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PROPOSED PLAN FOR SEDIMENT AT AREA A WETLAND SITE 2B OPERABLE UNIT 12 (OU 12) NSB NEW LONDON CT

06/01/2010

NAVFAC MID ATLANTIC

Naval Submarine Base - New London

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

Introduction

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

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

The Cleanup Proposal...

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

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

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

What Do You Think?

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

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

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

Learn More About the Proposed Plan

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

Public Meeting and Hearing

Public Meeting

Meeting: 6:30 pm

Hearing: 7:00 pm

Date: June 17, 2010

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

Introduction (continued)

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

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

Site Background

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

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

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

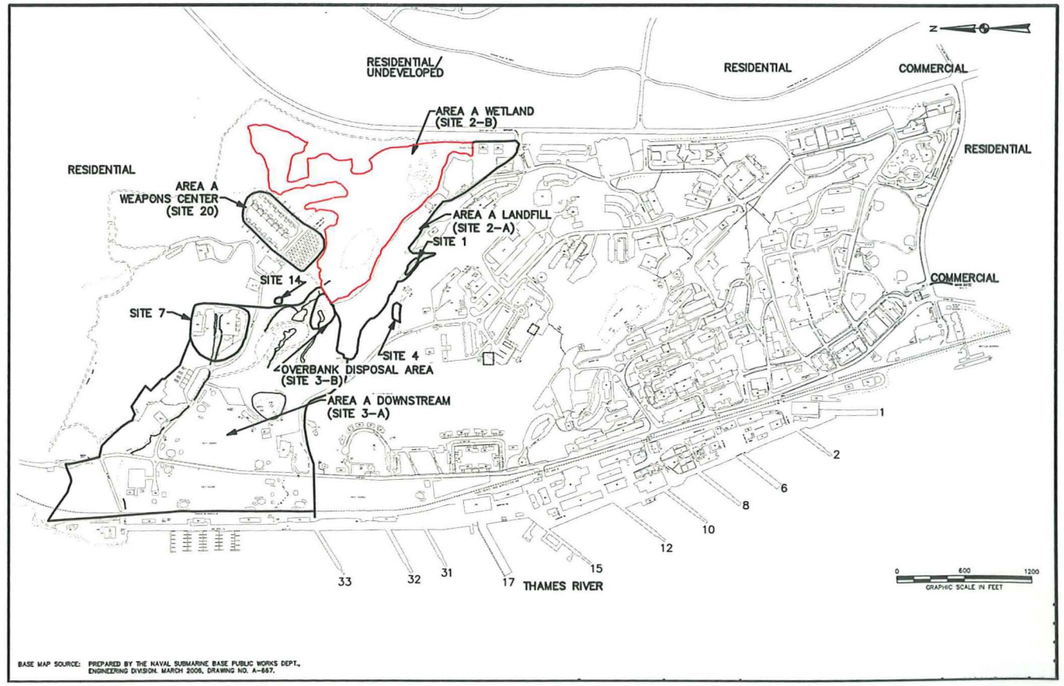

Figure 1. Site Location Map

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

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

Site Characteristics

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

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

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

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

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

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

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

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

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

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

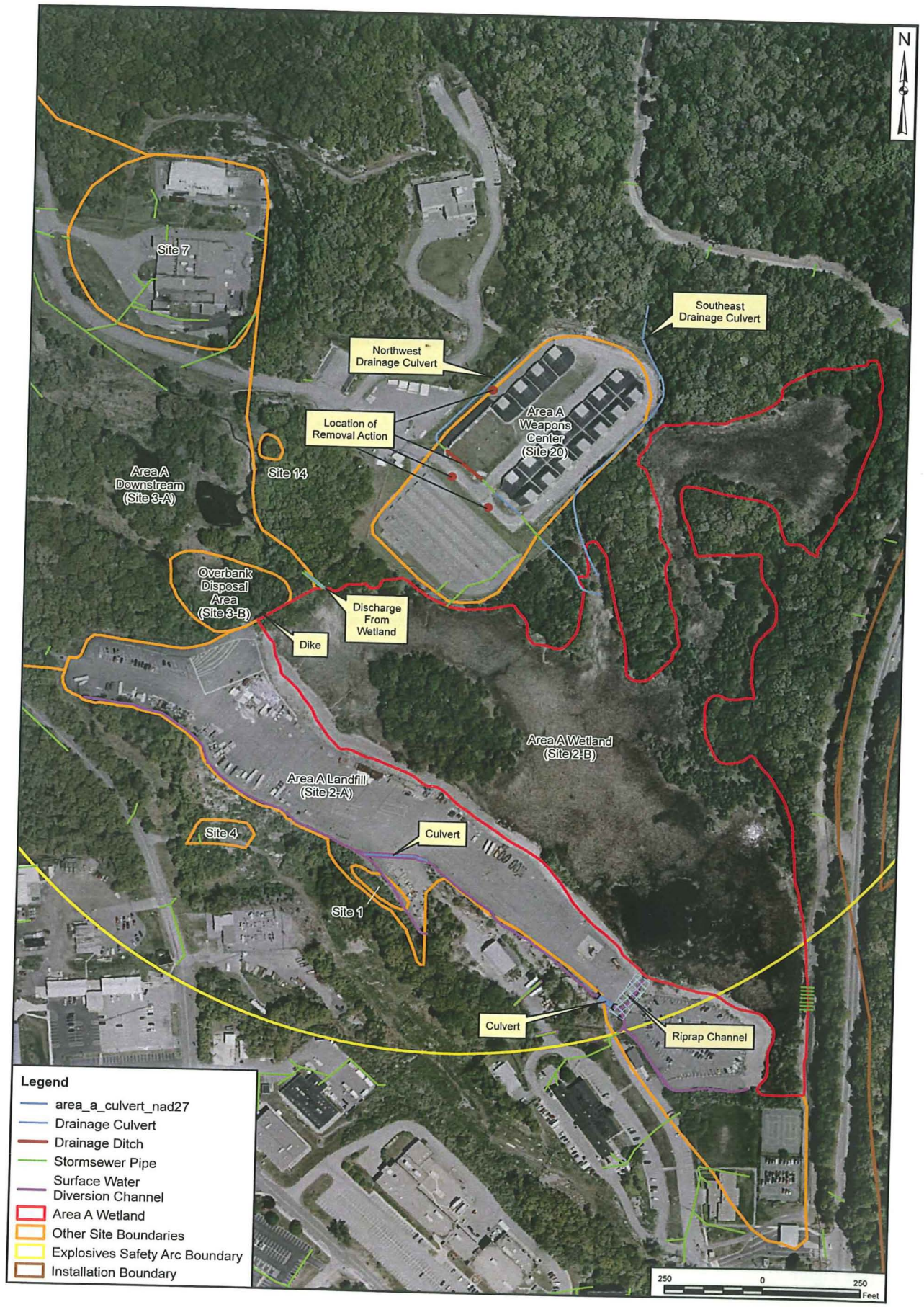

Figure 2. Surface Features

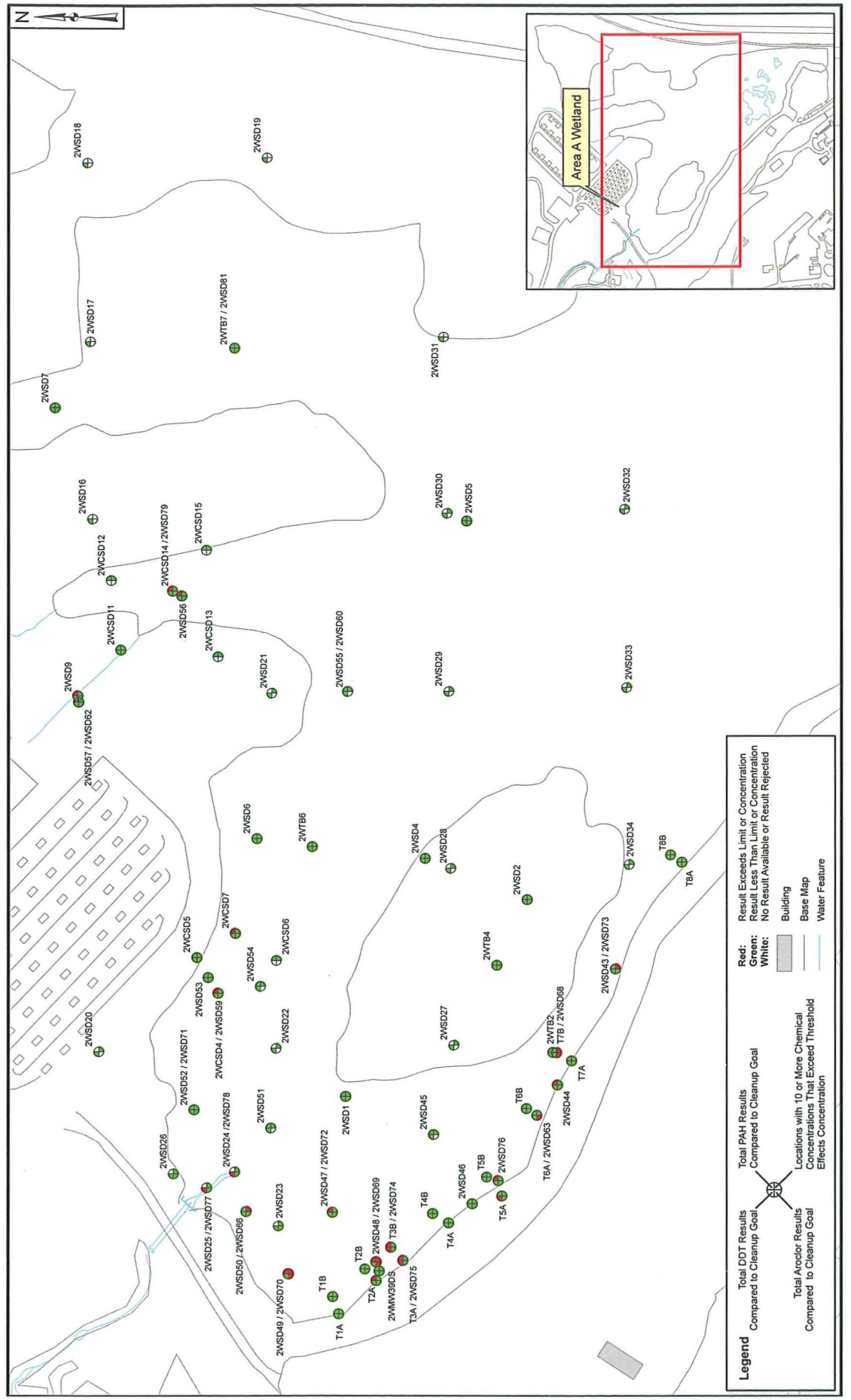

Figure 3. Summary of PRG Exceedances

Scope and Role of Response Action

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

Summary of Site Risks

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

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

Project Team in Area A Wetland

Area A Wetland Facing Northwest

How are Human Health Risks Evaluated?

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

Step 1: Analyze **Contamination**

Step 2: Estimate Exposure

Step 3: Assess Potential Health Dangers

Step 4: Characterize Site Risk

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

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

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

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

Human Health Risks

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

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

How are Ecological Risks Evaluated?

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

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

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

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

Step 4. Study Design and Data Quality Objectives

Step 5. Field Verification of Sampling Design

Step 6. Site Investigation and Analysis of Exposure and Effects

Step 7. Risk Characterization

Step 8. Risk Management

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

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

Ecological Risks

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

Remedial Action Objectives

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

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

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

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

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

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

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

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

Summary of Remedial Alternatives

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

Alternative 1 – No Action

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

Estimated Capital Cost: $0

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

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

Alternative 2 – Soil Cover, Wetlands Mitigation, and LUCs

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

Estimated Capital Cost: $1,672,440

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

Estimated NPW Cost: $2,103,580

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

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

Estimated Capital Cost: $1,773,800

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

Estimated NPW Cost: $1,900,180

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

Evaluation of Alternatives

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

Evaluation Criteria for Superfund Remedial Alternatives

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

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

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

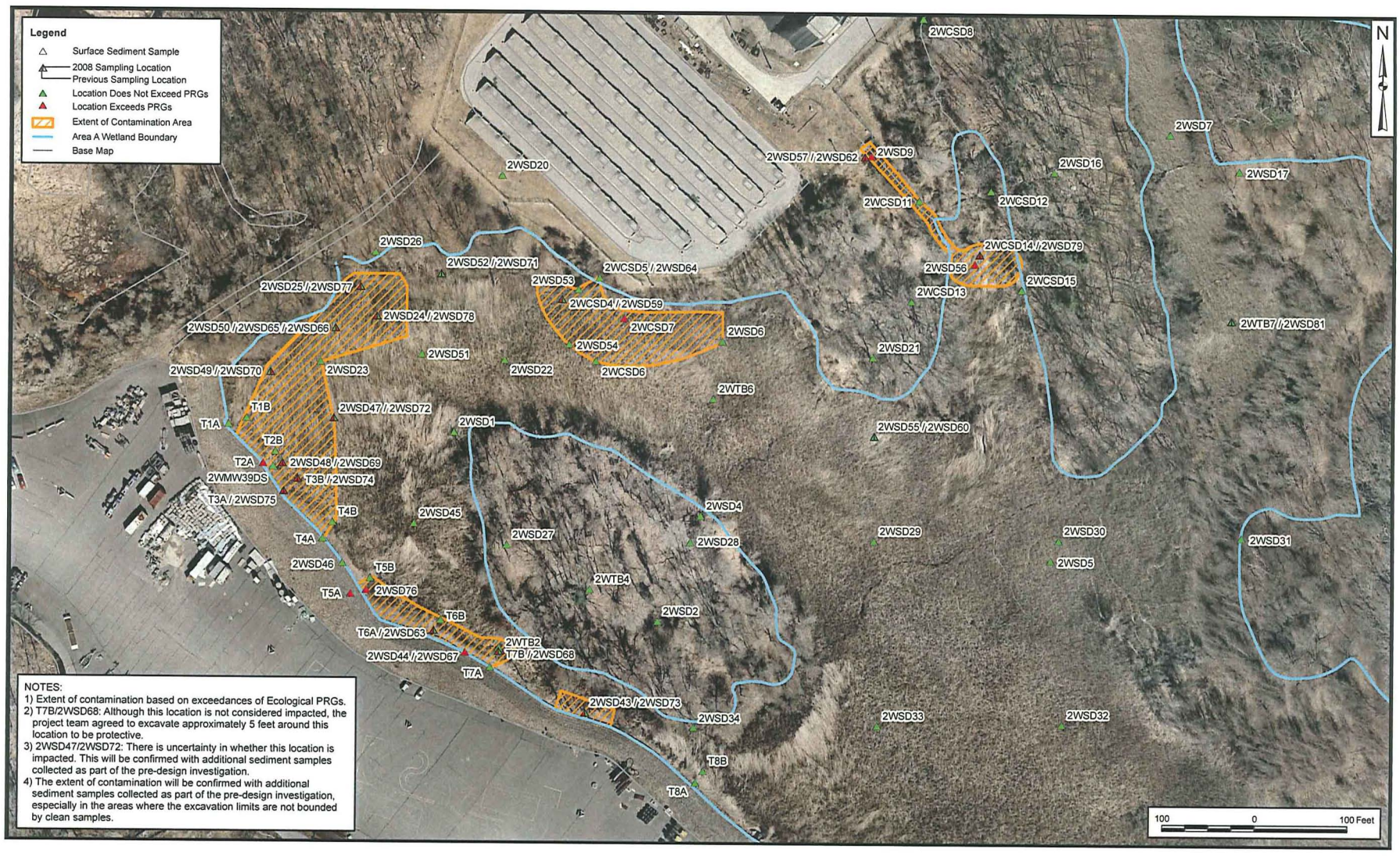

Figure 4: Impacted Area Considered In The FS

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

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

NOTES:

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

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

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

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

Preferred Alternative

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

Glossary of Technical Terms

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Total PAHs: The total concentration of the various PAH compounds.

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

The Public's Role in Alternative Selection

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

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

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

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

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

For further information, please contact:

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USE THIS SPACE TO WRITE YOUR COMMENTS

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

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

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Name _____

Address _____

City _____

State _____ Zip _____

Telephone _____

FOLD HERE

Place
Stamp
Here

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