 2B, 3A, 3B, 6, 8, 9, and 23 (Navy, 2009c; Navy 2009d)
- Vapor Intrusion Evaluation Memorandum (2008) - Potential risks resulting from exposures to chemicals that have volatilized from groundwater were evaluated in a 2008 memorandum by comparing concentrations of volatile chemicals detected in groundwater to USEPA and CTDEEP screening criteria for vapor intrusion. Concentrations of COCs which exceeded the USEPA screening criteria and were further evaluated using the USEPA's Johnson and Ettinger Model. This memorandum was included as Appendix E-1 within the OU-9 Basewide Groundwater ROD (Navy, 2008b).

In addition to these investigation documents, numerous other documents have been generated for the IR Program at NSB-NLON. Because of the large number of documents, they are not discussed in detail in this section. Appropriate references to these additional documents are provided in Section B.2 –Site Descriptions.

The Community Involvement Plan (CIP) for NSB-NLON was updated in 2011. The CIP describes the IR Program process, history of the IR Program at the Subbase, and each of the NSB-NLON sites. The Navy will use the activities outlined in the CIP to keep residents informed and provide opportunities to be involved in the NSB-NLON IR Program (Tetra Tech, 2011c).

## **C.2 SITE DESCRIPTIONS**

This section presents a brief history and status for each site addressed in this SMP. Site-specific information is provided below in text form, and site maps are provided as Figures 2-1 through 2-25 in Appendix B. Table 1-2 – Site Closeout Status of IR Program Sites is presented in the main body of this SMP Report.

### **C.2.1 Site 1 - Construction Battalion Unit Drum Storage Area**

The CBU Drum Storage Area was an unpaved area located in the northern section of NSB-NLON, adjacent to the deployed personnel parking lot and within the boundary of the Area A Landfill. The site was situated on a flat, open area at the base of a wooded hillside that sloped to the northeast toward the site at a 25 percent grade. The site was approximately 15 feet in width by 30 feet in length.

Twenty-six 55-gallon drums of waste oil, lubricating oil, and paint materials were observed at the site during the 1982 IAS (Envirodyne Engineers, Inc. [Envirodyne], 1983). Some of the drums were reportedly leaking at that time. The IAS report concluded that the site had not been used for several years. The site was inspected October 20, 1988, and two 55-gallon drums labeled as engine oil were observed. No surface soil staining or stressed vegetation was evident. The drums noted in the IAS report were reportedly removed and properly disposed by the Navy; the two drums observed in 1988 were also subsequently removed.

Phase I and Phase II RIs were conducted at Site 1. During the Phase II RI (B&RE, 1997b), it was determined that soil and groundwater samples collected in the vicinity of the site had relatively low concentrations of contaminants. The human health risk assessment (B&RE, 1997b) concluded that the Incremental Cancer Risks (ICRs) for the stated exposure scenario did not exceed the USEPA acceptable risk range ( $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ ). The evaluation of noncarcinogenic risk potential revealed that adverse effects were unlikely for the stated exposure scenarios. It was also determined during the Phase II RI that the potential for this site to impact ecological receptors was low.

Historically, surface drainage from the CBU Drum Storage Area flowed northeast across the unpaved deployed personnel parking lot [which covered a portion of the Area A Landfill (Site 2A)] and into the Area A Wetland (Site 2B) via a catch basin and storm sewer located approximately 40 feet northeast of the CBU Drum Storage Area. Groundwater in this area flows in a northeasterly direction toward Area A Wetland (B&RE, 1997b). Because of the relatively low concentrations of detected contaminants, immobile nature of these contaminants within the soil matrix, and lack of contamination detected in groundwater, NFA was recommended for this site. The groundwater at

this site was investigated as part of the Area A Landfill Groundwater Monitoring Program and the BGOURI (Tetra Tech, 2002a).

An NFA Decision Document for this site was signed by the Navy and regulators in September 1996 (USEPA, 1996). This document removed the CBU Drum Storage Area from further consideration under the IR Program process and changed the status of this site to RC. Although no Remedial Actions (RAs) were implemented specifically for Site 1, the site was covered by a low-permeable cap that was constructed over the Area A Landfill (Site 2A), which encompasses Site 1. Construction of this cap system was completed in September 1997.

In 2009, a table and map were filed in the land record offices of the Towns of Groton and Ledyard, Connecticut to show the location of monitoring wells, note the remedy in place, and list contaminants of concern and LUCs that have been imposed at Site 2A, which encompassed former Site 1 (Navy, 2009c; Navy 2009d).

## **C.2.2 Site 2 - Area A Landfill and Area A Wetland**

### **C.2.2.1 Site 2A - Area A Landfill**

The Area A Landfill is a relatively flat area bordered by a steep, wooded hillside that rises to the south, a steep wooded ravine to the west, and the Area A Wetland to the north. Currently, the Area A Landfill has been closed and capped with a low-permeability engineered cap including pavement. The surface is flat. Use of the top of the landfill includes miscellaneous material storage and a crane test area

All combustible materials generated by base operations that were not salvageable were incinerated, and the residues were disposed in the Site 6 (former DRMO), Site 8 (Goss Cove), and Site 2A (Area A) Landfills. The base incinerator, which was located in the Lower Subbase along the waterfront at the present location of Building 478, ceased operation in 1963. From 1963 to 1973, refuse and debris were disposed in the Area A Landfill. Landfilling operations ceased in 1973. The thickness of the landfill materials is estimated to range from 10 to 20 feet, based on test boring data.

A Focused FS (FFS) for the Area A Landfill (Atlantic, 1995c) was completed in response to the recommendations of the Phase I and Phase II RIs. A capping alternative was selected in the ROD signed in September 1995 (Atlantic, 1995e). An RA-C, which involved the construction of a low-permeability cover system over the landfill area, was performed at the Area A Landfill. The final

cover system was constructed from March 3, 1997, through September 5, 1997 (B&RE, 1996b and 1998b).

Groundwater at the Area A Landfill has been monitored for 12 years (Tetra Tech, 2001b; 2002d; 2003a; ECC, 2004e; 2005c; 2006c; 2008b; 2008n; 2009e; H&S, 2010; 2011b, Sovereign 2012). Overall, the results of 11 years of monitoring indicate that the cap system is working properly and that significant contaminant migration from the site to surrounding areas is not occurring.

The ROD for OU9, Basewide Groundwater (groundwater at Sites 2A, 2B, 3, 7, 9, 14, 15, 18, 20, and 23), was signed in September 2008 (Navy, 2008b). The OU9 ROD determined that groundwater monitoring at Sites 2A and 2B will continue, as required by the OU1 ROD and the Operations and Maintenance (O&M) Manual, Volume II (Groundwater Monitoring Plan) of the O&M Manual was revised in 2008 (REV 2 Draft), 2010 (REV 2 Draft Final), and 2011 (Final) to update site information for Site 2A (Tetra Tech, 2008g; 2010f, 2011g).

The O&M process includes annual inspections, reporting of results, and correcting any identified problems. The findings of the inspections are documented in the field on inspection checklists and summarized in Annual Landfill Inspection Reports (LIRs) for 2003 through 2010 (ECC, 2004a; 2005e; 2005h; 2008d; 2008k; 2009b; 2009i; H&S, 2011a).

As presented in Table 1-2, the status of Area A Landfill soil and groundwater are RC and the current phase is long-term management (LTMgt). Groundwater at Site 2B was addressed as part of OU 9. As documented in the OU9 ROD signed in September 2008 (Navy 2008b), groundwater monitoring at Site 2A will continue as required by the Area A Landfill, OU1 ROD (Atlantic, 1995e) and the O&M Manual (Tetra Tech, 2008g, 2010f, 2011g). Surface water at Site 2A is currently monitored under the Area A Landfill long-term monitoring program (OU1) and the O&M Manual (Tetra Tech, 2008g, 2010f, 2011g). Groundwater and surface water are currently monitored annually, and Year 12 (Round 24) of groundwater and surface water monitoring were performed in April 2011. Monitored COCs for groundwater and surface water include selected SVOCs, polynuclear aromatic hydrocarbons (PAHs), and metals. The primary monitoring criteria for groundwater are based upon the aquatic life criteria in Appendix D of the Connecticut Department of Environmental Protection (CTDEP) Water Quality Standards. The primary monitoring criteria for surface water are based upon the CTDEP Surface Water Protection Criteria. Monitoring criteria were established in the Basewide Groundwater OU Remedial Investigation (Tetra Tech, 2002a). The 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following groundwater

exceedances: copper (2 samples). The 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following surface water exceedances: cadmium (1 sample), chromium (1 sample), copper (5 samples), lead (5 samples), zinc (4 samples), and dissolved lead (1 sample). The annual site inspection was performed in spring 2011 and routine maintenance will be performed as needed. A RACR and LUC RD are being developed for Site 2A in 2012, and are expected to be finalized in 2013.

#### **C.2.2.2 Site 2B - Area A Wetland**

The Area A Wetland is located north of the Area A Landfill. The location of the Area A Wetland was undeveloped, wooded land and was possibly a wetland until the late 1950s. In the late 1950s, dredge spoils from the Thames River were pumped to this area and contained within an earthen dike that extends from the Area A Landfill to the southern side of the Area A Weapons Center.

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. However, the Navy is in the process of removing the reed from the area under their Natural Resources Program by mowing the plants, and treating them with a herbicide.

The Area A Wetland is underlain by dredge spoils that consist of silt and clay with traces of fine sand and shell fragments. The thickness of dredge spoils ranges from 25 to 35 feet on the southern side of the wetland, adjacent to the landfill, and from 10 to 15 feet on the northeastern side of the wetland. The total volume of dredged material in the wetland is approximately 1.2 million cubic yards.

A small pond is located at the southern portion of the wetland, within which 1 to 3 feet of standing water is present during all seasons. *Phragmites* is the predominant type of vegetation. It was reported that pesticide "bricks" were placed on the wetland ice during winter and allowed to dissolve as a mosquito control measure.

The Navy, in cooperation with the CTDEEP Wetlands habitat and Mosquito Management Program's *Phragmites* Control Team, initiated a program in 2010 to control *phragmites* in the Area A Wetland through mechanical and chemical methods. The extent of the program includes mowing the *phragmites* twice (spring 2010 and winter 2010/2011) and applying herbicide after each mowing event (summer 2010 and summer 2011). The initial mowing and herbicide treatment were completed in 2010. The second mowing was completed in February 2011 and the second herbicide

treatment was completed in October 2011. After the phragmites has been removed and the area shows signs of recovery, the Navy will work with the regulatory agencies to assess natural recruitment and coordinate potential future mitigation measures.

A Phase III investigation of the sediments at the Area A Wetland was conducted in October 2007 (Tetra Tech, 2008b). A Phase IV Investigation of the sediments at the Area A Wetland was conducted in October 2009. The data were used to develop site-specific Preliminary Remediation Goals (PRGs). An RI update and FS for sediments in OU 12 were completed in 2010 (Tetra Tech, 2010b). The PRGs were used in the FS to establish areas that will be remediated and restored with wetland vegetation. A Proposed Plan for sediment at Site 2B (Navy, 2010a) was completed and a ROD for OU12 was signed in August 2010 (Navy, 2010b).

A pre-design investigation sampling and analysis plan (SAP) (Tetra Tech, 2011d) was prepared to address data gaps and to better define the extent of contaminated sediment. The samples were collected during three events (April 2011, September 2011, and November 2011). A Final PDI Report is expected to be completed in 2012. A draft RD and Remedial Action Work Plan are expected to be completed in 2012 and remedial action construction is planned to be initiated in 2012.

The groundwater and surface water at the Area A Wetland (dredge spoil) were monitored under the Site 2A long-term groundwater monitoring program; however, future monitoring at Site 2B will include only surface water.

Groundwater at Area A Wetland -Site 2B was addressed as part of OU 9. As documented in the OU9 ROD signed in September 2008 (Navy 2008b), groundwater monitoring at Site 2B will continue as part of Site 2A monitoring as required by the Area A Landfill, OU1 ROD (Atlantic, 1995e) and the O&M Manual (Tetra Tech, 2008g, 2010f, 2011g). Surface water at the Area A Wetland is currently monitored as part of Site 2A under the Area A Landfill long-term monitoring program (OU1) and the and the O&M Manual (Tetra Tech, 2008g, 2010f, 2011g). The O&M Manual is expected to be revised in 2012 to include Site 2B monitoring requirements. The status of Site 2B groundwater and surface water is RIP. See Section 2.2.1.1 for additional groundwater information.

Wetland sediment at Site 2B is addressed as the OU12 Area A Wetland ROD (Navy, 2010b). COPCs for wetland sediments at Site 2B include PAHs (target compound list), PCBs (by Aroclor), 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and select metals (arsenic, cadmium, chromium, copper, lead, nickel, and

zinc). The analytical COPCs were chosen based on the PRGs developed in the RI Update/FS Report (Tetra Tech, 2010b). Analytical concentration data are compared with the project action limits reported in the Final Sampling and Analysis Plan (Tetra Tech, 2011d). The project action limits are set at the Threshold Effects Concentration (TEC), or other similar screening levels (Tetra Tech, 2011d). As reported in ROD (Navy, 2010b), PAHs, pesticides, PCBs, and metals were detected in several sediment samples at concentrations that exceed ecological sediment benchmarks. The selected remedy indicated in the ROD (Navy, 2010b) includes excavation of soils to meet project action limits, site restoration, LUCs, monitoring, and five-year reviews. As shown in Table 1-2, the most recent Site 2B milestone is the LUC RD for OU12 (Tetra Tech, 2012c).

### **C.2.3 Site 3 - Area A Downstream Watercourses and Overbank Disposal Area**

Site 3 includes undeveloped wooded areas with several small ponds, streams, wetlands, and recreational areas, including a golf course and swimming lake. Site 3 covers approximately 75 acres and receives surface water and groundwater recharge from the Area A Landfill (Site 2A), Area A Wetland (Site 2B), Site 7, Site 14, and surrounding areas and conveys them to the Thames River. Site 3 includes Upper Pond, Lower Pond, OBDA Pond, and Streams 1 through 6. The major sources of contamination to Site 3 included historical application of pesticides, abandoned disposal areas, and the septic system leach fields at Site 7.

Most of Site 3 is within designated Explosive Safety Quantity Distance (ESQD) arcs of Site 20 (Area A Weapons Center); therefore, further development is not planned for this area. Navy Regulations prohibit construction of inhabited buildings or structures within these arcs and, although existing buildings operate under a waiver of these regulations, no further construction is planned.

The main cause of contamination at the Area A Downstream Watercourses was the application of pesticides. These pesticides were reportedly applied on the surface of water bodies to control mosquito proliferation adjacent to nearby base recreational facilities (North Lake and golf course). Additional contaminants are inorganic constituents of the river dredge spoil and Area A Landfill material that have been carried over from adjacent sites. Samples of sediment also contained relatively high levels of several metals such as arsenic, beryllium, cadmium, lead, and zinc, compared to less contaminated reference areas outside the site.

Following a Phase II RI, an FS was completed in 1997 for soil and sediment at Site 3 (B&RE, 1997j). An alternative that included dredging, on-site dewatering, off-site disposal of sediment and soil, restoration of wetlands and waterways, and monitoring was selected for the site, and the selected remedy was documented in the ROD signed in March 1998 (B&RE, 1998c). An RA-C for

Site 3 soil and sediment was completed in 1999 and 2000 (FWEC, 2001). During the RA-C excavation activities, contaminated soil and sediment were discovered in and around two abandoned pipes at the headwaters of Stream 4. Because this contaminated material could not be removed without seriously compromising the integrity of the Area A Dike, the ends of the pipes were isolated and encapsulated with concrete. The status of the Site 3A soil and sediment remediated under the OU3 ROD is RC.

A previously unknown source of petroleum contamination was detected during the RA-C at Site 3. The source, found during the remediation of Stream 5, is located on the northern side of the stream just east of the Small Arms Range. Petroleum product was discovered emanating from the northern side of the excavation. Upon further investigation, a small disposal area (i.e., buried drums, cable, etc.) was discovered upgradient of the location where petroleum was discovered. The site was named the Site 3 – NSA. The Site 3 – NSA was not remediated at the time of the RA-C because the nature and extent of contamination were unknown.

An FS (Tetra Tech, 2004) was completed to identify and evaluate appropriate remedial alternatives for soil at Site 3 – NSA and for groundwater at Site 3. A ROD was signed for Site 3 – NSA soil in September 2004 (Navy, 2004a). The ROD called for NFA for the petroleum-contaminated soil because petroleum is excluded from consideration under CERCLA; however, the Navy's cleanup plan to address the petroleum-contaminated soil under other applicable regulations was detailed in an appendix to the ROD. The Site 3 – NSA soil corrective action was completed in October 2007 to meet Connecticut regulations.

Institutional controls and monitoring were selected as the remedy for Site 3 groundwater in the Interim ROD in 2004 (Navy, 2004d). A LUC RD was subsequently completed for Site 3 groundwater in June 2005 (Tetra Tech, 2005).

The Navy began implementation of the groundwater monitoring program, as described in the Remedial Action Work Plan (Tetra Tech, 2006b) and Site 3 Groundwater Monitoring Plan (Tetra Tech, 2006a), in April 2006. Site 3 monitoring results have been documented (Tetra Tech, 2007c; ECC, 2008g; Tetra Tech, 2008h; H&S, 2010, 2011b, Sovereign 2012) and utilized to adjust the monitoring plan on a regular basis. In the most recent groundwater monitoring report (2012), no vinyl chloride was detected and TCE was below criteria in samples from all five monitored wells. It was recommended in the report that wells 2DMW16S, 2DMW16D, 3MW16S, 3MW16D, and 2DMW29S continue to be monitored for TCE and vinyl chloride (Sovereign, 2012).

Based on the discovery and encapsulation of contaminated material during the Site 3 soil RA-C, an Explanation of Significant Difference (ESD) was prepared to document the change in the remedy as presented in the 1998 ROD (Navy, 2007). Because contaminated material was left in place instead of removed (as was planned based on the remedy detailed in the ROD), institutional controls are now required as part of the remedy. In 2010, Volume VI was added to the O&M Manual for Site 3 inspection, including inspection of the Site 3 ESD concrete cover, institutional controls, and groundwater monitoring wells (Tetra Tech 2010f). The concrete that encapsulates contaminated soil was inspected in 2010 and was found to be stable and adequate to prevent erosion (H&S, 2011a). The status of the ESD soil and sediment is RC. Because the concrete cover requires Institutional Controls and inspections, the current phase is LTMgt. The ESD concrete cover is now inspected annually, and was last inspected in April 2011.

The ROD for OU9, Basewide Groundwater was completed in September 2008 (Navy, 2008b). The final selected remedy for groundwater at Site 3 is Institutional Controls with Monitoring. Tetra Tech Volume II (Groundwater Monitoring Plan) of the O&M Manual was revised in 2008 (Rev 2 Draft) and 2010 (Rev 2 Draft Final) to update information for Site 3 (Tetra Tech, 2008g; 2010f).

As shown in Table 1-2, the most recent milestone completed for Site 3 groundwater is RIP. Groundwater will continue to be monitored for natural attenuation until remedial goals (RGs) are met; therefore, the current phase is Remedial Action Operation (RA-O). Groundwater is currently being monitored annually, and Year 6 (Round 13) of groundwater monitoring was performed in April 2011. Groundwater monitoring focused on trichloroethene and vinyl chloride, as identified in the ROD for OU9 – Basewide Groundwater (Navy, 2008b). The analytical results are compared to Groundwater Monitoring Plan (GMP) (2006a) selected groundwater criterion identified in the ROD (Navy, 2008b). The cleanup goal for trichloroethene is based on the federal and state Maximum Contaminant Level. The cleanup goal for vinyl chloride is based on the Connecticut groundwater volatilization criteria. Site 3 groundwater results for trichloroethene and vinyl chloride exceeded criteria in 2009, but have not exceeded criteria in 2010 or 2011. After 4 years of annual monitoring are performed with all results less than RGs, the monitoring program can be discontinued and groundwater LUCs can be eliminated. A RACR and LUC RD are being developed for Site 3 soil and sediment as part of OU3 in 2012, and are expected to be finalized in 2013.

#### **C.2.4 Site 4 - Rubble Fill Area at Bunker A-86**

Site 4 was a 25-foot by 60-foot plot located in the north-central section of NSB-NLON, approximately 80 feet west of Former Bunker A-86 and just south of the Area A Landfill. According

to the IAS report (Envirodyne, 1983), waste materials, including an electric motor, concrete, asphalt, tar buckets, wood, and gravel were discarded at the site in the early 1970s. In addition to wood and concrete construction debris, previous investigations located an empty 5-gallon container of monothanolamine (labeled as a corrosive), an empty 5-gallon container of thorite (labeled as nonshrinking compound for patching concrete), and a 55-gallon drum of lubricating oil approximately 10 percent full, at the site (Atlantic, 1992).

A low-permeability cover system was installed over the Area A Landfill in 1997. In conjunction with the construction of this cover system, an interception trench was constructed into the hillside between the Area A Landfill and Site 4. Grading required for the construction of the interception trench involved excavating the soil at Site 4 and the hillside between Site 4 and the Area A Landfill to a depth of approximately 8 feet. This excavation constituted a TCRA for Site 4, and an Action Memorandum was written for this site in September 1997 (Navy, 1997d).

Site 4 soil and construction debris were excavated during the removal action and incorporated into the Area A Landfill subgrade, except wood debris, which was sampled and disposed off-site (FWEC, 1997a). Following excavation, verification sampling was conducted in an area of about 17,000 square feet to determine the extent of residual contamination. The Verification Sampling Report (B&RE, 1997c) concluded that, if the human health risk assessment conducted for the Phase II RI was revised using the verification sampling data, the cumulative Incremental Cancer Risk (ICR) would exceed the upper limit of the USEPA target risk range (i.e.,  $1 \times 10^{-4}$ ). Based on this information, the Navy decided to remove the remaining soil at Site 4, leaving only exposed bedrock. The Navy prepared a risk evaluation memorandum in March 1998 to document the negligible remaining risks associated with the site. An NFA Proposed Plan (Navy, 1998c) and ROD (Navy, 1998d) were prepared for this site. The status of this site is considered to be RC. Site 4 soil has achieved SC.

The groundwater in this area is being monitored in conjunction with the Site 2A long-term groundwater monitoring plan.

A well inventory was conducted at NSB-NLON in 2007. This inventory included five Site 4 wells (Tetra Tech, 2007b). Three of these wells had been documented as previously abandoned. Of the two remaining Site 4 wells, one is part of the active monitoring program for Site 2 and the other is idle.

### **C.2.5 Site 6 - Former Defense Reutilization and Marketing Office**

Site 6 is located adjacent to the Thames River in the northwestern section of NSB-NLON. The site is located between a bedrock outcrop that runs roughly parallel to the Providence and Worcester Railroad to the east and the Thames River to the west. The site covers approximately 3 acres that gently slopes toward the Thames River. A majority of the site is paved with an asphalt layer, and includes buildings, a weighing scale, and miscellaneous storage piles. Currently, the DRMO is used as a storage and collection facility for items such as computers, file cabinets, and other office equipment to be sold during auctions and sales held periodically during the year.

From 1950 to 1969, the DRMO was used as a landfill and waste-burning area. Non-salvageable waste items, including construction materials and combustible scrap, were burned along the Thames River shoreline, and the residue was pushed to the shoreline and partially covered. During the review of archived aerial photographs of the DRMO area, the 1934 photographs show fill in the southern portion of the site. Aerial photographs from 1951 show the land in its present configuration, except the northwestern portion which was not filled at that time.

A TCRA was completed at the site in January 1995 at generally the same time as the Phase II RI. Approximately 2,500 cubic yards of lead-, PAH-, and PCB-contaminated soils were excavated from the northern portion of the DRMO as part of a TCRA. The excavated area was backfilled with clean soil, and the excavated soil was transported off site to a RCRA landfill (B&RE, 1997b). The backfilled area was then capped with woven geotextile liner, a geosynthetic clay liner, a nonwoven geotextile liner and approximately 9 inches of crushed stone, and 3 inches of asphalt. The remaining portion of the DRMO was repaved. An Action Memorandum was prepared in March 1995 (Atlantic, 1995b) to document the removal action completed at the DRMO.

Confirmatory soil sampling and analysis were conducted on the sidewalls of the excavations and results were evaluated during the Phase II RI. The Phase II RI recommended that an FS be prepared for DRMO soil and groundwater and that groundwater monitoring be conducted to verify that significant contamination is not leaching to groundwater. An FS (B&RE, 1997g) was completed for soil and groundwater at the DRMO, and the selected remedial alternative (institutional controls and monitoring) was documented in an interim ROD (Navy, 1998a).

O&M of the cover system at the former DRMO is being performed in accordance with the O&M Manual (Tetra Tech, 2006a). The O&M process includes annual inspections, reporting of results, and correcting any identified problems. Site 6 has been inspected annually since 2003. The

findings of the inspections are documented in the field on inspection checklists and summarized in Annual LIRs (ECC, 2004b; 2005f; 2005i; 2008e; 2008i; 2009c; 2009i; H&S, 2011a). Volume IV (Site 6 O&M) of the O&M Manual was revised in 2008 and 2010 to update information for Site 6 (Tetra Tech, 2008g; 2010f).

A groundwater monitoring program began at the DRMO in April 1998 in accordance with the Groundwater Monitoring Plan (B&RE, 1998a) and is ongoing (Tetra Tech, 2006a). Based on the results of the monitoring program, a final ROD for Site 6 was signed in December 2006 (Navy, 2006b). The selected remedial alternative is similar to the interim remedy selected in 1998 and includes institutional controls, monitoring, and five-year reviews.

Site 6 was monitored annually for 11 years (Tetra Tech, 1999e; 2000a; 2002b; 2003b; ECC, 2004f; 2005d; 2006a; 2008c; 2008h; 2009e), then biennially since 2008 (H&S, 2011b). The results of 2010 monitoring indicate that none of the COCs exceeded primary monitoring criteria (H&S, 2011b). The results indicate that the TCRA at the site removed sufficient contaminant source material and reduced infiltration of precipitation through any remaining source material so that significant contaminant migration from the site to the Thames River is not occurring.

Volume II (Groundwater Monitoring Plan) of the O&M Manual was revised in 2008 (REV 2 Draft), 2010 (REV 2 Draft Final), and 2011 (Final) to update information for Site 6 (Tetra Tech, 2008g; 2010f; 2011g).

An RA Completion Report was prepared to document implementation of the soil and groundwater remedies at the site (Tetra Tech, 2007a). As shown on Table 1-2, the most recent milestone completed for Site 6 soil and groundwater is RC, and the current phase is LTMgt. A RACR and LUC RD are being developed for Site 6 soil and groundwater as part of OU 2 in 2012, and are expected to be finalized in 2013. Groundwater is currently being monitored biennially, and the most recent monitoring event was Round 22 (Year 14) in 2012. The overall objective of groundwater monitoring is to evaluate the effectiveness of the cap and to confirm that contamination is not migrating through the soil, into the groundwater, and ultimately discharging to the Thames River. Groundwater is analyzed for selected TCL VOCs, TCL SVOCs, TCL PAHs, and TAL metals (total and dissolved). As reported in the ROD (Navy, 2006b) and GMP (Tetra Tech, 2006a) two types of monitoring criteria (primary and secondary) are applied to groundwater at Site 6. Primary monitoring criteria include CTDEP SWPCs, site-specific SWPCs, and CTDEP volatilization criteria. Secondary monitoring criteria include federal AWQCs and Connecticut WQsS [i.e. aquatic life criteria

developed for chronic (long-term) exposure of aquatic receptors in saltwater and human health criteria for consumption of organisms]. Results 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following secondary monitoring criteria exceedances: bis(2-ethylhexyl)phthalate (4 samples), total arsenic (7 samples), copper (1 sample), and lead (2 samples). There were no exceedances of primary screening criteria reported in the 2010 report (H&S, 2011b). The annual site inspection was performed in April 2011 and routine maintenance will be performed as needed.

### **C.2.6 Site 7 - Torpedo Shops**

The Torpedo Shops (Site 7) are located in the northern portion of NSB-NLON on the northern side of Triton Road. The site covers approximately 7 acres and is bordered on the east and north by 60-foot-high bedrock cliffs. The remainder of the site slopes to the southwest toward the Area A Downstream Watercourses (Site 3). An earthen berm extends along the base of the eastern portion of the exposed rock face. Three buildings (325, 450, and 477) exist at the site. The Navy conducts maintenance activities on torpedoes at Site 7. The Navy currently manages the use, storage, and disposal of hazardous material and waste at Site 7 in accordance with Resource Conservation and Recovery Act (RCRA) regulations.

The ROD for Site 7 and Site 14 soil (OU8) was signed in September 2004 (Navy 2004b), and the Interim ROD for Sites 3, 7, 14, 15, 18, and 20 groundwater (OU9) was signed in December 2004 (Navy, 2004d). The remedy selected for soil was excavation and off-site disposal. Approximately 1,150 tons of soil and 125 tons of asphalt were removed during an RA completed in May 2006 (Tetra Tech EC, 2006b).

The remedy selected for groundwater was institutional controls and monitoring. A LUC RD was completed for Site 7 groundwater in June 2005 (Tetra Tech, 2005), and the Navy began implementation of the groundwater monitoring program as described in the Remedial Action Work Plan and Site 7 Groundwater Monitoring Plan (Tetra Tech, 2006a) in May 2006. The monitoring results presented in the Round 9 Groundwater Monitoring Report (Tetra Tech, 2008h) indicate that the selected remedial action for Site 7 groundwater successfully reduced COC concentrations to levels below RGs. This data supported the discontinuation of LUCs at Site 7. Volume II (Groundwater Monitoring Plan) of the O&M Manual was revised in 2008 to remove Site 7 from the groundwater monitoring program (Tetra Tech, 2008g).

The RD for LUCs on Basewide Groundwater OU9 documented NFA for Site 7 (Tetra Tech, 2009e) and the RACR for OU9 acknowledged that the RA is complete and that monitoring, LUCs, and five-

year reviews have been discontinued (Tetra Tech, 2009b). The completion of the groundwater remedial action at Site 7 was documented in the RACR for OU9 that was completed in 2010 and in the Third Five-Year Review Report that was completed in 2011. A RACR is being developed for Site 7 soil as part of OU 8 in 2012, and are expected to be finalized in 2013. The RC milestone has been achieved and Site 7 has achieved SC (see Table 1-2).

### **C.2.7 Site 8 - Goss Cove Landfill**

The Goss Cove Landfill (Site 8) is located in the southwestern corner of NSB-NLON, adjacent to the Thames River. It is west of Shark Boulevard and the intersection of Crystal Lake Road and Military Highway, east of the Thames River, and north of Goss Cove. The landfill encompasses approximately 3.5 acres. The Nautilus Museum and a paved parking lot are constructed directly over the site of the former landfill. The Nautilus Museum is a submarine museum operated by the Navy and open to the public.

The IAS report (Envirodyne, 1983) indicated that the Goss Cove Landfill was operated from 1946 through 1957. Incinerator ash and inert rubble were disposed at the site in what was then the northern portion of Goss Cove.

The DGI was conducted in January 1997 (B&RE, 1997e) to determine the source of PCE contamination detected in groundwater samples collected during the Phase II RI. The DGI concluded that the source of PCE contamination detected in groundwater is off site and upgradient of the site and is likely a neighboring dry cleaning establishment. The CTDEEP conducted a Phase I/II Environmental Site Assessment of the dry cleaners in 1998 (CTDEEP, 1999). The results of the investigation conclusively showed that the dry cleaners released PCE to the environment. This information indicates that the dry cleaner is the source of the PCE detected in downgradient groundwater at the Goss Cove Landfill. CTDEEP completed injection of an in-situ chemical oxidation agent (permanganate) into the source area and have completed monitoring of soil and groundwater concentrations.

The investigations showed that contaminant levels detected in sediment and surface water in Goss Cove did not pose potential adverse risks to human health or the environment. Based on these findings, NFA was recommended for these media.

The two remedial alternatives evaluated for the soil/waste in the FS were no action and installation of an engineered control cap (presumptive remedy) with institutional controls and monitoring. The capping alternative was selected for Site 8, and the ROD for this site was signed by the Navy and

regulators in September 1999 (Navy, 1999). Other components of the remedy as detailed in the ROD, included institutional controls to prevent disturbance of the cap and site soil, long-term groundwater monitoring to evaluate the effectiveness of the cap and to ensure that contaminants do not migrate to Goss Cove or the Thames River, and five-year reviews.

The RD was finalized in November 2000 (Tetra Tech, 2000b) and construction of the engineered cap system was completed in June 2001 (FWEC, 2002c).

The BGOURI was completed (Tetra Tech, 2002a) to further evaluate the potential risks identified in the Phase II RI associated with exposure to groundwater by human receptors. The BGOURI recommended that the Navy complete the RA-C for the soil, implement LUCs, and begin groundwater monitoring in accordance with the Groundwater Monitoring Plan (Tetra Tech, 2001a) after finalization of the RA-C. It was subsequently determined that groundwater monitoring, as detailed in the ROD, was sufficient and that a separate groundwater ROD was not required.

O&M of the cap system at Site 8 and groundwater monitoring are being performed in accordance with the O&M Manual (Tetra Tech, 2006a). The O&M process includes annual inspections, reporting of results, and correcting any identified problems. Site 8 has been inspected annually since 2003. The findings of the inspections are documented in the field on inspection checklists and summarized in annual LIRs (ECC, 2004c; 2005g; 2005j; 2008f; 2008j; 2009d; 2009i). In addition, culverts were inspected by video in 2004, 2005, 2007, 2008, and 2009 (ECC, 2005a; 2006b; 2007a; 2008l; 2009g). Volume V (Site 8 O&M) of the 2006 O&M Manual was revised in 2008 to update information for Site 8 (Tetra Tech, 2008g).

The groundwater monitoring program for Site 8 began in 2001 (Tetra Tech, 2001a), and the results of the program are being used to verify the effectiveness of the cap in reducing infiltration and leaching of contaminants and to confirm that contamination is not migrating from the soil to groundwater and eventually to the Thames River. To date, groundwater has been monitored for 9 years (Tetra Tech, 2003c; ECC, 2004d; 2005b; 2006b; 2008a; 2008m; 2009a; H&S, 2010; 2011b).

Volume II (Groundwater Monitoring Plan) of the 2006 O&M Manual was revised in 2008 (REV 2 Draft), 2010 (REV 2 Draft Final) and 2011 (Final) to update information for Site 8 (Tetra Tech, 2008g; 2010f; 2011g).

As documented in Table 1-2, the status of Site 8 soil and groundwater is RC and the current phase is LTMgt. The status of Site 8 surface water and sediment is SC. Groundwater is monitored annually, and Year 10 (Round 23) of the monitoring was performed in April 2011. Groundwater monitoring has been conducted to evaluate whether the engineered cap has been effective in minimizing contaminant migration from the landfill to downgradient locations. Monitored groundwater COCs include selected VOCs, SVOCs, PAHs, and metals. As reported in GMP (Tetra Tech, 2006a) two types of monitoring criteria (primary and secondary) are applied to groundwater at Site 8. Primary monitoring criteria include CTDEP SWPCs, site-specific SWPCs, and CTDEP volatilization criteria. Secondary monitoring criteria include federal AWQCs and Connecticut WQs [i.e. aquatic life criteria developed for chronic (long-term) exposure of aquatic receptors in saltwater and human health criteria for consumption of organisms]. Results reported in the 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following exceedances of primary screening criteria: total and dissolved arsenic (2 samples). Results in the 2010 Annual Groundwater Monitoring Report (H&S, 2011b) identified the following exceedances of secondary screening criteria: tetrachloroethene (2 samples), benzo(a)pyrene (3 samples), fluoranthene (2 samples), total arsenic (7 samples), total beryllium (1 sample), total copper (9 samples), dissolved arsenic (7 samples), and dissolved copper (2 samples). The annual site inspection was performed in April 2011 and found that an aboveground storage tank (AST), its foundation (concrete pad), and associated piping were installed on the cap without prior knowledge or approval from the IRP Manager. An investigation was conducted confirming that the installation of the AST did not impact the Site 8 engineered cap system (Tetra Tech, 2012). A RACR and LUC RD are being developed for Site 8 soil and groundwater as part of OU 5 in 2012, and are expected to be finalized in 2013.

### **C.2.8 Site 9 - Oily Wastewater Tank (OT-5)**

Site 9, Waste Oil Tank (OT-5), was an underground, concrete storage tank located between Sculpin Avenue and Tang Avenue in the southern portion of NSB-NLON. Site 9, located within the limits of the Former Tank Farm (Site 23) is currently developed as a recreation area which includes baseball fields.

The investigations at Site 9 were conducted under the CTDEEP RCRA UST Program. The tank had a diameter of approximately 112 feet and was 11 feet deep. The top of the tank was approximately 5 feet below the ground surface, and the tank had a capacity of approximately 750,000 gallons.

The tank was constructed in the 1940s and was used to store fuel oil. In the late 1970s, the tank was converted to a storage tank for bilge water and other waste solutions. Use of OT-5 stopped in

1993 and all tank contents including floating product and most of the settled sludge were removed. A residual sludge layer of approximately 2 to 3 inches was left in the tank during purging. This sludge contained PCBs at concentrations exceeding 500 milligrams per kilogram (mg/kg) [Halliburton NUS (HNUS), 1994a].

After OT-5 was emptied, groundwater infiltrated through cracks in the concrete surface and partially refilled the tank (HNUS, 1994a). Subsurface contamination of the surrounding soil and groundwater may have been caused by draining of the infiltrated water through the cracks and into the surrounding media.

In 1994, HNUS completed a removal action at OT-5 that included the removal and disposal of PCB-contaminated sludge at OT-5. The Post Removal Action Report (HNUS, 1994b) presents the results of the verification sampling and analysis procedures performed by HNUS to verify that decontamination of the containers used for the temporary on-site storage of the PCB-contaminated sludge removed from OT-5 met cleanup standards.

After the contents of OT-5 were removed, the tank was cleaned and the top of the tank was crushed. The tank was closed in place by filling it with inert material. Based on the results of the RA, no further remedial action is necessary for soil to ensure protection of human health and the environment at Site 9.

Site 9 is located within the Fuel Farm (Site 23). Groundwater at Site 23 was investigated under CERCLA during the BGOURI (Tetra Tech, 2002a). Further discussion of the groundwater results for Site 23 is provided in Section 2.1.21.

Based on the Final ROD for OU9, an RD for LUCs on Basewide Groundwater OU9 was prepared. LUCs at Site 9 are to prevent the withdrawal and/or use of groundwater for potable water purposes until concentrations in groundwater meet criteria acceptable for unrestricted use and unlimited exposure and ensure that groundwater extracted during construction dewatering activities is properly handled, stored, and disposed (Tetra Tech, 2009e). The RACR for OU9 was prepared to document the completion of site remedies and LUCs at OU9, including Site 9 (Tetra Tech, 2009b). In 2009, a table and map were filed in the land record offices of the Towns of Groton and Ledyard, Connecticut to show the location of monitoring wells, note the remedy in place, and list COCs and LUCs that have been imposed at Site 23 (including Site 9) (Navy, 2009b; Navy 2009c). The Site 23

boundary was surveyed in March 2010 and a revised map will be submitted to the Towns of Ledyard and Groton with a corrected Site 23 boundary.

The status of Site 9 groundwater is RC (see Table 1-1). Site 9 is located within Site 23 and inspections, and five-year reviews are planned for Site 23 until groundwater meets criteria for unrestricted use and unlimited exposure. See Section 2.2.14 for additional information on groundwater at Site 23. As reported in the RACR for OU 9 (Tetra Tech 2009b) the soil at Site 9 was investigated and remediated under the CTDEP RCRA UST Program; therefore, no decision documents have been prepared for the soil at Site 9. Screening Evaluation (SASEs) for Sites 9 and 23, which include an assessment of soil compliance, are currently being developed and will be finalized in 2013.

### **C.2.9 Site 10 and Site 11 (Lower Subbase - Zone 1)**

#### **C.2.9.1 Site 10 – Lower Subbase – Fuel Storage Tanks and Tank 54-H**

Six former USTs, including Tank 54-H, are located at the Lower Subbase at the corner of Corvina Road and Amber Jack Road.

At Site 10, five concrete USTs located southwest of Building 107 were placed in service during World War II. Three of the tanks (E, F, and G) had 125,000-gallon capacities and were used to store diesel fuel from 1954 to 1987. From 1954 to 1989, Tanks K and L (25,000-gallon capacities) were used to store lubrication and hydraulic oils. A sixth tank (Tank 54-H) was located adjacent to and north of Tank E. Tank 54-H had a 30,000-gallon capacity and was used as a reclamation tank for the other five tanks. The Navy decommissioned Tanks E, F, and G in 1987. Tank 54-H was also decommissioned. In 1989, the Navy decommissioned Tanks K and L and installed new steel tanks within the shells of these two tanks to provide secondary containment. The tanks are routinely tested and are in compliance with Connecticut regulations.

The IAS concluded that there was some measurable leakage from the tanks at Site 10 (Envirodyne, 1983). In 1989, Fuss & O'Neill conducted a hydrogeologic investigation of two UST areas at NSB-NLON, one at the Tank Farm located southeast of the Lower Subbase and the other in the Lower Subbase (i.e., Site 10). Fuss & O'Neill concluded that petroleum contamination had impacted groundwater in the area.

### **C.2.9.2 Site 11 – Lower Subase – Power Plant Oil Tanks**

Site 11 includes four 170,000-gallon USTs (Tanks A, B, C, and D) located adjacent to and east of the power plant (Building 29). Tanks A and B were used to store No. 6 fuel oil pumped from the Tank Farm at the southern end of NSB-NLON, Tank C was used to store diesel oil, and Tank D was used to store waste oil generated by the bilge water oil recovery system at the power plant. The tanks have been in place since World War II. Past oil leakage was apparent when the old tanks were cleaned; however, the old tanks were repaired and are now used as containment structures for three 150,000-gallon steel USTs. The new steel USTs are routinely tested and are in compliance with Connecticut regulations.

Sites 10 and 11 were evaluated collectively as Zone 1 in the Phase II RI (B&RE, 1997b) and Lower Subase RI (Tetra Tech, 1999b). The Thames River adjacent to Zone 1 was also investigated during the Phase II RI and Lower Subase RI. Because of this approach, the remainder of this section only discusses information in terms of Zone 1.

The investigation found that significant amounts of petroleum contamination (No. 2 fuel oil and waste lubricating oils) remain in the soil of Zone 1; however, the historical sources of petroleum contamination have been eliminated. Petroleum and lead contamination were also identified in groundwater. The ecological risk assessment for the Thames River (sediment and surface water) adjacent to Zone 1 indicated that risks to ecological receptors are minor.

The Lower Subase RI Report (Tetra Tech, 1999b) recommended that Zone 1 proceed to an FS for evaluation of appropriate remedial alternatives for soil and limited actions for groundwater. It was recommended that the FS for this zone evaluate, to the extent possible, passive and/or in-situ remedial alternatives and the use of LUCs. It was also recommended that the FS evaluate limited action scenarios for the groundwater and storm sewer system of Zone 1, in conjunction with the soil remedial alternatives. The scenarios evaluated for groundwater should include LNAPL removal from monitoring well 13MW18 and a monitored natural attenuation/tiered groundwater monitoring program.

The Lower Subase FS was prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subase sites. The Lower Subase FS was issued in December 2010 (Tetra Tech, 2010g) and a Soil and Groundwater PDI Completion Report and FS Addendum (Tetra Tech, 2012a) were issued in January 2012.

TPH was not included in the FS Addendum evaluations and alternatives for Zone 1 because TPH was not commingled with CERCLA contaminants. TPH and LNAPL contamination at Zone 1 will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP Remediation Standard Regulations (RSRs).

The remedy for Zone 1 soil was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, PAHs and mercury were detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria. The remedial alternative identified in the ROD is LUCs and monitoring. The LUC components will include restricting residential land use, restricting disturbance of contaminated soil, and maintaining a protective cover layer to provide CERCLA risk-based engineering controls. A LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

The current site closeout phase of Zone 1 (Site 10 and Site 11) is RD and LUC RD.

#### **C.2.10 Site 13, Quay Wall Study Area, Thames River Sediment (Lower Subbase – Zone 4)**

##### **C.2.10.1 Site 13 – Lower Subbase – Building 79 Waste Oil Pit**

Site 13 (Building 79 Former Waste Oil Pit) is located adjacent to one of the oil-impacted areas identified in the Navy Environmental Support Office (NESO) and Wehran Engineering Corporation reports (NESO, 1979 and Wehran, 1987). A railroad spur was located at Site 13, where diesel engines were serviced inside Building 79 during World War II and through the 1950s. The Building 79 service area included a pit in the northwestern corner of the building into which waste oil and solvents were reportedly drained during the cleaning and servicing of diesel engines. The pit is no longer in use and has been filled with concrete. Available building maps show a subsurface drainpipe extending from the pit to Albacore Road. Building 79 is slated to be demolished as part of a project to build a new Port Operations Center on the footprint of Building 110. Building 79 will be demolished to grade and the area will be subsequently paved and used for parking. A majority of the site is paved or covered with buildings.

Investigations in this area (NESO, 1979; Wehran, 1987; Atlantic, 1992) identified oil impacts to subsurface soil and within manholes. The estimated saturated volume of contamination was approximately 50 feet by 50 feet by 4 feet deep. Wehran recommended removal of the oil from the manholes near Building 79 using absorption pads and/or excavation of oil-laden soil and inspection of fuel lines within the trench and subsequent cleaning of the trench. During the Phase I RI, a brown, milky oil was identified west of Building 79 (Atlantic, 1992).

### **C.2.10.2 Quay Wall Study Area**

The Quay Wall Study Area encompassed the area near the Thames River from approximately Pier 2 to Pier 6. The wooden platform and quay wall were constructed in 1940. Petroleum impacts were previously visible in the soil immediately above the wooden platform, in the fill below the wooden platform, in the area around the stormwater system manhole northeast of former Pier 4, and globules of floating product were also present in standing water in void spaces below the wooden platform.

An expandable rubber plug was placed in the stormwater system outfall in November 1994, and the stormwater pipe leading to the outfall was abandoned and filled with sand in late December 1994. Five product recovery wells (QW-1 through QW-5) were subsequently installed and a total of approximately 16,000 gallons of oily water were pumped from the recovery wells and containerized during December 1994. This action was completed as part of a TCRA for the Quay Wall Study Area (HNUS, 1995b). A Removal Site Evaluation (HNUS, 1995d) recommended that no further removal action be performed at that time but that further site investigations should focus on lead concentrations.

For the Phase II RI and Lower Subbase RI, Zone 4 included: Site 13 – Building 79 Waste Oil Pit, the Quay Wall Study Area, Site 19 – Former Solvent Storage Area (Former Building 316), and the fuel distribution pipeline. The Thames River adjacent to Zone 4 was also investigated during the Phase II RI and Lower Subbase RI. Because of this approach, the remainder of this section discusses information in terms of Zone 4.

Lead contamination was identified in shallow and deep soil and groundwater in Zone 4. Widespread TPH contamination was identified in deep soil at Zone 4. Some petroleum contamination was also evident in shallow soil and groundwater.

In the Lower Subbase RI, it was recommended that Zone 4 proceed to an FS to evaluate appropriate remedial alternatives. Cleaning and repair of the Zone 4 storm sewer system were recommended for evaluation. The RI also recommended additional characterization of sediment in the Thames River to provide the data necessary to refine the ecological risk assessment prior to proceeding to an FS (Tetra Tech, 1999b).

The Lower Subbase FS was prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subbase sites. The

Lower Subbase FS was issued in December 2010 (Tetra Tech, 2010g) and a Soil and Groundwater PDI Completion Report and FS Addendum (Tetra Tech, 2012a) were issued in January 2012. As part of the Soil PDI, the invert elevations of selected storm sewer manholes and catch basins in Site 13 were surveyed to determine which storm sewers pass through contaminated soil and may contribute to contaminant migration. At Site 13, arsenic, copper, and lead concentrations detected during the groundwater PDI were much less than their respective criteria; therefore, groundwater remediation is not required for CERCLA contaminants at Site 13.

The remedy for Zone 4 soil was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, PAHs were detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria and lead was detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria and Industrial/Commercial Target Action Levels provided in the ROD. The alternative identified in the ROD is excavation to meet I/C RGs, LUCs, including CERCLA risk-based engineering controls, institutional controls, and inspections, and long-term monitoring. The LUC components will include restricting residential land use, restricting disturbance of contaminated soil, and maintaining a 36,000 sf protective cover layer that meets CTDEEP RSR standards for I/C use. An RD, LUC RD and monitoring program are expected to be developed in 2012 or 2013.

TPH is commingled with CERCLA contaminants in a portion of the Site 13 and will be collaterally addressed with the CERCLA contaminants after a final remedy is selected for Site 13 soil. In addition, non-commingled TPH contamination is present in Site 13 media and will be evaluated in a future Corrective Action Plan that will be developed to meet CTDEEP RSRs.

No major contamination was found at Site 19 and the site is outside the Zone 4 residential LUC boundary identified in the Lower Subbase FS Addendum, indicating no unacceptable risks were associated with the site.

The current site closeout phase of Zone 4 is RD and LUC RD.

### **C.2.10.3 ZONE 4 – Thames River and Sediment Studies**

Per the recommendations of the Lower Subbase RI, investigations of Thames River sediment included sampling and ecological risk evaluations for Zones 4 and 7 and Pier 1 (Battelle, 2003; 2004a; 2004b; 2007; 2008a; Tetra Tech, 2008c, 2008f, 2009a). The Pier 1 site was identified based on the results of sampling conducted in the area by Science Application International Corporation (SAIC) in 1999 and by the Navy in association with the siting of the Controlled Industrial Facility (CIF) Building. From the Battelle and Tetra Tech investigations, it was concluded

that concentrations of PAHs, PCBs, pesticides, and metals in Inner and Outer Pier 1 sediment posed unacceptable risks to ecological receptors. Based on the results of the 2008 Validation Study, an EE/CA was prepared for the Pier 1 Inner Area (Battelle, 2008b) and additional Tetra Tech data was used to evaluate NTCRA alternatives for the Inner and Outer pier 1 (Tetra Tech, 2009c).

The NTCRA for Inner and Outer Pier 1 sediment was initiated in December 2009, and completed in April 2010 (Tetra Tech EC, 2009; 2010). Tetra Tech EC was able to dredge a substantial amount of contaminated sediments from Inner and Outer Pier 1 (8,757 cubic yards total); however, because of obstructions encountered during dredging, and limitations associated with the remedial technology (i.e., mechanical dredging), not all of the contaminated sediment from Inner Pier 1 could be removed. To address the remaining sediment, the Navy will complete another phase of the NTCRA that will use a different remedial technology (e.g., hydraulic dredging). A Removal Action Design for Pier 1 Inner Area was prepared (Tetra Tech, 2011f) and is anticipated that the second phase of the NTCRA fieldwork will be completed in 2012.

The sediment data collected from the Thames River along the Zone 4 Quay Wall and at the outermost portion of Outer Pier 1 were incorporated into the Zone 4 sediment alternatives in the FS and FS Addendum (Tetra Tech, 2010g, 2012a). Additional sediment data will be collected within the Zone 4 and Outer Pier 1 area as part of a PDI (Tetra Tech, 2012b), which is planned to be completed during 2012. The additional data will be incorporated into the Zone 4 and Outer Pier 1 Sediment Remedial Design which is anticipated to be started in 2012 and completed during 2013.

The remedy for Zone 4 sediment was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, unacceptable ecological risks were estimated for benthic invertebrates and piscivorous birds exposed to metals, PAHs, pesticides, and PCBs in Zone 4 and Outer Pier 1 sediment. The alternative identified in the ROD is dredging to meet RGs in the majority of Zone 4, LUCs, including institutional controls and inspections in Zone 4 and Outer Pier 1, long-term monitoring in Zone 4 and Outer Pier 1, and five-year reviews for Zone 4 and Outer Pier 1. The LUC components will include prohibiting disturbance of sediment over the 13,500 sf area in Outer Pier 1 and adjacent to the quay wall and existing pier structure in Zone 4 and yearly inspections to ensure the cover is preventing exposure. An RD, LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

#### **C.2.11 Site 14 - Overbank Disposal Area-Northeast**

The OBDANE site is located in a heavily wooded area on the edge of a ravine north of Stream 3 of the Area A Downstream, west of the Area A Weapons Center, and south of the Torpedo Shops. At

one time, miscellaneous wastes were apparently dumped over the bedrock edge. The site was circular and approximately 80 feet in diameter. A dirt road provides limited access to the wooded site. A nearly vertical 20-foot-high bedrock face is located at the eastern edge of the site. The rest of the site slopes to the southwest.

The IAS Report (Envirodyne, 1983) stated that vegetation at the site indicated that no dumping had occurred within 10 years prior to the 1982 investigation. The IAS report documented the presence of several empty fiber drums. Atlantic personnel inspected the site on September 30, 1988, and verified that the drums were still present. No visual staining or stressed vegetation was observed at this time. No development of this area was planned.

During the Phase I RI (Atlantic, 1992), surface soil samples were collected from within the limits of the identified disposal area. Based on the sample results, the RI concluded that there was negligible risk associated with Site 14 and recommended that a supplemental Step I Investigation be performed. The Phase II RI (B&RE, 1997b) concluded that all human health risks were within or less than the USEPA target range; however, arsenic was found in surface soil samples at concentrations slightly exceeding state standards, and lead contamination was found in surface soil samples approximately 80 feet south of the site. The RI Report recommended that further characterization of surface soil with respect to arsenic and lead be completed.

An Action Memorandum for an NTCRA was prepared for Site 14 by the Navy in 1999. Removal and off-site disposal of contaminated soil and debris at the site was the recommended alternative in the Action Memorandum. A work plan for the removal action was prepared, and the removal action was completed in May 2001. A post-removal action report was prepared to document the actions taken during the removal action (FWEC, 2002a). No significant risks from exposure to soil remained at the site after the NTCRA; therefore, an NFA ROD for Site 14 soil was signed in September 2004 (Navy, 2004b).

Groundwater at Site 14 was further characterized during the BGOURI (Tetra Tech, 2002a). For the RI, Site 3 and Site 14 were evaluated collectively because Site 14 falls within the boundary of Site 3, and any impacts from Site 14 would be detected in groundwater beneath Site 3. Groundwater results for Sites 3 and 14 indicated that water quality was generally good, with only sporadic, low-concentration detections of VOCs and metals in site monitoring wells. The VOCs were detected exclusively in Site 3 monitoring wells. Seven metals were the only chemicals detected in the Site 14 groundwater sample, and all concentrations were less than background groundwater

concentrations. The human health risk assessment determined that risks posed by exposure of construction workers to groundwater at Sites 3 and 14 are within USEPA and CTDEEP acceptable levels, assuming that the workers are exposed to the maximum observed concentrations of site contaminants. The human health risk assessment also determined that risks posed by exposure of hypothetical future residents to groundwater at Sites 3 and 14 are outside of USEPA and CTDEEP acceptable levels, assuming the residents are exposed to the maximum observed concentrations of site contaminants. Arsenic, benzo(a)pyrene, TCE, and vinyl chloride were the major contributors to the ICRs, and thallium was the major contributor to the HIs. All of the chemicals that contributed significantly to the risks were detected in the Site 3 wells. The BGOURI recommended that an FS be prepared to evaluate the groundwater associated with Sites 3 and 14.

Site 14 groundwater was further evaluated in the BGOURI Update/FS Report (Tetra Tech, 2004). A supplemental human health risk assessment evaluation was performed with Site 14 groundwater data collected during the BGOURI, separate from Site 3 groundwater data. The evaluation indicated no significant risks to potential receptors from exposure to Site 14 groundwater. Based on these results, NFA was recommended for Site 14 groundwater in the BGOURI Update/FS. An interim ROD for OU9 (Navy, 2004d), which includes Site 14, was signed in December 2004 and documented the NFA decision for the site. No VOCs were detected in groundwater samples collected at Site 14 during the BGOURI, indicating that vapor intrusion is not a concern at Site 14. As a result, NFA was selected for Site 14 in the Final OU9 ROD (Navy, 2008b). A final remedy of NFA for Site 14 was also documented in the RACR for OU9 (Tetra Tech, 2009b).

The status of Site 14 soil and groundwater is considered SC (see Table 1-1).

#### **C.2.12 Site 15 - Spent Acid Storage and Disposal Area**

The SASDA was located in the southeastern section of NSB-NLON, between the southern side of Buildings 409 and 410. The site consisted of a concrete storage pad and an UST.

According to previous reports (Atlantic, 1994b), the area was used for storage and disposal of discarded batteries. Acid was removed from the battery housings and temporarily stored in a 4- by 4- by 12-foot, rubber-coated, underground tank. The acid was periodically emptied from the tank by a pumper truck and disposed off-site. The battery housings were temporarily stored on the adjacent concrete pad. The former tank and the surrounding soils encompassed approximately 1,000 square feet.

All battery acid and housing storage at the site was terminated. According to documentation (Atlantic, 1994b), the acid storage tank was filled with soil and covered by a concrete pad. Future plans for this area included the demolition of Buildings 409 and 410 and the construction of a warehouse.

Site 15 was investigated during the Phase I RI (Atlantic, 1992) and the FFS (Atlantic, 1994b). The results of the RI and FFS suggested that a removal action should be completed to address the tank and associated contamination. An Action Memorandum was prepared, and a TCRA was completed by OHM Remediation Services Corporation (OHM) in January 1995. The tank, 318 tons (200 cubic yards) of lead-contaminated soil, contaminated pavement, and the tank contents were removed and disposed off-site (OHM, 1995b).

The site was further evaluated during the Phase II RI (B&RE, 1997b), which included the collection and analysis of soil and groundwater samples from the site. The field investigation was conducted prior to the TCRA, but the only data evaluated during the RI were associated with sample locations not excavated during the TCRA. This approach provided an assessment of post-TCRA conditions at the site. The RI recommended that limited additional sampling be completed to verify that the remaining soil did not contain significant contaminant concentrations that would impact groundwater beneath the site. The RI also recommended that if sampling results confirmed that soil would not impact groundwater, an NFA decision document should be prepared for soil.

Based on the recommendations of the Phase II RI, CTDEEP completed additional sampling and analysis at the site in 1997. The results showed that remaining concentrations of inorganics in soil did not present a contaminant migration concern from soil to groundwater. Using these results, the Navy subsequently prepared an NFA Source Control ROD for the site that was signed in September 1997 (Navy, 1997c).

The groundwater associated with this site was further characterized as part of the BGOURI (Tetra Tech, 2002a). The objective of the RI was to further characterize the nature and extent of groundwater contamination to determine if the TCRA was successful and to quantify the risks to potential human receptors associated with groundwater at the site. Groundwater samples were collected from four existing groundwater monitoring wells, and the results indicated that residual contamination (i.e., metals in soil) from the former SASDA was impacting groundwater. Because groundwater at the site was found to be relatively acidic, it was hypothesized that the lead and other metals detected in groundwater will be mobile and migrate from the site. The data also

indicated that a source of TCE unrelated to the site is impacting Site 15 groundwater. The human health risk assessment results from the BGOURI indicated that Site 15 groundwater does not pose any significant risks to construction workers, but it does pose potential risks to hypothetical human receptors. Carcinogenic risks for future adult residents exposed to Site 15 groundwater were less than or within acceptable risk levels, but noncarcinogenic risks for future adult residents exposed to Site 15 groundwater exceeded the acceptable level of 1.0 under the RME scenario. Although not evaluated in the human health risk assessment, potential risks to future child residents resulting from exposures to groundwater would also be expected to marginally exceed acceptable risk levels. The BGOURI recommended that an FS be prepared for Site 15 groundwater to address contaminant migration issues and potential risks to hypothetical residential users associated with metals.

A DGI was completed at the site in the fall of 2002 to delineate the extent of the remaining source material and confirm the groundwater results from the BGOURI. The results of the DGI, as documented in the BGOURI Update/FS Report (Tetra Tech, 2004), showed there is no contamination remaining in soil that is acting as a source of contamination to the groundwater and there is no significant groundwater contamination at the site. The human health risk assessment and data screening results showed there are no soil or groundwater COCs for Site 15. Comparison of the Phase II RI and DGI analytical results to the BGOURI results indicate that the BGOURI results were anomalies and not representative of site conditions. The cause(s) of the anomalies may have been the field sampling methodology and/or laboratory issues. Based on the results of the DGI, it was recommended that the existing NFA ROD for Site 15 soil not be amended and that an NFA decision document be prepared for Site 15 groundwater. The Interim ROD for groundwater at Sites 3, 7, 14, 15, 18, and 20 (OU9), signed in December 2004, documented the NFA decision for Site 15 groundwater (Navy, 2004d).

Potential risks resulting from exposures to chemicals that have volatilized from groundwater and migrated through building foundations into indoor air were evaluated in a 2008 memorandum by comparing concentrations of volatile chemicals detected in groundwater to USEPA and CTDEEP screening criteria for vapor intrusion. Concentration of chloroform exceeded the USEPA screening criterion and it was further evaluated using the USEPA Johnson and Ettinger Vapor Intrusion Model. Modeling results showed that cancer risks were within USEPA and CTDEEP acceptable levels and vapor intrusion is not an issue at Site 15. As a result, NFA was selected for Site 15 in the Final OU9 ROD (Navy, 2008b). A final remedy of NFA for Site 15 was also documented in the RACR for OU9 (Tetra Tech, 2009b).

The status of Site 15 soil and groundwater is considered SC.

### **C.2.13 Site 16 - Hospital Incinerator**

Site 16 consists of two former locations where the skid-mounted hospital incinerator was reportedly operated. In the 1980s, the Naval Hospital Groton operated a skid-mounted waste incinerator at two sites adjacent to the base hospital. The two sites (16-A and 16-B) are located west of Tautog Road, adjacent to Building 449 and Building 452.

According to the FFA, the incinerator was used to destroy medical records and medical waste contaminated with pathological agents. Ash generated by the waste incinerator was transferred to dumpsters and disposed at the municipal landfill.

Site 16 was evaluated during the IAS (Envirodyne, 1983) for NSB-NLON, although no sampling activities were conducted as part of the study. The study's recommendation for this site was that no further investigation was necessary because, at the time of the IAS study, the site was still operational. As a result, no investigation of Site 16 was conducted during either the Phase I or the Phase II RIs. The Navy has subsequently ceased operations of the incinerator at the hospital.

The site was investigated during the BGOURI (Tetra Tech, 2002a) to determine the impact of the operation of the incinerator. The BGOURI focused on soil at Site 16, and surface and subsurface soil samples were collected for analysis during test boring activities. Temporary groundwater monitoring wells were to be installed and sampled during the investigation, but were not installed because no overburden groundwater was found before shallow bedrock was encountered. The depth to bedrock at Site 16 was found to be less than 3 feet below the ground surface. Additional efforts were not made to investigate the groundwater in the bedrock because of the following factors:

- The source of contamination at Site 16 was a skid-mounted incinerator, and the contaminants at the site (i.e., dioxins/furans, PCBs, and metals) are not typically mobile in the dissolved phase.
- The bedrock (granite) at NSB-NLON is relatively competent and would likely impede vertical contaminant migration. In addition, regional hydrogeologic information suggests that the depth to groundwater in the bedrock is more than 70 feet below the ground surface.

The nature and extent of contamination and human health risk assessment results from the RI indicated that past operation of the skid-mounted incinerator at Site 16 did not significantly impact the surrounding soil and that site soil does not pose significant risks to any potential human receptors (i.e., all risks were within acceptable levels). Risks to ecological receptors were not evaluated during this RI because the site does not provide suitable ecological habitat.

In addition to the sampling and analytical program, interviews were conducted during the RI to obtain historical information about the incinerator. Personnel at the Naval Groton Hospital (the Director of Records and the Regional Coordinator) and the NSB-NLON Public Works Department were contacted regarding this issue. None of the personnel could provide any historical information about the incinerator or any insight into its operation.

The results of the BGOURI did not indicate that subsequent rounds of investigation were necessary to further characterize Site 16. In addition, the results did not suggest that an FS was necessary for the site. Therefore, the BGOURI recommended that an NFA decision document be prepared for the site (Tetra Tech, 2002a). NFA was selected for Site 16 soil and was documented in the September 2004 ROD (Navy, 2004c).

The status of Site 16 is considered SC.

#### **C.2.14 Site 17 - Lower Subbase-Hazardous Materials/Solvent Storage Area (Building 31)**

Site 17 is the Former Battery Overhaul Shop (Former Building 31), which was constructed in 1917 and used as a battery shop until the mid-1950s. Battery overhaul was one of the largest submarine maintenance operations conducted at the Lower Subbase prior to use of nuclear power. Batteries from diesel-powered submarines, which contained approximately 100 batteries, were routinely serviced in the Battery Overhaul Shop at Building 31. Spent acid from the overhauled batteries was stored in a tank located at the Spent Acid Storage and Disposal Area (Site 15) (Envirodyne, 1983). When the tank was full, the spent acid was pumped into a tank trunk and placed in the Area A Landfill (Site 2).

Building 31 was used as the main hazardous/flammable materials warehouse for NSB-NLON from the 1970s to late 1990s. Materials such as sulfuric acid, methyl isobutyl ketone, potassium hydroxide, potassium tetraborate, hydrofluoric acid, and nitric acid were stored in containers of up to 55-gallon capacity. In 1992, while the concrete floor of the building was being replaced to comply with RCRA regulations, a yellow discoloration was discovered in the soil beneath the floor

slab. Analysis of soil samples revealed elevated levels of lead. As a result, the Navy prepared an Action Memorandum (HNUS, 1993) recommending a TCRA and a RD (HNUS, 1995a). The removal action included excavation, onsite solidification of soil with a total lead concentration of 500 mg/kg or greater or a TCLP leachate lead concentration of 5 mg/L or greater, onsite backfilling, and offsite disposal of impacted debris.

During subsequent investigations, Site 17 has been included in Zone 3 of the Lower Subbase, which contains Site 17 – Hazardous Materials/Solvent Storage Area (Building 31) and former subsurface fuel oil distribution lines, and steam, condensate, and electrical ducts. Zone 3 extends from Capelin Road along the southern end of Zone 2 to the southern side of Bullhead Road. The Providence and Worcester Railroad borders the eastern edge of Zone 3, and the Thames River abuts Zone 3 to the west. Because of this approach, the remainder of this section discusses information in terms of Zone 3.

The results of the Lower Subbase RI (Tetra Tech, 1999b) indicated that lead is still a concern in soil and groundwater at this site and petroleum compounds are also of concern in soil. The Lower Subbase RI recommended that Zone 3 proceed to an FS. It was recommended that the FS for this zone focus on the evaluation of alternatives that rely on institutional controls to limit exposure to contaminated soil and a tiered groundwater monitoring program to verify that significant contaminant migration is not occurring. It was also recommended that “hot spot” removal actions for the lead contamination and cleaning and repair of the Zone 3 storm sewer system be evaluated during the FS. The ecological risk assessment for the Thames River adjacent to Zone 3 showed that risks to ecological receptors in sediment adjacent to Zone 3 are relatively low and lead is not a significant threat to ecological receptors.

Building 31 was demolished in 2001. The building's foundation and floor slab were not disturbed during the demolition. Building 78, which was located adjacent to Building 31, was demolished in 2005, and a parking lot was constructed in the area formerly occupied by Buildings 31 and 78. Three inches of asphalt were placed over the Building 31 floor slab, which covered the solidified waste material and contaminated soil remaining at Site 17, to make the parking lot.

The Lower Subbase FS was prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subbase sites. The final Lower Subbase FS was issued in December 2010 (Tetra Tech, 2010g) and a Soil and Groundwater PDI Completion Report and FS Addendum (Tetra Tech, 2012a) were issued in January 2012. As

part of the Soil PDI, the invert elevations of selected storm sewer manholes and catch basins in Zone 3 were surveyed to determine which storm sewers pass through contaminated soil and may contribute to contaminant migration.

The remedy for Zone 3 soil was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, benzo(a)anthracene was detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria and lead was detected in soil at concentrations that exceed CT Residential and Industrial/Commercial Direct Exposure Criteria. The remedial alternative identified in the ROD is LUCs and monitoring. The LUC components will include restricting residential land use, restricting disturbance of contaminated soil, and maintaining a protective cover layer to provide CERCLA risk-based engineering controls and CTDEEP engineered controls. A LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

TPH was not included in the FS Addendum evaluations and alternatives for Zone 3 (Site 17) because TPH was not commingled with CERCLA contaminants. TPH contamination at Zone 3 (Site 17) will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP RSRs.

The current site closeout phase of Zone 3 (Site 17) is RD and LUC RD (see Table 1-2).

#### **C.2.15 Site 18 - Solvent Storage Area (Building 33)**

Site 18 consists of Building 33, which is located east of Grayback Avenue. Several 55-gallon drums containing solvents such as TCE and dichloroethene and some gas cylinders were stored in Building 33 (USEPA, 1995). The solvent storage area was identified during the IAS (Envirodyne, 1983) for NSB-NLON. The site was identified as Study Area F in the FFA and is now identified as ER Program Site 18.

No sampling activities were conducted at Site 18 prior to the BGOURI (Tetra Tech, 2002a). During the BGOURI, both soil and groundwater samples were collected at Site 18 to perform an initial characterization of the nature and extent of contamination at the site. Another objective of the RI was to quantify the risks to human receptors associated with the site. Ecological risks associated with the site were not evaluated because a majority of the site consists of a building and paved parking lot, which do not represent viable habitat.

The nature and extent of contamination and human health risk assessment results from the RI indicated that past storage of solvents at Building 33 did not significantly impact the surrounding

media and the site does not pose significant risks to any potential human receptors. No significant concentrations of contaminants were detected in groundwater at Site 18. All carcinogenic risks from exposure to soil at Site 18 were less than or within acceptable risk levels, and all noncarcinogenic risks were less than the acceptable level of 1.0.

The results of the BGOURI did not indicate that subsequent rounds of investigation were necessary to further characterize the site. In addition, the results did not suggest that an FS was necessary for the site. Therefore, the RI recommended that an NFA decision document be prepared for this site. Separate RODs for Site 18 soil and groundwater (Navy, 2004c and 2004d) were prepared to document the NFA decisions. The ROD for Site 18 soil was signed in September 2004. The selected NFA remedy for groundwater at Site 18 was documented in the Interim ROD for groundwater at Sites 3, 7, 14, 15, 18, and 20 (OU9) signed in December 2004. No VOCs were detected in groundwater samples collected at Site 18 during the BGOURI, indicating that vapor intrusion is not a concern at Site 18. As a result, NFA was selected for Site 18 in the Final OU9 ROD (Navy, 2008b). A final remedy of NFA for Site 18 was also documented in the RACR for OU9 (Tetra Tech, 2009b).

The status of Site 18 soil and groundwater is considered SC.

#### **C.2.16 Site 19 - Lower Subbase-Solvent Storage Area (Building 316)**

Site 19 (Former Solvent Storage Area) includes former Building 316, which was located south of the gate valve building (Building 332). Various solvents used for equipment cleaning were stored in Building 316 until approximately 10 years ago. The roof and doors of Building 316 were recently demolished leaving only the side walls. Solvents are no longer stored in this facility.

Historical investigations of Zone 4, which includes Sites 13 and 19, are presented in the Site 13 discussion. No major contamination was found at Site 19.

The Lower Subbase FS and FS Addendum were prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subbase sites (see Site 13 discussion). No major contamination was found at Site 19 and the site is outside the Zone 4 residential LUC boundary identified in the Lower Subbase FS Addendum, indicating no unacceptable risks were associated with the site. The remedy for Zone 4 (including Site 19) soil was selected in the OU4 ROD which was finalized in August 2012.

The current site closeout phase of Site 19 is RD (see Table 1-2). No site closeout milestones have been completed.

### **C.2.17 Site 20 - Area A Weapons Center**

Site 20 is the Area A Weapons Center, located north of the terminus of Triton Road, adjacent to the Area A Wetland. Site 20 is currently a high-security, restricted access area which consists of Building 524 and the southern bunker area, which is located southeast and downhill from Building 524. Building 524 was historically used for administration, minor torpedo assembly, and storage of simulator torpedoes. Currently, the bunkers are used for storage of live and simulator torpedoes and missiles. No weapons production takes place in this building. Chemicals and chemical wastes, including cleaning and lubricating compounds, paints, adhesives, and liquid fuels, were stored in 1- to 5-gallon containers in seven metal storage cabinets located on a paved area south of the building. Many of these materials are classified as corrosive or flammable. Building 524 was constructed in 1990 and 1991. Prior to construction, the area was primarily woodlands. Portions of the site were blasted to remove bedrock during construction.

The northern and southern weapons storage bunkers are located southeast of Building 524. The southern bunkers are first evident in photographs from 1969, and the northern area bunker is evident in photographs from 1974. Weapons containing liquid fuels such as Otto fuel, JP-10, and TH-Dimer (jet rocket fuel), are stored in these bunkers. Routine maintenance and security improvements planned for the Area A Weapons Center include grouting and waterproofing of bunkers, repaving of roads, regrading, and culvert installation.

This site was investigated during the Phase II RI (B&RE, 1997b), and it was found that minimal contamination of surface water and groundwater exists and that the potential for substantial contaminant transport is low. Therefore, limited action was recommended for this site in the Phase II RI. Although Building 524 is part of Site 20, an RA in this area is not expected because no impacted soil or sediment has been identified.

A ROD was signed for the soil and sediment OU associated with Site 20 in June 2000 (Navy, 2000). A small (less than 200 cubic yards) RA-C was conducted at the site in 2001 to address PAH and arsenic contamination in soil and sediment. The action was intended to mitigate direct exposures to soil and sediment and involved the excavation of soil and sediment with contaminant concentrations exceeding cleanup levels. Confirmatory soil and sediment samples were collected from the bottom and sidewalls of the excavation. Following verification of contaminated soil removal, the excavations were backfilled with clean soil, drainage swales were regraded, and

disturbed asphalt was replaced (FWEC, 2002b). Based on the results of the RA at Site 20, the RC milestone has been achieved and the status of site soil is SC (see Table 1-1).

The groundwater at Site 20 was further characterized during the BGOURI (Tetra Tech, 2002a). The objective of the investigation was to further characterize the nature and extent of groundwater contamination and to quantify the risks to human receptors from groundwater contamination. In general, organic and inorganic contaminants were detected infrequently and at low concentrations in groundwater at Site 20. TCE and benzo(a)pyrene were the only organic contaminants identified as significant contaminants in groundwater. Metals detected at significant concentrations in groundwater included antimony, arsenic, nickel, silver, thallium, and zinc. High levels of total suspended solids and total dissolved solids in one sample may be the reason for the elevated concentrations of two of the metals. All the organic and inorganic contaminants were identified in samples from overburden monitoring wells.

The human health risk assessment determined that risks posed by exposure of construction workers to maximum observed concentrations of site contaminants in groundwater at Site 20 are less than acceptable levels. The human health risk assessment also evaluated future residential groundwater usage, and calculated risks were greater than acceptable levels based on exposure to maximum contaminant concentrations. Even though contaminant concentrations were generally low and risks were acceptable under the current land use scenario, the RI recommended that an FS be prepared for the groundwater associated with Site 20.

Prior to proceeding to an FS for the groundwater, a DGI was conducted at Site 20 to confirm the groundwater results of the BGOURI. The results of the DGI were presented in the BGOURI Update/FS (Tetra Tech, 2004) and showed there is no significant contamination in Site 20 groundwater and there are no significant risks to human health associated with exposure to Site 20 groundwater. The BGOURI Update recommended that an FS not be prepared for Site 20 groundwater and an NFA decision document be prepared for the groundwater. The Interim ROD for OU9, signed in December 2004, documented the NFA decision for Site 20 groundwater (Navy, 2004d).

Potential risks resulting from exposures to chemicals that have volatilized from groundwater and migrated through building foundations into indoor air were evaluated in a 2008 memorandum by comparing concentrations of volatile chemicals detected in groundwater to USEPA and CTDEP screening criteria for vapor intrusion. Concentrations of TCE exceeded the USEPA screening

criterion and it was further evaluated using the USEPA Johnson and Ettinger Vapor Intrusion Model. Modeling results showed that cancer risks were within USEPA and CTDEP acceptable levels and vapor intrusion is not an issue at Site 20. As a result, NFA was selected for Site 20 groundwater in the Final OU9 ROD (Navy, 2008b). A final remedy of NFA for Site 20 groundwater was also documented in the RACR for OU9 (Tetra Tech, 2009b). The status of Site 20 groundwater is considered SC (see Table 1-1). A RACR for Site 20 soil and sediment as part of OU 7 are currently being developed and will be finalized in 2013.

## **C.2.18 Site 21 and Site 25 - Lower Subbase Zone 7**

### **C.2.18.1 Site 21 – Lower Subbase – Berth 16**

Site 21, Berth 16, is located at the Lower Subbase along the Thames River at the intersection of Amberjack Road and Albacore Road. The following structures (former and current uses) are included in Site 21: Building 106 (Electronics and Storage), Building 157 (Periscope Shop and Optical Shop), Building 173 (Substation and Electrical Distribution), and Buildings 456 and 478 (Maintenance Shop). Buildings 106, 157, and 173 were constructed between 1918 and 1944. Buildings 456 and 478 were constructed after the incinerator (Site 25) was demolished in 1979. Berth 16 formerly included a 250-gallon diesel fuel UST located adjacent to the northern wall of Building 157. The UST was connected to the diesel fuel transfer line that extended from the storage tank and along Pier 15, east of Building 173. The storage tank supplied the emergency generator for the sewage lift station.

Transformers, which formerly contained PCB-based oils, were located in an outdoor covered electrical vault (Vault 31) at Building 157. The Navy has since replaced these transformers with non-PCB-containing transformers and constructed secondary containment around the vault.

### **C.2.18.2 Site 25 – Lower Subbase – Classified Materials Incinerator**

Site 25 consists of the former Classified Materials Incinerator located on the Lower Subbase, approximately 300 feet east of Pier 17. Between 1944 and 1963, the incinerator, located within former Building 97, was used to burn classified materials and other wastes generated at NSB-NLON. Materials generated by base operations that were not salvageable were incinerated at Site 25. Residual ash from the incinerator was disposed in the Goss Cove Landfill. Adjacent to the incinerator was a dumpster cleaning operation. The incinerator was demolished in 1979, and Buildings 456 and 478 were constructed in the areas previously used for the dumpster cleaning operation and incinerator, respectively.

Site 21 (Berth 16), Site 25 (Classified Materials Incinerator), and Transformers at Building 157 Vault 31 have been investigated collectively as Zone 7. Because of this approach, the remainder of this section discusses information in terms of Zone 7. Subsurface fuel oil distribution lines were historically located in Zone 7 but have been abandoned. Subsurface steam, condensate, and electrical ducts are located within Zone 7. A former septic tank with a leaching field serviced Building 173. The exact locations of the former septic tank and leaching field have not been verified.

The area was investigated during the Pier 33 and Berth 16/Former Incinerator Site Investigation (Atlantic, 1995a) and the Lower Subbase RI (Tetra Tech, 1999b). Soil, groundwater, and sediment sampling (in the adjacent Thames River) and analysis were conducted at this site during the Lower Subbase RI.

An area of lead contamination was identified in shallow and deep soil in Zone 7. TPH contamination was also identified in two general areas. Two areas of lead contamination were identified in Zone 7 groundwater. The human health risk assessment indicated potential risks to receptors from exposure to contaminated site media. The ecological risk assessment for the Thames River (sediment and surface water) adjacent to Zone 7 indicated that risks to ecological receptors were low to moderate. The evaluation indicated that there were potential risks to sediment-dwelling organisms from contaminants near Pier 17 but not near Pier 15. However, most of the sediment near Piers 15 and 17 was subsequently dredged, making interpretation of the results from historical studies difficult.

The Lower Subbase RI Report (Tetra Tech, 1999b) recommended additional characterization of the sediment in the Thames River to provide the data necessary to refine the ecological risk assessment prior to proceeding to an FS. The RI also recommended that Zone 7 soil and groundwater proceed to an FS for evaluation of appropriate remedial alternatives. It was recommended that the FS focus, to the extent possible, on alternatives that rely on institutional controls to limit exposure to contaminated soil and passive and/or in-situ remedial alternatives. In addition, it was recommended that the FS evaluate limited action scenarios for the groundwater and storm sewer system of Zone 7 in conjunction with the soil remedial alternatives.

Additional investigations of Thames River sediment included sampling and ecological risk evaluations for Zones 4 and 7 and Pier 1 (Battelle, 2003; 2004a; 2004b; 2007; 2008a). Based on

the results of the 2008 Validation Study, no footprint at Zone 7 was determined for evaluation in the FS because no areas of sediment had unacceptable ecological risk (Battelle, 2008b).

The Lower Subbase FS was prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subbase sites. The final Lower Subbase FS was issued in December 2010 (Tetra Tech, 2010g) and a Soil and Groundwater PDI Completion Report and FS Addendum (Tetra Tech, 2012a) were issued in January 2012. As part of the Soil PDI, the invert elevations of selected storm sewer manholes and catch basins in Site 21 were surveyed to determine which storm sewers pass through contaminated soil and may contribute to contaminant migration. All Zone 7 copper and lead concentrations detected during the Groundwater PDI were less than their respective criteria; therefore, further investigation for these metals in Zone 7 groundwater was not warranted. Regarding arsenic in Zone 7 groundwater, the low frequency of criterion exceedance (one of six) and the fact that the exceedance was only marginally greater than the criterion, further investigation of arsenic in Zone 7 groundwater was not warranted.

The remedy for Zone 7 soil was selected in the OU4 ROD which was finalized in August 2012. As reported in the ROD, PAHs and arsenic were detected in soil at concentrations that exceed CT Residential Direct Exposure Criteria and lead was detected in soil at concentrations that exceed CT Residential and Industrial/Commercial Direct Exposure Criteria. Additionally, antimony, copper, and hexavalent chromium were detected in soil at concentrations that exceed residential Human Health Risk Assessment (HHRA) values provided in the ROD. The remedial alternative identified in the ROD is LUCs and monitoring. The LUC components will include restricting residential land use, restricting disturbance of contaminated soil, and maintaining a protective cover layer to provide CERCLA risk-based engineering controls and CTDEEP engineered controls. A LUC RD and monitoring program are expected to be developed in 2012 and finalized in 2013.

TPH was not included in the FS Addendum evaluations and alternatives for Zone 7 because TPH was not commingled with CERCLA contaminants. TPH contamination at Zone 7 will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP RSRs.

The current site closeout phase of Site 21 and Site 25 (Zone 7) is RD and LUC RD (see Table 1-2).

#### **C.2.19 Site 22 - Lower Subbase - Pier 33**

Site 22 is located at the Lower Subbase along the Thames River and includes Pier 33, Building 175, and approximately 400 linear feet of additional riverfront property adjacent to these two structures.

Building 175 was originally used to house several above-ground battery acid (sulfuric acid) storage tanks (Atlantic, 1995a). Transfer lines from the battery acid storage tanks extended in trenches along Amberjack Road to the piers. The Navy removed the above-ground storage tanks and associated transfer piping and there are no known or reported spills from the storage tanks or transfer system. Building 175 is currently used for miscellaneous storage and administrative purposes. No underground steam or fuel-oil utilities service Building 175.

A 1,000-gallon UST was located adjacent to the southern side of Building 175. The UST was removed and replaced by a new 1,500-gallon above-ground storage tank. A 250-gallon, diesel fuel UST was located adjacent to the northern side of Building 175. This UST was removed and replaced with a 550-gallon above-ground storage tank. All current storage tanks are monitored and inspected per the requirements of the Subbase Integrated Contingency Plan.

Zone 5 consists of Site 22. The area was investigated during the Pier 33 and Berth 16/Former Incinerator Site Investigation (Atlantic, 1995a) and the Lower Subbase RI (Tetra Tech, 1999b). Additional soil, groundwater, and sediment sampling (in the adjacent Thames River) were conducted at this zone in conjunction with the Lower Subbase RI. Petroleum compounds and lead were identified as the primary COCs for this site. The petroleum contamination appears to be from a UST formerly located at the site. The lead contamination, detected in sediment collected from a catch basin between Zones 5 and 6, appears to be related to the storage of lead ballast in this area and to surface water runoff. The ecological risk assessment for the Thames River adjacent to Zone 5 indicated that risks to ecological receptors in this area are relatively low.

The Lower Subbase RI Report (Tetra Tech, 1999b) recommended that Zone 5 proceed to an FS to evaluate appropriate remedial alternatives. It was recommended that the FS for this zone focus, to the extent possible, on alternatives that rely on institutional controls to limit exposure to contaminated soil and passive and/or in-situ remedial alternatives. In addition, it was recommended that the FS evaluate limited action scenarios for the groundwater and storm sewer system of Zone 5, in conjunction with the soil remedial alternatives. The scenario for the groundwater should include a combination of monitored natural attenuation and a tiered groundwater monitoring program.

The Lower Subbase FS was prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subbase sites. The final

Lower Subbase FS was issued in December 2010 (Tetra Tech, 2010g) and a Soil and Groundwater PDI Completion Report and FS Addendum (Tetra Tech, 2012a) were issued in January 2012. At Site 22, arsenic, copper, and lead concentrations detected during the Groundwater PDI were much less than their respective criteria; therefore, groundwater remediation is not required for CERCLA contaminants at Site 22.

The remedy for Zone 5 (Site 22) soil was selected in the OU4 ROD which was finalized in August 2012. The ROD indicates that NFA (under CERCLA) will be applicable for Zone 5 (Site 22).

TPH was not included in the FS Addendum evaluations and alternatives for Site 22 because TPH was not commingled with CERCLA contaminants. TPH contamination at Site 22 will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP RSRs.

The current site closeout phase of Site 22 is SC (see Table 1-2).

### **C.2.20 Site 23 - Fuel Farm**

In the early 1940s, Crystal Lake was drained and dredged to allow for construction of the nine concrete USTs. When construction was complete, the former lake bed was reportedly filled with soil excavated from a small hill west of Site 23 and graded to create a level surface for development at NSB-NLON. The Fuel Farm features include the following:

- Nine former 110-foot-diameter, 11-foot-high USTs (OT-1 to OT-9)
- A 30,000-gallon, double-walled UST (OT-10)
- An oil/water separator (at OT-10)
- A 10,000-gallon waste oil tank (at OT-10)
- A fuel oil loading area adjacent to Building 482
- A tanker truck dumping pad and trough (at OT-10)
- Associated UST piping systems
- Buildings 310, 322, O-831, 445, and 461
- An partially abandoned air sparging (AS)/soil vapor extraction (SVE) facility for the Naval Exchange (NEX) service station

- Two 150,000-gallon diesel above-ground storage tanks
- Six baseball/recreational fields and a number of parking areas are located on top of the Fuel Farm

Tanks OT-1 through OT-9 have been demolished and closed in place. Tank OT-10 was installed in 1990. A number of petroleum releases were documented by the Navy in the vicinity of the Fuel Farm at NSB-NLON. Investigations of the Fuel Farm conducted from 1989 through 1999 detected evidence of releases of petroleum products from these tanks and their associated piping and, possibly, from other nearby sources. Both soil contamination and free-product were identified at Site 23 during the investigations. Petroleum hydrocarbons have been detected periodically at the outfall of the Fuel Farm storm sewer system.

Site 23 was further characterized during the BGOURI in 2000 (Tetra Tech, 2002a). The human health risk assessment did not identify any significant risks to receptors from exposure to groundwater. The RI recommended postponing any decisions on the groundwater at Site 23 until a sufficient amount of data was available from the groundwater collection system monitoring program. The Site 23 underdrain metering pit was sampled after construction and quarterly for a period of 1 year starting in June 2007 (Tetra Tech, 2008d). All relevant concentrations were less than established Connecticut criteria (with the exception of some anomalous results). Based on results less than criteria, Site 23 groundwater (including Site 9 groundwater) being collected and conveyed in the storm sewer system does not pose a significant threat to human health or the environment under the current land use scenario; however, risks would be unacceptable if groundwater at the site was used as a drinking water supply (Navy, 2008b). In the four rounds of Year 2 monitoring, no contaminants were detected at concentrations greater than any established Connecticut criteria (surface water protection, residential volatilization, or stormwater discharge permit criteria). The Year 2 monitoring report recommended no additional monitoring at Site 23 (ECC, 2009h).

Concentrations of chloroform and TCE in groundwater exceeded the USEPA screening criterion at Sites 23. Chloroform and TCE were further evaluated against Applicable or Relevant and Appropriate Requirements (ARARs) showed that vapor intrusion is not an issue at Site 23. NFA was indicated for vapor intrusion issues (Navy, 2008b).

Based on the Final ROD for OU9, an RD for LUCs on Basewide Groundwater OU9 was prepared. The Site 23 underdrain metering pit was sampled after construction and quarterly for a period of 1

year starting in June 2007 (Tetra Tech, 2008d). The metering pit collects groundwater from the Site 23 area underdrains from four former tanks. As reported in the LUC RD for OU 9 (Tetra Tech 2010b) all relevant concentrations were less than established Connecticut criteria (with the exception of anomalous results as discussed the Final ROD). Based on these results, as reported in SOPA 5090.25 (Navy, 2009b) Site 23 groundwater (including Site 9 groundwater) being collected and conveyed in the storm sewer system does not pose a significant threat to human health or the environment under the current (not-potable) use scenario; however, risks would be unacceptable if groundwater at the site was used as a drinking water supply. Therefore, LUCs at Site 23 are to prevent the withdrawal and/or use of groundwater for potable water purposes until concentrations in groundwater meet criteria acceptable for unrestricted use and unlimited exposure and ensure that groundwater extracted during construction dewatering activities is properly handled, stored, and disposed (Tetra Tech, 2009e). The RACR for OU9 was prepared to document completion of site remedies and LUCs at OU9, including Site 23 (Tetra Tech, 2009b).

As indicated in Table 1-2, the status of Site 23 groundwater is RIP. LUC inspections and five-year reviews are planned for Site 23 until groundwater meets criteria for unrestricted use and unlimited exposure; therefore, the current phase is LTMgt. As reported in the RACR for OU 9 (Tetra Tech 2009b) the soil at Site 23 was investigated and remediated under the CTDEP RCRA UST Program; therefore, no decision documents have been prepared for the soil at Site 23. Site Assessment Screening Evaluation (SASEs) for Sites 9 and 23, which include an assessment of soil compliance are, are currently being developed and will be finalized in 2013. The O&M Manual is expected to be revised in 2012 to include Site 23 monitoring requirements.

#### **C.2.21 Site 24 - Lower Subbase-Central Paint Accumulation Area (Building 174)**

Site 24 - Central Paint Accumulation Area (Building 174) is located in the northern section of the Lower Subbase along the Thames River, immediately east of Pier 32.

Building 174 was used as the primary storage facility for paints used in boat maintenance. In 1982, Building 174 was refitted to allow boat anchor sandblasting and other paint activities (USEPA, 1995).

For investigation purposes, Site 24 and the surrounding area were identified as Zone 6 during the Lower Subbase RI (Tetra Tech, 1999b). Because of this approach, the remainder of this section discusses information in terms of Zone 6.

Petroleum compounds (TPH and PAHs) and several inorganics were identified as COCs for this zone. The source(s) of the TPH and PAHs is not known. Lead contamination detected in sediment collected from a catch basin between Zones 5 and 6 appears to be related to the storage of lead ballast in this area and to surface water runoff. The ecological risk assessment for the Thames River adjacent to Zone 6 indicated that risks to ecological receptors in this area are relatively low.

The Lower Subbase RI Report (Tetra Tech, 1999b) recommended that Zone 6 proceed to an FS to evaluate appropriate remedial alternatives. It was recommended that the FS for this zone focus, to the extent possible, on alternatives that rely on institutional controls to limit exposure to contaminated soil and passive and/or in-situ remedial alternatives. It was also recommended that the FS evaluate limited action scenarios for the groundwater and storm sewer system of Zone 6, in conjunction with the soil remedial alternatives. A tiered groundwater monitoring program was also recommended for evaluation during the FS.

The Lower Subbase FS was prepared to develop and evaluate appropriate remedial alternatives for potentially impacted media (soil, groundwater, and sediment) at the Lower Subbase sites. The final Lower Subbase FS was issued in December 2010 (Tetra Tech, 2010g) and a Soil and Groundwater PDI Completion Report and FS Addendum (Tetra Tech, 2012a) were issued in January 2012. The remedy for Zone 6 (Site 24) soil was selected in the OU4 ROD which was finalized in August 2012. The ROD indicates that NFA (under CERCLA) will be applicable for Zone 6 (Site 24).

TPH was not included in the FS Addendum evaluations and alternatives for Zone 6 (Site 24) because TPH was not commingled with CERCLA contaminants. TPH contamination at Site 24 will be evaluated in a Corrective Action Plan that is currently being developed to meet CTDEEP RSRs.

The current site closeout phase of Site 24 is SC (see Table 1-2).

#### **C.2.22 Site 25 - Lower Subbase Zone 7**

Please refer to Section 2.2.11 - Site 21 and Site 25 - Lower Subbase Zone 7.

## **Appendix D**

### **Summary and Detailed Schedules**







2012 SMP SCHEDULE - MILESTONES  
NSB-NLON, GROTON, CONNECTICUT

ID	Task Name	Duration	Start	Finish	% Complete	Predecessors	Resource Names	1997		1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017	
								H1	H2																																								
140	RD	0 days	Fri 5/14/99	Fri 5/14/99	100%																																												
141	FINAL RD WORK PLAN	0 days	Fri 5/14/99	Fri 5/14/99	100%		A/E,NAVY																																										
142	RA	1345 days	Tue 2/13/01	Wed 10/20/04	100%																																												
143	FINAL RA COMPLETION REPORT	0 days	Tue 2/13/01	Tue 2/13/01	100%		A/E,NAVY																																										
144	YEAR 1 SITE RESTORATION MONITORING	0 days	Thu 11/21/02	Thu 11/21/02	100%		A/E,NAVY																																										
145	YEAR 2 SITE RESTORATION MONITORING	0 days	Fri 6/27/03	Fri 6/27/03	100%		A/E,NAVY																																										
146	YEAR 3 SITE RESTORATION MONITORING	0 days	Wed 10/20/04	Wed 10/20/04	100%		A/E,NAVY																																										
147	LONG-TERM MANAGEMENT	1232 days	Tue 12/15/09	Wed 5/1/13	0%																																												
148	OPERATION AND MAINTENANCE	1232 days	Tue 12/15/09	Wed 5/1/13	0%																																												
149	YEAR 1 (2009) O&M/LUC INSPECTION REPORT	0 days	Tue 12/15/09	Tue 12/15/09	100%		A/E,NAVY																																										
150	YEAR 2 (2010) O&M/LUC INSPECTION REPORT	0 days	Sat 1/1/11	Sat 1/1/11	100%		A/E,NAVY																																										
151	O&M MANUAL UPDATE NO. 2	0 days	Fri 7/15/11	Fri 7/15/11	0%		A/E,NAVY																																										
153	YEAR 3 (2011) O&M/LUC INSPECTION REPORT	0 days	Sun 7/1/12	Sun 7/1/12	0%		A/E,NAVY																																										
154	YEAR 4 (2012) O&M/LUC INSPECTION REPORT	0 days	Wed 5/1/13	Wed 5/1/13	0%		A/E,NAVY																																										
155	SITE 3 - NSA SOIL (OU3)	123 days	Fri 7/16/04	Tue 11/16/04	100%																																												
156	PROPOSED PLAN/ROD	123 days	Fri 7/16/04	Tue 11/16/04	100%																																												
157	FINAL PROPOSED PLAN	0 days	Fri 7/16/04	Fri 7/16/04	100%		A/E,NAVY																																										
158	FINAL ROD	0 days	Tue 11/16/04	Tue 11/16/04	100%		A/E,NAVY																																										
159	SITE 3 - GROUNDWATER (OU9)	3142 days	Wed 9/22/04	Wed 5/1/13	4%																																												
160	INTERIM PROPOSED PLAN/ROD	72 days	Wed 9/22/04	Fri 12/3/04	100%																																												
161	FINAL INTERIM PROPOSED PLAN	0 days	Wed 9/22/04	Wed 9/22/04	100%		A/E,NAVY																																										
162	FINAL INTERIM ROD	0 days	Fri 12/3/04	Fri 12/3/04	100%		A/E,NAVY																																										
163	INTERIM RD	49 days	Thu 1/26/06	Thu 3/16/06	100%																																												
164	FINAL GMP	0 days	Thu 1/26/06	Thu 1/26/06	100%		A/E,NAVY																																										
165	FINAL RD WORK PLAN	0 days	Thu 3/16/06	Thu 3/16/06	100%		A/E,NAVY																																										
166	INTERIM RA	471 days	Wed 5/17/06	Fri 8/31/07	100%																																												
167	REMEDIAL ACTION	0 days	Wed 5/17/06	Wed 5/17/06	100%		NAVY																																										
168	FINAL RA COMPLETION REPORT	0 days	Fri 8/31/07	Fri 8/31/07	100%		A/E,NAVY																																										
169	FINAL PROPOSED PLAN/ROD	105 days	Fri 6/13/08	Fri 9/26/08	100%																																												
170	FINAL PROPOSED PLAN	0 days	Fri 6/13/08	Fri 6/13/08	100%		A/E,NAVY																																										
171	FINAL ROD	0 days	Fri 9/26/08	Fri 9/26/08	100%		A/E,NAVY																																										
172	FINAL RD	960 days	Wed 11/26/08	Fri 7/15/11	0%																																												
173	DRAFT GMP	0 days	Wed 11/26/08	Wed 11/26/08	100%		A/E,NAVY																																										
174	FINAL GMP (O&M Volume 2)	0 days	Fri 7/15/11	Fri 7/15/11	0%		A/E,NAVY																																										
175	DRAFT LUC RD	0 days	Fri 1/16/09	Fri 1/16/09	100%		A/E,NAVY																																										
176	FINAL LUC RD	0 days	Tue 11/17/09	Tue 11/17/09	100%	175	A/E,NAVY																																										
177	FINAL RA	27 days	Thu 5/27/10	Tue 6/22/10	100%																																												
179	FINAL RA COMPLETION REPORT	0 days	Tue 6/22/10	Tue 6/22/10	100%	178	A/E,NAVY																																										
180	LONG-TERM MANAGEMENT	2667 days	Tue 1/10/06	Wed 5/1/13	2%																																												
181	GROUNDWATER MONITORING	2058 days	Wed 9/12/07	Wed 5/1/13	0%		</																																										



















