PROPOSED REMEDIAL ACTION PLAN

Harbor at Hastings
Operable Unit Number: 02
State Superfund Project
Hastings-on-Hudson, Westchester County
Site No. 360022
January 2012

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repositories identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repositories:

> Hastings Public Library
> Attn: Susan Feir
> 7 Maple Avenue
> Hastings-on-Hudson, NY 10706
> Phone: 914-478-3307

NYSDEC Region 3
Attn: Call for Appointment
21 South Putt Corners Road
New Paltz, NY 12561
Phone: 845-256-3154

A public comment period has been set from:

January 11, 2012 to February 10, 2012

A public meeting is scheduled for the following date:

January 26, 2012

Public meeting location:

James Harmon Community Center, 44 Main Street, Village of Hastings-on-Hudson

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent to:

William Ports
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
wfports@gw.dec.state.ny.us

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and

Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The site is located on approximately 28 acres along the Hastings-on-Hudson waterfront, separated from the village commercial district by railroad tracks. The site is bounded on the north and west by the Hudson River and to the south by the Tappan Terminal site. A former marina borders the site to the north.

Site Features: Most of the site is covered by pavement or concrete building slabs. One building remains at the site (Building 52). The shoreline consists of areas of loosely-placed rip rap and concrete rubble in the north and decaying wooden bulkheads, docks and piers in the central area. Two former boat slips are present along the waterfront, both of which have filled in to a shallow depth with naturally-deposited sediment. The shoreline south of the South Boat Slip consists of modern steel sheeting.

Current Zoning and Uses: The site is zoned general industrial, and is the subject of planning studies by the Village of Hastings-on-Hudson. The current owner, ARCO Environmental Remediation LLC, leases a portion of the site for the storage of new automobiles. Several temporary trailers are in use for security and remedial activities.

Historical Uses: The site is the former Anaconda Wire and Cable Company, which ceased operations in 1974. Wire manufacturing operations caused the release of PCBs and metals to site soil, groundwater and sediments. A site investigation was performed in 1986-87 in connection with a potential real estate development. This investigation led to the discovery of high levels of PCBs beneath the northwest corner of the site.

Operable Units: The site is divided into two operable units. An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. Operable Unit 1 (OU1) is the on-site soils area west of the railroad tracks. OU2 is the off-site impacts to the Hudson River.

Site Geology and Hydrogeology: The landmass of the property was constructed by placement of fill material into the Hudson River until the early 1900s. This fill material is approximately 10-20 feet thick along the railroad tracks, and 20-40 feet thick along the river. Beneath the fill layer lies the Marine Silt, which is a structurally weak clayey silt material that is approximately 40 feet thick along the shoreline. Beneath the Marine Silt lies the Basal Sand unit, a very dense sand and gravel material, into which all structural piles for site buildings were placed. Groundwater is approximately 2 to 8 feet below ground surface in the fill material, and is influenced by tidal variation. Groundwater in the Basal Sand unit is confined by the Marine Silt unit and is present in an artesian condition. The shoreline shows signs of historical erosion due to storm events and wave action. Low-lying parts of the site have been flooded during larger storms.

Operable Unit (OU) Number 02 is the subject of this document.

A Record of Decision was issued previously for OU 01.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to restricted-residential use (which allows for commercial use and industrial use) as described in Part 375-1.8(g) are/is being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Atlantic Richfield Company (ARCO)

The Department and ARCO entered into Consent Orders in 1995 and March 2005. These Orders obligate ARCO to implement a RI/FS and RD/RA for OU1.

The PRPs for the site declined to implement a remedial program when requested by the Department for OU2. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Information

The analytical data collected on this site includes data for:

- groundwater
- surface water
- soil
- sediment

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified for this Operable Unit at this site is/are:

polychlorinated biphenyls (pcb)	lead
copper	zinc

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- surface water
- sediment

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

There were no IRMs performed in OU2 during the RI.

6.3: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure*.

For OU-1: The site is completely fenced, which restricts public access. Some contaminated soils remain at the site below concrete and/or clean fill, therefore, people will not come in contact with contaminated soil unless they dig below the surface materials. Contaminated groundwater at the site is not used for drinking or other purposes as the site is served by a public water supply that obtains water from a different source not affected by this contamination. For OU-2: People using the river for recreational purposes such as swimming and boating may come into direct contact with site related contaminants. The river is not a source of potable water in this area. People may come in contact with contaminants present in shallow sediment while entering and exiting the river. Fish in the river are likely to contain the same contaminants that are present in surface water and sediment; therefore, people who consume fish from the river are likely to be consuming these contaminants as well. For specific advisories on fish consumption in this area please refer to NYSDOH's Health Advise on Eating Sportfish and Game. http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/docs/advisory_booklet_2011.pdf

6.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

The Fish and Wildlife Resources Impact Analysis (FWRIA) for OU 02, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

The primary contaminants of concern for the site are PCBs (Aroclors 1260 and 1262) and metals, including copper, lead and zinc from historic wire manufacturing operations. For OU1, soil and groundwater beneath the site are contaminated with PCBs and metals, including beryllium, above standards, criteria and guidance values. For OU2, PCBs and metals have also contaminated Hudson River surface water and sediments, and site-related PCBs have been detected in resident fish.

The site presents a significant environmental threat due to ongoing releases from contaminated soils and/or sediments to groundwater, surface water and the Hudson River ecosystem. Metals in sediment pose a toxicity threat to benthic organisms, and PCBs in sediment pose a toxicity and bioaccumulation threat to fish and wildlife.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Surface Water

RAOs for Public Health Protection

- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Restore surface water to ambient water quality criteria for the contaminant of concern.
- Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain.

Sediment

RAOs for Public Health Protection

- Prevent direct contact with contaminated sediments.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of (ambient water quality criteria).
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.
- Restore sediments to pre-release/background conditions to the extent feasible.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

To be selected, the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the FS report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's proposed remedy is set forth at Exhibit D.

The estimated present worth cost to implement the proposed remedy is $105,000,000. The cost to construct the remedy is estimated to be $95,200,000 and the estimated average annual cost is $454,000.

The elements of the proposed remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development

2. Installation of a sheet pile wall within the Hudson River to provide containment and allow for the recovery of liquid PCB DNAPL offshore of the northwest corner of the site. The location and alignment of the northwest extension area (NEA) sheet pile wall will be verified during the remedial design to minimize filling into the Hudson River while enabling effective DNAPL containment and recovery and maintaining stability of the site. It is estimated that this area of fill will encompass 0.88 acres. The area behind the sheet pile wall will be filled with soil

and/or lightweight aggregate as approved by the Department. The sheet pile wall will include sealed joints, installation of tie-rods, upland anchors, and cathodic protection. The wall system will also include groundwater filtration units to adsorb contaminants that may be present in groundwater before discharge to the river.

3. Mitigation of fill placed into the Hudson River to replace the aquatic habitat that will be lost as a result of the NEA. Mitigation will involve the creation and/or restoration of river habitat in accordance with a Department-approved plan.

4. Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the northwest corner of the site and the NEA.

5. Removal of sediment and fill that contains PCB concentrations greater than 1 ppm and/or copper, zinc and lead concentrations above the background concentrations listed in Table 2 of Exhibit A, to a maximum excavation depth of 6 feet within the area where sediment resuspension controls, such as a fixed silt curtain, are feasible. This area generally corresponds to a water depth of 15 feet and a distance from the shoreline into the river of approximately 60 to 80 feet and along approximately 2000 feet of shoreline.

6. The specific area where fixed sediment resuspension controls can be feasibly deployed will be evaluated during design based on the water depth and velocity conditions at the site. Alternative designs for fixed resuspension controls will be evaluated to increase the depth of feasible resuspension controls. Designs for mobile resuspension controls will also be evaluated and developed for dredging in deeper water, if necessary.

7. Removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water that is defined by PCB concentrations greater than 50 ppm, to a maximum depth of 6 feet. During the design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging.

8. On-site dewatering of dredged and excavated sediments for off-site transportation and disposal or onsite reuse, as appropriate. On-site reuse of sediments will be evaluated during design. Water removed from the sediment will be treated and discharged back to the river in compliance with regulatory requirements.

9. Backfill of dredged areas with Department-approved material. Dredged areas within the resuspension controls will be backfilled with clean material to isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer. In nearshore areas which have contamination remaining above background concentrations, isolation capping will be placed following dredging. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer. The isolation and armoring layer thicknesses and materials of the cap will be established in the remedial design. As part of the design, a river flow and deposition study will be conducted to determine approximate sedimentation rates and the acceptability that up to 12 inches of the habitat layer may fill in by

natural deposition within a reasonable duration of time after installation of the remainder of the isolation cap. Additional backfill needed to reach bathymetry requirements will be placed between the erosion protection layer and habitat layer. The habitat layer will be designed to restore aquatic habitat. Dredged areas that are outside the near shore area will be backfilled with appropriate river substrate to within 12 inches of the pre-dredge elevation provided that the sedimentation study demonstrates that sufficient deposition will occur within a reasonable time frame. All activities associated with the excavation and restoration of Hudson River sediments will meet the requirements of 6NYCRR Part 608.

10. Imposition of an institutional control in the form of an environmental easement for the NEA which will be included with the environmental easement for OU1 that will:

a. require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);

b. allow the use and development of the controlled property for restricted residential uses as defined by Part 375-1.8(g), consistent with the OU1 ROD, as amended,, although land use is subject to local zoning laws;

c. restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;

d. prohibit agriculture or vegetable gardens on the controlled property; and

e. require compliance with the Department approved Site Management Plan.

11. A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:
Institutional Controls: The Environmental Easement discussed in Paragraph 10 above.
Engineering Controls: The sediment containment system and cover discussed in Paragraphs 2 and 9.

This plan includes, but may not be limited to:

i. Excavation and Sediment Management Plan which details the provisions for management of future excavations in areas of remaining contamination and includes a prohibition on the construction of pile-supported structures within the Northwest Area;

ii. descriptions of the provisions of the environmental easement including any land use, groundwater, and surface water use restrictions;

iii. provisions for the management and inspection of the identified engineering controls;

iv. maintaining site access controls and Department notification; and

v. the steps necessary for the periodic reviews and certification of the institutional and engineering controls.

b. a monitoring plan to assess the performance and effectiveness of the remedy. The plan will be designed to measure PCB and metals concentrations and evaluate the long-term contaminant trends in the affected media (biota, sediment, water). One goal of the monitoring program will be to determine if the remedy is successful in reducing the local contribution to PCB tissue concentrations in biota. This program will monitor the performance and effectiveness of the remedy in achieving the remedial goals established for the project and will be a component of the monitoring and maintenance of the site. The plan includes, but may not be limited to:

i. baseline sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and habitat characterization;

ii. long-term sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and restoration success to assess the performance and effectiveness of the remedy; and

iii. a schedule of monitoring and frequency of submittals to the Department.

c. an Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

i. compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;

ii. maintaining site access controls and Department notification; and

iii. providing the Department access to the site and O&M records.

Exhibit A

<u>Nature and Extent of Contamination</u>

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into two categories: pesticides/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). For comparison purposes, the SCGs are provided for each medium.

The former manufacturing operations within OU 1 caused the release of PCBs and metals to site soil, groundwater and sediments at the Harbor at Hastings Site. The nature and extent of contamination found in OU 1 is important to understanding the contamination found in the sediments of OU 2. The areas of concern include the Northwest Corner On-Shore Area, Building 52 outfalls, Building 15 Outfall, and Sluice Area have been identified as areas which have caused the release and discharge of contaminants from portions of OU 1 to the OU 2 sediments. These areas are shown on Figure 2.

The OU 2 portion of the site is divided into different areas which has been useful to define the nature and extent of contamination and evaluate alternatives. These areas are described below and are labeled on Figure 2.

<u>Near Shore Area</u>: The area of sediments along the shore defined by the feasible limit of resuspension controls on the west and the existing bulkhead between OU1/OU2 boundary on the east. This area is generally within 60 to 80 feet from the shoreline. This area does not include the Backwater Area or the Northwest Corner Off-Shore Area.

<u>Backwater Areas</u>: These sediment areas include the Old Marina, North Boat Slip, and South Boat Slip and are areas with lower river velocities and have been identified with increased sediment deposition.

<u>Deepwater Area</u>: Sediment areas beyond the feasible deployment of resuspension controls. The furthest extent of contamination is approximately 400 feet west of the OU 1 shoreline and 300 feet north, and adjacent to the OU1 southern boundary.

<u>Northwest Corner Off-Shore Area</u>: The area of rip rap that is offshore of the Northwest Corner On-Shore Area of OU1. This area extends approximately 100 feet from the shoreline and represents an area of approximately 0.88 acres.

<u>The Northwest Corner On-Shore Area</u>: The area of OU1 where PCB DNAPL has been found and current PCB DNAPL recovery is occurring.

Waste/Source Areas

As described in the RI and Feasibility Study reports, waste/source materials were identified at the site and are impacting sediment.

Wastes are defined in 6 NYCRR Part 375-1.2 (aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375 (au). Source areas are areas of concern at a site were substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Wastes and Source areas were identified at the site in sediment areas in close proximity to outfalls and manufacturing buildings.

The highest levels of PCB in sediments at the site were found in the Northwest Corner Off- Shore Area and were associated with separate phase PCB material that varies in consistency from a fluid dense non-aqueous phase liquid (DNAPL) to an elastic material that resembles rubber cement. This PCB material is the Aroclor wire insulating mixture that was formulated in the Northwest Corner On-Shore Area of the property in Building 56. This material apparently migrated through the soil beneath the property in its fluid form and was also discharged into the Hudson River through outfalls; by runoff; and eroded surface soil from areas where wire reels were dried or stored on the site.

The PCB Material has been classified in three different physical states, the variation in the physical state of the material represents weathering changes since the material was released:

> Liquid PCB (LPCB) Material or Dense Non-aqueous Phase Liquid was observed to be amber in color, is less viscous than the Semi-Solid or Trace PCB Material and is highly to moderately mobile, readily flowing into monitoring wells when it is encountered.
>
> Semi-Solid PCB (SSPCB) Material was generally observed to be more viscous than Liquid PCB Material and appeared grayish-brown in color. Based on visual observations, SSPCB has a sticky, string-like consistency. Although not as fluid or capable of migration, large deposits of semi-solid PCBM have been identified.
>
> Trace PCB (TPCB) Material, when observed, consists of small quantities of TPCB Material intermingled with the soil and was more difficult to visually observe. Like the Semi-Solid PCB Material, the Trace PCB Material had a string-like consistency (small strings and hair-like filaments) and appeared grayer in color.

Samples containing PCB Material were found in sediments adjacent to the northwest corner of the property, as indicated on Figure 3. Samples outside this area generally contained lower levels of PCBs, indicating that the contamination is sorbed onto the sediment particles. The precise locations in the subsurface and boundaries between the different forms of PCB material is not currently known, due to the limitations to perform investigation borings to the targeted depth in the area of rip rap immediately off-shore of the site.

With limited exceptions, the depth of PCB migration in both OU1 and OU2 is controlled by the marine silt layer, which is present between 30 and 42 feet beneath the site. The surface of the marine silt, which generally tilts towards the Hudson River, is also characterized by troughs and ridges. These features may be directing the migration of the liquid PCB material beneath the site, creating preferential pathways and depressions where the material may pool.

Investigations beginning in 2006 and continuing into 2011 identified locations at which liquid PCB Material is present beneath the Northwest Corner On-Shore Area shoreline in both monitoring wells and DNAPL recovery wells. Soil and sediment sampling has generally identified the PCB nature and distribution in the shoreline and sediment area. The location where PCB DNAPL was identified in monitoring and recovery wells is shown on Figure 3.

The waste/source areas identified will be addressed in the remedy selection process.

Surface Water

Surface water samples were collected during the RI from upstream and on-site locations in the Hudson River. The samples were collected to assess the surface water conditions on and off-site. The results indicate that polychlorinated biphenyls (PCBs) and lead in surface water at the site exceed the Department's Surface Water Quality Standards. Levels of PCB in Hudson River surface water were higher than the 0.001 parts per trillion (ppt) standard in all of the 5 samples taken. The highest level, 62.4 ppt, was found in the North Boat Slip area of the site. Elevated levels were also found in samples taken offshore of Dobbs Ferry, the background location (57.0 ppt), in the former marina area (52.7 ppt), and offshore of the northwest corner (46.6 ppt). The sample taken offshore of Dobbs Ferry was significantly more turbid than the others, and elevated levels seen there may have resulted from suspended material in the sample. A much lower level (18.0 ppt) was found in the south boat slip.

The PCB analysis for these samples was congener-specific, so an evaluation of Aroclor patterns was not performed. However, the highest degree of chlorination, which is consistent with the higher numbered Aroclors (eg. Aroclor 1260) found at the site, was found in the sample collected from the old marina. The lowest degree of chlorination was found in the sample collected from Dobbs Ferry, the upstream location. These results suggest that the site is a source of dissolved PCBs in the Hudson River.

Table 1 - Surface Water

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb) or (ppt)	Frequency Exceeding SCG
Metals			
Lead	6.3 to 23.1 ppb	8.0 ppb	2 of 4
Pesticides/PCBs			
PCBs, total	18.0 to 57.0 ppt	0.001 ppt	4 of 4

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b-SCG: Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1) and 6 NYCRR Part 703: Surface Water and Groundwater Quality Standards.

The primary surface water contaminants are polychlorinated biphenyls (PCBs) and lead associated with historical manufacturing and disposal at the site. The primary surface water contamination is found where high levels of PCBs were found in soils and sediments near the Northwest Corner Off-Shore Area.

Based on the findings of the Remedial Investigation, the presence of PCB in soils and sediment has resulted in the contamination of surface water. The site contaminants that are considered to be the primary contaminants of concern in surface water which will be addressed by the remedy selection process are PCBs and lead.

Sediments

Sediment samples were collected during the RI and during additional investigations from the Hudson River and at locations upstream, adjacent and downstream of the site along the Hudson River. The samples were collected to assess the potential for impacts to river sediment from the site related contaminants. The results indicate that sediment in the Hudson River exceed the Department's sediment SCGs for PCBs, copper, lead, mercury, nickel, silver and zinc. The following is a summary of the SCGs and patterns of detection for these metals and PCBs.

The highest PCB concentrations in shallow and deeper sediment were found offshore of the northwest corner of the property. The samples included PCB material identified as semisolid PCB material. It appears that the PCB Material moved through the more permeable fill unit and into the sediments. A conceptual model of PCB migration showing the PCB migration pathways is shown in Figure 4.

Screening Criteria for PCBs

For PCBs and other organic contaminants, the "Technical Guidance for Screening Contaminated Sediments" lists four screening values that correspond to different levels of protection. The values for these criteria were calculated using the site-specific values of organic carbon content, as directed by the guidance, and are listed in Table 3.

Remediation Goals That Account for Background Contamination

Because sediments in the lower Hudson River are widely contaminated with low levels of PCBs that exceed some of these screening criteria, background levels were factored into the development of site-specific remediation goals. Background levels of PCBs in the 10 samples taken upstream and across the river from the site ranged from non-detectable to 7.0 ppm. The sediment containing the 7.0 ppm value was re-sampled and determined to contain 1.2 ppm PCB based on re-sampling. As a result, the Feasibility Study considered 1 ppm as a remedial goal based on background conditions. It should be noted that where background concentrations that exceed risk-based criteria for toxicity and/or bioaccumulation are used as remediation goals, some ecological risk is anticipated to remain in the unremediated sediments.

Screening Criteria for Metals

New York State sediment criteria for metals are based on their toxicity to sediment-dwelling (benthic) organisms. For each metal, the following criteria were considered. Specific values are listed in Table 2.

The following effects-based values are based on observed toxicity from field studies, as reported in the literature:

Effects Range - Low (ER-L) - The level of sediment contamination that can be tolerated by most benthic organisms, but still causes toxicity to a few species.

Effects Range - Median (ER-M) - The level at which significant harm to benthic aquatic life is anticipated.

Remediation Goals That Account for Background Contamination

Because sediments in the lower Hudson River are widely contaminated with some metals that exceed effects-based levels, background levels were factored into the development of site-specific remediation goals. The site-derived background concentrations were determined based on a combined sediment data set from the 2003 Feasibility Study and "Hudson River Estuary Sediments – Metals" (NYSDEC 2009). The 90th and 95th percentile values of the background data set were used to determine the range of site-specific background concentrations of metals.

Copper concentrations exceeded the effects range median (ER-M) of 270 ppm in shallow sediment at three locations: offshore of the sluice discharge area, offshore of the Building 15 SPDES discharge pipe, and in the northwest area over the Fill Unit. The extent of copper concentrations in the deeper sediments was greater in comparison to the shallow sediments.

Lead concentrations also exceeded the ER-M of 218 ppm in sluice area, the northwest area over the Fill Unit, and a location off-shore. The detection of high concentrations of lead were similar to copper, but at a lesser distance from shore.

The range of mercury contamination in shallow sediments (0.018 to1.4 ppm) is similar to background levels (0.41 to 2.5). The pattern of mercury contamination shows that levels are higher near shore and near the former marina, which are both sediment deposition areas. Because mercury levels are consistent with background, and there is no pattern of mercury contamination near OU 1 source areas, mercury appears to be caused by regional or upstream contaminant sources.

Nickel exceeded the ER-M of 52 ppm in both the shallow and deeper sediments at the same locations, off-shore of the sluice and water tower areas.

Silver exceeded the ER-M of 3.7 ppm in two locations of the northwest area of the site for the shallow sediments and broad areas offshore of the south boat slip, north boat slip, and old marina for the deeper sediments. Silver was not identified as a contaminant of concern on the OU 1 property, and the pattern of silver contamination is not consistent with the presence of the on-site source areas.

Zinc exceeded the ER-M of 410 ppm offshore of the sluice area and the water tower area for the shallow sediments. The deeper sediments exceeded the ER-M offshore of the sluice, Building 15 discharge pipe, and offshore of the water tower area.

The highest concentrations of metals in sediments are found in the offshore of the sluice area, Building 15 discharge pipe, and water tower area. The concentrations of metals found in these areas are much lower past approximately 100 feet of the shoreline. The deeper sediments within 100 feet of shore, up to 6 feet, generally have higher concentrations than the shallow sediments (0- 2 feet).

Figure 5 and 6 present the areas identified with PCB and metals sediment contamination from the site.

Table 2 - Sediment

Detected Constituents	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)	Frequency Exceeding SCG	Site Derived Value [c] (ppm)	Frequency Exceeding Site Derived Value
Metals					
Arsenic	1.5 – 44.4	ER-L 8.2	330 of 543		
		ER-M 70	0 of 543		
Cadmium	ND – 87.3	ER-L 1.2	376 of 574		
		ER-M 9.6	181 of 574		
Copper	ND -4301	ER-L 34	393 of 546	104 to 129	219 of 546
		ER-M 270	92 of 546		190 of 546
Lead	ND- 2,700	ER-L 46.7	359 of 523	110 to 132	153 of 523
		ER-M 218	15 of 523		105 of 523
Mercury	ND – 4.0	ER-L 0.15	360 of 492		
		ER-M 0.71	284 of 492		
Nickel	ND- 1,390	ER-L 20.9	391 of 523		
		ER-M 51.6	8 of 523		
Silver	ND -11.9	ER-L 1.0	284 of 523		
		ER-M 3.7	65 of 523		
Zinc	ND- 6,450	ER-L 150	278 of 523	203 to 234	153 of 523
		ER-M 410	35 of 523		111 of 523
PCBs					
	ND-5,200	See Table 3		1	314 of 1014

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment;
b - SCG: The Department's "Technical Guidance for Screening Contaminated Sediments."
c – Site Derived Value: Background range for metals (copper, lead and zinc) is the 90th to 95th percentile values of the metals background data set.
ER-L = Effects Range – Low and ER-M = Effects Range – Median. A sediment is considered contaminated if either of these criteria is exceeded. If the ER-M criteria are exceeded, the sediment is severely impacted. If only the ER-L is impacted, the impact is considered moderate.

Table 3 PCB Screening Criteria for Alternate Levels of Protection

LEVEL OF PROTECTION	PCB SCREENING CRITERION	FREQUENCY OF EXCEEDANCE IN SURFACE SEDIMENT (0-6")	FREQUENCY OF EXCEEDANCE IN SUBSURFACE SEDIMENT (>6")
Human Health Bioaccumulation	0.019 ppb[a]	85/153	380/863
Wildlife Bioaccumulation	34.2 ppb	85/153	380/863
Benthic Aquatic Life Chronic Toxicity	1.010 ppm	46/153	271/863
Benthic Aquatic Acute Toxicity	335 ppm[a]	0/153	21/863

These are site-specific values calculated based on the average measured organic carbon content of the sediment of 2.43%.

a - ppb: parts per billion, which is equivalent to micrograms per kilogram, ug/kg, in sediment;
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment;

Based on the findings of the Remedial Investigation, the presence of PCBs, copper, lead, mercury, nickel, silver and zinc have resulted in the contamination of sediment. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of sediment to be addressed by the remedy selection process are PCBs, copper, zinc and lead.

Exhibit B

Description of Remedial Alternatives

Site Specific Conditions Limiting the Development of Alternatives

Geotechnical instability associated with the northwest corner is a critical factor in the development of the alternatives. Global stability refers to the ability of a slope or retaining wall to resist a rotational or sliding failure that would cause destabilization. A slope or retaining wall failure in the northwest corner would release contaminated soil into the Hudson River and cause damage to the site. It is generally recognized that the global stability factor of safety of 1.5 is the minimum allowable for design of a slope or retaining wall. The global stability factor of safety for the existing condition in the northwest corner is approximately 1.0, indicating that the slope is marginally stable. Removal of existing rip rap from along this portion of the shoreline, even temporarily, would reduce the resistance to rotational failure (the "buttressing effect"), and increase the potential for contaminant release.

Because the contamination in the Northwest Corner Off-Shore Area cannot be fully removed, the following two remedial approaches are used in the alternatives to address the unique site conditions in the Northwest Corner Off-Shore Area.

Northwest Sloped Cap: This is a subaqueous cap which provides chemical and physical isolation of contamination from the environment. The cap would be placed in layers after sufficient dredging to allow the cap’s final grade to approximate the existing bathymetry.

Northwest Extension Area:

This remedial approach involves the Northwest Corner Off-Shore Area of the site which is distinguished by the presence of rip rap and PCB Material that will be contained by a proposed sealed sheet pile wall. The sheet pile wall will contain PCB Material and prevent further release into the environment, and will be filled with lightweight fill to an elevation that rises to meet the OU 1 grade. To meet the requirements of Article 15 and 6 NYCRR Part 608, the sheet pile wall alignment will be placed to minimize filling of the Hudson River while still meeting the remedial goals. The alignment is anticipated to be along the toe of the rip-rap slope. Fill behind the wall will be minimized to reach the minimal necessary elevation for remedial actions. The location of the sheet pile wall was also chosen to avoid drag down of the PCB Material (liquid or semi-solid) or creation of vertical flow pathways along sheet piles into underlying uncontaminated layers. Due to the potential presence of PCB Material throughout this area, pile-supported structures will not be permitted on the Northwest Extension. This remedial approach will require aquatic habitat mitigation for placing fill into the Hudson River.

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A:

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Alternative 2: Near Shore Cap and Northwest Sloped Cap

Alternative 2 includes installation of a 3-foot subaqueous cap in the near shore area with associated sediment dredging to maintain the existing bathymetry; targeted dredging and placement of a subaqueous cap or backfill in backwater and deepwater areas, as appropriate; dredging and installation of a sloped subaqueous cap in the northwest area; institutional controls and monitoring. The overall thickness of the subaqueous cap in near shore areas may allow for up to 12 inches to be deposited naturally through sedimentation. Disposal options for removed sediments include a combination of off-site disposal and potential on-site re-use in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. This alternative includes an institutional control, in the form of a site management plan, necessary to protect the sediment cap, protect public health, and monitor the environment due to contamination remaining at the site.

Present Worth: $74,400,000
Capital Cost: $65,800,000
Annual Costs:... $394,000

Alternative 3: Near Shore Dredge (up to 6-feet) and Backfill and Northwest Sloped Cap

Alternative 3 includes dredging up to 6 feet in near shore areas where sediments exceed the site-specific cleanup goals listed in Table 2; placing subaqueous cap or backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition; targeted dredging and placement of a subaqueous cap or backfill in backwater and deepwater areas, as appropriate; dredging and installation of a sloped subaqueous cap in the Northwest Corner Off-Shore area; institutional controls; and monitoring. Disposal options for removed sediments include a combination of off-site disposal and potential on-site reuse in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. This alternative includes institutional controls, in the form of a site management plan, necessary to protect the sediment cap, to protect public health, and to monitor the environment due to contamination remaining at the site.

Present Worth: $77,900,000
Capital Cost: $69,400,000
Annual Costs:... $394,000

Alternative 4: Near Shore Dredge (up to 10-feet) and Backfill and Northwest Sloped Cap

Alternative 4 includes dredging up to 10 feet in near shore areas where sediments exceed the site specific clean-up goals listed in Table 2; placing subaqueous cap or backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition; targeted dredging and placement of a subaqueous cap or backfill in backwater and deepwater areas, as appropriate; dredging and installation of a sloped subaqueous cap in the Northwest Corner Off-Shore area; institutional controls; and monitoring. Disposal options for removed sediments include a combination of off-site disposal and potential on-site reuse in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. This alternative includes institutional controls, in the form of a site management plan, necessary to protect the sediment cap, to protect public health, and to monitor the environment due to contamination remaining at the site.

Present Worth: $78,600,000
Capital Cost: $70,100,000
Annual Costs:... $394,000

Alternative 5: Near Shore Cap with Dredge (for cap) and Northwest Extension

Alternative 5 includes installation of a 3-foot subaqueous cap in the near shore area with associated dredging to maintain the existing bathymetry; placing subaqueous cap or backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition ; targeted dredging in backwater and deepwater areas; extension of the Northwest Corner On-Shore Area to create an above-grade containment area; institutional controls for contaminated sediments; and long term monitoring. The Northwest Corner of the site property would be extended by installing a sealed sheet pile wall at a feasible location beyond the limits of liquid PCB DNAPL and backfilling it with clean material, while minimizing fill placed in the river. Disposal options for removed sediments include a combination of off-site disposal and potential on-site reuse in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. A mitigation plan would be developed and implemented to mitigate the habitat impacts associated with installation of the bulkhead wall and placement of fill into the river. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and to monitor the environment due to contamination remaining at the site.

Present Worth: $89,000,000
Capital Cost: $79,100,000
Annual Costs:... $454,000

Alternative 6: Near Shore Dredge (up to 6-feet) and Backfill and Northwest Extension

Alternative 6 includes dredging up to 6 feet in near shore areas where sediments exceed the site specific clean-up goals listed in Table 2; placing subaqueous cap or backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition; placing a subaqueous cap in backwater and deepwater areas; targeted dredging in backwater and deepwater areas; extension of the Northwest Corner as described in Alternative 5; institutional controls for contaminated sediments; and monitoring. Disposal options for removed sediments include a combination of off-site disposal and potential on-site reuse in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. A mitigation plan will be developed and implemented to mitigate the habitat impacts associated with the installation of the bulkhead wall and placement of fill into the river. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and to monitor the environment due to contamination remaining at the site.

This alternative has been modified from the alternative developed in the FS to include additional dredging in deepwater, old marina, and north boat slip areas, as shown on Figure 7. The FS evaluated dredging in the near shore area limiting the area to be dredged to a maximum water depth of 15 feet, which represents the limit of commercially-available silt curtains. The location and types of sediment resuspension controls in greater than 15 feet of water may include other innovative and customized approaches to extend areas of dredging to approximately 100 feet from shore, or approximately 20 feet of water for targeted areas. This approach would dredge sediments in targeted areas which contain the most highly impacted sediment for PCB and metals and therefore represents a greater sediment volume than the original Alternative 6. Targeted dredging is defined for deepwater areas where resuspension controls cannot be feasibly used due to water depth and current velocities. The areas were preliminarily identified as those containing PCB contaminated sediments with greater than 50 ppm.

Present Worth: $92,600,000
Capital Cost: $82,700,000
Annual Costs:... $454,000

Modified Alternative 6 Costs

Present Worth: $105,000,000
Capital Cost: $95,200,000
Annual Costs:.. $454,000

Alternative 7: Near Shore Dredge (up to 10-feet) and Backfill, Northwest Extension

Alternative 7 includes dredging up to 10 feet where sediments exceed the site specific cleanup goals listed in Table 2; placing subaqueous backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition; placing subaqueous cap in backwater and deepwater areas; targeted dredging in backwater and deepwater areas; installing a bulkhead wall (steel sheeting) beyond PCB dense non-aqueous phase liquid (DNAPL) in the Northwest Corner Area; institutional controls for contaminated sediments; and monitoring. Disposal options for removed sediments include a combination of off-site disposal and potential on-site re-use in OU-1. The details and limitations for the on-site re-use will be developed during the remedial design. Mitigation of habitat impacts due the installation of the bulkhead wall and placing fill in the river. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and the environment from any contamination remaining at the site.

Present Worth: $93,300,000
Capital Cost: $83,400,000
Annual Costs:.. $454,000

Alternative 8: Near Shore/Backwater Dredge to Feasible Limits and Backfill, Limited Deepwater Dredging, Northwest Extension

This alternative would include dredging to the deepest feasible depth where sediments exceed the site specific clean-up goals listed in Table 2 in near shore and backwater areas; limited dredging in deepwater areas; placing subaqueous backfill in near shore, backwater, and deepwater areas, which may allow for natural deposition; installing a bulkhead wall (steel sheeting) beyond PCB dense non-aqueous phase liquid (DNAPL) in the Northwest Corner Area; institutional controls for contaminated sediments; and monitoring. The feasible dredging depth is defined as dredging all sediments that exceed site-specific clean-up levels to constructable limits. Disposal options for removed sediments include a combination of off-site disposal and potential on-site re-use in OU-1. The details and limitations for the on-site re-use will be developed during the remedial design. Mitigation of habitat impacts due the installation of the bulkhead wall and placing fill in the river. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and the environment from any contamination remaining at the site.

Present Worth: $185,000,000
Capital Cost: $179,000,000
Annual Costs:.. $272,000

Alternative 9: Dredge to Feasible Limits in All OU-2 Areas and Backfill, Northwest Sloped Cap

This alternative would include dredging to feasible limits where sediments exceed the site specific clean-up goals listed in Table 2; placing subaqueous backfill in near shore, backwater and deepwater areas, which may allow for natural deposition; monitoring. The feasible limit to dredging in the Northwest Corner Off-Shore Area is based on driving steel sheeting along the toe of the rip rap to control DNAPL migration and removing all sediments that exceed site-specific cleanup levels to constructable limits. Sediment remaining in the Northwest Corner Off-Shore Area would be capped with a subaqueous cap. Disposal options for removed sediments include a combination of off-site disposal and potential on-site re-use in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and the environment from any contamination identified at the site. The remedy will not rely on institutional or engineering controls to prevent future exposure. There is no Site Management, no restrictions, and no periodic review.

Present Worth: $245,000,000
Capital Cost: $242,000,000
Annual Costs: $174,000

Exhibit C
Remedial Alternative Costs

Remedial Alternative	Capital Cost[1] ($)	Annual Costs ($)	Total Present Worth[1] ($)
1. No Action	0	0	0
2. Near Shore Cap and Northwest Sloped Cap	$65,800,000	$394,000	$74,400,000
3. Near Shore Dredge (up to 6-feet) and Backfill and Northwest Sloped Cap	$69,400,000	$394,000	$77,900,000
4. Nearshore Dredge (up to 10-feet) and Backfill and Northwest Sloped Cap	$70,100,000	$394,000	$78,600,000
5. Nearshore Cap with Dredge (for cap) and Northwest Extension	$79,100,000	$454,000	$89,000,000
6. Nearshore Dredge (up to 6-feet) and Backfill and Northwest Extension	$82,700,000 ($95,200,000)[2]	$454,000	$92,600,000 ($105,000,000)[2]
7. Nearshore Dredge (up to 10-feet) and Backfill, Northwest Extension	$83,400,000	$454,000	$93,300,000
8. Nearshore/Backwater Dredge to Feasible Limits and Backfill, Limited Deepwater Dredging, Northwest Extension	$179,000,000	$272,000	$185,000,000
9. Dredge to Feasible Limits in All OU-2 Areas and Backfill, Northwest Sloped Cap	$242,000,000	$174,000	$245,000,000

[1] Capital Cost and Annual Costs include a 30% contingency in calculating Total Present Worth

[2] Modified Alternative 6 includes additional dredging in the following areas and increases the costs presented in Feasibility Study as follows:

Old Marina	6,000 $yards^3$ with an estimated cost of $600/ $yards^3$= $3,600,000
North Boat Slip	3,500 $yards^3$ with an estimated cost of $600/ $yards^3$= $2,100,000
Deepwater Areas for >50 ppm PCBs	4,700 $yards^3$ with an estimated cost of $1,200/ $yards^3$= $5,640,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing modified Alternative 6, Near Shore Dredge (up to 6 feet) and Backfill and Northwest Extension as the remedy for this site. The elements of this remedy are described in Section 7.2. The proposed remedy is depicted in Figure 7.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375.

The modified Alternative 6 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the balancing criteria described below. It achieves the remediation goals for the site by removing sediment containing greater than 1 ppm PCB and metals exceeding background from the near shore and backwater areas, where the potential for public health and environmental exposures are most likely. Dredging to a depth of 6 feet removes sediment that has the potential to be scoured and migrate, and thus represents an exposure pathway for human and environmental receptors. In deepwater areas, where dredging activities cannot be fully contained, the proposed remedy removes PCBs in targeted areas at a higher threshold of 50 ppm up to a depth of 6 feet, thereby removing the highest levels of PCBs from the Hudson River environment. Targeting deepwater areas with PCBs above 50 ppm reduces the time needed to complete dredging activities when compared to deepwater areas above 1 ppm. While this action does not eliminate ecological exposures, it does limit the potential for construction-related impacts associated with disturbance to the river bottom and migration of suspended sediments. The majority of targeted PCB dredging areas identified in the deepwater are within the top two feet. Therefore, the targeted dredging will remove sediments which have the highest levels of PCBs and the greatest potential to migrate and be an on-going source to the environment.

In the Northwest Corner Off-Shore Area, where the full depth of sediment contamination cannot be feasibly excavated without destabilizing the shoreline, the proposed containment of the area using sealed sheet piles provides the greatest degree of long term effectiveness by containing the material with the highest levels of PCBs. This extension also enables the more effective removal of liquid PCB DNAPL from the source area beneath the Northwest Corner On-Shore and Northwest Corner Off-Shore areas by creating a land platform to support additional investigation and removal activities. The sheet piles will be driven along an alignment that is known to be free of liquid or semi-solid PCBs, ensuring that drag down or migration of PCBs into the clean Basal Sand aquifer will not occur. Groundwater passing through the Northwest Corner On-Shore Area will be treated before entering the Hudson River, providing a higher degree of environmental protection and reliability than alternatives that rely on capping the Northwest Corner Off-Shore Area sediments in place. While creation of this filled area in the river results in greater impacts than the capping alternative in terms of loss of habitat, the need to eliminate environmental exposure to the PCBs in this area has been deemed to outweigh the loss of habitat. A mitigation plan will be developed and implemented to mitigate the habitat impacts associated with the installation of the bulkhead wall and placement of fill into the river.

Overall, Alternative 6 is an effective remedy which removes and isolates significant portions of the contamination from the environment that has the potential for exposure to the greatest feasible degree. The remaining known PCB material within the NEA is contained by a structure that provides the highest degree of environmental protection and reliability, and the greatest opportunity for removal of the most mobile material. This alternative creates the conditions necessary for the restoration of surface water and sediment to the extent practicable when it is integrated with the remedy for OU1.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

<u>1 Protection of Human Health and the Environment.</u> This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

Alternative 1, the No Action Alternative would not be protective of human health or the environment since it would not achieve remediation goals described in Section 6.5.

Alternatives 2 through 4 provide increasing protection for human health and the environment by removing sediment which exceeds cleanup levels for PCBs and metals. These three alternatives are comparable to Alternatives 5 through 7 because of the same depth of sediment removal outside of the Northwest Corner Off-Shore Area. Alternatives 2 through 4 and 5 through 7 involve the same increasing depths of sediment removal of up to 3, 6 and 10 feet, respectively. The removal of 3 feet of contaminated sediment would leave a greater amount of contaminated sediment than the removal of 6 feet of sediment. The removal of contaminated sediment to a depth of 6 feet provides greater overall protection by reducing the potential for sediment resuspension due to human activities or an extreme erosion event. Because sediment between 6 and 10 feet is not expected to migrate or become exposed, the removal of up to 10 feet of sediment would not provide a substantial increase in environmental protection in comparison to removing 6 feet of sediment. Alternative 6 provides the best balance in the level of protection for the Near Shore sediment because the highest levels of contamination will be removed.

For Alternatives 5 through 8, the installation of the sheet pile wall around the Northwest Extension is more protective of human health and the environment in comparison to the capping evaluated for the Northwest Corner Off-Shore Area in Alternatives 2 through 4 and 9. The sheet pile wall provides better overall protection of public health and the environment than the capping alternatives by more effectively containing PCB DNAPL; enhancing PCB DNAPL recovery options; and preventing PCB contaminated groundwater from entering the Hudson River. By minimizing the further release of PCBs to the Hudson River, the sheet pile wall will prevent site-related contributions to exceedances of surface water standards that contribute to the current PCB contamination in fish tissues in the vicinity of the site. However, installation of the sheet pile and creation of the filled area in the river does result in greater habitat impacts than the capping alternative, which will require mitigation.

Alternative 9 includes an area of extensive deepwater dredging which provides the highest degree of protection for human health and the environment because it would remove a greater extent of contamination that could potentially cause impacts at its current location. However, the substantially increased cost of this alternative ($136 million) is not justified, especially considering the increased short-term risks to the environment due to extensive dredging without turbidity control which could mobilize contaminated sediment to other areas.

<u>2. Compliance with New York State Standards, Criteria, and Guidance (SCGs).</u> Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

The primary chemical specific SCGs for the site are the surface water quality standards and sediment screening guidance values. The No Action Alternative would not meet these criteria because groundwater discharging into the

Hudson River would continue to materially contribute to the contravention of the PCB surface water standard. The PCB and metals concentrations found in sediments also exceed the guidance values for screening contaminated sediments and as well as site-specific background sediment concentrations. Therefore, Alternative 1 is rejected as a potential candidate for a remedy for OU 2 because it would not meet the threshold criteria of protecting public health and the environment and would not achieve the SCGs for surface water and sediment.

Alternatives 2 through 4 and 9 would not be as effective in complying with the PCB surface water standard in the Northwest Corner Off-Shore Area, as compared to Alternatives 5 through 8. The capping alternatives (Alternatives 2, 3, 4, and 9) would continue to allow the flow of groundwater through highly contaminated sediment and fill with subsequent discharge into the Hudson River. The resulting desorption of PCBs from sediment into the water column, which currently contributes to the contravention of PCB surface water standards, would continue. Because Alternative 9 removes greater depths of sediment in the different areas, it complies with the SCG for the sediment source to the greatest extent for the alternatives which involve capping the Northwest Off-Shore Area. Alternatives 5 through 8 are more effective at complying with the surface water standard through the installation of a sealed sheet pile wall to contain PCB in the Northwest Extension and treat the groundwater contamination. Groundwater will pass through gates in the wall and will be treated to remove PCBs before it passes into the river. These alternatives will therefore provide a higher degree of surface water protection than Alternatives 2 through 4 and 9. Because Alternative 8 removes greater depths of sediments, it complies with the SCG for the sediment to the greatest extent for the alternatives that involve construction of the Northwest Extension.

Alternatives 2 and 5, which remove 3 feet of sediment, would leave behind a greater mass of PCB and metals which exceed the sediment background and screening guidance concentrations. Alternatives 3 and 6, which remove up to 6 feet of sediment, would address the PCB and metals which exceed the sediment background and screening guidance concentrations to a greater degree than Alternatives 2 and 5. Alternative 4 and 7, which remove up to 10 feet of sediment, would address the PCB and metals which exceed the sediment background and screening guidance concentrations to a greater degree than Alternative to 3 and 6.

In addition, the alternatives will need to meet the substantive requirements in the applicable location specific SCGs found in 6NYCRR Part 608 Use and Protection of Waters and Environmental Conservation Law Article 15 due to the proposed dredging and filling in the Hudson River. These requirements apply most significantly to Alternatives 5 through 8 because of the construction of the Northwest Extension and associated filling of approximately 0.88 acres of the Hudson River. The allowance for filling the River is based on the findings of the stability analysis and the engineering determination that it is not feasible to address the PCBs in the northwest corner of the site without the Northwest Extension. The NEA extension will be designed to minimize the filling of the Hudson River; however, creation or restoration of river habitat will be required to mitigate for the placement of fill in the river.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

The short-term impacts to the community, workers, and environment for Alternatives 2 through 4 and 5 through 8 generally increase, and are proportional, to the additional material handling activities (dredging, capping and containment work) performed. These impacts include noise, air emissions, resuspension of contaminated sediment from dredging and truck traffic. Alternatives 8 and 9 would have the greatest short-term impacts due to the greater area dredged and volume of sediment handled. The short term impacts from noise, air emissions, and resuspension would be controlled by monitoring and mitigation measures to protect human health and the environment and will be identified in the remedial design. Alternative 2 would have fewer short term impacts than Alternatives 3 and 4 for the dredging and capping alternatives. Alternatives 5 would have fewer short term impacts than alternatives 6 and 7 for the dredging, capping and containment alternatives.

The FS evaluated dredging in the near shore area limiting the area to be dredged to a maximum water depth of 15 feet, which represents the limit of commercially-available silt curtains. The location and types of sediment resuspension controls in greater than 15 feet of water may include other innovative and customized approaches to extend the area of dredging to approximately 100 feet from shore, or approximately 20 feet of water. The additional targeted dredging to approximately 100 feet from shore has the potential to increase the short term environmental impacts, but will increase long term effectiveness and overall environmental protection, provided the short term impacts can be controlled with the alternative approaches.

Short term environmental impacts with PCB resuspension for the dredging and capping Alternatives 2 through 4 and 9 will be greater than Alternatives 5 through 8 in the Northwest Corner Off-Shore Area. These short term impacts are greater because they involve dredging high levels of PCB sediment in the Northwest Corner Off-shore Area to install the cap as compared to containing the same area with the sealed sheet pile.

The short term environmental impacts of dredging in Deepwater Areas were also evaluated because complete resuspension control will not be feasible due to the water depths and velocities. Partial resuspension controls are available in the form of mobile containment systems that are suspended from dredging barges. These provide limited reductions in particle migration from the dredge, but are limited to the upper portion of the water column. The short term impacts for dredging PCB contaminated sediment in limited targeted Deepwater Areas (greater than 50 ppm PCB) in Alternatives 2 thorough 8 will provide long-term benefits by removing concentrated areas of PCBs, particularly in shallow sediments that are most vulnerable to migration and exposure.

<u>4. Long-term Effectiveness and Permanence.</u> This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternatives 2 through 4 would provide long-term effectiveness and permanence in increasing order by providing greater removal and capping of increased quantities of sediment. The capped or backfilled sediment layer represents a source of risk that is proportional to the remaining sediment contamination and its respective depth below the sediment surface. Of these alternatives, Alternative 2 will have the least long-term effectiveness and Alternative 4 will have the greatest for the capping alternatives. A monitoring and maintenance program will insure the reliability, but there are potential challenges to maintaining a cap at this location. There is the potential need to repair or replace portions of the cap if it is damaged or if contaminant breakthrough would occur, particularly for the PCB DNAPL beneath the Northwest Corner Off-Shore Area for Alternatives 2 through 4. Contaminant breakthrough is less likely where greater quantities of contaminated sediment are removed and there is a greater thickness of the cap or backfill materials placed over the remaining contaminated sediment. Additionally, the Department has concerns for the long-term stability of the northwest corner that are not addressed under Alternatives 2 through 4.

Alternatives 5 through 8 provide greater long-term effectiveness and permanence in increasing order of the alternative by the containment of PCB DNAPL in the Northwest Extension and dredging of sediments to greater depths. There is an increase in the long-term reliability for the alternatives which remove greater quantities of contaminated sediment. The remaining source of risk from the sediments is directly proportional to the remaining sediment contamination and the respective depth below the sediment surface. Alternative 5 will have the greatest potential for long-term risk and alternative 8 will have the least potential. The sealed sheet pile wall in the Northwest Extension provides the greatest degree of long term effectiveness for containment of the highest levels of PCBs without compromising the geotechnical stability of this area. The extension area also enables the greatest removal of liquid PCB DNAPL from the source area beneath the Northwest Corner Off-Shore Area by creating a land platform to support delineation and removal activities. The sealed sheet pile wall in the Northwest Extension is considered to be more effective and permanent to control both liquid PCB migration and dissolved groundwater contamination as compared to the sloped shoreline and capping approach in Alternative 9. Monitoring of habitat and biota will be required to ensure the long-term effectiveness of the remedy. However, installation of the sheet pile and creation of the filled area in the river does result in additional ecological impacts because of the loss of habitat.

The removal of up to 6 feet of PCB and metals contaminated sediment in Alternative 6 is more permanent and effective in the long-term due to the removal of greater quantities of PCB and metals contaminated sediments than Alternatives 5. This significantly and permanently reduces the potential for migration of site-related contaminants through erosion, resuspension and re-distribution of sediments, including, but not limited to those mobilized during extreme events or human activities.

Alternative 9 includes extensive deepwater dredging area which will increase short-term impacts due to dredging without turbidity control and migration of contaminated sediment to other areas, however, the long-term impacts will be reduced by removal of the greater volume of contaminated sediment.

<u>5. Reduction of Toxicity, Mobility or Volume.</u> Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

The alternatives under consideration reduce the mobility of contamination by removing metal and PCB-contaminated sediments from the river system and placing them in secure upland areas and/or landfills. Alternatives that remove greater quantities of sediment provide a greater reduction in potential mobility. However, because the potential for sediment scour at depths greater than 6 feet is less than for surficial sediments, there is little additional reduction in mobility provided by Alternatives 4 and 7 as compared to Alternatives 3 and 6. The toxicity, mobility and volume of wastes at the site are reduced to the degree that liquid PCBs are removed from the Northwest Corner Off-Shore Area and destroyed off-site. As a result Alternatives 5 through 8, which include the Northwest Extension and a greater opportunity to remove liquid PCBs, would reduce the toxicity, mobility and volume of the PCB DNAPL to a greater degree than Alternatives 2 through 4 and 9. For PCBs that cannot be removed using recovery wells, the sealed sheet pile wall of the Northwest Extension (Alternatives 5 through 8) also provides a greater reduction in mobility than capping the Northwest Corner Off-Shore Area (Alternatives 2 through 4 and 9).

<u>6. Implementability.</u> The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Dredging sediment for all alternatives poses implementation challenges related to water depths and flow dynamics, resuspension control and monitoring, and debris management. Proven technologies such as energy and turbidity barriers, real-time turbidity monitors and a variety of dredging equipment are available to address these challenges.

The OU 1 site property provides a large staging area for managing the sediments. The location of the site on a major navigable waterway and adjacent to a rail line greatly expands opportunities for dredged material transport. The major construction differences between alternatives involves the installation a sloped shoreline (Alternatives 2, 3, 4, and 9) versus a sheet pile wall (Alternatives 5, 6, 7, and 8) in the Northwest Corner Off-Shore Area; the depth for dredging sediments; and deepwater dredging. Both groups of alternatives are implementable and acceptable from a geotechnical perspective by using readily available, materials, equipment, and construction practices.

Alternatives 5 through 8 are more challenging to construct because they require the off-shore construction of a large bulkhead wall requiring heavy king pile construction; associated tie-rods and deadman system; and a corrosion protection system. The tie-rod and deadman system will need to be designed to accommodate settlement. Both groups of alternatives will require monitoring and maintenance to add fill for areas that experience settlement. For Alternatives 2, 3, 4, and 9 in Northwest Sloped Cap will require additional construction of erosion protection for wave, ice and potential scouring events to protect the capped areas. The maintenance of the sheet pile wall for repairs and cathodic protection is more specialized in comparison to the sloped shoreline.

Dredging contaminated sediments at deeper depths will require the same monitoring as for the shallower depths of dredging. Sediment resuspension controls will be used during dredging which are designed for the appropriate water depth and velocity conditions at the site. Dredging in the deepwater areas will be performed with limited resuspension controls in targeted areas, which may require site-specific evaluations to implement. Alternative 9, which requires extensive dredging in the Deepwater Areas is the most difficult alternative to implement.

The ability to monitor the effectiveness of the alternatives is more difficult for the Northwest Sloped Cap shoreline in Alternatives 2, 3, 4 and 9. The monitoring will need to determine if PCB breakthrough of the cap over the sloped shoreline area is occurring.

Both groups of alternatives will require a permit from the United States Army Corps of Engineers for construction within the in the navigable waters of the Hudson River. The administrative implementability is more challenging for Alternatives 5, 6, 7, and 8 than for Alternatives 2, 3, 4 and 9 due to the construction of the Northwest Extension into the Hudson River. Permitting and approvals will be required from local and federal agencies for all alternatives that involve fill being placed into the Hudson River and the installation of the sheetpile wall.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The no action alternative would be the least expensive to implement since there would be no cost associated with its implementation.

The costs associated with the alternatives for this site are substantial, and range from $74.4 to $245 million due to the size and complex nature of the site conditions. Alternatives 2 through 9 involve increasing present worth costs which vary with the extent of dredging, capping, backfilling, creating the Northwest Extension, and monitoring. These costs increase with the volume of material dredged and disposed. In general, Alternatives 2 through 4 have a lower present worth cost ($74.4 to $78.6 million) in comparison to Alternatives 5 through 7 ($89 to $93 million). The major reason for the increase in cost between the two sets of alternatives involves the higher cost to construct the Northwest Extension as compared to the installation of the Northwest Sloped Cap. However the proposed extension of land is cost effective because the sealed sheet piles provides a greater degree of long term effectiveness for containment of the highest levels of PCBs. This extension also enables the greatest removal of liquid PCB DNAPL from the source area beneath the Northwest Corner On-Shore Area by creating a land platform to support delineation, monitoring and removal activities.

Table 4 provides a summary of the total costs of Alternatives 2 through 9 with several measures of cost-effectiveness. The costs increase proportionally for dredging PCB and metals contaminated sediments at greater depths. The present worth cost for Alternative 3 is $3.5 million greater than Alternative 2 due to the additional sediment dredging depth (6 feet versus 3 feet) and material handling. Alternative 3 removes roughly the same amount of PCBs as Alternative 2 (2,610 pounds versus 2,590 pounds), but more than twice the amount of copper (19,440 pounds versus 8,240 pounds). The increased present worth cost for Alternative 4 is $0.7 million over Alternative 3 and removes the same amount of PCB and slightly more copper.

Of the alternatives that include the Northwest Extension, the present worth cost of Alternative 6 is $16 million greater than Alternative 5 for the additional sediment dredging depth and material handling. Alternative 6 removes roughly the same amount of PCB as Alternative 5 (610 pounds versus 590 pounds), but more than twice the amount of copper (18,240 pounds versus 7,040 pounds). The increased present worth cost for Alternative 7 is $4.3 million and represents removal of the same amount of PCB as Alternative 6 and a slight increase (1,000 pounds) in the amount of copper contaminated sediment. These estimates represent dredging to a maximum water depth of 15 feet. Other temporary containment approaches may extend the area of dredging to approximately 100 feet from shore and would similarly increase the estimated volume of sediment in each alternative.

The total present worth costs for Alternative 8 and Alternative 9 are $185 and $245 million, respectively. While these alternatives provide for greater sediment dredging and disposal, they are not considered cost effective due to the substantial increase in capital costs relative to the additional environmental benefit.

Table 4: Cost Effectiveness Measures of Alternatives 2 through 9

Alternative	Depth of Sediment Removal and volume[2]	Estimated PCB mass removal (contained) and percentage	Estimated Copper mass removal and percentage	Estimated Lead mass removal and percentage	Cost
2	3 feet 15,800 yd^3	2,590 lbs 25%	8,240 lbs 11%	10,100 lbs 45%	$74, 400,000
3	Up to 6 feet 22,400 yd^3	2,610 lbs 25%	19,440 lbs 27%	12,800 lbs 48%	$77,900,000
4	Up to 10 feet 23,300 yd^3	2,610 lbs 25%	20,440 lbs 29%	14,300 lbs 64%	$78,600,000
5[1]	3 feet 12,900 yd^3	590 lbs 6%	7,040 lbs 10%	8,600 lbs 39%	$89,000,000
6[1]	Up to 6 feet 19,500 yd^3	610 lbs 6%	18,240 lbs 25%	11,200 lbs 50%	$92,600,000 ($105,000,000)
7[1]	Up to 10 feet 20,800 yd^3	610 lbs 6%	19,240 lbs 27%	12,700 lbs 57%	$93,000,000
8[1] (NWE)	Greatest extent practicable nearshore and backwater areas 98,700 yd^3	3,000 lbs 29%	41,020 lbs 57%	19,400 lbs 87%	$185,000,000
9 (NW Slope)	Greatest extent practicable 168,300 yd^3	10,460 lbs 100%	71,500 lbs 100%	22,200 lbs 100%	$245,000,000

[1] Alternatives which include the Northwest Extension will contain approximately 2,000 pounds of PCBs within the sheetpile wall
[2] The estimated volume of sediment removed assumed dredging to a maximum water depth of 15 feet. Targeted dredging in deepwater areas would increase the estimated volume of sediment in each alternative.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 6 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

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SITE COORDINATES: 40°59'36"N 73°53'9"W

U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

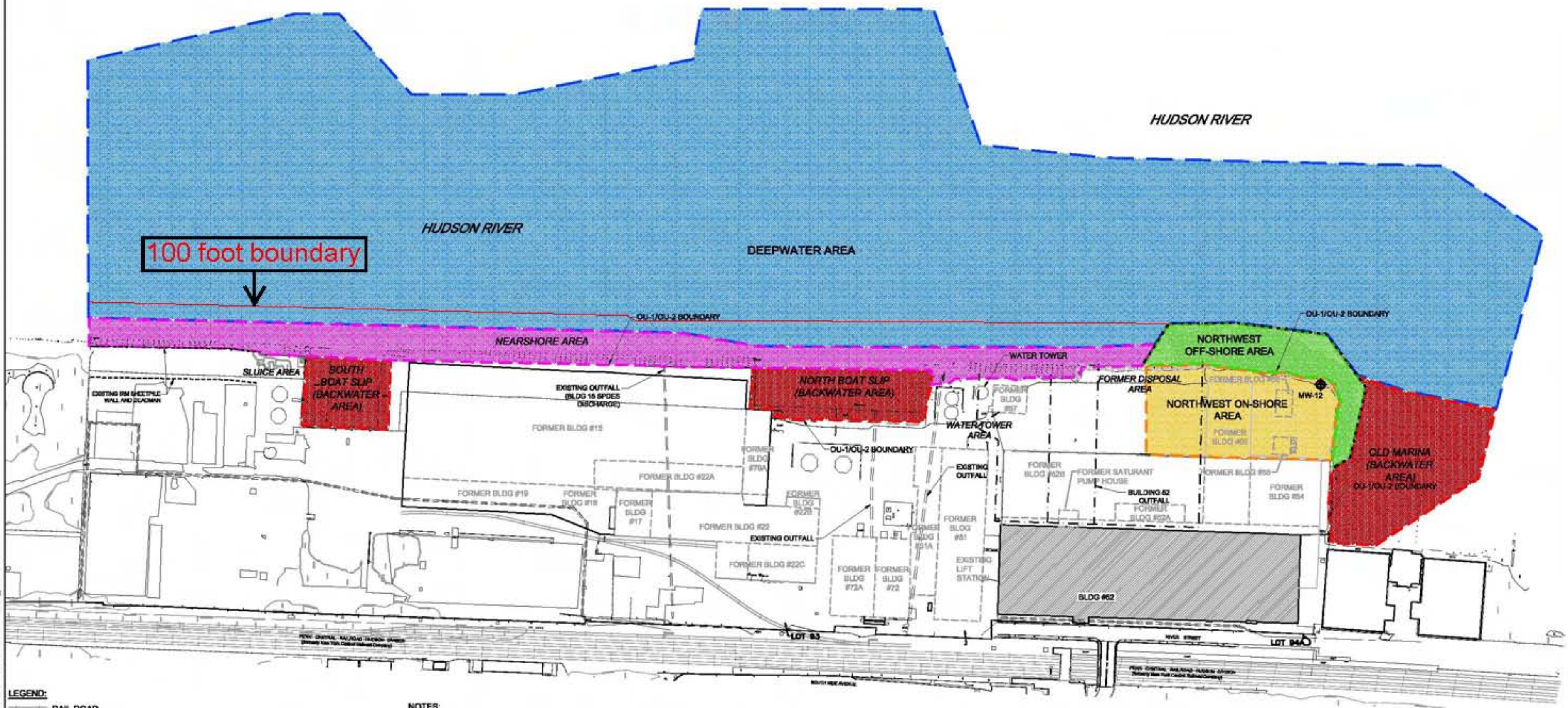
HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Site Location

SCALE: 1:24000
MAY 2011

FIGURE 1



LEGEND:

- RAIL ROAD
- EXISTING STRUCTURES
- RIP-RAP
- BUILDING 52 OUTFALLS
- EXISTING OFFSITE OUTFALLS
- MONITORING WELL

- DEEPWATER AREA
- NEARSHORE AREA
- NORTHWEST OFF-SHORE AREA
- NORTHWEST ON-SHORE AREA
- BACKWATER AREA

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
3. NUMEROUS MONITORING WELLS ARE LOCATED ON SITE. HOWEVER, ONLY MW-12 IS SHOWN AS IT IS THE FIRST LOCATION WHERE LIQUID PCB MATERIAL WAS OBSERVED.
4. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
4. THE OU-2/OU-1 BOUNDARY IS LOCATED AT THE MHW.

0 200 400
SCALE IN FEET

HALEY & ALDRICH

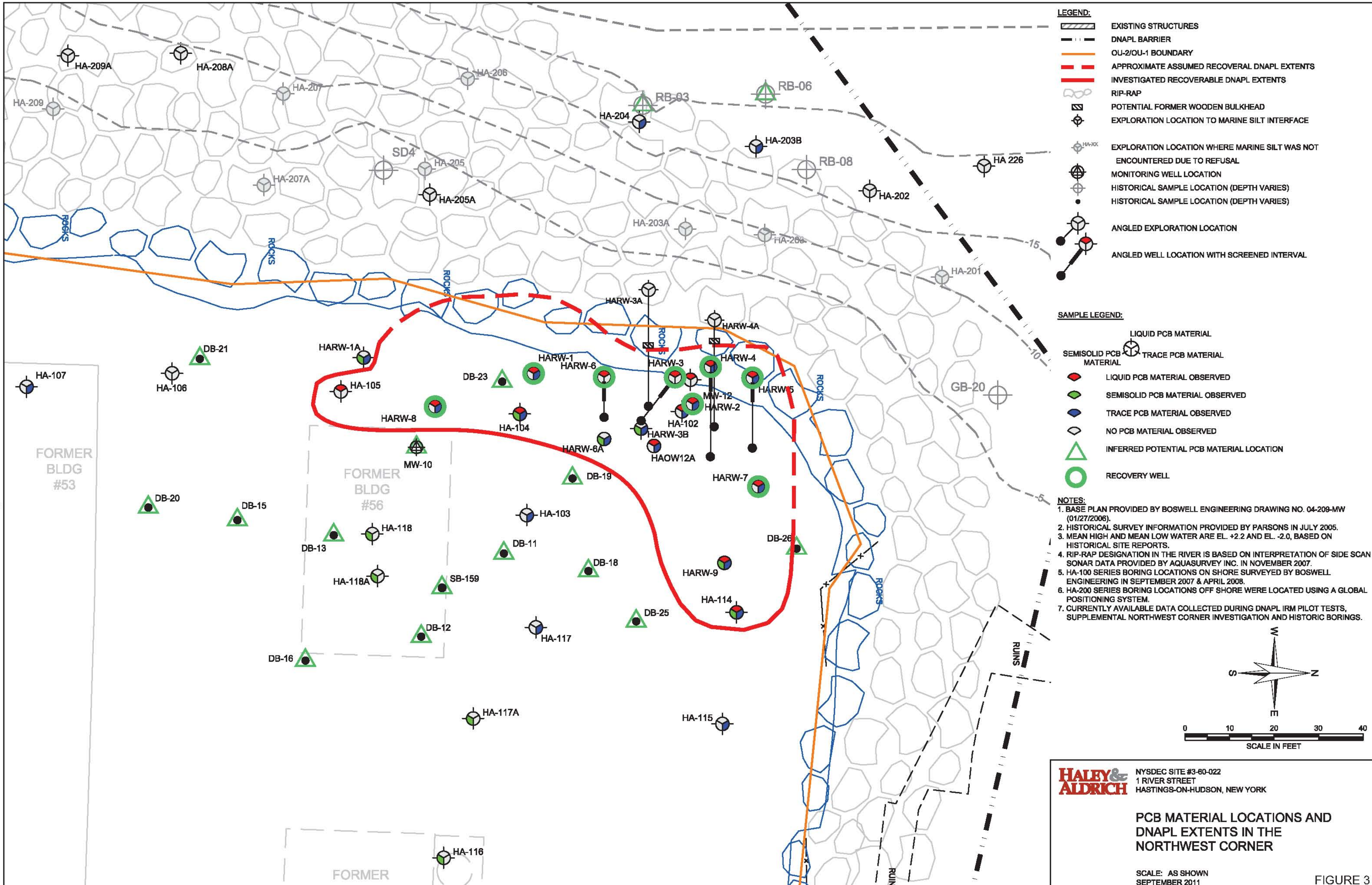
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Site Features

SCALE: AS SHOWN
MAY 2011

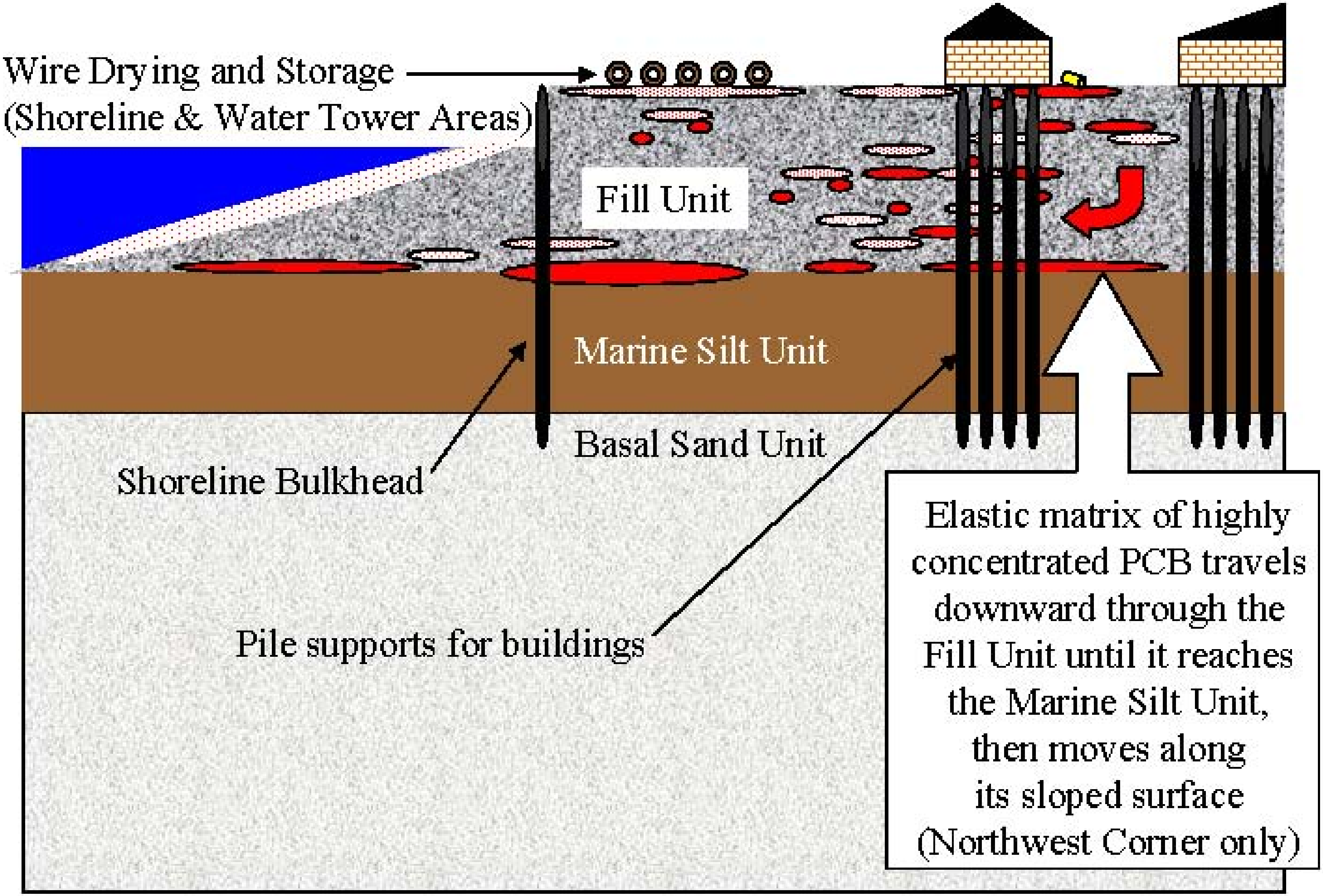
FIGURE 2

G:\PROJECTS\28612\250 - RFS\CAD\PLAN VIEWS & SECTIONS\28612-OU-2 SITE PLAN_D2.DWG



G:\PROJECTS\28612\250 - RFS\COMMUNICATIONS\2011-09-29 DEC FIGURE\28612-PCB MATERIAL EXTENTS_DF.DWG

Figure 4: Conceptual Model of PCB Migration



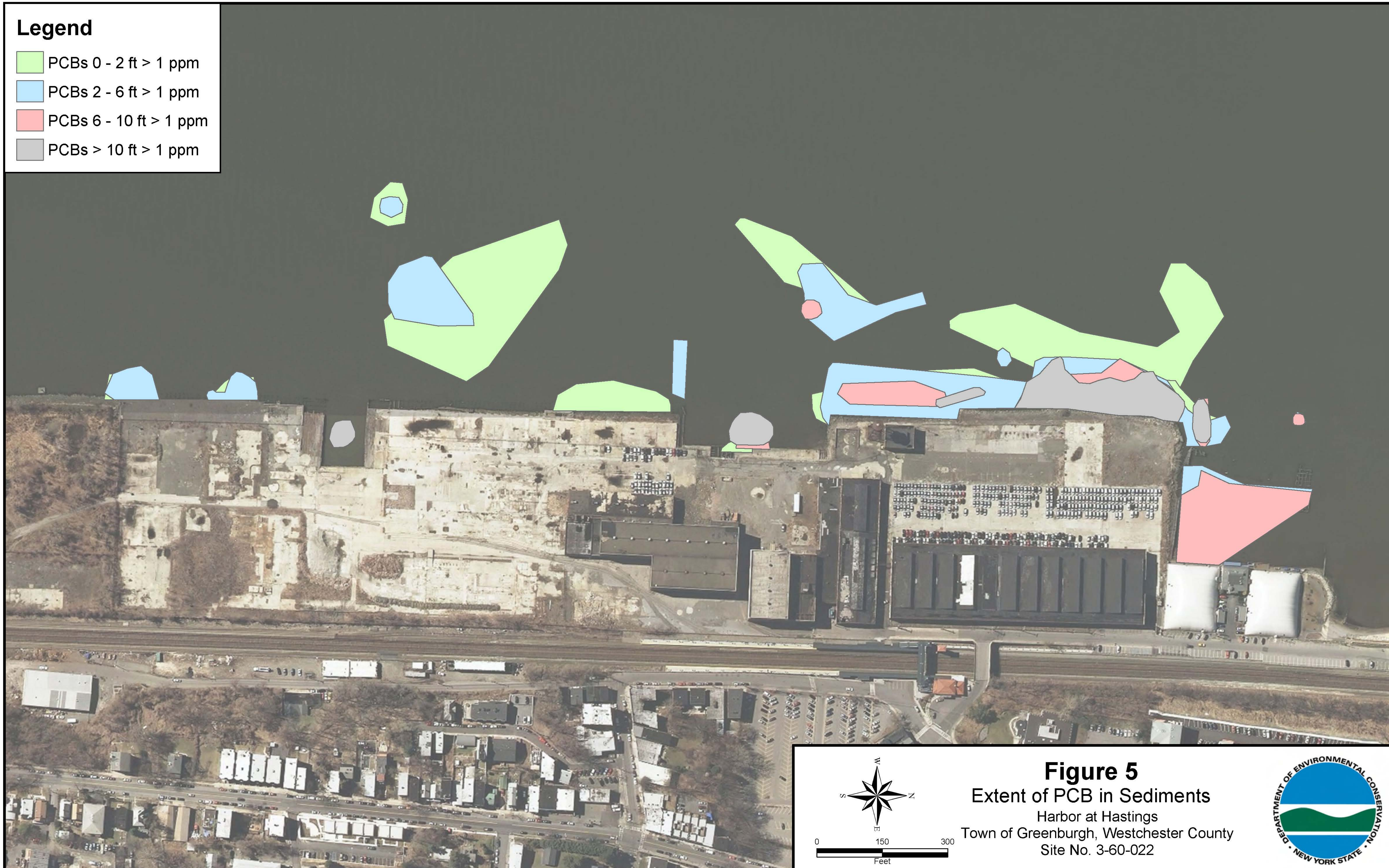


Figure 5
Extent of PCB in Sediments
Harbor at Hastings
Town of Greenburgh, Westchester County
Site No. 3-60-022

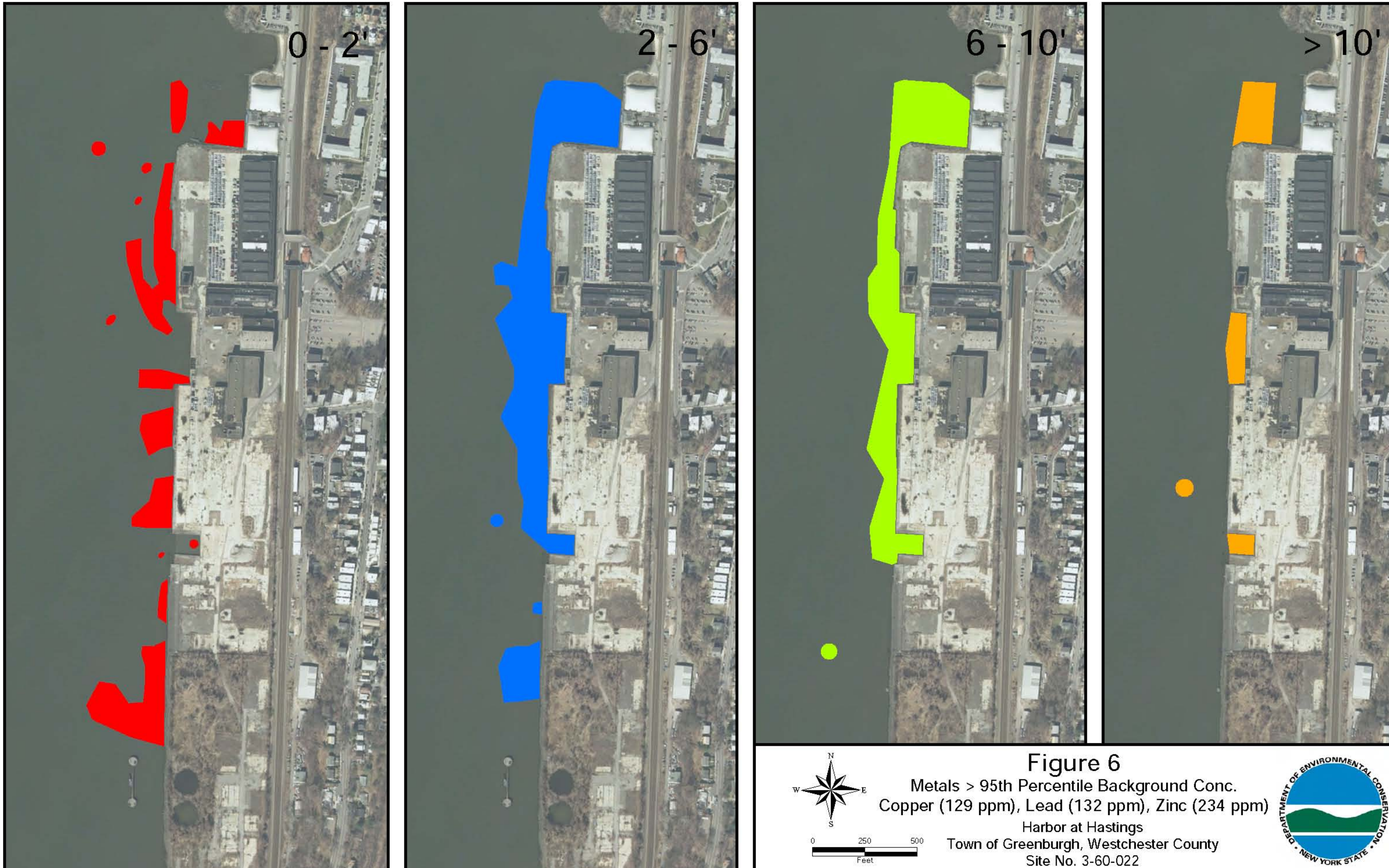


Figure 6

Metals > 95th Percentile Background Conc.
Copper (129 ppm), Lead (132 ppm), Zinc (234 ppm)

Harbor at Hastings
Town of Greenburgh, Westchester County
Site No. 3-60-022

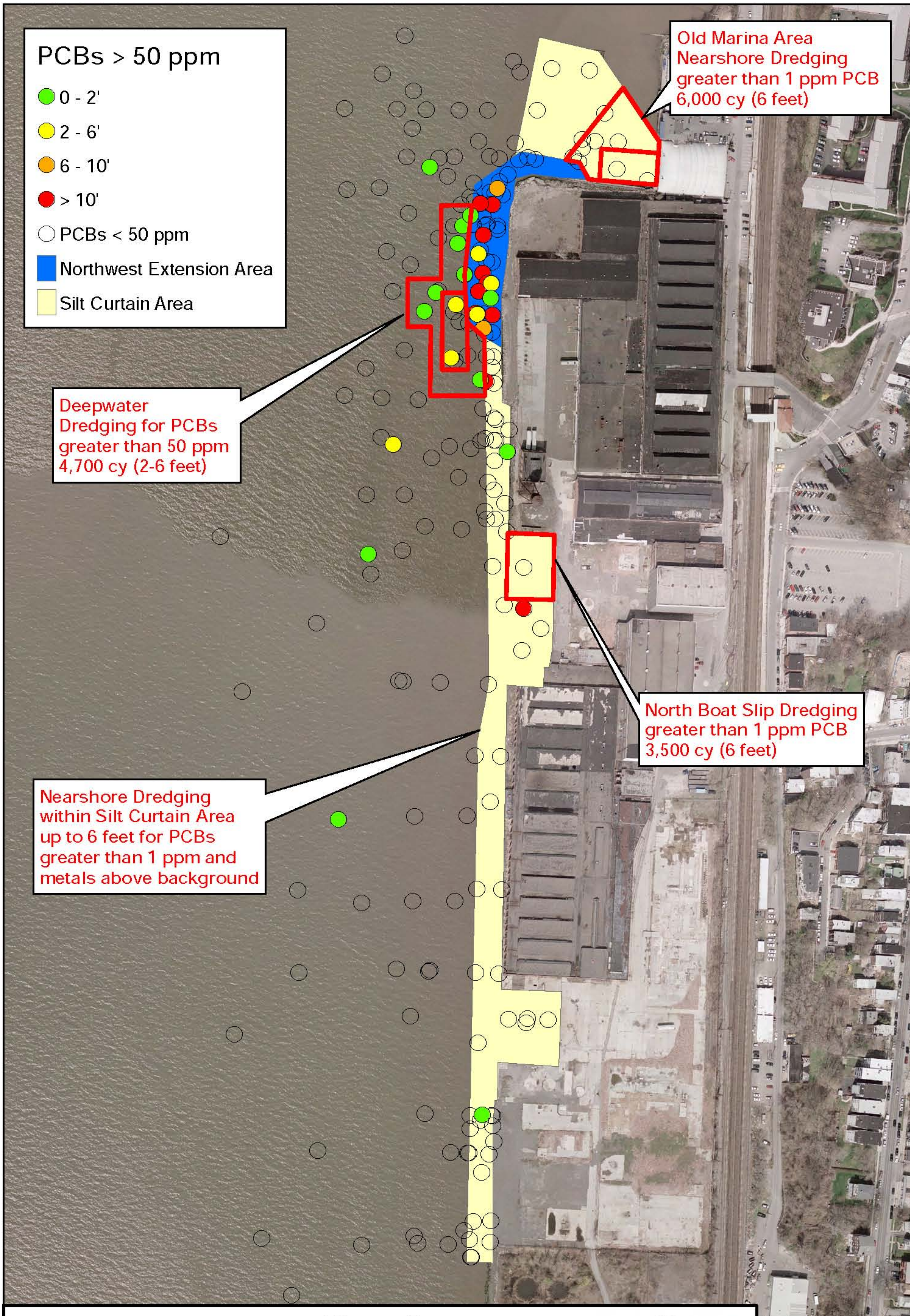


Figure 7

Showing Additional Proposed Dredging in Targeted Areas of Modified Alternative 6

Harbor at Hastings

Town of Greenburgh, Westchester County

Site No. 3-60-022

DEPARTMENT OF ENVIRONMENTAL CONSERVATION · NEW YORK STATE ·