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FINAL PROPOSED PLAN FOR SITE 17 PETTIBONE CREEK OPERABLE UNIT 1 (OU1)
NSTC GREAT LAKES IL
4/1/2013
TETRA TECH

INTRODUCTION

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 remedial alternative to address surface water and sediment in Site 17 - Pettibone Creek at Naval Station Great Lakes (NSGL) in Great Lakes, Illinois. The results of the investigation of Site 17 – Pettibone Creek were presented in the Remediation Investigation/Risk Assessment (RI/RA) Report and Sediment Characterization Report. Additional information on investigation activities and results can be found in the Administrative Record (see section “For More Detailed Information” at the end of the Proposed Plan for details on accessing the Administrative Record). The Department of the Navy, with the concurrence of Illinois Environmental Protection Agency (Illinois EPA), developed this plan to summarize the proposed remedy for this site. The Navy, the lead agency, is accepting formal public comments on this Proposed Plan from May 16, 2013 to June 17, 2013 and, with input from Illinois EPA (the support agency), will make a final remedy selection after reviewing and addressing the public’s comments. Therefore, the public is encouraged to review and comment on the information presented in this Proposed Plan.

Site 17 is composed of two interconnected geographic areas, Pettibone Creek and the NSGL Boat Basin (see Figure 1). For reasons discussed in the Site Description/Characteristics section, Site 17 has been split into two operable units (OUs). The Pettibone Creek portion of Site 17 has been designated as OU1. The remaining portion of Site 17 is the NSGL Boat Basin, which has been designated as OU2. This Proposed Plan addresses only OU1 (Pettibone Creek). A separate Proposed Plan will be issued at a later date to discuss the Navy’s cleanup options for the Boat Basin (OU2).

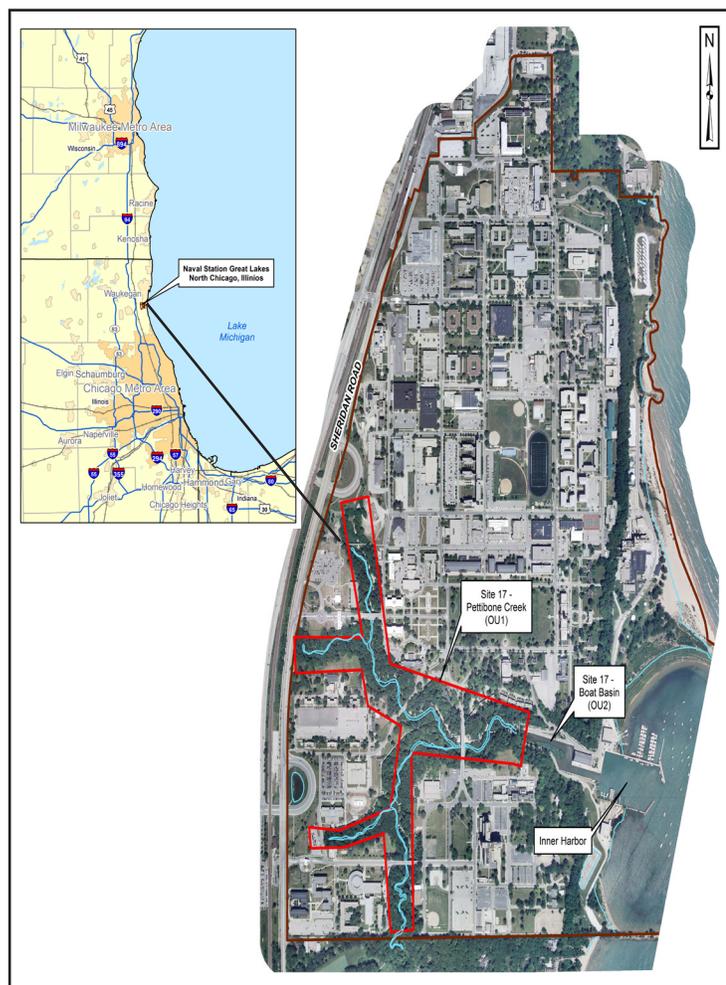


Figure 1: Location Map

What do you think?

You do not 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. The Navy, as the lead agency, is accepting formal public comments on this Proposed Plan for a 30-day period from May 16, 2013 to June 17, 2013. To comment formally, send written comments postmarked no later than June 17, 2013 to:

Department of the Navy
Naval Station Great Lakes
NAVFAC Midwest
Attn: Benjamin Simes
201 Decatur Avenue
Building 1A, Code EV
Great Lakes, IL 60088

Or, e-mail comments by the end of the comment period to: benjamin.simes@navy.mil.

The Navy will provide written responses to all comments in the Responsiveness Summary included in 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. At the meeting, the proposed action will be discussed and questions about the action will be received.

INTRODUCTION (CONTINUED)

In this Proposed Plan, the Navy proposes that no environmental cleanup action be conducted for surface water and sediment in Site 17 - Pettibone Creek (OU1). This No Action plan is proposed because the human health and ecological risk assessments concluded that the low chemical concentrations detected in surface water and sediment do not pose unacceptable risks to human health or the environment based on current and future exposure pathways. This Proposed Plan presents additional details regarding why the Navy is proposing No Action.

SITE BACKGROUND

NSGL covers 1,202 acres of Lake County, which is located in northeastern Illinois, north of the City of Chicago, and encompasses 1.5 miles of Lake Michigan shoreline (Figure 2). NSGL lies within both the North Branch Chicago River Drainage Basin and the Lake Michigan North Drainage Basin. The divide between the basins lies along Green Bay Road. Precipitation runoff that does not infiltrate into the ground flows into the Skokie River or Pettibone Creek. The areas east of Green Bay Road, which includes NSGL, drain into Lake Michigan through Pettibone Creek.

NSGL administers base operations and provides facilities and related support to training activities (including the Navy's only boot camp) as well as a variety of other military commands located on base. Approximately 38,000 Naval Recruits are trained each year at the NSGL campus.

There are a variety of land uses that currently surround NSGL. Along the northern boundary of NSGL are the most highly urbanized and industrial areas. Much of the land beyond the northwest site boundary comprises unincorporated vacant lands of Lake County, except for scattered retail and

residential properties. Adjacent to the western boundary are primarily industrial properties; while along the southern boundary is a mixture of public open space and residential land.

SITE DESCRIPTION/CHARACTERISTICS

As discussed above, Site 17 is composed of two interconnected geographic areas, Pettibone Creek and the NSGL Boat Basin. The two areas were evaluated as a single entity in the Remedial Investigation and the Feasibility Study for Site 17. However, due to differences in the type and extent of contamination and the degree of human health and ecological risk, separate alternatives were developed for each of these areas and the Navy plans to address each area separately in a phased approach, so Site 17 has been split into two OUs: OU1 (Pettibone Creek), and OU2 (the NSGL Boat Basin).

Pettibone Creek originates in North Chicago and enters the base at the northwest corner of NSGL, meandering through the main training area of the base and terminating in Lake Michigan (see Figure 2). Pettibone Creek flows through a ravine (named Pettibone Creek Ravine) that is approximately 50 to 100 feet in height with 30 to 70-degree slopes. The Pettibone Creek system consists of north and south branches that merge and flow east into Lake Michigan via the NSGL harbor system. The North Branch of Pettibone Creek begins outside the base in an urbanized area that is zoned for light industry. The North Branch of the creek is the discharge point for storm sewers from the City of North Chicago and NSGL. The South Branch of Pettibone Creek originates in a residential area southwest of the Veteran's Hospital and flows to the east and then to the north through a private golf course before entering the NSGL.

Pettibone Creek, including the North and South Branches, covers approximately 0.3 square miles. The creek ranges

SITE HISTORY

Following is a brief environmental history of Site 17:

- **1906** – The original Boat Basin and harbor were constructed.
- **1970s** – Sediment investigations of Pettibone Creek by Illinois EPA and United States EPA (USEPA).
- **1986** – Initial Assessment Study conducted at NSGL identified 14 potentially contaminated sites. Each site was evaluated with respect to contamination characteristics, migration pathways, and pollutant receptors. The study concluded that seven of these sites, including Site 17, warranted further investigation to assess potential long-term impacts.
- **1991** – Surface water samples contained volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), and other samples contained metals and SVOCs at concentrations three times the background concentrations.
- **1992** – Elevated concentrations of inorganics, chlorinated solvents, pesticides, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) were detected in sediment samples.
- **1995** – Significant metals contamination was detected in sediment samples. The Illinois EPA identified many potential sources that were part of upstream facilities.
- **2001** – Remedial Investigation/Risk Assessment identified that PAHs, pesticides, PCBs, and metals were present in sediment samples; VOCs and metals were present in surface water samples. The risk assessment conducted as part of the Remedial Investigation found no significant risks to human health. However, there was a potential risk to benthic invertebrates.
- **2012** – Sediment Characterization Investigation determined that benthic communities are affected more by habitat stressors than by chemical concentrations in sediment. Investigation results also showed a continuing source of upstream contamination exists, which potentially impacts benthic communities.

between 15 and 30 feet in width, and several inches to 6 feet in depth, with an average flow of less than 10 cubic feet-per-second. Some low-lying banks and small “flood plains” are found within the main banks of the creek. The main banks are generally steep and 3 to 10 feet high. Flooding over top of the higher banks is not known to have occurred.

A path along the North Branch Pettibone Creek is used by staff, military personnel and their family members, and NSGL recruits and students who hike, jog, and walk their dogs. The South Branch flows at the base of steep slopes behind buildings and is not frequented by people. Pettibone Creek is not used as a drinking water source; however, children may play in the creek. Fish are present in the creek and have been observed migrating upstream.

Initial Investigations

Investigations of Pettibone Creek were initiated in the 1970s and originated from studies of the abandoned industrial facilities in the City of North Chicago, located upstream of NSGL (Figure 2). Several of the facilities [Fansteel, North Chicago Refiners and Smelters (NCRS), and the Vacant Lot] were turn-of-the-century manufacturing facilities that produced tantalum mill products, non-ferrous metals, and zinc oxide. USEPA Region 5, Illinois EPA, and the Navy investigated these facilities to determine if contaminants such as VOCs, SVOCs, pesticides, PCBs, and metals were present on those sites.

Remedial Investigation (2001)

The Navy conducted a detailed Remedial Investigation of Pettibone Creek in 2001. The investigation included collection of surface water and sediment samples and analysis of the samples for the potential presence of VOCs, SVOCs, pesticide, PCBs, and metals. The results of the chemical analyses were used to identify the type, extent, and potential sources of the chemicals in the creek. They were also used to estimate risks for potential human exposure to the creek and to determine whether chemical concentrations in the creek could be impacting ecological receptors living in or near Pettibone Creek.

VOCs include compounds such as solvents that are very water soluble and tend to volatilize (evaporate) quickly. The Remedial Investigation did not find significant VOC contamination in surface water. Sediment was also analyzed for VOCs, although it was not expected that VOCs would settle with the sediment at the bottom of the creek. As was expected, the study did not find any indication of significant VOC contamination in creek sediment.

SVOCs are a diverse class of chemicals that include man-made and naturally-occurring compounds. SVOCs tend not to be very water soluble. This is consistent with what was observed in Pettibone Creek, as SVOCs were found to be present at elevated concentrations in sediment but not in surface water. PAHs are a type of SVOCs that were found to be widespread in Pettibone Creek sediment. The most likely source of the PAHs in Pettibone Creek sediment is

surface water run-off from roads, paved parking lots, roofs, and other places where petroleum-based materials (which consist of high concentrations of PAHs) are present. The small particles containing the PAHs in the run-off are then deposited in the sediment after the water discharges to Pettibone Creek through the storm water outfalls.

The Remedial Investigation analyzed the sediment samples for PCBs and pesticides, as these are persistent organic pollutants that are often sources of risk to both human health and the environment (ecological receptors). PCBs and pesticides were detected in the sediment samples. However, the source of the low-level PCBs is not known, and could have been from historical upstream or on-base industrial sources. Similarly, pesticides were routinely used both at NSGL and in local communities. There is no indication from the concentration of pesticides observed that the pesticide concentrations are from anything other than historical use, with the creek as the repository of upstream soil that has been washed away by storm water.

Because of the history of industrial activity in North Chicago, it was not surprising that the Remedial Investigation found metals at significant concentrations in Pettibone Creek sediment. Metals (including copper, lead, mercury, selenium, silver and zinc) were found to be present in the sediment at concentrations above natural background concentrations. It is believed that the vast majority of the metals detected in the Pettibone Creek sediment are from historical upstream refining and smelting operations.

To address potential ecological risks identified during the Remedial Investigation, the Navy issued a Proposed Plan in 2009 outlining potential cleanup options. The Navy ultimately did not select a remedy as a result of the 2009 Proposed Plan. During a review of the data and cleanup options, concerns were raised regarding upstream contamination, beyond the NSGL fence line. The Navy was concerned that upstream sources of contamination had not been addressed and would recontaminate the stream if an action was conducted to remove sediment within the NSGL portion of the creek. The Navy contacted USEPA, Illinois EPA, U.S. Army Corps of Engineers, Illinois Department of Natural Resources, and National Oceanic and Atmospheric Administration regarding the issue and sought information on planned additional work in the upstream areas of Pettibone Creek.

Sediment Characterization (2012)

In 2012, the Navy and regulators concluded that it was necessary to further examine the distribution of chemical concentrations in Pettibone Creek sediment, and to determine, via site-specific biological studies, whether benthic invertebrates were being significantly impacted by site-related chemicals in the sediment.

The Sediment Characterization Report completed in 2012 showed that chemical concentrations, primarily PAHs and metals such as copper, lead, and zinc, are generally higher in the North Branch of Pettibone Creek compared to the South Branch. The report confirmed that there remains a

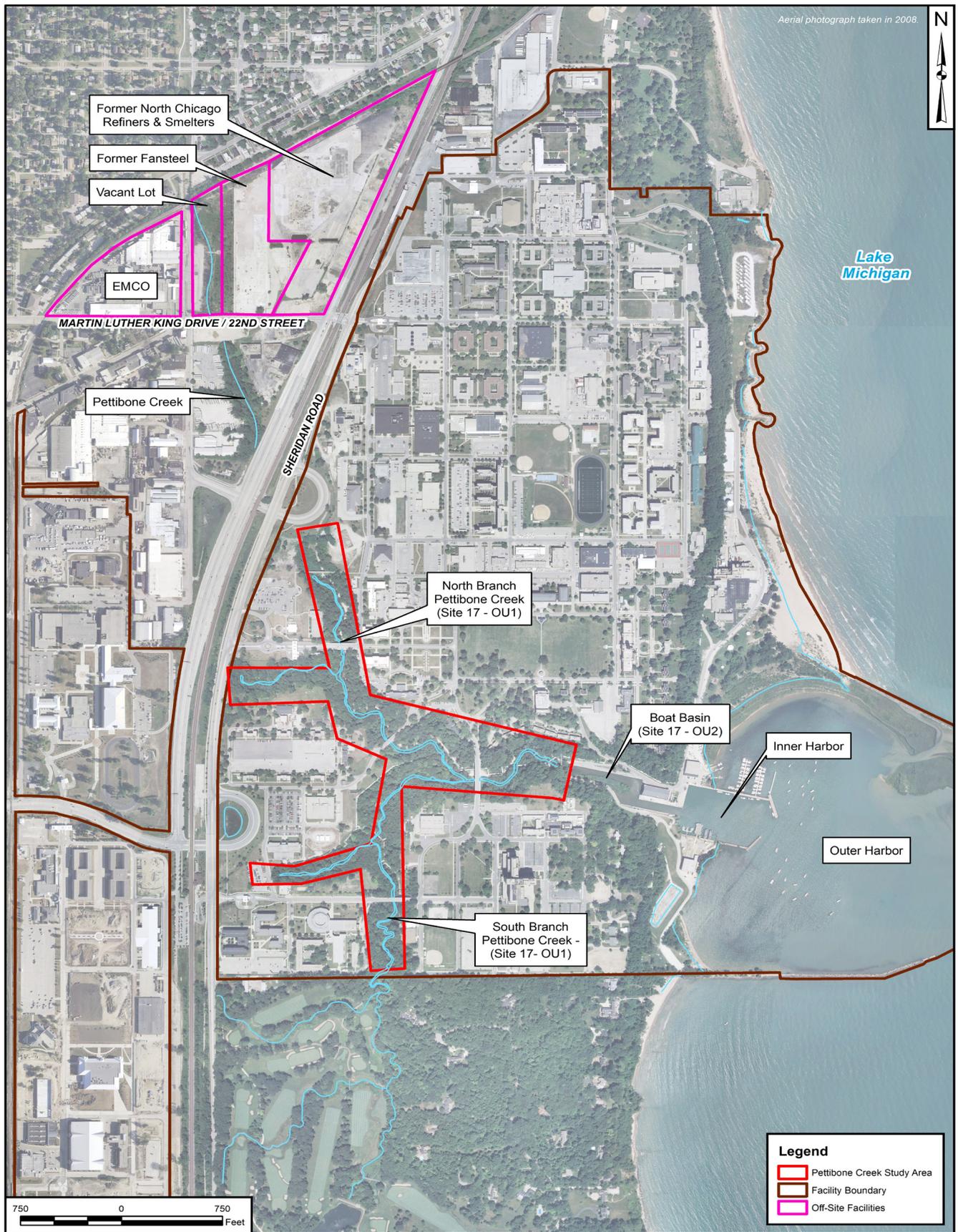


Figure 2: Site 17 - Pettibone Creek

continuing source of contaminants to sediment from upstream off-base (non-Navy) sources. The 2012 sediment chemistry results also showed that overall chemical concentrations in sediment were significantly lower than what was observed in 2001. The lower concentrations in the 2012 samples are likely the result of many upstream sources of contamination being eliminated or reduced and the contaminated sediment being either covered or transported downstream into the Boat Basin. It is expected that chemical concentrations in the sediment will continue to decline over time, as industrial activities in upstream areas of North Chicago are better controlled by environmental regulations.

SUMMARY OF SITE RISKS

Remedial action is needed when an unacceptable risk of exposure to contaminants exists for potential receptors such as children, adults, or wildlife. The human health risk assessment focused on adolescent and adult recreational users exposed to surface water and sediment in Pettibone Creek. The ecological risk assessment focused on the typical species that may live in or be exposed to the surface water and sediment in Pettibone Creek. The following sections summarize the results of the human health and ecological risk assessments. Figure 3 presents the conceptual site model for Site 17 – Pettibone Creek.

Human Health Risks

The risk assessment conducted as part of the 2001 Remedial Investigation determined that there were no significant risks to human health from exposure to chemicals in creek surface water or sediment. The human receptors that were evaluated in the risk assessment were adult and adolescent recreational users exposed to surface water and sediment via dermal contact and incidental ingestion. Although some fish may be present in the North Branch of Pettibone Creek, it does not support a significant fish population; therefore, the risk assessment assumed that recreational fishing does not occur within Pettibone Creek.

For known or suspected carcinogens, USEPA acceptable additional cancer risk falls within a range between one person in ten thousand (1×10^{-4}) and one person in one million (1×10^{-6}), known as the risk management range. Risks less than one in one million (that is, less than 1×10^{-6}) are considered to be acceptable. Risks greater than one in ten thousand (that is, greater than 1×10^{-4}) may indicate the need for further evaluation. The cancer risk for adult (6.9×10^{-6}) and adolescent (2.6×10^{-6}) recreational users from exposure to surface sediment in the North Branch of Pettibone Creek was within the USEPA risk management range. Risks greater than 1.0×10^{-6} were mainly the result of exposure to PAHs. The cancer risks for adult and adolescent recreational users from exposure to surface water in the North Branch of Pettibone Creek were less than 1.0×10^{-6} . The Hazard Indices for adult and adolescent recreational users exposed to creek sediment and surface water in the North Branch of Pettibone Creek were less than 1.0, indicating that humans should not experience non-cancer risks. Therefore, potential human

health impacts associated with exposure to Pettibone Creek are considered minimal.

Ecological Risks

The risk assessment conducted as part of the 2001 Remedial Investigation evaluated risks to benthic invertebrates, fish, piscivorous birds, and carnivorous mammals exposed to chemicals in surface water and sediment. The risk assessment results showed that there was a potential risk to benthic invertebrates that live in the creek sediments. Benthic invertebrates are small organisms, such as worms and crayfish, which have no backbones. The potential risks to the benthic invertebrates were from PAHs, pesticides, and metals detected in the North Branch of Pettibone Creek sediment samples at concentrations that exceeded sediment benchmarks. Most of the elevated concentrations of these chemicals were detected in the furthest upstream sample which indicates that the predominant source of these chemicals appeared to be off-site of NSGL. The risk assessment also found that there was a potential risk to piscivorous (fish-eating) birds from two pesticides (4,4'-DDE and 4,4'-DDT) based on a model of contaminant uptake through the food chain. However, the concentrations of pesticides are indicative of concentrations associated with typical applications of the pesticides when it was legal to do so; therefore, they did not appear to be related to site activities.

As part of the Sediment Characterization completed in 2012, composite sediment samples were collected for chemical analysis and toxicity testing, and benthic community health data was collected to directly determine whether benthic invertebrates are being adversely impacted from exposure to North Branch Pettibone Creek sediment. This approach is sometimes referred to as the sediment triad approach because sediment chemistry, toxicity testing, and benthic community survey data provide three lines of evidence regarding the health of the benthic invertebrates in the sediment. As part of the benthic invertebrate community survey, benthic invertebrates were collected from 14 areas within the creek to adequately characterize the benthic community present within Pettibone Creek. Nine of the areas were located along the North Branch of Pettibone Creek and five of the areas were located along the South Branch of Pettibone Creek, which is not significantly contaminated and is considered a reference location. Sediment samples were also collected from off-base upstream locations to determine whether there is a continuing upstream source of contamination in Pettibone Creek. Potential risks to piscivorous birds were not evaluated in the Sediment Characterization investigation because total DDT concentrations in sediment were much lower in the 2012 samples so risks would have decreased to acceptable levels. Also, as discussed in the Remedial Investigation, the pesticides do not appear to be site-related.

The first line of evidence, the benthic community survey, found that the benthic community in Pettibone Creek ranged from poor to fair, with the benthic communities in the South Branch generally better than those in the North Branch. A strong correlation between benthic community health and

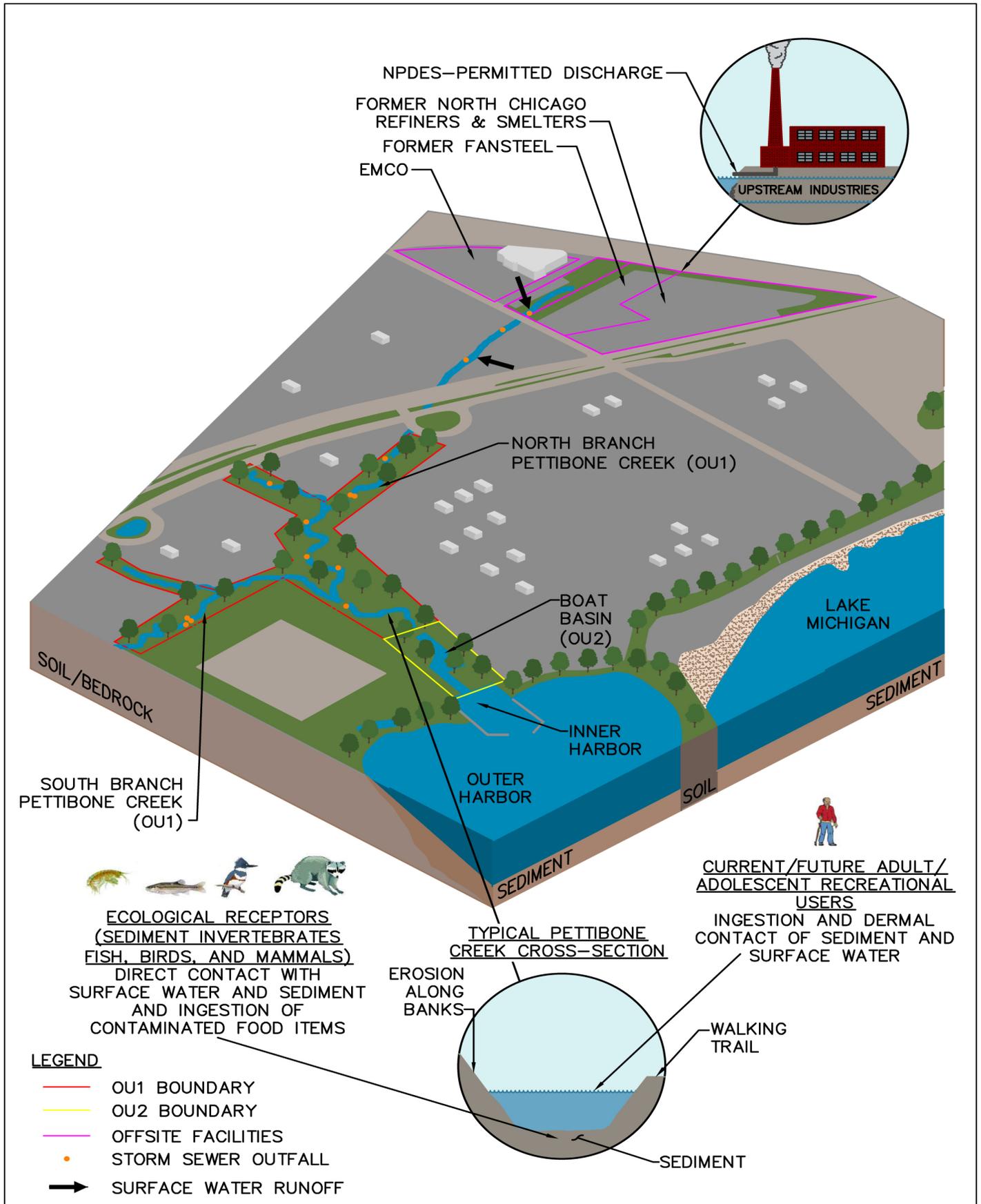


Figure 3: Site 17 Conceptual Site Model

physical stressors related to habitat conditions suggested that almost 50 percent of the variability in the biological index can be attributed to habitat. Habitat stressors within Pettibone Creek include the extent of in-stream cover, the channel morphology, and the water velocity during high-flow events. The next line of evidence was sediment chemistry. Several chemicals were detected at concentrations that exceeded their respective ecological sediment criteria. Finally, the last line of evidence, toxicity testing, found that none of the site samples were considered impacted regarding the survival or growth of *Hyalella azteca* (scud).

Based on the results of the three lines of evidence (chemistry, toxicity testing, and benthic community survey data) from the 2012 investigation, the possibility that chemicals in the sediment are at least partially impacting the benthic community in Pettibone Creek could not be ruled out. However, the lack of toxicity observed in the toxicity test supports the likelihood that the poor to fair benthic community in the creek is related to habitat conditions. This is further supported by the fact that no strong relationships were found between chemical concentrations and the benthic community using toxicity test results. Therefore, it is believed that benthic communities are affected more by habitat stressors than by sediment contamination so any actions to address chemical concentrations in the sediment may not actually result in an improved benthic community. For that reason, it was determined that risks to benthic macroinvertebrates from chemicals in the sediment are not considered great enough to warrant a remedial action. In addition, because of the existing physical site characteristics of the site, a remedial action, such as dredging the sediment, would likely further impact the creek bed habitat, as well as the ravine sides, which are severely sloped and under continual erosive forces.

DESCRIPTION OF THE NO ACTION PROPOSED PLAN

Under CERCLA, No Action is appropriate for sites when there is no current or potential threat to human health or the environment. Because no unacceptable risks to human health or the environment were identified for Pettibone Creek based on the completed investigations and risk assessments, there is no requirement that the Navy undertake an action to address the sediment or surface water in the creek. For that reason, the Navy and Illinois EPA recommend the No Action alternative because it has been determined that it is protective of public health and the environment. There is no direct cost for this alternative.

EVALUATING ALTERNATIVES AGAINST THE NINE CRITERIA

The Navy evaluated the No Action alternative against eight of the nine criteria that are used to help decide which plan is best (see "Explanation of Evaluation Criteria" on the following page). The ninth criterion, community acceptance, will be evaluated after the Navy receives public comments. The

degree to which the alternative meets the evaluation criteria, as determined by the Navy, is briefly discussed in the table below.

Remedial Alternatives	No Action
Overall Protection of Human Health and the Environment	Alternative is Protective
Compliance with Applicable or Relevant and Appropriate Requirements	Evaluation criterion is not relevant because no site-related unacceptable human health or ecological risks were identified.
Long-Term Effectiveness and Permanence	Continued movement of contaminants from upstream sources may impact the creek sediment within NSGL. However, it is not expected that risks will increase significantly above current levels based on available upstream data.
Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation criterion is not applicable to the No Action Alternative since no action would be taken.
Short-Term Effectiveness	The No Action alternative is effective in the short term because the current contaminant extent does not present an unacceptable risk to human health or the environment.
Implementability	The No Action alternative is readily implementable.
Cost	\$ 0
State Acceptance	Yes. The Illinois EPA has indicated that the current data support taking no direct action to address Pettibone Creek sediment.
Community Acceptance	To be determined based on public comment.

NEXT STEPS

The Navy will receive comments during the 30-day public comment period (May 16 to June 17, 2013). 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. The Navy's final decision will be outlined in the Record of Decision. A summary of the decision will be advertised in the local newspaper.

Explanation of evaluation criteria

1. Overall protection of human health and the environment addresses how well an option protects people and the environment. This standard can be met by reducing or removing pollution or by reducing exposure to it.
2. Compliance with applicable or relevant and appropriate requirements (ARARs) ensures that options comply with federal, state and local laws.
3. Long-term effectiveness and permanence evaluates how well an option will work over the long-term, including how safely remaining contamination can be managed.
4. Reduction of toxicity, mobility or volume through treatment addresses how well the option reduces the danger, movement and amount of pollution.
5. Short-term effectiveness compares how quickly an option can help the situation and how much risk there will be while the option is under construction.
6. Implementability evaluates how feasible the option is and whether materials and services are available in the area.
7. Cost includes not only buildings, equipment, materials and labor but also the cost of maintaining the option for the life of the cleanup.
8. State acceptance asks does the state environmental agency accept the option? Illinois EPA evaluates this criterion after receiving public comments.
9. Community acceptance judges how well do nearby residents accept the option? Illinois EPA checks this standard after a public hearing and comment period.

FOR MORE DETAILED INFORMATION

To help the public understand and comment on the proposal for this site, 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/RsJ>

From that website, click on the "Administrative Records" tab, enter the Administrative Record, and search for "SITE 00017" documents. If you do not have a computer or internet access, hard copies of the Administrative Record can be viewed at NSGL. Please contact Mr. Simes at (847) 688-2600 x320 to arrange a time and location for reviewing the information.

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 site. This body of documents is kept at a location where it can be accessed by the general public.

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

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.

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. Metals are classified as inorganic because they are a mineral, and not of biological origin.

Polychlorinated biphenyls (PCBs): Used as dielectric and coolant fluids, for example in transformers, capacitors, and electric motors.

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.

Remedial Investigation/Risk Assessment (RI/RA): A report that describes the site, documents the type and location of environmental contaminants, and presents the results of the risk assessment.

Record of Decision (ROD): An official document that describes the selected Superfund 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.

Risk: Defined as a process that evaluates the likelihood that adverse human health effects or ecological effects are occurring or may occur as a result of exposure to one or more contaminants or stressors.

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.

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. Such compounds participate in a range of processes that lead to atmospheric pollution, including the formation of urban smog.

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Place
Stamp
Here

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