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PROPOSED PLAN SITE 12 HARBOR DREDGE SPOIL AREA NS GREAT LAKES IL
12/17/2015
TETRA TECH, INC

Proposed Plan
Site 12 - Harbor Dredge Spoil Area
Naval Station Great Lakes
Great Lakes, Illinois

About This Document

This Proposed Plan is being presented to satisfy the statutory and regulatory requirements for public participation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Its primary intent is to help the public understand and provide input on the proposed cleanup alternatives to address impacted surface soil, subsurface soil, and groundwater at Site 12 - Harbor Dredge Spoil Area at Naval Station Great Lakes (NSGL) in Great Lakes, Illinois. The Department of the Navy (Navy), with the concurrence of Illinois Environmental Protection Agency (Illinois EPA), developed this plan to summarize the preferred remedy for this site.

The Navy, the lead agency, is accepting formal public comments on this Proposed Plan from February 1, 2016 through March 1, 2016. The Navy, with input from Illinois EPA (the support agency), will make a final remedy selection after reviewing and addressing the public comments. Therefore, the public is encouraged to review and comment on the information presented in this Proposed Plan. The final remedy has not yet been determined and could change in response to public comments or based on receipt of new information.

This Proposed Plan highlights key information from the Remedial Investigation (RI) and Feasibility Study (FS) reports. More complete information can be found in these reports, which are included in the Administrative Record available for review online at http://go.usa.gov/3SNHA. From this website, click on "Administrative Records," select "Administrative Record File", and search for "SITE 12" in the Basic Search box.

Technical terms are provided in a glossary at the end of this document.

The Proposed Plan

This Proposed Plan describes the Navy's proposed cleanup approach for Site 12 - Harbor Dredge Spoil Area at NSGL in Great Lakes, Illinois. To address contaminated surface and subsurface soil and groundwater at Site 12, the Navy, with the concurrence of Illinois EPA, proposes an alternative that will include the following components:

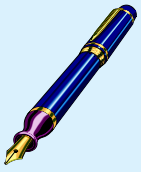
- **Land Use Controls** (LUCs) to limit access and use of property and use of groundwater.
- **Five-Year Reviews** of the remedy to ensure continued protection of human health and the environment.

Let Us Know What You Think

Public Comment Period: February 1 through March 1, 2016

You don't have to be a technical expert to comment. If you have a concern, question, suggestion, or preference, the Navy and Illinois EPA want to hear it before making a final decision on how to protect our community. The Navy, as the lead agency, is accepting formal public comments on this Proposed Plan for a 30-day period. **Send written comments postmarked/dated no later than March 1, 2016 to:**

Department of the Navy
NAVSTA Great Lakes
Attn: John Sheppard
Public Affairs Office
2601E Paul Jones Street
Great Lakes, IL 60088
Email: john.l.sheppard@navy.mil



The Navy will provide written responses to the comments in the Responsiveness Summary included as part of the final Record of Decision (ROD).

The Navy will provide an opportunity for a public meeting during the public comment period if significant interest is expressed and a formal written request is made. The public will be notified of the date, time, and location through the local news media. At the meeting, the Preferred Alternative will be discussed and questions about the recommended remedial action will be received.

Facility Description

NSGL is located in Lake County, Illinois, north of the City of Chicago and encompasses 1.5 miles of Lake Michigan shoreline (see Figure 1). NSGL is used to support Naval training and consists of the Recruit Training Command and Training Support Center. Site 12 is part of a comprehensive environmental investigation and cleanup program currently being performed at NSGL for 22 areas of potential hazardous material releases. The sites are being evaluated with respect to contamination characteristics, migration pathways, and pollutant receptors. Several of these sites warranted further investigation to assess potential long-term impacts, including Site 12, because historical site activities may have resulted in soil and/or groundwater contamination.

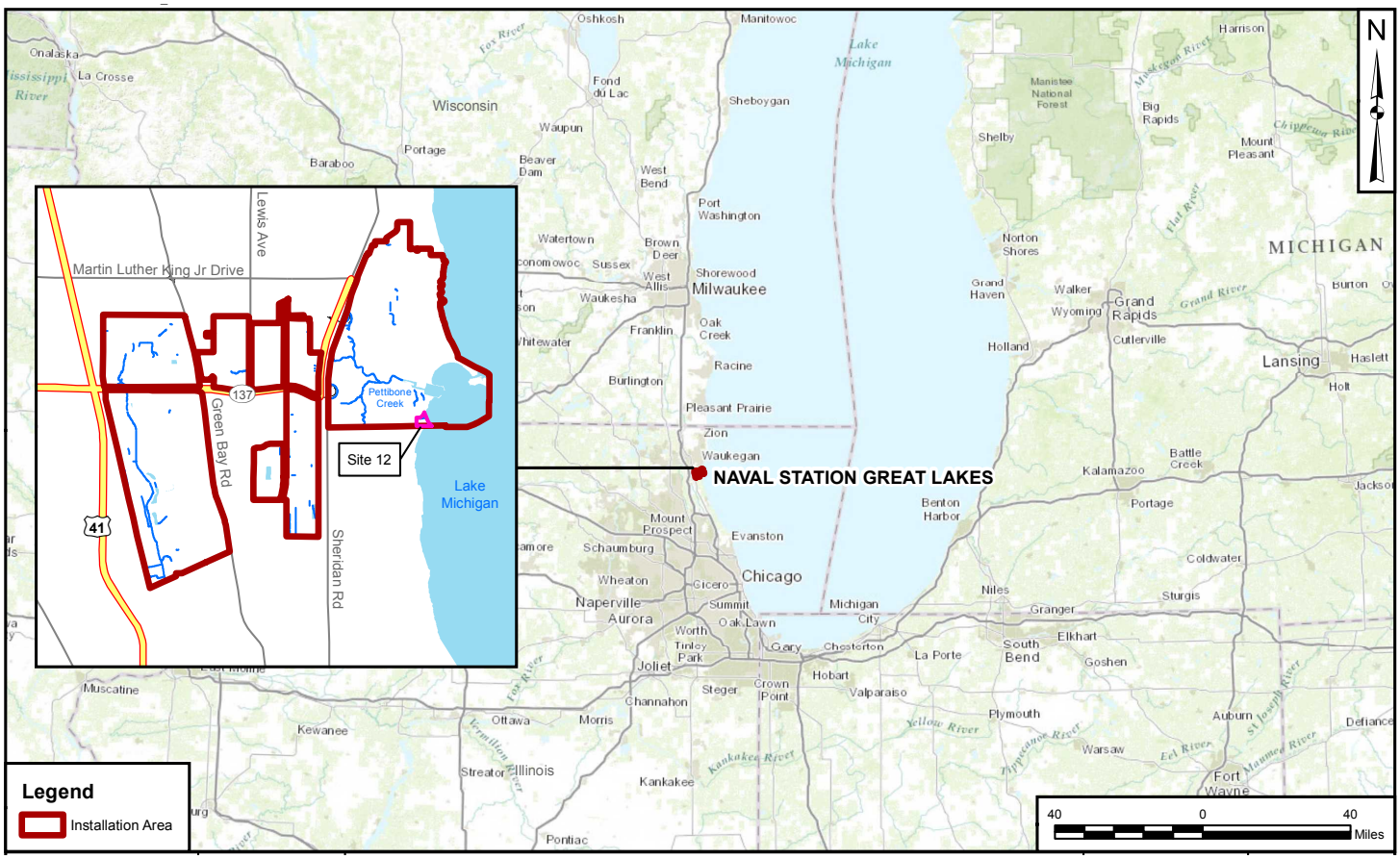


Figure 1: Vicinity Map

Site Background and Characteristics

Where is the Site?

Site 12 is located in a flat area on the shore of the NSGL Outer Harbor and Lake Michigan, south of a stormwater retention basin, and is approximately 3.5 acres in size (Figure 2). Site 12 includes a beach area, grass-covered areas, and a gravel parking lot. Topography increases westward from the shore of Lake Michigan, and the site is bounded on the western edge by a wooded bluff that is 50 to 60 feet high.

What is the Site Used For?

The site is currently used as a picnic and recreational area, and the only structure on the site is a picnic pavilion overlooking the lake.

The shallow groundwater at Site 12 is less than 10 feet below ground surface (bgs) and generally flows eastward towards Lake Michigan. There are no drinking water wells immediately downgradient of the site. Because of existing groundwater use restrictions at NSGL and the City of North Chicago (Ordinance 11-7-2), groundwater at the site cannot be used for drinking water. NSGL and the area surrounding NSGL are supplied by a public water system.

What Caused the Contamination?

Site activities that may have resulted in contamination of soil and groundwater at Site 12 include disposal of dredged sediment from the harbor system (Boat Basin, Inner Harbor, Outer Harbor) at NSGL. The sediment reportedly dredged from the harbor and deposited on Site 12 may contain metals, oils containing semivolatile organic compounds (SVOCs) [including polynuclear aromatic hydrocarbons (PAHs)], pesticides, and polychlorinated biphenyls (PCBs) from industries located upstream of NSGL. In addition, NSGL placed land-based fill material at the site that is generally composed of sand and gravel with some clay and asphalt-like material. Concrete rubble was also encountered during investigations at the site. The investigations conducted at Site 12 are summarized in Table 1.

Photograph of Site 12

Scope and Role

Site 12 is one of 22 areas of potential hazardous material releases that were identified as part of the environmental investigation and cleanup program at NSGL. The proposed remedial actions presented in this document are expected to

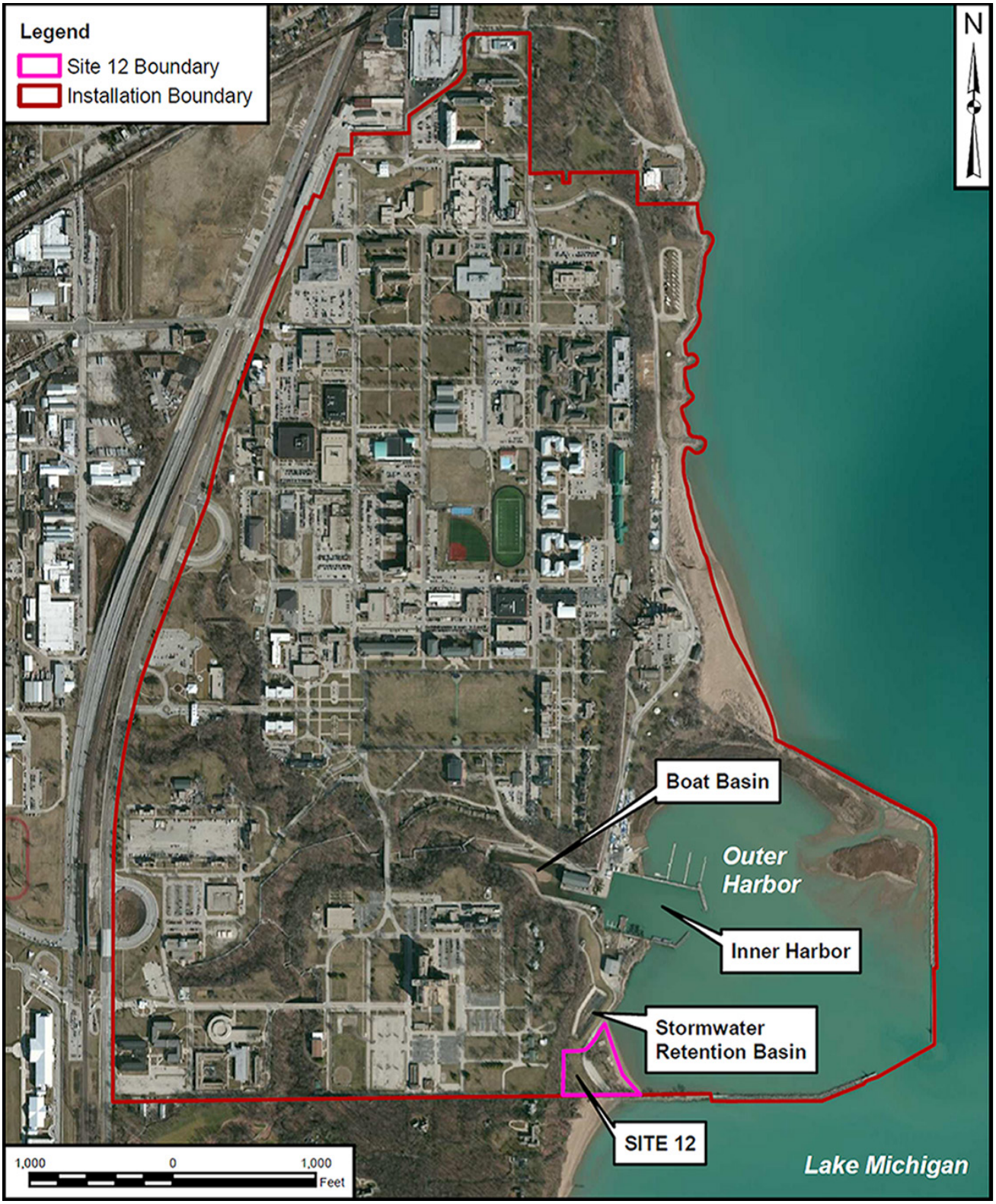


Figure 2: Location of Site 12

Table 1. Previous Investigations and Site Documentation		
Investigation	**Date**	**Activities**
Initial Assessment Study	1986	Included review of historical records and aerial photographs, field inspections, and personnel interviews to evaluate the potential for environmental impacts at numerous sites across the base. Site 12 was one of 22 sites identified as needing further study. Future investigation was recommended to confirm or refute the presence of suspected contamination.
Verification Study	1991	Indicated the presence of SVOCs, pesticides/PCBs, and metals in soil at Site 12.
RI	2014	Field investigations conducted in 2010, 2012, and 2013. PAHs, pesticides, arsenic, and lead concentrations in soil exceeded Illinois EPA Tiered Approach to Corrective Action Objectives (TACO) criteria, which are remediation objectives to protect human health. Arsenic, iron, and manganese concentrations in groundwater exceeded Illinois Administrative Code (IAC) groundwater standards for potable water. A risk assessment, which evaluates the current and future potential for adverse human health or environmental effects from exposure to contaminants was performed using data from the Site 12 RI.

be the final remedy for Site 12. The other identified sites at NSGL are in various stages of investigation and remediation (e.g., no further action at six sites, RODs have been signed for six sites, RODs are being prepared for three sites, and remedial actions have occurred or are in progress at six sites).

Nature and Extent of Contamination

The Navy conducted the Site 12 RI in three phases (December 2010, December 2012, and August 2013) to determine the nature of fill materials placed at Site 12 and to identify potential risks associated with the site. Surface soil, subsurface soil, and groundwater samples were collected and analyzed for the potential presence of volatile organic compounds (VOCs), SVOCs, PAHs, pesticides, PCBs, and metals. Soil samples were also analyzed to determine if metals in the soil were leachable and had the potential to migrate to groundwater. The results of the chemical analyses were used to identify the type, extent, and migration potential of chemicals in soil and groundwater. The sample locations are shown on Figure 3.

What are the Investigation Results?

The soil analytical results indicate that contamination is distributed throughout Site 12. The soil sample locations along the shoreline have lower concentrations of chemicals of potential concern (COPCs) than sample locations within the pre-1990 boundary (the shoreline at Site 12 changed significantly and extended eastward into Lake Michigan after 1990). The contamination is most likely from the land-based fill material used to fill in Site 12. The concentrations of COPCs in the dredge spoil (i.e., dredged sediment from bottom of the harbor) along the shoreline are an order of magnitude less than the land-based fill material found further inland at Site 12. Laboratory analysis of soil samples suggest that several metals are potentially mobile and may migrate from soil to shallow groundwater. Concentrations of PAHs, pesticides, and arsenic in surface soil and PAHs, arsenic, and lead in subsurface soil exceeded Illinois EPA residential TACO criteria. Concentrations of arsenic in surface soil and PAHs, arsenic, and lead in subsurface soil exceeded Illinois EPA I/C TACO criteria. Concentrations of lead in subsurface soil also exceeded Illinois EPA construction worker TACO criteria. Antimony, iron, lead, and manganese may leach from the soil at concentrations greater than Illinois EPA TACO criteria.

Concentrations of arsenic, iron, and manganese in groundwater exceeded IAC groundwater standards for potable groundwater resources; however, only arsenic concentrations exceeded the United States Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL) protective of human health. NSGL has an ordinance that does not allow the use of groundwater and a Memorandum of Agreement with Illinois EPA that restricts the use of groundwater. Only concentrations of iron exceeded IAC groundwater standard for general groundwater resources (groundwater that is not classified as potable and does not meet other groundwater classifications). It appears that reducing conditions (i.e., low oxygen concentration in groundwater) at the site mobilizes some of the metals, resulting in elevated metals concentrations in groundwater.

Figure 4 presents the conceptual site model (CSM) which identifies contaminant sources, contaminant release mechanisms, transport routes, and receptors under current and future land use scenarios.

Summary of Site Risks

The Site 12 RI included evaluating potential human health and ecological risk using detected chemical concentrations in surface soil, subsurface soil, and groundwater.

Human Health Risks

The HHRA estimates the baseline risk to humans, which is the likelihood of health problems occurring if no remedial actions were taken at Site 12. To estimate this baseline risk, a four-step process was used. A description of how human health risks are evaluated is presented in the box on page 7.

Analyze contamination. In Step 1 of the HHRA, COPCs were identified. COPCs are chemicals found at Site 12 at concentrations that exceeded federal or state risk-based screening levels, where applicable. Chemicals with concentrations greater than these benchmarks are further evaluated in Step 2. COPCs identified at Site 12 included the following:

- **Surface Soil** – Various PAHs, pesticides, and metals
- **Subsurface Soil** – Various PAHs and metals, and a PCB
- **Groundwater** – Various metals

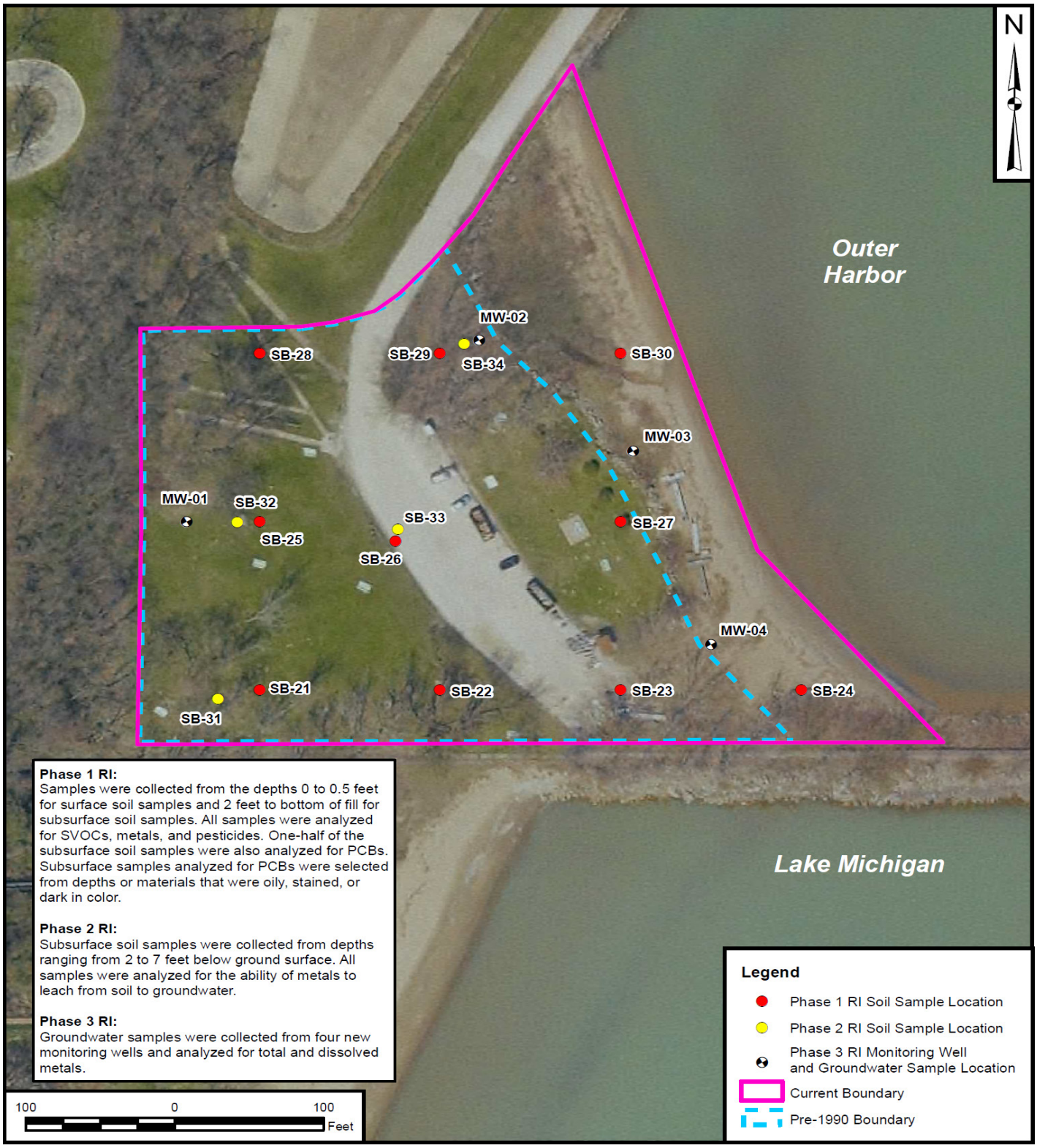


Figure 3: Site 12 Sample Locations

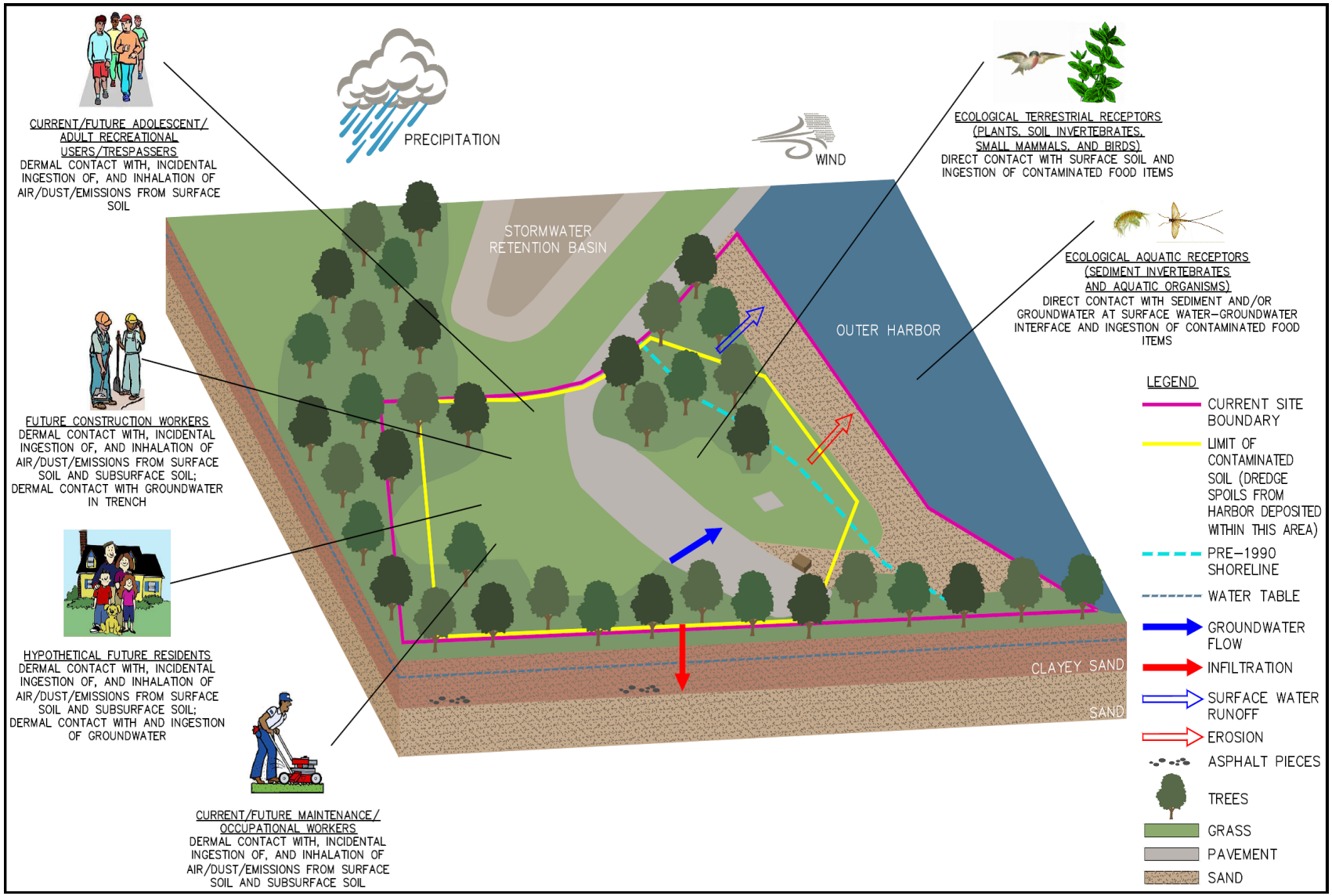


Figure 4: Conceptual Site Model

A full list of COPCs identified is provided in the RI report.

Estimate exposure. Step 2 of the HHRA examines possible pathways by which humans may be exposed to the identified COPCs, based on current and possible future land use scenarios. The following potential human receptors were evaluated in the HHRA because they may come into direct contact with COPCs in surface and/or subsurface soil:

- Future construction workers,
- Current/future maintenance/occupational workers,
- Current/future recreational users/ trespassers, and
- Hypothetical future residents

Potential exposure routes to COPCs that were evaluated include incidental ingestion of, dust inhalation of, and dermal contact with soil.

Under current land use, access to and use of the site for picnicking is primarily limited to military personnel and employees. Current adolescent and adult recreational users/ trespassers and maintenance/occupational workers may be exposed to surface soil at the site. Future construction workers may be exposed to soil during excavation activities and hypothetical site residents may be exposed to soil under the unlikely premise that the site would be developed for residential use. In addition, construction workers may be exposed to groundwater during excavation activities and hypothetical site residents may use groundwater.

A HHRA was not performed for groundwater, but groundwater data were compared to risk assessment screening criteria. Various metals were identified in Site 12 groundwater at concentrations that exceeded federal or state risk-based screening levels.

Current human receptors are not exposed to groundwater because of the current institutional controls prohibiting groundwater use (Base Instruction and the North Chicago ordinance) and physical limitations (low yield).

Assess potential health dangers. In Step 3 of the HHRA, possible harmful effects from exposure to the individual COPCs are evaluated. These chemicals are separated into two groups: carcinogens (chemicals that may cause cancer) and non-carcinogens (chemicals that may cause adverse health effects other than cancer).

Characterize Site risk. In Step 3 of the HHRA, the results of Steps 2 and 3 are combined to estimate overall risks from exposure to chemicals present at the Site. The terms used to define the estimated risk are explained in the text box, "How are Human Health Risks Evaluated." The results of the risk assessment evaluating health effects to persons utilizing the Site show that:

- For surface soil, potential risks for future residents exceed acceptable exposure levels. The risks are associated with PAHs, arsenic, chromium (assumed to be hexavalent chromium in the HHRA), and some pesticides.
- For subsurface soil, PAHs, arsenic, chromium (assumed to be hexavalent chromium in the HHRA), and Aroclor-1254 (a PCB).

How are Human Health Risks Evaluated?

A human health risk assessment (HHRA) estimates "baseline risk," which is an estimate of the likelihood of health problems occurring if no cleanup action occurs at a site. To estimate baseline risk at a site, the Navy undertakes a four-step process in accordance with USEPA 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 chemicals found at a site as well as past scientific studies on the effects these chemicals 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 chemicals are most likely to pose the greatest threats to human health.

In Step 2, the Navy considers the different ways that people might be exposed to the chemicals 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 develops reasonable maximum exposure (RME) and central tendency exposure (CTE) scenarios, which represents the highest level and average level of human exposure, respectively, 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 ($1x10^{-4}$). In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site chemicals. An extra cancer case means that one more person could get cancer than would normally be expected from other causes. The USEPA target risk range for carcinogenic risks is $1x10^{-4}$ to $1x10^{-6}$. For non-cancer health effects, the Navy calculates a Hazard Index (HI), and for HI values less than 1 (threshold level) 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. The Navy adds the potential risks from the individual chemicals to determine the total risk resulting from the site.

The findings of the HHRA are summarized in Table 2. This table presents the receptors to which there is possible risk of health effects: cancer effects are expressed as greater than $1x10^{-4}$; non-cancer effects are expressed as a Hazard Index of 1 or more on a target organ basis. These risk results were used to develop the list of chemicals of concern (COCs) further evaluated in the FS for Site 12 (see Table 3 for the chemicals retained as COCs for soil).

No unacceptable risks were estimated for current or anticipated future recreational use of the site.

TABLE 2
Calculated Risk (RME) for HHRA Receptors

Receptor	Media	Cancer Risk	Non-Cancer Hazard Index
Construction Worker	Surface Soil	3E-07	0.5
	Subsurface Soil	9E-07	0.8
Occupational/Maintenance Worker	Surface Soil	2E-05	0.2
	Subsurface Soil	4E-05	0.3
Adolescent Trespasser	Surface Soil	2E-06	0.03
Adult Trespasser	Surface Soil	3E-06	0.02
Child Residents	Surface Soil	2E-04	2(1)
	Subsurface Soil	8E-04	4(1)
Adult Residents	Surface Soil	4E-05	0.3
	Subsurface Soil	1E-04	0.5
Lifelong (Child and Adult)	Surface Soil	3E-04	2(1)
	Subsurface Soil	1E-03	4(1)

1 - Target organs HI is < 1; therefore, non-cancer health effects are not predicted.
Shading indicates exceedance of USEPA target risk range.

Although risks to occupational/maintenance workers and construction workers were within the USEPA acceptable risk range based on the HHRA, concentrations of some chemicals exceeded Illinois EPA TACO criteria for I/C (applicable to occupational/maintenance workers) and construction worker exposure.

- For surface soil, concentrations of arsenic exceeded I/C TACO criteria.
- For subsurface soil, concentrations of arsenic, lead, and various PAHs exceeded I/C TACO criteria.
- For subsurface soil, concentrations of lead exceeded construction worker TACO criteria.

The risk for I/C and construction worker exposure to surface soil is acceptable because the arithmetic mean concentration and 95 percent upper confidence limit for arsenic at the Site are less than the I/C TACO criterion. Arsenic, lead, and various PAHs in subsurface soil were retained as COCs for the FS (see Table 3).

Although risks from exposure to groundwater were not evaluated in the HHRA, arsenic is retained as a COC for groundwater because arsenic concentrations exceeded USEPA MCL and Illinois EPA MCL (see Table 4 for the chemicals retained as COCs for groundwater).

Ecological Risks

The screening ERA included in the Site 12 RI is comprised of three steps. A description of how ecological risks are evaluated is presented in the text box on this page.

Problem formulation. In Step 1, the contaminants present and the ecological receptors potentially exposed to those contaminants are identified. Based on the habitat at the site, which includes maintained grass-covered areas, some wooded areas, and a beach area along the lake, the following ecological receptors may be exposed to chemicals found at the site:

How are Ecological Risks Evaluated?

An ecological risk assessment (ERA) evaluates the likelihood that adverse ecological effects are occurring or may occur as a result of exposure to one or more stressors. ERAs typically focus on chemical stressors, but biological and physical stressors often need to be considered during data evaluation. The ERA process consists of the following eight 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 cleanup goals. 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.

TABLE 3

Surface and Subsurface Soil PRGs

COC	Selected PRGs for Residential Exposure				Selected PRGs for I/C and Construction Worker Exposure	
	Surface Soil		Subsurface Soil		Subsurface Soil	
	PRG	Basis	PRG	Basis	PRG	Basis
Metals (mg/kg)						
Arsenic	13	Illinois EPA TACO/Background	13	Illinois EPA TACO/ Background	13	Illinois EPA TACO (I/C)/ Background
Lead	400	Illinois EPA TACO	400	Illinois EPA TACO	700/800	Illinois EPA TACO (Construction Worker/ I/C)
Pesticides/PCBs (µg/kg)						
Total chlordane	1,800	Illinois EPA TACO	--	--	--	--
Heptachlor	100	Illinois EPA TACO	--	--	--	--
Total PCBs	--	--	1,120	HHRA	--	--
Polynuclear Aromatic Hydrocarbons (µg/kg)						
Benzo(a)anthracene	1,800	Background	1,500	HHRA	8,000	Illinois EPA TACO (I/C)
Benzo(a)pyrene	2,100	Background	150	HHRA	800	Illinois EPA TACO (I/C)
Benzo(b)fluoranthene	2,100	Background	1,500	HHRA	8,000	Illinois EPA TACO (I/C)
Benzo(k)fluoranthene	9,000	Illinois EPA TACO	15,000	HHRA	--	--
Dibenzo(a,h)anthracene	420	Background	150	HHRA	--	--
Indeno(1,2,3-cd)pyrene	1,600	Background	1,500	HHRA	--	--

mg/kg - Milligram per Kilogram
µg/kg - Microgram per Kilogram

TABLE 4

Groundwater PRG

COC	PRG (µg/L)	Basis
Arsenic	10	35 IAC 620 Class I Groundwater Standard

µg/L - Microgram per Liter

- Plants
- Soil invertebrates
- Sediment invertebrates
- Aquatic organisms
- Birds and mammals

Terrestrial plants, soil invertebrates, birds, and mammals are exposed to chemicals in surface soil by direct contact and/or ingestion of soil and food items that have accumulated chemicals from the soil. In addition, contamination may have migrated from soil to groundwater by leaching and to sediment by overland runoff. Sediment invertebrates and aquatic organisms in Lake Michigan may be exposed to contaminants in groundwater after the groundwater discharges and mixes with the surface water. Potential impacts to sediment invertebrates from erosion of soil into the harbor were also evaluated. However, erosion is likely minimal because heavy vegetation is present over most areas at the site.

Similar to the HHRA, COPCs were identified by comparing Site 12 chemical concentrations to risk-based screening levels. The initial list of COPCs evaluated in the ERA included SVOCs, PAHs, pesticides, and metals.

Risk analysis. In Step 2, possible harmful effects from being exposed to individual COPCs are evaluated. This step includes measuring or estimating the amount of a chemical in soil, sediments, plant and animal tissue, and then evaluating ecological receptor exposure to these chemical concentrations.

Risk characterization. In the first part of Step 3, which was included in this screening ERA, results of the risk analysis are evaluated to determine the likelihood of harmful effects to ecological receptors at Site 12. The screening ERA concluded that potential impacts to terrestrial plants, soil invertebrates, mammals, or birds from exposure to chemicals in surface soil are not likely. In addition, potential impacts to sediment invertebrates from chemicals in surface soil, which may migrate to sediment via erosion and surface runoff, are not likely.

Why is Remedial Action Needed?

Remedial action is needed when an unacceptable risk of exposure to contaminants exists for potential receptors such as human receptors. The Navy's environmental studies of Site 12 resulted in the conclusion that as a result of past activities, several chemicals are present in surface soil, subsurface soil, and groundwater that may result in unacceptable human health risk under hypothetical future residential site use. These chemicals were identified as COCs based on the results of the HHRA. Although chromium, evaluated as hexavalent chromium, was identified as a COC in soil in the HHRA, based on historical information on the site, hexavalent chromium is not expected to be present. If chromium had been evaluated as trivalent chromium, then risks for chromium would be within acceptable levels. Therefore, chromium is not retained as a COC. Tables 3 and 4 summarize chemicals identified as COCs in the FS for soil and groundwater, respectively. It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

What are the 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 contaminated media. The RAOs for NSGL Site 12 were developed based on future hypothetical land uses as I/C property or as residential property, with the goal of protecting the public from potential future health risks. The RAOs were also developed in consideration of the existing prohibitions on groundwater use.

The following RAOs were developed for Site 12:

RAO 1: Prevent residential exposure through ingestion of, dust inhalation of, and dermal contact with contaminated surface soil and subsurface soil with COC concentrations exceeding Preliminary Remediation Goals (PRGs).

RAO 2: Prevent I/C and construction worker exposure through ingestion of, dust inhalation of, and dermal contact with contaminated subsurface soil with COC concentrations exceeding TACO criteria.

RAO 3: Return the groundwater resource to beneficial use, if practicable, and address human health risks associated with groundwater consumption with COC concentrations exceeding the PRG.

PRGs were developed to identify the concentrations of chemicals that, when exceeded, cause potentially unacceptable risk to human health and the environment. PRGs were developed for the COCs using the results of the HHRA, Illinois EPA criteria, and Illinois EPA background values. The lowest applicable criteria presented were selected as PRGs for residential exposure unless the lowest criteria were less than background in which case the background values were selected as the PRG.

The PRGs for residential exposure are shown in Tables 3 and 4 for soil and groundwater, respectively. In addition, the PRGs for I/C and construction worker exposure are also presented on Table 3.

Remedial Action Alternatives

The FS presents the options that the Navy developed for remedial action at the site to address the estimated 21,200 cubic yards (cy) of contaminated soil and 600,000 gallons of contaminated groundwater. Based on the evaluation of various technologies documented in the FS, the five remedial alternatives described below were developed and evaluated for Site 12 (see box on page 11).

Alternative 1: No Action

This alternative is a "walk-away" alternative that maintains the site as is and is required for consideration under CERCLA to establish a basis for comparison with other alternatives. No restriction would be imposed to prevent access to the site, and the alternative would not address the site contamination. Under this alternative, the property would be released for unrestricted use. In addition, Five-Year Reviews would not be required.

Alternative 2: LUCs

The existing surface soil, consisting primarily of sandy clay and sand (0 to 0.5 feet bgs), would act as a barrier to prevent exposure by I/C workers and construction workers to subsurface soil contaminants exceeding I/C TACO criteria. LUCs would be established at the site to make sure that the property is not developed for residential or non-residential special uses (such as for a park, day care, or school). LUCs would require review of construction activities and intrusive work in the area to protect workers and to confirm proper management of contaminated media prior to construction activities. A LUC Remedial Design (RD) would be prepared to establish methods to prevent exposure to COCs and to restrict the disturbance of contaminated soil. The LUC RD would be developed after the signing of the ROD to document the LUC requirements. LUCs would also be implemented to restrict groundwater use. LUCs would be permanent in the event of a change in land use or ownership. LUCs would also require routine inspection of the soil and repairs to this barrier to prevent exposure to contaminated subsurface soil.

Arsenic concentrations in groundwater would decrease by natural chemical and physical processes. As groundwater flows into areas with oxidizing conditions, arsenic will precipitate along with iron and manganese. Because groundwater is not used as a drinking water source, there would be no long-term monitoring.

Five-Year Reviews to evaluate the continued protectiveness of the remedy would be required for this alternative because contamination would remain in soil and groundwater in excess of concentrations that allow unrestricted use and unlimited exposure at the site.

Alternative 2A: LUCs and Air Sparging

Alternative 2A includes components similar to Alternative 2, with the addition of air sparging for treatment of groundwater. The existing surface soil, consisting primarily of sandy clay and sand (0 to 0.5 feet bgs), would act as a barrier to prevent exposure by I/C workers and construction workers to subsurface soil contaminants exceeding I/C TACO criteria. Similar to Alternative 2, LUCs would be implemented to restrict groundwater use. For this alternative, groundwater LUCs would only continue until air sparging is completed and the groundwater arsenic PRG is met. As for Alternative 2, soil LUCs would be permanent in the event of a change in land use or ownership. LUCs would also require routine inspection of the soil and repairs to this barrier to prevent exposure to contaminated subsurface soil.

Evaluation Criteria for Remedial Alternatives

Threshold Criteria:

1. Overall Protection of Human Health and the Environment: Will it protect you and the plant and animal life on and near the site? 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 environmental, state environmental, and facility siting statutes, regulations and requirements? ARARs were determined and presented in the FS. The chosen cleanup plan must meet this criterion.

Primary Balancing Criteria:

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, or 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 (e.g., treatment machinery) available for the plan?
7. Cost: What is the total cost of an alternative over time? The Navy must find a plan that gives necessary protection for a reasonable cost.

Modifying Criteria:

8. State Acceptance: Does the state agree with the proposal?
9. Community Acceptance: What objections, suggestions, or modifications do the public offer during the comment period?

To assess the performance of air sparging, groundwater monitoring would be performed to track changes in arsenic concentrations. Groundwater monitoring would continue until air sparging is completed and the groundwater arsenic PRG is met.

Five-Year Reviews would be required for this alternative for soil because concentrations of contaminants would remain in soil in excess of concentrations acceptable for unrestricted use and unlimited exposure at the site. Groundwater would be included in Five-Year Reviews until the arsenic PRG is met.

Alternative 3: Excavation (Unrestricted Reuse), Off-Site Disposal, and Groundwater LUCs

Alternative 3 would consist of the excavation of approximately 21,200 cy of contaminated soil to meet PRGs. Excavated

material would be transported offsite to a non-hazardous landfill for proper disposal.

LUCs would be implemented to restrict groundwater use, and arsenic concentrations in groundwater would decrease by natural chemical and physical processes.

Five-Year Reviews would not be required for soil under this alternative because concentrations of contaminants in soil would be less than levels acceptable for unrestricted use and unlimited exposure at the site. However, groundwater would still be included in Five-Year Reviews.

Alternative 3A: Excavation (Unrestricted Reuse), Off-Site Disposal, Air Sparging, and Groundwater LUCs

Alternative 3A includes components similar to Alternative 3, with the addition of air sparging for treatment of groundwater. Similar to Alternative 3, LUCs would be implemented to restrict groundwater use. For this alternative, groundwater LUCs would only continue until air sparging is completed and the groundwater arsenic PRG is met.

To assess the performance of air sparging, groundwater monitoring would be performed to track changes in arsenic concentrations. Groundwater monitoring would continue until air sparging is completed and the groundwater arsenic PRG is met.

Five-Year Reviews would not be required for soil under this alternative because post-evaluation concentrations of contaminants in soil would be less than levels acceptable for unrestricted use and unlimited exposure at the site. Groundwater would still be included in Five-Year Reviews until the arsenic PRG is met.

Analysis of Alternatives

In accordance with CERCLA, a detailed analysis of the remedial alternatives developed for this site must be conducted with respect to the nine CERCLA evaluation criteria. These include the two threshold, five balancing, and two modifying criteria described in the box on page 11. Estimated costs presented in the FS include capital and net present worth (NPW) costs. An analysis of these criteria was performed for each remedial alternative, and summary comparisons of these analyses are presented in Table 5. Consult the Site 12 FS Report for more detailed information.

Preferred Alternative

Alternative 2 is the Preferred Alternative for Site 12. Figure 5 shows the extent of the area covered by the LUCs for this Preferred Alternative. Based on information currently available, the Navy believes that the Preferred Alternative would meet the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria.

The preferred alternative includes LUCs to maintain existing surface soil as a barrier to prevent exposure by I/C workers and construction workers. LUCs will also prevent residential and non-residential special uses, supported by inspections and long-term monitoring, though these are not anticipated uses for this site. The LUCs would also include a restriction on groundwater use.

The Navy expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; and (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent possible. However, the Preferred Alternative does not satisfy the preference for treatment as a principal element.

Why Does the Navy Recommend this Preferred Alternative?

The Preferred Alternative for Site 12, Alternative 2, is recommended for the following reasons:

- This alternative would effectively prevent exposure to surface and subsurface soil and groundwater contamination by controlling use of and activities at the property through LUCs. The groundwater LUC would be maintained until groundwater concentrations have naturally decreased to less than the PRGs.
- It would protect human health and the environment.
- LUCs at the site can be incorporated into the NSGL Base Master Plan and are not overly burdensome.
- Five-Year Reviews would be conducted to make sure the LUCs are in place and maintained for continued protection of human health and the environment.
- It is deemed to be cost effective and represents a reasonable value for the money to be spent.
- Land use at the site is not expected to change in the foreseeable future.

This preferred alternative can change in response to public comments or based on receipt of new information.

Next Steps

The Navy will accept comments on the Preferred Alternative for Site 12 during the 30-day public comment period (February 1 through March 1, 2016). A public meeting will be conducted if there is significant public interest. In response to public comments or upon receipt of new information, the Preferred Alternative for the site may change. By May 2016, the Navy expects to have reviewed comments and signed the ROD describing the chosen remedial action. The ROD, which includes a summary of responses to public comments, will then be uploaded into the Administrative Record. The Navy will also announce its decision through the local news media.

For More Detailed Information

To help the public understand and comment on the proposal for Site 12, this publication summarized a number of reports and studies. The technical and public information prepared to date for the site is available online at: http://go.usa.gov/3SNHA. From that website, click on

TABLE 5. EVALUATION OF REMEDIAL ALTERNATIVES

EVALUATION CRITERIA	REMEDIAL ALTERNATIVES				
	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 2A	ALTERNATIVE 3	ALTERNATIVE 3A
	NO ACTION	LUCS	LUCS AND AIR SPARGING	EXCAVATION, OFF-SITE DISPOSAL, AND GROUND WATER LUCS	EXCAVATION, OFF-SITE DISPOSAL, AIR SPARGING, AND GROUND WATER LUCS
Threshold Criteria					
Protects human health and the environment *Will it protect you and plant and animal life on and near the site? Is the protection permanent?*	○	◘	◘	●	●
Meets federal and state regulations *Does the alternative meet federal and state environmental statutes, regulations, and requirements?*	N/A	●	●	●	●
Primary Balancing Criteria					
Provides long-term effectiveness and is permanent *Will the effects of the cleanup last?*	○	◘	◘	●	●
Reduces mobility, toxicity, and volume of contaminants through treatment *Are the harmful effects of the contaminants, their ability to spread, and the amount of contaminated material present reduced?*	○	○	●	○	●
Provides short-term protection *How soon will the site risks be reduced?* *Are there hazards to workers, residents, or the environment that could occur during cleanup?*	N/A	●	●	◘	◘
Implementability *Can it be implemented? Is the alternative technically feasible? Are the goods and services necessary to implement the alternative readily available?*	N/A	●	●	●	●
Costs (see Notes a and b) *Capital Costs (initial costs)* *O&M Costs (total long-term, 30-year)* *Total Present Worth Cost (total cost in today's dollars)*	$0	$212K	$1,635K	$5,519K	$6,693K(b)
Time for construction (months)	N/A	3	8	10	12
Time to achieve cleanup objectives (months)	N/A	3	8	10	12
Modifying Criteria					
State agency acceptance *Does Illinois EPA agree with the Navy's recommendation?*	Illinois EPA has indicated that Alternative 2 would be acceptable.				
Community acceptance *What objections, suggestions, or modifications does the public offer during the comment period?*	Assessment will be performed after comments on the Proposed Plan are received from the public				

Notes:

Shaded column indicates preferred alternative

Relative comparison of the nine balancing criteria and each alternative:

● – Good , ◘ – Average, ○ – Poor; N/A –Not applicable.

a) For purposes of cost estimation, O&M costs represent 30-year timeframes, except where noted. Actual total costs may be higher.

b) Operation and Maintenance (O&M) costs represent 10-year timeframe.

Figure 5: LUCs

"Administrative Records," select "Administrative Record File," and search for "SITE 12" documents in the Basic Search box. Please contact Mr. John Sheppard at the Public Affairs Office, at 847-688-2430 x359 with questions on submitting comments.

Glossary of Terms

This glossary defines the terms used in this Proposed Plan. The definitions in this glossary apply specifically to this Proposed Plan and may have other meanings when used in different circumstances.

Administrative Record: The complete body of documents pertaining to the investigation and restoration of an environmental facility. This body of documents is kept at a location where it can be accessed by the general public.

Air sparging: Injecting air in the groundwater to induce an air current through the water that promotes oxygenation of the groundwater to create oxidizing conditions.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal, state, and local environmental rules, regulations, and criteria that must be met by the selected cleanup action under CERCLA.

Chemical of Concern (COC): A substance detected at a level where it could have an adverse effect on human health or the environment.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law also known as "Superfund." This law was passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). This law created a special tax that goes into a trust fund to investigate and cleanup abandoned or uncontrolled hazardous waste sites.

Conceptual Site Model (CSM): Identifies contaminant sources, contaminant release mechanisms, transport routes, and receptors under current and future land use scenarios for a site.

Dredge spoil(s): Excess material, such as sediment, removed from the bottom of the 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 cleanup alternatives.

Hazard Index (HI): The ratio of the daily intake of chemicals from onsite exposure divided by the reference dose for those chemicals. The reference dose represents the daily intake of a chemical that is not expected to cause adverse health effects.

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

Initial Assessment Study: Review of historical records and aerial photographs, field inspections, and personnel interviews to evaluate the potential for environmental impacts at numerous sites across the base.

Invertebrate: Small animals without skeletal systems, such as a worm, that live in or on soil or sediment.

Land use controls (LUCs): Engineered and non-engineered measures formulated and enforced to regulate current and future land use options. Engineered measures can include fencing and posting. Non-engineered measures typically consist of administrative deed restrictions that prohibit residential development and/or construction restrictions.

Leach: Ability of soluble constituents from soil to be removed by the action of a percolating liquid such as stormwater during a rainfall event.

Maximum Contaminant Level (MCL): The maximum permissible level of a contaminant in water delivered to any user of a public system. MCLs are enforceable standards protective of public health.

Memorandum of Agreement (MOA): An agreement between Illinois EPA and NSGL, on behalf of the Department of the Navy, to implement base wide, certain periodic site inspections, condition certifications, and agency notification procedures to ensure the maintenance by NSGL personnel of site-specific LUCs deemed necessary for present or future protection of human health and the environment.

Metals: Metals are naturally occurring elements. Some metals, such as arsenic, can have toxic effects. Other metals, such as iron, are essential to the metabolism of humans. Metals are classified as inorganic because they are a mineral and not of biological origin.

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

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 the costs associated with the remedial action over its planned life. NPW considers both capital (construction) costs and costs for annual operation and maintenance.

Oxidizing: The presence of oxygen promotes conditions for chemicals to undergo a chemical reaction with oxygen.

Potable: Suitable for drinking.

Polychlorinated biphenyls (PCBs): A family of compounds commonly used in electric transformers as insulators and coolants, in lubricants, adhesives, and caulking compounds. PCBs are extremely persistent in the environment because they do not readily break down into less harmful chemicals.

Polynuclear aromatic hydrocarbons (PAHs): High molecular weight, relatively immobile, and moderately toxic solid organic chemicals that feature multiple benzenic

(aromatic) rings in their chemical formula. PAHs are typically formed during the incomplete combustion of coal, oil, gas, garbage, or other organic substances.

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

Receptor: An individual, either human, plant, or animal, which may be exposed to a chemical present at the site.

Record of Decision (ROD): An official document that describes the selected remedy for a specific site. The ROD documents the remedy selection process and is issued by the Navy, with concurrence of Illinois EPA, following the public comment period.

Remedial Action Objective (RAO): The RAOs are medium-specific goals that define the objectives of conducting cleanups to protect receptors that are at risk from contaminated media.

Remedial Design (RD): Development of technical specifications for cleanup remedies and technologies.

Remedial Investigation (RI): Mechanism for data collection to characterize site conditions and determine the nature and extent of contamination.

Responsiveness Summary: A summary of written and oral comments received during the public comment period and the Navy's responses to these comments. The Responsiveness Summary is an important part of the ROD, highlighting community concerns for decision makers.

Semivolatile organic compound (SVOC): An organic compound with a boiling point higher than water that may vaporize when exposed to temperatures above room temperature. SVOCs include phenols and PAHs.

Tiered Approach to Corrective Action Objectives (TACO): Remediation objectives for contaminated soil and groundwater developed by the Illinois EPA. These remediation objectives protect human health and take into account site conditions and land use. Remediation objectives generated by TACO are risk based and site specific.

Verification Study: An investigation conducted to confirm the presence of contaminants.

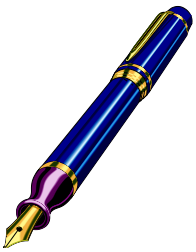
Volatile organic compound (VOC): Any organic compound that has a high tendency to pass from the solid or liquid state to the vapor state under typical environmental conditions.

What's a Formal Comment?

Formal comments are used to improve the final decision for the remedy selected for a site. During the 30-day formal comment period, the Navy will accept formal written comments and hold a meeting, if requested, to accept formal verbal and written comments. To make a formal comment, you need to submit a written comment during the comment period or present your views during the public meeting.

A request for an extension to the public comment period (minimum of 30 days) must be made in writing. A request for a public meeting to present your formal comments must also be made in writing. These requests must be postmarked/dated no later than March 1, 2016.

Department of the Navy
NAVSTA Great Lakes
Attn: John Sheppard
Public Affairs Office
2601E Paul Jones Street
Great Lakes, IL 60088
Email: john.l.sheppard@navy.mil



Federal regulations require the Navy to distinguish between "formal" and "informal" comments. Although the Navy uses public comments throughout site investigation and cleanup activities, the Navy is only required to respond in writing to formal comments on the Proposed Plan. If a public meeting is held, there will be no Navy verbal responses to your comments during the formal meeting portion of the meeting. After the formal portion of the public meeting is closed, the Navy may respond to informal questions.

The Navy will review the transcript of formal comments received at the meeting and written comments received during the formal comment period before making a final decision. They will then prepare a written response to formal comments. The transcript of formal comments and the Navy's written responses will then be included in the Responsiveness Summary issued as part of the final ROD.

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Use This Space to Write Your Comments

The Navy wants your written comments on the options under consideration for dealing with Site 12 - Harbor Dredge Spoil Area. You can use the form below to send written comments or to request that a formal public meeting be held. Additionally the form below can be used to request an extension of the comment period. A request for an extension to the public comment period (minimum of 30 days) must be made in writing. A request for a public meeting to present your formal comments must also be made in writing.

This form is provided for your convenience. Written comments can be submitted to the Public Affairs Office by mail or email. Send written comments postmarked/dated no later than March 1, 2016 to:

Department of the Navy
NAVSTA Great Lakes
Attn: John Sheppard
Public Affairs Office
2601E Paul Jones Street
Great Lakes, IL 60088
Email: john.l.sheppard@navy.mil

Comment submitted by: _____

(Attach additional sheets as needed)

FOLD HERE

Place
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Department of the Navy
NAVSTA Great Lakes
Attn: John Sheppard
Public Affairs Office
2601E Paul Jones Street
Great Lakes, IL 60088