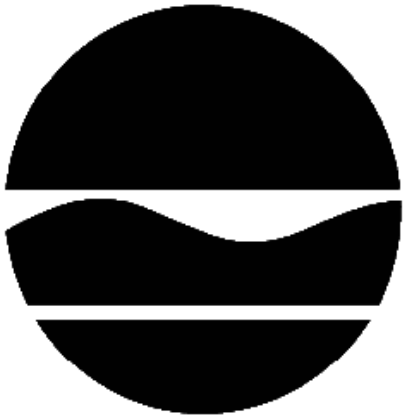
PROPOSED REMEDIAL ACTION PLAN

BASF - Manufacturing Plant
Operable Unit Number 02:
Hudson River Sediment and Off-site Areas
State Superfund Project
Rensselaer, Rensselaer County
Site No. 442027
February 2016



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

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Site No. 442027
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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 repository 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 repository:

Rensselaer Public Library
Attn: Jane Chirgwin
676 East Street
Rensselaer, NY 12144
Phone: 518-462-1193

A public comment period has been set from:

02/11/16 to 03/11/16

A public meeting is scheduled for the following date:

02/24/16 @ 6:00 PM

Public meeting location:

Rensselaer City Hall

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 through 03/11/16 to:

John Strang
NYS Department of Environmental Conservation
Division of Environmental Remediation
1130 North Westcott Rd
Schenectady, NY 12306
john.strang@dec.ny.gov

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 BASF Manufacturing Plant Site is located within the City of Rensselaer. The site is located approximately 0.25 miles west of the intersection of Routes 9 and 9J adjacent to the

Hudson River.

SITE FEATURES: The 45.32 acre site (OU 01) is an open area. The off-site area includes industrial areas, residential areas, railroad tracks and the Hudson River.

CURRENT ZONING AND LAND USE: The vacant OU 01 area is zoned industrial. The OU 02 off-site areas include a residential neighborhood located to the north (Fort Crailo), the Albany Molecular Research, Inc. (former Sterling Drug Site 1, Site 442009, industrial) also to the north, Railroad (Amtrak/CSX) tracks to the east, the BASF Closed Landfill (Site V00521, industrial) to the south east, the Rensselaer Iron and Steel Inc. (industrial) and Albany Port Commission parking lot to the south. The Hudson River is to the west.

PAST USE OF THE SITE: Dyes and pharmaceuticals were manufactured at the BASF Manufacturing Plant Site OU 01 since the 1890's. Soil and groundwater contamination originated from numerous sources including four tanks that stored chlorobenzene.

OPERABLE UNITS: The site was divided into two operable units (OU). OU 01 Manufacturing Plant on-site and OU 02 Hudson River sediment and off-site areas. 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.

OU 01, Manufacturing Plant, consists of the on-site source area of contamination. OU 02, Hudson River sediment and off-site areas, consists of media off-site which may have been impacted by contaminant migration.

SITE GEOLOGY AND HYDROGEOLOGY: Groundwater flow direction is north towards Albany Molecular Research, Inc. and west towards the Hudson River. The depth to the shallow water bearing unit averages from five feet (along the eastern boundary) to 15 feet (near the Hudson River). A clay layer separates this shallow groundwater from a deeper water bearing unit. The clay layer is approximately 18 feet below the ground surface at the western boundary (where it is 40 feet thick) and approximately five feet below the ground surface at the eastern boundary (where it is ten feet thick). The deep water bearing unit is a ten foot thick layer of sand just above a layer of glacial till, which is just above the shale bedrock.

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-A.

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 operable unit, which requires remediation of Hudson River sediments, land use is not applicable since it is

submerged lands.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use 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:

BASF Corporation

The Department and BASF Corporation entered into Consent Orders on February 24, 1998 and October 10, 2003. The first Order obligates the responsible parties to implement a RI/FS only. The second Order obligates the responsible parties to implement the OU1 remedy. After the remedy is selected for OU2, the Department will approach the PRPs to implement the selected remedy. 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.

The analytical data collected on this site includes data for:

- groundwater
- sediment
- soil vapor

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 Results

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:

chlorobenzene	arsenic
lead	cadmium
benzene	chromium
1,2-dichlorobenzene	copper
1,3-dichlorobenzene	mercury
1,4-dichlorobenzene	zinc

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

- 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.

The following IRM(s) has/have been completed at this site based on conditions observed during the RI.

IRM - River Sediment Treatment Pilot Study

Hudson River sediments (approximately 1000 cubic yards) were removed nearshore for the installation of a discharge pipe for Empire Generating Power Plant built on the BASF South 40 Site. The sediment was separated into on-site treatment cells to test various treatment options. The dredged sediment treatment pilot study began April 20, 2009 and was completed on December 7, 2012. The results of the study were summarized in a report entitled Dredged Sediment Treatment Pilot Study Closure Report, dated January 31, 2013.

6.3: 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 Hudson River in the vicinity of the BASF site is a Class C stream. Sediment contamination within OU 02 presents a significant threat to benthic organisms. Submerged aquatic vegetation beds dominated by water celery are present within this area.

Summary of Soil Gas Contamination: BASF completed an off-site investigation of the soil gas migrating toward the adjacent properties. Based on the results of the investigation the Department and NYSDOH concluded that no site contaminants of concern are migrating in the soil gas to the surrounding properties.

Summary of Groundwater Contamination: BASF completed an off-site investigation of the groundwater in the adjacent properties. Groundwater samples were analyzed for VOCs, semi-volatile compounds and inorganics. Based on the results of the investigation the Department and NYSDOH concluded that no site contaminants of concern are present in the groundwater of the surrounding properties.

Summary of Sediment Contamination: Sediment samples were analyzed for VOCs, inorganics and polychlorinated biphenyls (PCBs). Hudson River sediment is impacted by the following volatile organics constituents: chlorobenzene, benzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene; the following metals: arsenic, cadmium, chromium, copper, lead, mercury and zinc; and polychlorinated biphenyls. Lead and chlorobenzene are the primary site related contaminants of concern driving the remediation.

The impacted sediments were broken down into two study areas. In the Northern FS Study Area (NFSSA), an approximately 5-acre area of the Hudson River located immediately adjacent to the Manufacturing Plant site (OU 01), the highest concentrations of VOCs are located in the 2 to 4 foot depth interval. The NFSSA extends a maximum of 300 feet out into the river and runs 1500 feet along the BASF site with the water depth ranging from 3 to 35 feet.

The highest concentration of lead in the NFSSA was at the sediment surface (from 0 to 6 inches) at 1,200 parts per million (ppm), and in the 2 to 4 foot depth interval at 1,120 ppm. The maximum

concentration of chlorobenzene was measured at 28,000 ppm. In the NFSSA, over one-third of the sample results exceeded the Class C sediment guidance values (SGV) for chlorobenzene and lead (sediments considered to be highly contaminated and-likely to be toxic to aquatic life). The Class C SGV for chlorobenzene is 1.7 ppm. The Class C SGV for lead is 130 ppm.

BASF has divided the NFSSA into three segments, upper, central and lower areas. The largest quantity of contaminated sediments are located in the NFSSA central area.

In the Southern FS Study Area (SFSSA), an approximately 7-acre area of the Hudson River, south of the NFSSA, sediments are contaminated with cadmium, chromium, copper, lead, mercury and zinc at the surface (from 0 to 6 inches). The SFSSA extends out into the Hudson River approximately 500 feet and runs for 350 feet along the river bank with water depths ranging from 20 to 40 feet.

The highest concentration of lead in the SFSSA was 604 ppm. Over a third of the sample results exceeded the Class C SGV level for lead, however the concentrations are comparable to the level of lead contamination found in the upstream samples (NFSSA). No VOCs were detected above Class C SGV values in the SFSSA.

Sediments in the NFSSA and SFSSA are comingled with PCBs at concentrations as high as 270 ppm. The Class C SGV for PCBs is 1 ppm. BASF has stated that the PCBs were not used or associated with the BASF Facility. PCBs were also found in upstream sediment samples at comparable levels as in the study areas, therefore, PCBs in sediment are not considered a BASF Manufacturing Plant site specific contaminant of concern.

6.4: 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.*

People are unlikely to come in contact with site-related contaminants present in river sediments.

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:

Sediment

RAOs for Public Health Protection

- Prevent direct contact with contaminated sediments.

RAOs for Environmental Protection

- 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 PROPOSED REMEDY

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 proposed remedy is referred to as the Sediment Dredging, Cover System and Monitoring remedy.

The estimated present worth cost to implement the remedy is $41,300,000. The cost to construct the remedy is estimated to be $40,700,000 and the estimated average annual cost is $94,000.

The elements of the proposed remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles 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 gases 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. Excavation/Removal by Dredging
Removal of approximately 38,700 cubic yards of contaminated Hudson River sediment within the NFSSA to a maximum excavation depth of 8 feet. Approximately 15,800 cubic yards will be removed in the lower and upper NFSSA areas where two to three feet of sediment will be removed. In the central NFSSA, approximately 22,900 additional cubic yards of sediment will be removed to depths ranging from 4 to 8 feet. (Figure 6.4). Approximately 7,000 cubic yards of dredged sediment may be treated on site by low level thermal desorption. The reminder of the sediments; including those sediments with TSCA level PCBs, will be disposed off site at a facility permitted to accept the material. Sediments are expected to be treated to allow more disposal options. Alternatively, all sediments may be transported and disposed off site without on-site treatment.

3. Cover System/Restoration of Dredged Areas
Riverbed bathymetry and topography will be restored with appropriate riverbed material. Where present, prior to this removal, submerged aquatic vegetation in the remediation area will also be restored. The design will include a monitoring plan for areas disturbed by the remedy and all activities will be consistent with the requirements of 6 NYCRR Part 608. Where two feet of sediment is dredged, the cover may include up to six inches of an erosion protection layer (where required) and will include a minimum of 18 inches of a habitat restoration layer. Where greater than two feet of sediment is dredged, the cover will contain a minimum of 24 inches of habitat restoration material. A habitat restoration plan will be developed during the remedial design.

4. Ex-Situ Thermal Desorption
Some of the dredged sediment with VOC levels that exceed Resource Conservation Recovery Act levels for hazardous waste will be treated on-site by a mobile thermal desorption unit. The sediment will be heated to about 800 degrees Fahrenheit, to cause the contaminants to change into vapor form and evaporate from the sediment. The vapors will be collected and subjected to further treatment prior to discharge to the atmosphere. Thermal treatment is being considered and will be further evaluated during the Remedial Design.

5. Monitoring
In the SFSSA the sediment contamination will be addressed through the migration of upgradient sediments into the SFSSA. Natural deposition of sediment from up-river is expected to continue to cover site-related contamination eliminating exposure and achieve the Remedial Action Objectives over a long period of time. Monitoring will include analysis of sediment and pore water for metals and bioassays (laboratory toxicity tests). The results will be compared to the baseline data. Bathymetric surveys would be conducted to track sedimentation. Reports will be provided every 5 years, and active remediation will be proposed if it appears that natural processes alone

will not address the contamination. The contingency remedial action will depend on the information collected.

6. Institutional Control
Imposition of an institutional control in the form of a deed restriction for the controlled property (OU 01) which will include the requirements associated with OU 01 (as per the 2003 ROD), plus the following:
• 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); and
• require compliance with the Department approved Site Management Plan.

7. Site Management Plan
A Site Management Plan is required, which includes the components of the interim Site Management Plan for Operable Unit 01, and will incorporate the monitoring of OU 02, plus the following:

a) an 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 Deed Restriction discussed in Paragraph 6 above.

Engineering Controls: The Cover System/Restoration of Dredged Areas discussed in Paragraph 3.

This plan includes, but may not be limited to:
• an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
• descriptions of the provisions of the deed restriction including any land use, and groundwater and surface water use restrictions;
• provisions for the management and inspection of the identified engineering controls;
• maintaining site access controls and Department notification; and
• the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b)a Monitoring Plan to assess the performance and effectiveness of the remedy. Details of the monitoring program will be developed during the remedial design. The plan includes, but may not be limited to:
• monitoring of sediment and pore water concentrations as well as sediment bathymetry to assess the performance and effectiveness of the remedy; and
• monitoring of Hudson River habitat restoration to include submerged aquatic vegetation. Repairs and/or replanting will be made as necessary.
• a schedule of monitoring and frequency of submittals to the Department.

Exhibit A

Nature and Extent of Contamination

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 for which contamination was identified, 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 three categories: volatile organic compounds (VOCs), inorganics (metals) and polychlorinated biphenyls (PCBs). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Groundwater

BASF completed an investigation of potential off-site migration of groundwater towards the Fort Crailo residential area to the north (see Figure 1-B). This included collecting groundwater elevations and samples from a monitoring well network and a number of sample points directly from saturated portions of sewer bedding from beneath Riverside Avenue.

Evaluation of the groundwater elevation data shows a groundwater divide beneath the Albany Molecular Research Inc. (AMRI) property. The elevation data shows that groundwater under the southern half of AMRI flows toward the BASF Manufacturing Plant Site. The groundwater flow direction in the sewer bedding in Riverside Avenue is to the west toward the Hudson River. Based on this evaluation, there are no groundwater flow paths that lead from BASF Manufacturing Site to the Fort Crailo neighborhood.

The groundwater results (See Figure 1-C) indicates chlorobenzene and lead, exceeding groundwater standards, were detected in a piezometer immediately north of the AMRI Site. Based on the groundwater flow direction due to the groundwater divide, the chlorobenzene and lead SCG exceedance is not attributable to the BASF Manufacturing Plant Site. No other contaminants of concern were detected in wells beneath and adjacent to the Fort Crailo neighborhood.

Arsenic was detected in the sewer bedding adjacent to the western boundary (former Lagoon Area). Arsenic is a known COC in groundwater beneath the Lagoon Area. Remedial measures done for OU 01 included removal of large quantities of arsenic-impacted soil from beneath the Lagoon Area, in-situ treatment for arsenic in the groundwater and the installation of a groundwater collection system extraction trench adjacent to the Lagoon Area.

Groundwater monitoring well network results indicate that, since the OU 01 remedial work, there have been sustained reductions in arsenic concentrations from original levels.

Table A-1 Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
Benzene	0.41 U - 150	1	2 / 15
Chlorobenzene	0.55 U – 400	5	5 / 15
1,2-Dichlorobenzene	0.55 U - 3.4	3	1 / 15
1,2-Dichloroethane	0.69 U - 1400	0.6	6 / 15
SVOCs			
No Exceedances			
Inorganics			
Arsenic			
- Unfiltered	4U – 1100	25	8 / 15
- Filtered	4U – 1200		7 / 15
Lead		25	
- Unfiltered	5U – 110		1 / 15
- Filtered	5U - 11		0 / 15
Pesticides/PCBs			
Not Analyzed For			

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).
U – not detected, method detection limit shown

No site-related groundwater contamination of concern was identified during the off-site RI. Therefore, no remedial alternatives need to be evaluated for groundwater.

Sediments

Sediment samples were collected in both the Northern FS Study Area (NFSSA) and the Southern FS Study Area (SFSSA) during the RI from locations upstream, adjacent and downstream of the BASF Manufacturing Plant site (Site) in the Hudson River. The samples were collected to assess the potential for impacts to river sediment from the Site. The results indicate that activities at the BASF site resulted in Hudson River sediment contamination exceeding the Department's SCGs. The concentrations of contaminants obtained in upstream locations were considered in determining site background. Figure 1-D shows the boundaries of the NFSSA and SFSSA.

Table B-1 – Sediment in the Northern FS Study Area

Detected Constituents	Concentration Range Detected (ppm)	SGV (ppm)	Frequency Below Class A SGV	SGV (ppm)	Frequency within Class B SGV	SGV (ppm)	Frequency Exceeding Class C SGV
Inorganics							
Arsenic	1.5 - 115	<10	178/279	10 - 33	92/279	>33	9/279
Cadmium	0.57 - 37.5	<1	117/279	1 - 5	86/279	>5	76/279
Chromium	10.5 - 665	<43	133/279	43 - 110	37/279	>110	109/279
Copper	6.8 - 5440	<32	36/279	32 - 150	175/279	>150	68/279
Lead	11.1 - 1200	<36	104/279	36 - 130	51/279	>130	124/279
Mercury	0.039 - 35.2	<0.2	117/275	0.2 - 1	55/275	>1	103/275
Zinc	51.5 - 2440	<120	106/279	120 - 460	116/279	>460	57/279
VOC							
Benzene	0.00036 - 880	<0.53	365/548	0.53 - 1.9	94/548	>1.9	89/548
Chlorobenzene	0.00041 - 28000	<0.2	253/542	0.2 - 1.7	72/542	>1.7	217/542
1,2-Dichlorobenzene	0.00043 - 32000	<0.28	326/528	0.28 - 2.5	139/528	>2.5	63/528
1,3-Dichlorobenzene	0.00046 - 1700	<1.8	447/526	1.8 - 7.1	28/526	>7.1	51/526
1,4-Dichlorobenzene	0.00046 - 4000	<0.72	384/528	0.72 - 3.3	75/528	>3.3	69/528
Total PCBs detected at the following depths	**Concentration Range Detected (ppm)**	**SGV (ppm)**	**Frequency Below Class A SGV**	**SGV (ppm)**	**Frequency within Class B SGV**	**SGV (ppm)**	**Frequency Exceeding Class C SGV**
PCBs							
0 - 2 feet	0.024 - 240	<0.1	14/145	0.1 -1	46/145	>1.0	85/145
2 - 4 feet	0.062 - 270	<0.1	18/96	0.1 -1	24/96	>1.0	54/96
4 - 6 feet	0.029 - 140	<0.1	10/68	0.1 -1	20/68	>1.0	37/68
6 - 8 feet	0.065 - 130	<0.1	16/43	0.1 -1	15/43	>1.0	12/43
8 - 10 feet	0.083U - 0.013U	<0.1	5/8	0.1 -1	3/8	>1.0	0/8

Note:

Screening Values obtained from NYSDEC *Screening and Assessment of Contaminated Sediment (2014)*

Metals concentrations include sources unrelated to the site.

Equilibrium partitioning for SGV based on 2% TOC. Sitewide average is 4% TOC.

SGV - Sediment Guidance value, Numeric Concentrations of Individual Contaminants in sediment used in New York State to classify sediment based on the potential for impacts to aquatic life.

Class A: If the concentration of contaminant in sediment is below the SGV that defines this class, the contaminant can be considered to present little or no potential for risk to aquatic life.

Class B: If the concentration of contaminant lies between the SGVs that define Class A and Class C, additional information is needed to determine the potential risk to aquatic life.

Class C: If the concentration of a contaminant is above the SGV that defined this class, there is a high potential for the sediments to be toxic to aquatic life.

Frequency Exceeding SGV: Number of detected samples with SGV exceedance / Total number of samples analyzed for contaminant

Concentration Range Detected: Minimum detected concentration to maximum detected concentration

Table B-2 – Sediment in the Southern FS Study Area

Detected Constituents	Concentration Range Detected (ppm)	SGV (ppm)	Frequency Below Class A SGV	SGV (ppm)	Frequency within Class B SGV	SGV (ppm)	Frequency Exceeding Class C SGV
Inorganics							
Arsenic	1.6 - 22.3	<10	64/74	10 - 33	10/74	>33	0/74
Cadmium	0.028 - 17.7	<1	35/74	1 - 5	21/74	>5	18/74
Chromium	7.4 - 306	<43	40/74	43 - 110	14/74	>110	20/74
Copper	5.3 - 233	<32	38/74	32 - 150	31/74	>150	5/74
Lead	9.6 - 604	<36	34/74	36 - 130	13/74	>130	27/74
Mercury	0.02 - 3.7	<0.2	40/73	0.2 - 1	13/73	>1	20/73
Zinc	40.2 - 573	<120	38/74	120 - 460	31/74	>460	5/74
VOC							
Benzene	0.0053 - 0.17	<0.53	22/22	0.53 - 1.9	0/22	>1.9	0/22
Chlorobenzene	0.00057 - 0.17	<0.2	22/22	0.2 - 1.7	0/22	>1.7	0/22
1,2-Dichlorobenzene	0.0017 - 0.17	<0.28	22/22	0.28 - 2.5	0/22	>2.5	0/22
1,3-Dichlorobenzene	0.0053 - 0.17	<1.8	22/22	1.8 - 7.1	0/22	>7.1	0/22
1,4-Dichlorobenzene	0.0053 - 0.17	<0.72	22/22	0.72 - 3.3	0/22	>3.3	0/22
Total PCBs detected at the following depth	**Concentration Range Detected (ppm)**	**SGV (ppm)**	**Frequency Below Class A SGV**	**SGV (ppm)**	**Frequency within Class B SGV**	**SGV (ppm)**	**Frequency Exceeding Class C SGV**
PCBs							
0 - 0.5 feet	0.041 - 51	<0.1	3/19	0.1 - 1	7/19	>1.0	9/19

Note:

Screening Values obtained from NYSDEC *Screening and Assessment of Contaminated Sediment (2014)*

Metals concentrations include sources unrelated to the site.

Equilibrium partitioning for SGV based on 2% TOC. Sitewide average is 4% TOC.

SGV - Sediment Guidance value, Numeric Concentrations of Individual Contaminants in sediment used in New York State to classify sediment based on the potential for adverse impacts to aquatic life.
impacts to aquatic life.

Class A: If the concentration of contaminant in sediment is below the SGV that defines this class, the contaminant can be considered to present little or no potential for risk to aquatic life.

Class B: If the concentration of contaminant lies between the SGVs that define Class A and Class C, additional information is needed to determine the potential risk to aquatic life.

Class C: If the concentration of a contaminant is above the SGV that defined this class, there is a high potential for the sediments to be toxic to aquatic life.

Frequency Exceeding SGV: Number of detected samples with SGV exceedance / Total number of samples analyzed for contaminant

Concentration Range Detected: Minimum detected concentration to maximum detected concentration

Based on the findings of the Remedial Investigation, the presence of VOCs, metals and PCBs 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 chlorobenzene and lead.

Soil Vapor

BASF completed an investigation of soil gas including on-site and potential off-site migration pathways towards the AMRI (former Sterling Drug Site 1) and the Fort Crailo residential area to the north. A total of five soil gas samples were collected from each of five subsurface sampling locations (see Figure 1-E). The results indicated that contaminant transport via the soil vapor migration pathway, was not occurring.

Based on the concentration detected, and in comparison with the Soil Vapor Intrusion Guidance (NYSDOH 2006), no site-related soil vapor contamination of concern was identified during the off-site Remedial Investigation. Therefore, no remedial alternatives need to be evaluated for soil vapor.

Exhibit B

Description of Remedial Alternatives

Due to the nature and extent of contamination in the river sediments, as well as river bathymetry and local sediment dynamics, different remedial approaches were assembled for different areas of contaminated sediment. A set of alternatives was developed and assessed for the northern portion of the contaminated sediments, the Northern FS Study Area (NFSSA), and a different set of alternatives was developed and assessed for the southern portion of the contaminated sediments, the Southern FS Study Area (SFSSA). (See Figure 1-A). The alternatives for the NFSSA and the SFSSA assess varying degrees of dredging or capping of contaminated sediments.

Further, two different alternatives were developed and assessed for management of certain dredged sediments, and the sediment management alternatives are described below in a third set of alternatives.

The proposed remedy for the site consists of a combination of the preferred remedy from each of these sets.

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.

Description of Remedial Alternatives for Northern FS Study Area (NFSSA)

NFSSA 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.

NFSSA Alternative 2: Two-Foot Dredge/Cover System

Alternative 2 includes dredging two (2) feet of sediment from the upper, central and lower reaches of the NFSSA, placement of a cover system and post remedy monitoring. An estimated 22,100 cubic yards of dredged material will be excavated from the NFSSA (a 4.8 acre area). The dredging is expected to take two years. Clean fill (habitat restoration) will be brought in to re-establish the designed grades of the riverbed. Institutional controls in the form of a deed restriction and a site management plan will be necessary to protect public health and the environment from remaining contamination. The maintenance of the cover system will be included in the Site Management Plan. Alternative 2 is depicted on Figure B-1.

Present Worth: *$27,000,000*
Capital Cost: *$25,500,000*
Annual Costs: Institutional Controls and Monitoring *$100,000*

NFSSA Alternative 3: Two-Foot Dredge/Cover System for Upper and Lower Reaches, Four-Foot Dredge/Cover System in the Central Reach

This alternative is similar to Alternative 2 where the Upper and Lower reaches are dredged to 2 feet. The Central reach will be dredged to 4 feet. Alternative 3 removes an estimated 28,500 cubic yards of dredged material from the NFSSA. The dredging is expected to take two years. Clean fill (habitat restoration) will be brought in to re-establish the grades of the riverbed. Institutional controls in the form of a deed restriction and a site management plan will be necessary. Maintenance of the cover system will be included in the Site Management Plan. Alternative 3 is depicted on Figure B-2.

Present Worth: *$33,400,000*
Capital Cost: *$31,900,000*
Annual Costs: Institutional Controls and Monitoring *$100,000*

NFSSA Alternative 4: Two-Foot Dredge/Cover System for Upper and Lower Reaches, Six-Foot Dredge/Cover System in the Central Reach

In Alternative 4 the Upper and Lower reaches are dredged to 2 feet. The Central reach will be dredged to 6 feet. Alternative 4 removes an estimated 34,800 cubic yards of dredged material from the NFSSA. The dredging is expected to take two years. Clean fill (habitat restoration) will be brought in to re-establish the grades of the riverbed. Institutional controls in the form of a deed restriction and a site management plan will be necessary. Maintenance of the cover system will be included in the Site Management Plan. Alternative 4 is depicted on Figure B-3.

Present Worth: *$38,200,000*
Capital Cost: *$37,300,000*
Annual Costs: Institutional Controls and Monitoring *$60,000*

NFSSA Alternative 5: Two-Foot Dredge/Cover System for Upper Reach and portion of the Lower Reach, three-Foot Dredge/Cover System for portion of Lower Reach, and Dredge/Backfill/Cover System to Eight-Feet in the Central Reach

In Alternative 5 the Upper and Lower reaches are dredged to 2 feet and portions of the Lower reach are dredged to 3 feet to remove greater amounts of metals contamination. Parts of the Central reach will be dredged as deep as 8 feet. Alternative 5 removes an estimated 38,700 cubic yards of dredged material from the NFSSA. The dredging is expected to take two years. Clean fill (habitat restoration) will be brought in to re-establish the grades of the riverbed. Institutional controls in the form of a deed restriction and a site management plan will be necessary. Maintenance of the cover system will be included in the Site Management Plan. Alternative 5 is depicted on Figure B-4.

Present Worth: ..... *$ 41,300,000*
Capital Cost: *$40,700,000*

Annual Costs: Institutional Controls and Monitoring.....$37,000

NFSSA Alternative 6: Eight-Foot Dredge/Cover System in Upper Reach and Ten-Foot Dredge/Backfill/Cover System in Lower and Central Reaches

In Alternative 6, the Upper reach is dredged to 8 feet and the Central and Lower reaches are dredged to 10 feet. Alternative 6 removes an estimated 133,000 cubic yards of dredged material from the NFSSA. The dredging is expected to take four years. Alternative 6 is designed to remove essentially all sediments with VOC concentrations in excess of the sediment cleanup objectives for VOCs. All dredged areas will be backfilled with clean fill (habitat restoration) to restore the bathymetric surface of the riverbed. Monitoring of the cover is not required. Alternative 6 is depicted on Figure B-5.

Present Worth:.....$122,000,000
Capital Cost:.....$122,000,000
Annual Costs: Institutional Controls and Monitoring.....$0

Description of Remedial Alternatives for Ex Situ Management of NFSSA Dredged Sediments

The costs of Alternatives 3-6 above reflect the cost of using on-site thermal treatment. The alternatives below provide the costs of off-site disposal versus on-site thermal treatment for proposed NFSSA Alternative 5.

Alternative 1: Off-Site Disposal

Alternative 1 is off-site disposal of all dredged sediments at a facility permitted to accept the waste. Prior to transportation, the sediments will be dewatered and stabilized at the BASF property (OU 01). For transportation and disposal, depending upon contaminant concentrations, the dredged sediment may be RCRA-regulated material, TSCA-regulated material, or simply a solid waste.

Present Worth:.....$3,090,000
Capital Cost:.....$3,090,000
Annual Costs:.....$0

Alternative 2: On-Site Thermal Treatment

Alternative 2 includes on-site treatment of a portion of the dredged sediments removed under NFSSA Alternatives 3-6. An estimated 7,000 cubic yards of sediment dredged under Alternative 5 will have sufficiently high VOC concentrations to qualify as a characteristic hazardous waste under the Resource Conservation and Recovery Act (RCRA). These sediments would be heated in a thermal desorption unit from 500 to 800 °F to remove VOCs. PCB-contaminated sediment regulated as a TSCA waste would not be treated on site. The removed VOCs would be captured to prevent their release to the atmosphere. After treatment, the sediment may be reused on site or transported for disposal as a solid waste, depending on residual contamination levels.

Present Worth: *$2,370,000*
Capital Cost: *$2,370,000*
Annual Costs: *$0*

Description of Remedial Alternatives for Southern FS Study Area

SFSSA 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.

Present Worth: *$0*
Capital Cost: *$0*
Annual Costs: Institutional Controls and Monitoring *$0*

SFSSA Alternative 2: Monitoring

River bottom assessment shows that sediment from up-river has been migrating into the SFSSA since the last dredge event (1961). Alternative 2 takes advantage of this sediment migration by monitoring to confirm the natural placement of a sediment cover over the site-impacted sediments. Sediment deposition and migration is expected to continue as the Hudson River delivers new sediment to the SFSSA and contaminated sediments are isolated by burial. Institutional controls in the form of a deed restriction and a site management plan, including a long-term monitoring plan, will be necessary. Alternative 2 is depicted on Figure B-6.

Present Worth: *$880,000*
Capital Cost: *$0*
Annual Costs: Institutional Controls and Monitoring *$57,000*

SFSSA Alternative 3: Monitoring and Additional Thin Layer Cover

Alternative 3 includes the placement of a six-inch thin-layer cover along with monitoring to ensure additional natural capping of impacted sediments. Installation of the thin layer cover involves placing an estimated 5,400 cubic yards of sand over the SFSSA at depths from 20 to 40 feet. Placement of the cover is expected to take one year. Institutional controls in the form of a deed restriction and a site management plan, including a long-term monitoring plan, will be necessary. Alternative 3 is depicted on Figure B-6.

Present Worth: *$4,900,000*
Capital Cost: *$3,900,000*
Annual Costs: *$65,000*

SFSSA Alternative 4: One Foot Dredging and Engineered Cover

Alternative 4 includes dredging approximately one foot of sediment, placement of a one-foot cover and post remedy monitoring. Alternative 4 removes an estimated 19,000 cubic yards of dredged material (includes an estimated six-inch over dredge). Installation of the cover involves placing an estimated 11,000 cubic yards of sand at depths from 20 to 40 feet. The dredging and placement of the cover is expected to take one year. Institutional controls in the form of a deed restriction and a site management plan, including a long-term monitoring plan, will be necessary. Alternative 4 is depicted on Figure B-6.

Present Worth: *$18,000,000*
Capital Cost: *$17,000,000*
Annual Costs: *$67,000*

Exhibit C

Northern FS Study Area Remedial Alternative Costs

	Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
1	No Action	0	0	0
2	Two-Foot Dredge/Cover System	25,500,000	100,000	27,000,000
3	Two-Foot Dredge/Cover System with Four-Foot Dredge/Cover System in Central Reach	31,900,000	100,000	33,400,000
4	Two-Foot Dredge/Cover System with Six-Foot Dredge/Cover System in Central Reach	37,300,000	60,000	38,200,000
5	Two-Foot Dredge/Cover System (Upper Reach and portion of the Lower reach), three-foot Dredge/Cover System (portion of Lower Reach), with Dredge/Backfill/Cover System to 8 feet in Central Reach	40,700,000	37,000	41,300,000
6	Eight-Foot Dredge/Cover System in Upper Reach and Ten-Foot Dredge/Backfill/Cover System in Lower and Central Reaches	122,000,000	0	122,000,000

NOTE: Cost estimates for Alternatives 3-6 above include sediment treatment by thermal desorption. Transport for disposal without treatment adds an estimated $700,000 to capital cost of each alternative.

Annual Costs are the Net Present Value for 5-year Environmental Monitoring.

A 5% Net Discount rate is assumed.

Southern FS Study Area Remedial Alternative Costs

	Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
1	No Action	0	0	0
2	Monitoring	0	57,000	880,000
3	Monitoring/Thin layer Cover	3,900,000	65,000	4,900,000
4	One-Foot Dredging and Engineered Cover	17,000,000	67,000	18,000,000

Annual Costs are the Net Present Value for 5-year Environmental Monitoring.

A 5% Net Discount rate is assumed.

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing a combination of NFSSA Alternative 5 (Sediment Dredging and Cover System), Management of NFSSA Dredged Sediment Alternative 2 (Thermal Treatment) and SFSSA Alternative 2 (Monitoring) as the remedy for OU 02. This Remedy would achieve the remediation goals for OU 02 by dredging impacted sediments, managing the sediments using treatment (ex-situ thermal desorption) and off-site disposal, restoration of dredged areas, placement of a cover, and monitoring of impacted areas of the river adjacent to the Site. The elements of this remedy are described in Section 7. The proposed remedy for OU 02 is depicted in Figure B-4 and in Figure B-6.

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. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

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

Basis for Selection of the Northern FS Study Area Alternative

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

The proposed NFSSA remedy Alternative 5 would satisfy this criterion by dredging contaminated sediments, restoring the dredged areas with backfill and placing a cover system over the dredged areas. Alternative 5 removes a significant portion of the most contaminated sediment with the highest levels of site-related contaminants of concern. Alternative 1 (No Action) does not provide any protection to public health and the environment and will not be evaluated further. Alternatives 2, 3, and 4 also comply with this criterion. Alternatives 2, 3, and 4 remove less contaminated sediment than Alternative 5. Alternative 6 also meets the criterion by removing essentially all site-impacted sediment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). 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.

Alternative 5 complies with SCGs to the extent practicable. It addresses areas of contamination and complies with the SCGs at the riverbed through implementation of a cover system constructed to create the conditions necessary to restore riverbed quality to the extent practicable. Alternatives 2, 3, 4 and 6 also comply with this criterion. Because Alternatives 2, 3, 4, 5, and 6 each satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the NFSSA.

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

3. Long-term Effectiveness and Permanence. 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.

Long-term effectiveness is best accomplished by those alternatives including dredging and removal of contaminated sediment. Cover systems and long term monitoring are required to ensure long-term effectiveness of those alternatives that do not remove all contamination. Since the largest volume of the most contaminated sediments are located in the central reach of the NFSSA, Alternative 5 is more effective than Alternatives 2, 3 and 4. Alternative 6 removes essentially all site-impacted sediment and would best satisfy this criterion.

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

As each alternative involves dredging, reduction in volume may be assessed by describing the volume of contaminant removed from the river under each alternative. For alternatives that do not remove all contaminated sediment, a cover system will eliminate contaminant mobility.

The total mass of VOCs present in the NFSSA was estimated to be 80,800 pounds. Alternatives 2 through 6 each remove a certain mass of VOCs from the NFSSA.

Alternative 2 will remove 7,900 cubic yards of sediment from the NFSSA central reach for a total of 22,100 cubic yards. This is an estimated 14% removal of the entire VOC mass within the NFSSA.

Alternative 3 will remove 14,300 cubic yards of sediment from the NFSSA central reach for a total of 28,500 cubic yards. This is an estimated 47% removal of the entire VOC mass within the NFSSA.

Alternative 4 will remove 20,600 cubic yards of sediment from the NFSSA central reach for a total of 34,800 cubic yards. This is an estimated 75% removal of the entire VOC mass within the NFSSA.

Alternative 5 will remove 22,800 cubic yards of sediment from the NFSSA central reach for a total of 38,700 cubic yards. This is an estimated 93% removal of the entire VOC mass within the NFSSA.

Alternative 6 will remove 42,900 cubic yards of sediment with the highest levels of VOCs from the NFSSA central reach for a total removal of 133,000 cubic yards. With an estimated 95 to 99% removal of the entire VOC mass, Alternative 6 reduces the greatest volume of contaminated sediments in the NFSSA.

5. Short-term Impacts and 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.

Alternatives 2 through 6 all have short-term water quality impacts which could be controlled through engineering controls. In general terms, those alternatives which involve a greater volume of sediment removal have a greater risk for short-term impacts due to dredging operations. The estimated time needed to achieve remediation goals is shortest for Alternative 2 (one year) and longer for Alternatives 3, 4 and 5 (estimated to require two years).

Alternative 6 takes the longest to achieve the remediation goals (estimated four years).

6. Implementability. 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.

Alternatives 2, 3, 4, 5 and 6 are all implementable, though each are technically challenging. Alternatives 3, 4, 5 and 6 require installation of sheet piling in the NFSSA Central reach to isolate the sediments with highest levels of VOCs and permit dredging to a deeper depth. All alternatives require the construction of a temporary structure to store and handle the sediment, control the vapors emitted during the handling and treatment of the sediments, and for storage prior to the disposal to the permitted facilities. The deeper dredging depth, the proposed quantity of dredged sediment and the length of time to perform the remedial action makes the implementability of Alternative 6 the most difficult. Alternatives 2, 3, 4 and 5 will require institutional controls (ICs). ICs are implementable and require coordination with the responsible party to follow the requirements in a Site Management Plan.

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.

While each of the alternatives is protective with proper monitoring, cost-effectiveness may be best assessed by comparing the pounds of VOC contamination removed versus the cost of the alternative. Such a comparison shows the unit cost of removing VOC contamination by dredging decreases with an increase in the volume of removed contamination (e.g. Alternative 4 has a higher ratio of contamination removed per dollar than Alternative 3, and Alternative 5 has a higher ratio than Alternative 4) indicating an increasing cost effectiveness with volume dredged. However, dredging the last 2% to 6% of VOC contamination (Alternative 6) results in a dramatic rise in the remedial cost, and a corresponding sharp increase in the unit cost of contaminant removal. Based on this comparison, Alternative 5 best satisfies this criterion.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Alternatives 2, 3, 4, 5 and 6 will not significantly inhibit future use of the river. For Alternatives 2, 3, 4 and 5, any restrictions on areas where a cover is constructed and maintained will be controlled with implementation of, and adherence to, a site management plan. Post remedy monitoring of the cover system will be controlled with the site management plan. For Alternative 6, no restrictions are required as there will be no cover system.

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.

9. 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.

NFSSA Alternative 5 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

Basis for Selection for the Ex Situ Management of NFSSA Dredged Sediment Alternative

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

With Engineering Controls (ECs) and monitoring, both Alternatives 1 and 2 are protective of human health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). 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.

Alternative 1 complied with all SCGs. Alternative 2 can be designed to conform to applicable standards, criteria and guidance. Because both alternatives satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final alternative for the management of dredged sediment.

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

3. Long-term Effectiveness and Permanence. 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.

Both Alternatives 1 and 2 achieve Long-term Effectiveness and Permanence either through disposal of the contaminated sediment at a permitted facility or with treatment to remove the contamination.

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

Alternative 2 may achieve a greater reduction in the toxicity, mobility and volume through treatment of a portion of the sediments.

5. Short-term Impacts and 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.

Alternative 1 provides some advantages in terms of the risk of short-term impacts compared to Alternative 2.

Short-term impacts for operation of a thermal desorption unit will be managed using engineering controls. Both Alternatives are estimated to be completed within one year following the completion of dredging.

6. Implementability. 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.

Alternative 1 is readily implementable. Alternative 2 is likely implementable but will require additional permits and approvals.

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.

Direct off-site disposal of sediment as a hazardous waste is estimated to cost $300 per ton. The cost of on-site thermal desorption followed by off-site disposal as non-hazardous waste is estimated to be $230 per ton (assuming a minimum of 7000 cubic yards of sediments with elevated VOCs). The potential cost savings for Alternative 2 is in the range of $700,000. Both alternatives provide a similar level of protection.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Neither alternative is expected to impair the future use of the site.

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.

9. 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.

Management of Dredged Sediment Alternative 2 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion since it further reduces the toxicity and costs less than Alternative 1.

Basis for Selection for the Southern FS Study Area Alternative

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

The proposed remedy (Alternative 2) would satisfy this criterion by ensuring impacted sediments are covered (isolated) by a layer of material from upstream. Alternatives 1 may not be protective. Alternatives 3 and 4 comply with this criterion.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). 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.

Alternative 2 complies with SCGs to the extent practicable. Alternatives 3 and 4 also comply with this criterion. Because Alternatives 2, 3 and 4 satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the SFSSA. Since Alternative 1 does not comply with this criterion, it will not be evaluated further.

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

3. Long-term Effectiveness and Permanence. 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, 3 and 4 will be effective in the long-term and permanent. Alternatives 2, 3 and 4 require long-term monitoring of the riverbed or cover.

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

Under Alternatives 2 and 3, the toxicity and volume of the wastes would not be reduced. Alternative 3 reduces the short-term risk of contaminant mobility and exposure with installation of the cover. For Alternative 4, the proposed dredging will remove sediments impacted with metals thereby reducing the volume of contaminated material at the site and it reduces the short-term risk of contaminant mobility and exposure with installation of the cover.

5. Short-term Impacts and 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.

Alternative 2 has no short-term impacts. Alternative 3 would have short-term water quality impacts due to the cap material mixing with the existing sediment surface. The installing of the cover is expected to take one year. Alternative 4 would have a greater risk of short-term water quality impacts, but they can be controlled through

engineering controls. The dredging and installing of a cover is expected to take one year.

6. Implementability. 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.

Alternative 2 is readily implementable. Alternative 3 is also implementable, but placement of the thin layer cover at a depth of twenty feet to 40 feet below water over a seven acre area is technically challenging. Alternative 4's cover installation is technically challenging and it has additional technical challenges associated with dredging at that depth below water. Alternatives 2, 3 and 4 will require institutional controls (ICs). ICs are implementable and require coordination with the responsible party to follow the requirements in a Site Management Plan.

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 capital costs of the alternatives vary significantly with Alternative 4 costing 20 times more than the cost of Alternative 2, while the level of protection provided by Alternatives 2, 3 and 4 are expected to be similar.

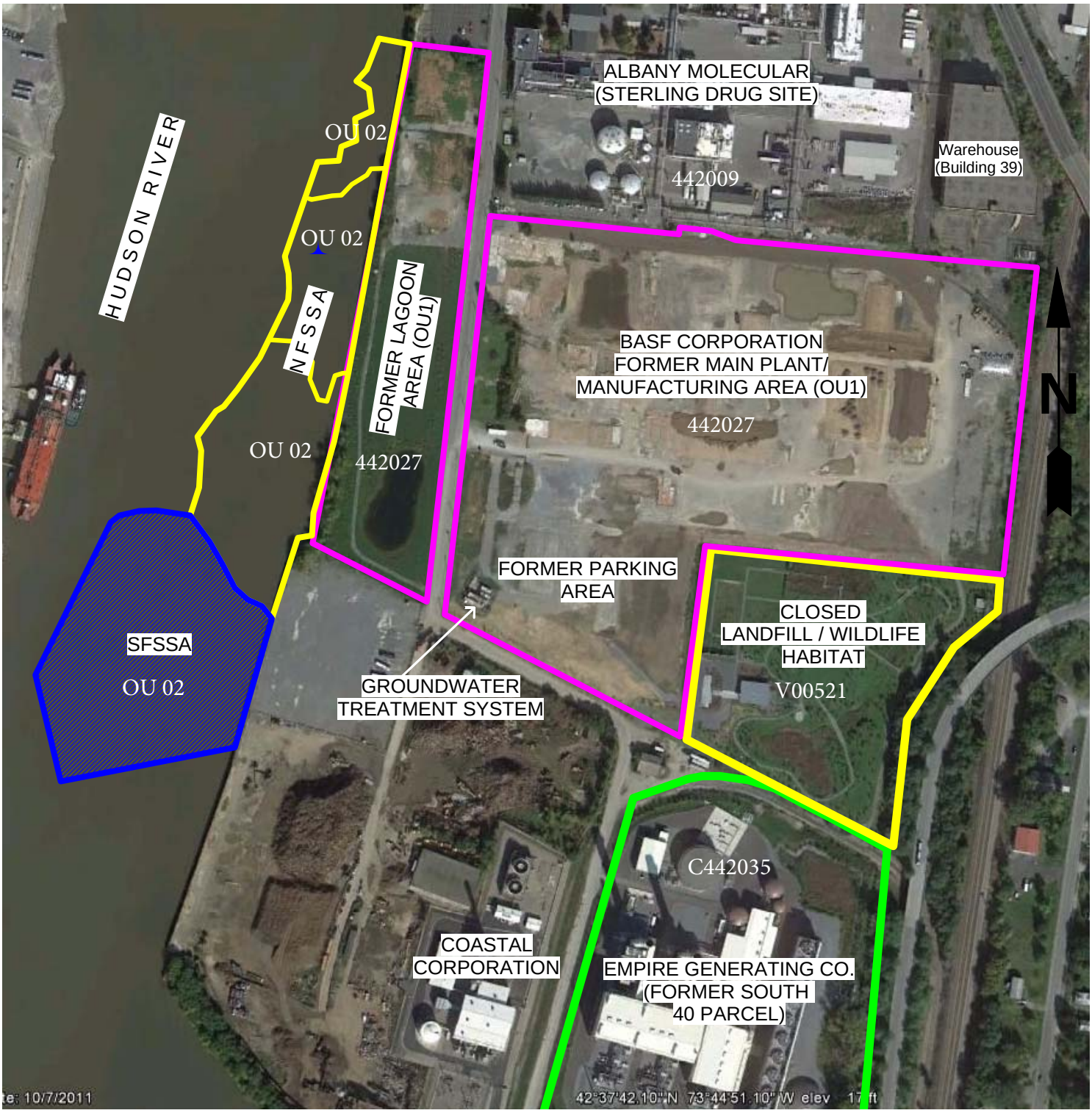
8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

None of the alternatives are expected to inhibit current or intended use of the river. Alternatives 3, and 4 will require long term management and coordination during dredge operations

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.

9. 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.

SFSSA Alternative 2 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.



442027 -BASF Manufacturing Plant Site OU 01
442009 - Albany Molecular (Sterling Drug Site 1)
V00521 - Closed Landfill / Wildlife Habitat
C442035 - Empire Generating (former South 40)
OU 02 PRAP subject area - NFSSA and SFSSA

AERIAL PHOTOGRAPH SOURCE: GOOGLE EARTH 2012
IMAGE DATE OCTOBER 7, 2011

Title:

BASF SITE BOUNDARIES
(SITE #4-42-027)

PROPOSED REMEDIAL ACTION PLAN

Prepared For:
BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: N.E.	Date: 12/13/2012	FIGURE
Prepared by: NE	NTS	1-A
Project Mgr: N.E.	Office: NY	
0251.0011Y608.02.WOR	0251.0011Y045	

SEWER BEDDING INVESTIGATION PHASE 1

SEWER BEDDING INVESTIGATION PHASE 2

LG-MH-7 — LOCATION AND DESIGNATION OF EXISTING MANHOLE SEWER BEDDING GROUNDWATER SAMPLING PORT

LG-PZ-128 — LOCATION AND DESIGNATION OF SEWER BEDDING GROUNDWATER SAMPLING PIEZOMETER

OS-MH-3-GW / OS-MH-3-SG — LOCATION AND DESIGNATION OF MANHOLE SEWER BEDDING SOIL GAS AND GROUNDWATER SAMPLING PORTS

OS-PZ-201 / OS-SG-201 — LOCATION AND DESIGNATION OF SOIL GAS SAMPLER (GEOPROBE) AND GROUNDWATER SAMPLING PIEZOMETER

PREFIX EXPLANATION:
LG - LAGOON AREA
OS - OFFSITE

AERIAL PHOTOGRAPH DATE : SPRING 2001

Title:

SEWER BEDDING SAMPLING LOCATIONS

PROPOSED REMEDIAL ACTION PLAN

Prepared For:

BASF CORPORATION
FLORHAM PARK, NEW JERSEY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: N.E.	Date: 3/31/04	FIGURE
Prepared by: NE	Scale: 1" = 300'	1-B
Project Mgr: N.E.	Office: NY	
File No: BF1134813.WOR	Project: BF25111Y24	

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LEGEND

MP–PP–2 ⊕ LOCATION AND DESIGNATION OF PERFORATED PIPE RISER

OS–PZ–203 ⊕ LOCATION AND DESIGNATION OF PIEZOMETER

LG–PZ–129 ◑ LOCATION AND DESIGNATION OF PIEZOMETER INSTALLED IN SEWER BEDDING

LG–MH–7 ⊙ LOCATION AND DESIGNATION OF GROUNDWATER SAMPLING PORT INSTALLED IN SEWER MANHOLE

SAMPLE LOCATION	LG-MH-7	6/8/04 (SAMPLE DATE)
	1,2-DICHLOROBENZENE	3.4
	1,2-DICHLOROETHANE	77
ANALYTE	BENZENE	33 (CONCENTRATION (ug/L))
	CHLOROBENZENE	440
	VINYL CHLORIDE	12

NOTES

METALS DATA ARE FOR FILTERED SAMPLES

ALL CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

ND ALL CONSTITUENTS OF CONCERN NOT DETECTED OR DETECTED BELOW NYSDEC AMBIENT WATER QUALITY STANDARDS

200' 0 200'

N

Title:
SUMMARY OF CONSTITUENTS OF CONCERN DETECTED ABOVE NYSDEC AMBIENT WATER QUALITY STANDARDS IN GROUNDWATER

PROPOSED REMEDIAL ACTION PLAN
BASF RENSSELAER, NEW YORK FACILITY

Prepared For:
BASF CORPORATION

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.E.	Date: 21OCT15	FIGURE 1-C
Prepared by: R.K.	Scale: AS SHOWN	
Project Mgr: N.E.	Project: 0251.0011Y051	
File: 0251.0011Y632.01.DWG		

Area of Upstream Deposition
Approx 0.1 Ac.

Upper Northern
FS Study Area
Approx. 0.9 Ac.**

Central Northern
FS Study Area
Approx. 2.2 Ac.**

Area of Upstream Deposition
Approx 1.8 Ac.

Lower Northern
FS Study Area
Approx. 3.9 Ac.**

Southern FS
Study Area
Approx. 6.7 Ac.

Area of Upstream Deposition
Approx. 0.3 Ac.

Depth (Feet - MLLW)

-45 - -40
-39 - -35
-34 - -30
-29 - -25
-24 - -20
-19 - -15
-14 - -10
-9 - -5
-4 - 0

0 50 100 200 300 400 500 Feet

NFSSA & SFSSA

Area of Upstream Deposition

Outfall Pipe Locations

** Total area is inclusive of
Areas of Upstream Deposition.

N

2015 FS Site Boundaries

Hudson River OU-2
Proposed Remedial Action Plan
BASF Corporation
Rensselaer, New York

SCALE	DATE	PROJECT NO.
1:2000	10/15	60323713

AECOM

Figure Number

1-D

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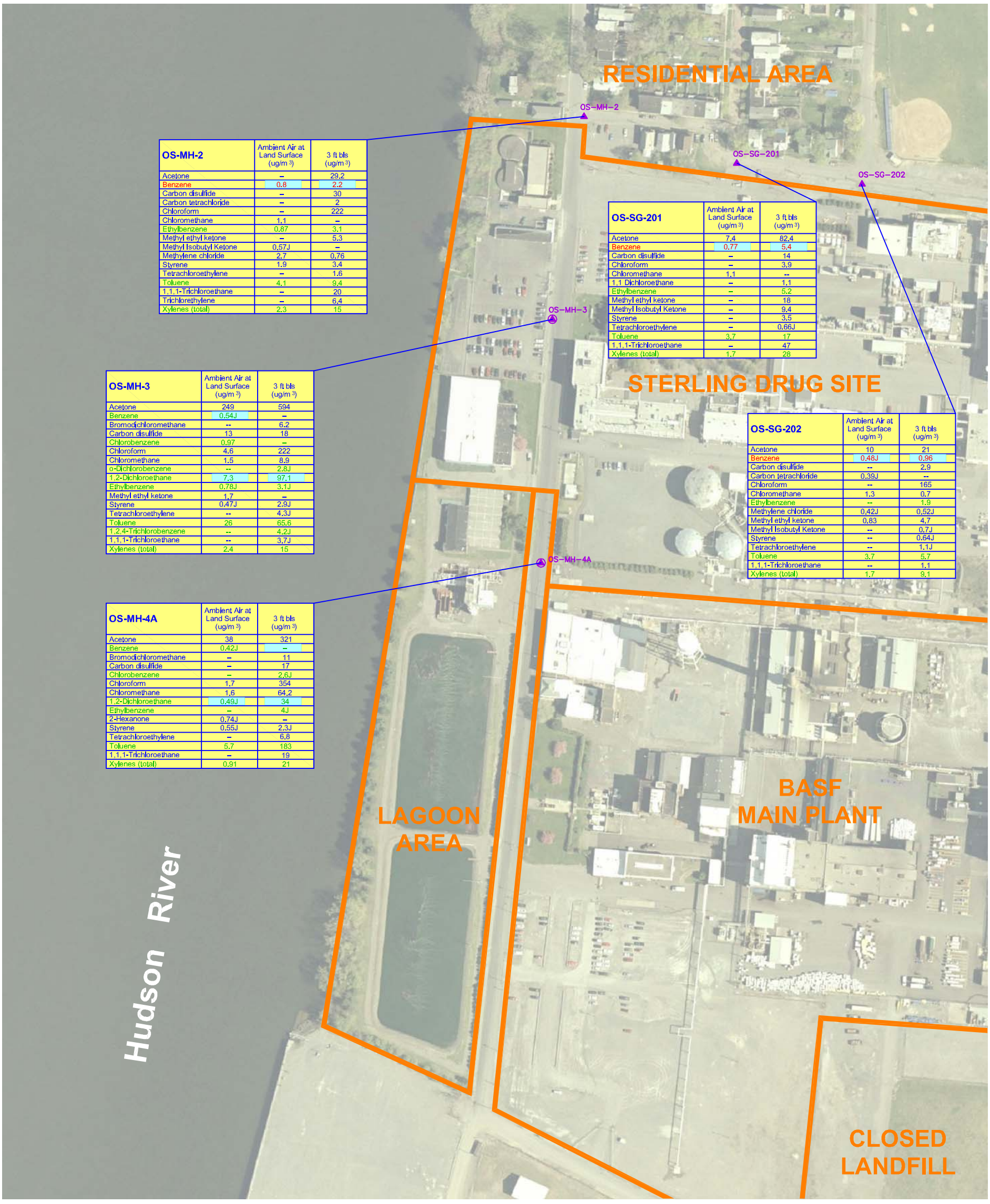


OS-MH-2	Ambient Air at Land Surface (ug/m 3)	3 ft bls (ug/m 3)
Acetone	–	29.2
Benzene	0.8	2.2
Carbon disulfide	–	30
Carbon tetrachloride	–	2
Chloroform	–	222
Chloromethane	1.1	–
Ethylbenzene	0.87	3.1
Methyl ethyl ketone	–	5.3
Methyl Isobutyl Ketone	0.57J	–
Methylene chloride	2.7	0.76
Styrene	1.9	3.4
Tetrachloroethylene	–	1.6
Toluene	4.1	9.4
1,1,1-Trichloroethane	–	20
Trichlorethylene	–	6.4
Xylenes (total)	2.3	15

OS-SG-201	Ambient Air at Land Surface (ug/m 3)	3 ft bls (ug/m 3)
Acetone	7.4	82.4
Benzene	0.77	5.4
Carbon disulfide	–	14
Chloroform	–	3.9
Chloromethane	1.1	--
1,1 Dichloroethane	–	1.1
Ethylbenzene	–	5.2
Methyl ethyl ketone	–	18
Methyl Isobutyl Ketone	–	9.4
Styrene	–	3.5
Tetrachloroethylene	–	0.66J
Toluene	3.7	17
1,1,1-Trichloroethane	–	47
Xylenes (total)	1.7	28

OS-MH-3	Ambient Air at Land Surface (ug/m 3)	3 ft bls (ug/m 3)
Acetone	249	594
Benzene	0.54J	–
Bromodichloromethane	--	6.2
Carbon disulfide	13	18
Chlorobenzene	0.97	–
Chloroform	4.6	222
Chloromethane	1.5	8.9
o-Dichlorobenzene	--	2.8J
1,2-Dichloroethane	7.3	97.1
Ethylbenzene	0.78J	3.1J
Methyl ethyl ketone	1.7	–
Styrene	0.47J	2.9J
Tetrachloroethylene	--	4.3J
Toluene	26	65.6
1,2,4-Trichlorobenzene	--	4.2J
1,1,1-Trichloroethane	--	3.7J
Xylenes (total)	2.4	15

OS-SG-202	Ambient Air at Land Surface (ug/m 3)	3 ft bls (ug/m 3)
Acetone	10	21
Benzene	0.48J	0.96
Carbon disulfide	--	2.9
Carbon tetrachloride	0.39J	--
Chloroform	--	165
Chloromethane	1.3	0.7
Ethylbenzene	--	1.9
Methylene chloride	0.42J	0.52J
Methyl ethyl ketone	0.83	4.7
Methyl Isobutyl Ketone	--	0.7J
Styrene	--	0.64J
Tetrachloroethylene	--	1.1J
Toluene	3.7	5.7
1,1,1-Trichloroethane	--	1.1
Xylenes (total)	1.7	9.1

OS-MH-4A	Ambient Air at Land Surface (ug/m 3)	3 ft bls (ug/m 3)
Acetone	38	321
Benzene	0.42J	–
Bromodichloromethane	–	11
Carbon disulfide	–	17
Chlorobenzene	–	2.6J
Chloroform	1.7	354
Chloromethane	1.6	64.2
1,2-Dichloroethane	0.49J	34
Ethylbenzene	–	4J
2-Hexanone	0.74J	–
Styrene	0.55J	2.3J
Tetrachloroethylene	–	6.8
Toluene	5.7	183
1,1,1-Trichloroethane	–	19
Xylenes (total)	0.91	21

LEGEND

OS-MH-2 ▲ LOCATION AND DESIGNATION OF SOIL GAS WELL INSTALLED VIA GEOPROBE FROM LAND SURFACE

OS-MH-4A ◭ LOCATION AND DESIGNATION OF SOIL GAS SAMPLING POINT INSTALLED IN SEWER MANHOLE

SAMPLE LOCATION → OS-MH-4A

ANALYTE	Ambient Air at Land Surface (ug/m 3)	3 ft bls (ug/m 3) ← SAMPLE INTERVAL
Acetone	38	321
Benzene	0.42	-
Bromodichloromethane	-	11 ← CONCENTRATION (ug/m3)
Carbon disulfide	-	-
Chlorobenzene	-	2.6J
Chloroform	1.7	354
Chloromethane	1.6	64.2
1,2-Dichloroethane	0.49	34
Ethylbenzene	-	4
2-Hexanone	0.74	- ← ANALYTE NOT DETECTED IN SOIL GAS
Styrene	0.55	2.3J
Tetrachloroethylene	-	6.8
Toluene	5.7	183
1,1,1-Trichloroethane	-	19
Xylenes (total)	0.91	21

N

200' 0 200'

NOTES

ALL SAMPLES OBTAINED JUNE 7, 2004

ALL CONCENTRATIONS IN MICROGRAMS PER CUBIC METER (ug/m 3)

GREEN TEXT INDICATES COMPOUND OF CONCERN IN SOIL OR GROUNDWATER AT BASF FACILITY

RED TEXT INDICATES SOIL GAS DETECTION NOT ATTRIBUTED TO CONTAMINATION AT THE BASF SITE

INDICATES SOIL GAS DETECTION AT CONCENTRATION ABOVE NYSDEC ANNUAL GUIDELINE CONCENTRATION FOR AMBIENT AIR

Title:

SUMMARY OF SOIL GAS DETECTIONS ASSOCIATED WITH SEWER BEDDING

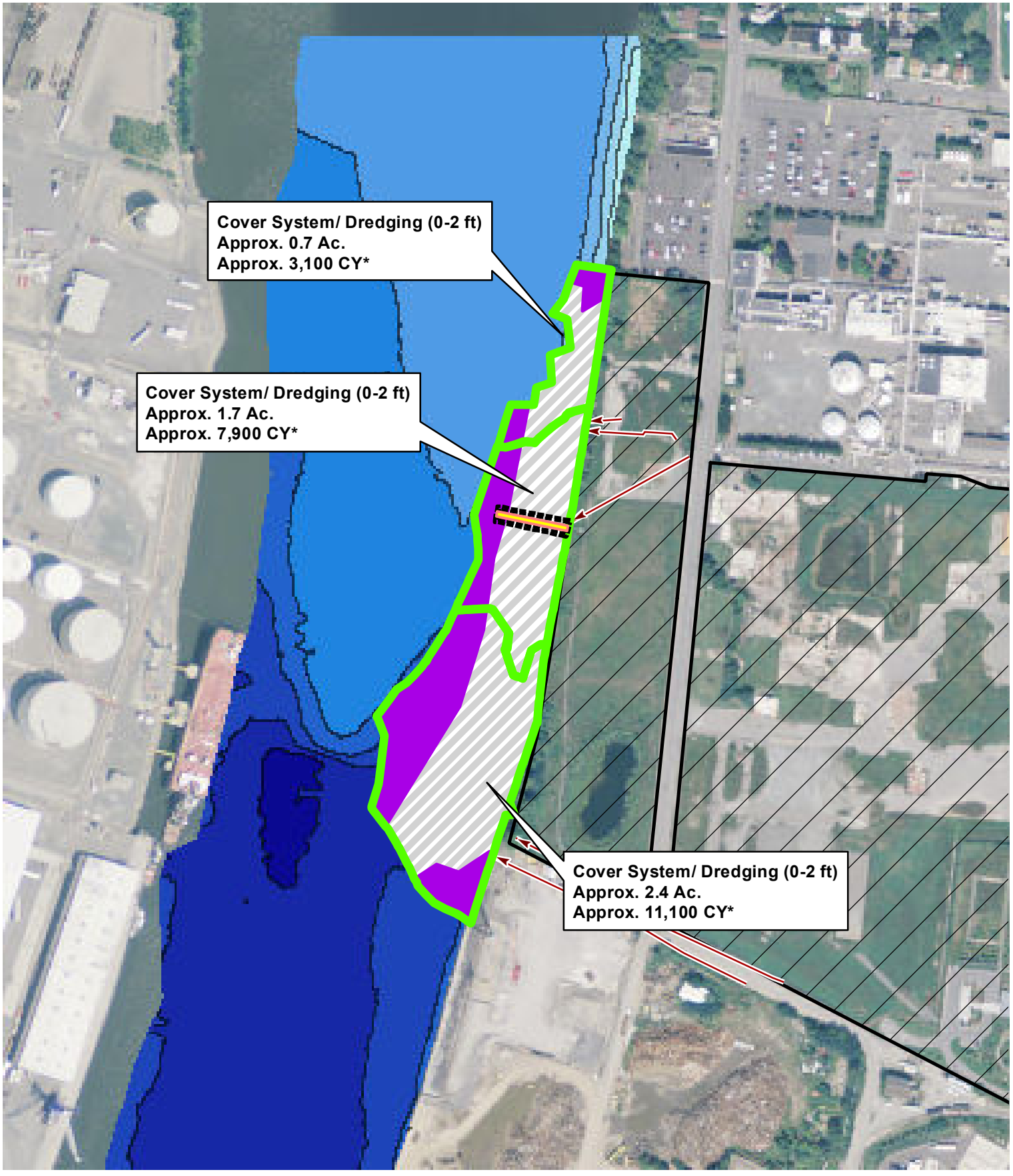
PROPOSED REMEDIAL ACTION PLAN
BASF RENSSELAER, NEW YORK FACILITY

Prepared For:

BASF CORPORATION

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.E.	Date: 21OCT15	FIGURE
Prepared by: R.K.	Scale: AS SHOWN	1-E
Project Mgr: N.E.	Project: 0251.0011Y051	
File: 0251.0011Y632.02.DWG		



Depth (Feet - MLLW)

-45 - -40 | -39 - -35 | -34 - -30 | -29 - -25 | -24 - -20 | -19 - -15 | -14 - -10 | -9 - -5 | -4 - 0

0 50 100 200 300 400 500 Feet

Naturally Capped

Approx. Location of Diffuser Pipe

*Note: Dredge volumes include 0.5 foot overdredge and 15% side wall slough factor

Northern FS Study Area
Alternative 2
Hudson River OU-2
Proposed Remedial Action Plan
BASF Corporation
Rensselaer, New York

SCALE	DATE	PROJECT NO.
See Insets	10/15	60323713

AECOM

Figure Number

B-1

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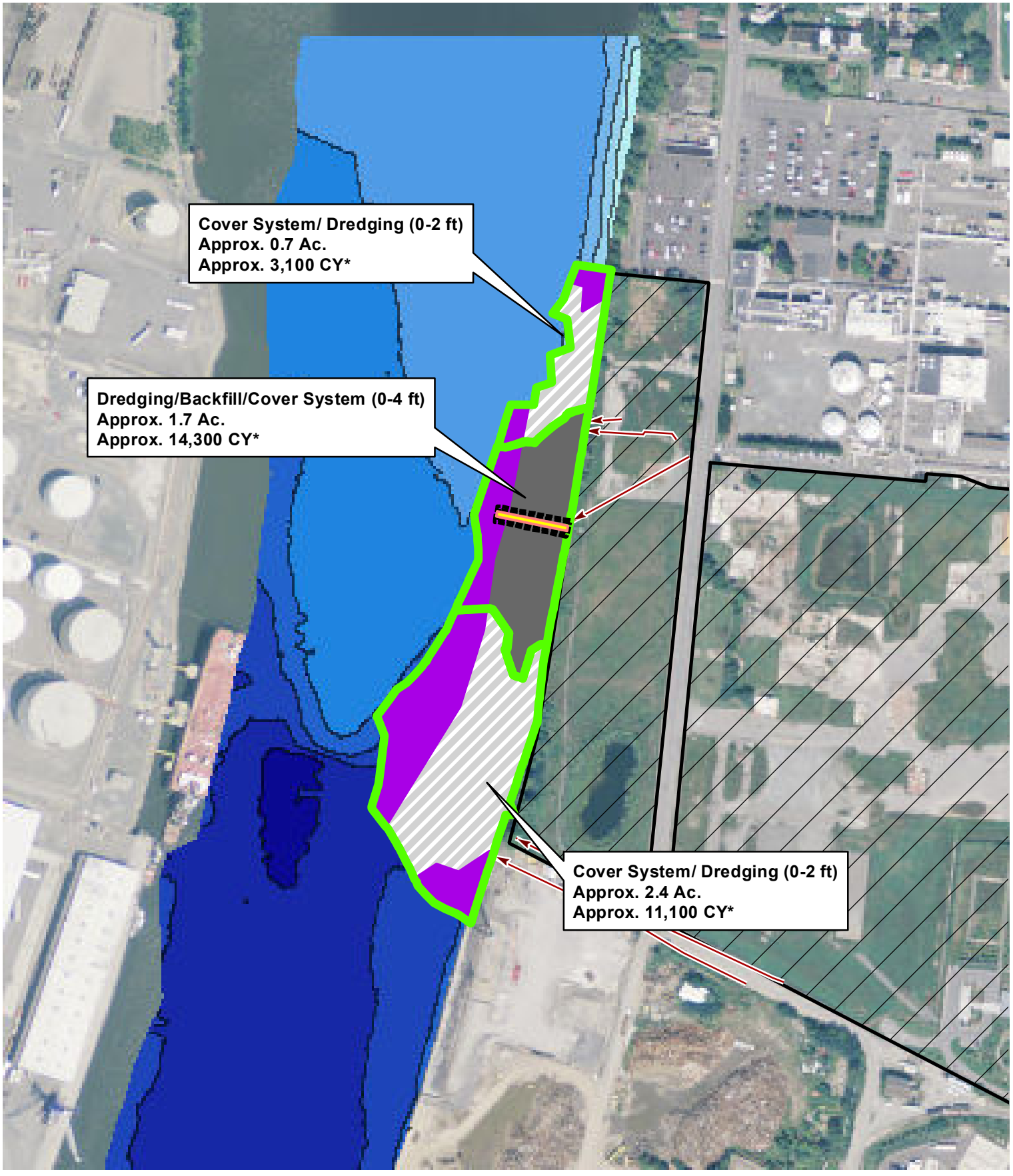

Depth (Feet - MLLW)

-45 - -40 | -39 - -35 | -34 - -30 | -29 - -25 | -24 - -20 | -19 - -15 | -14 - -10 | -9 - -5 | -4 - 0

0 50 100 200 300 400 500 Feet

Naturally Capped

Approx. Location of Diffuser Pipe

*Note: Dredge volumes include 0.5 foot overdredge and 15% side wall slough factor

N

Northern FS Study Area
Alternative 3
Hudson River OU-2
Proposed Remedial Action Plan
BASF Corporation
Rensselaer, New York

SCALE	DATE	PROJECT NO.
See Insets	10/15	60323713

AECOM

Figure Number

B-2

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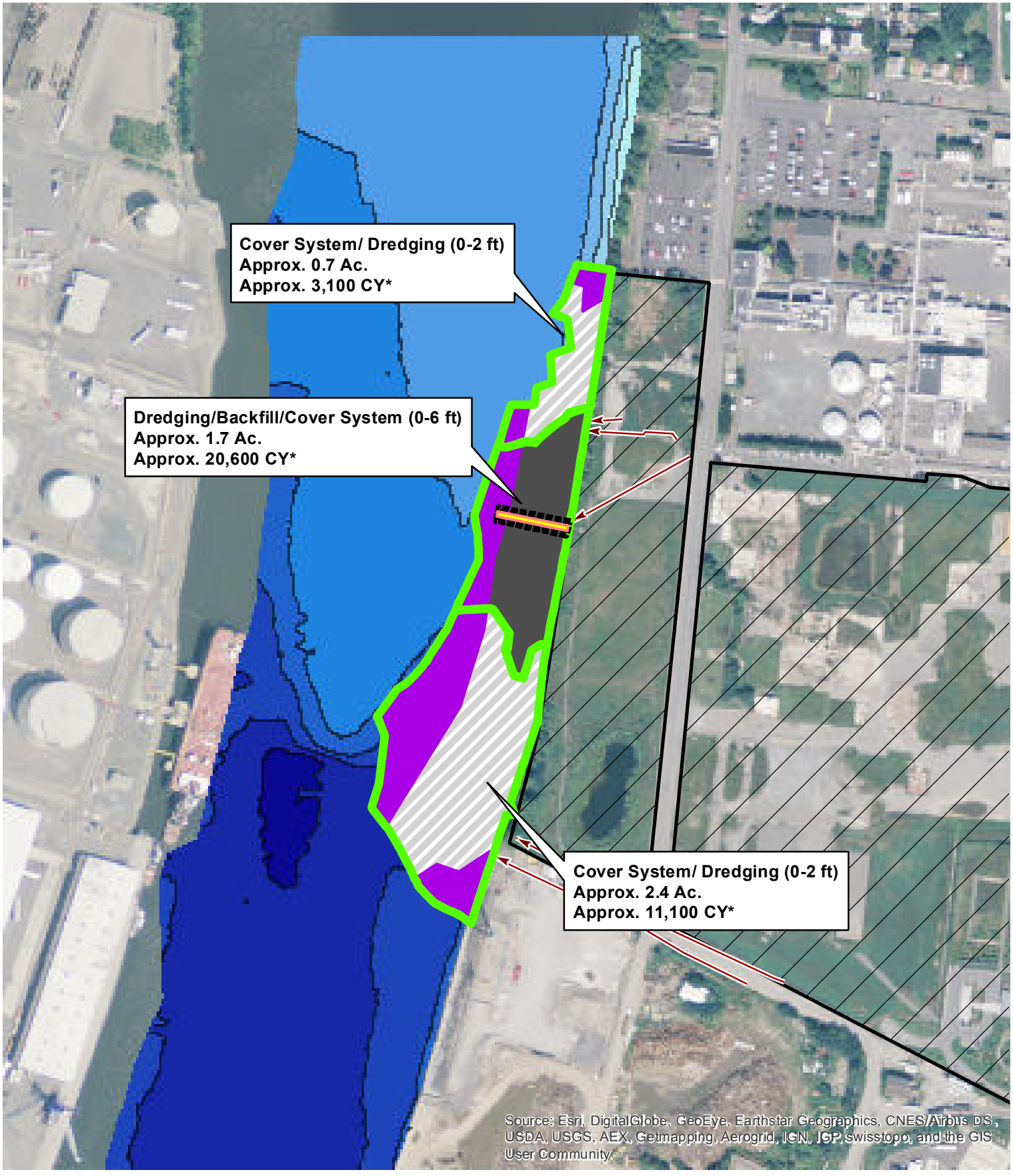

Depth (Feet - MLLW)

-45 - -40 | -39 - -35 | -34 - -30 | -29 - -25 | -24 - -20 | -19 - -15 | -14 - -10 | -9 - -5 | -4 - 0

0 50 100 200 300 400 500 Feet

Naturally Capped

Approx. Location of Diffuser Pipe

*Note: Dredge volumes include 0.5 foot overdredge and 15% side wall slough factor

Northern FS Study Area
Alternative 4
Hudson River OU-2
Proposed Remedial Action Plan
BASF Corporation
Rensselaer, New York

SCALE	DATE	PROJECT NO.
See Insets	10/15	60323713

AECOM

Figure Number

B-3

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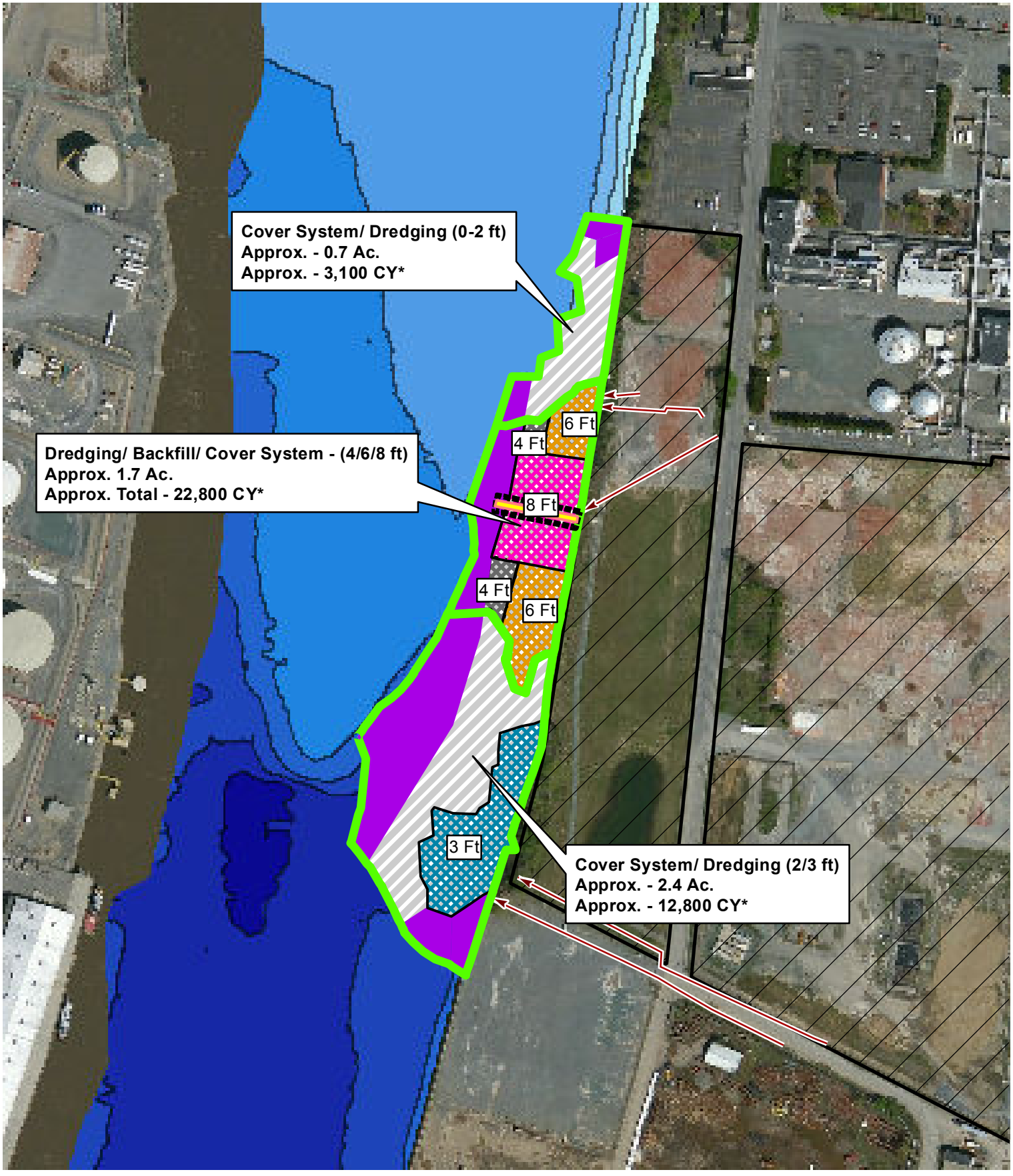

Depth (Feet - MLLW)

-45 - -40 | -39 - -35 | -34 - -30 | -29 - -25 | -24 - -20 | -19 - -15 | -14 - -10 | -9 - -5 | -4 - 0

0 50 100 200 300 400 500 Feet

Area of Upstream Deposition

Approx. Location of Diffuser Pipe

*Note: Dredge volumes include 0.5 foot overdredge and 15% side wall slough factor

Northern FS Study Area
Alternative 5
Hudson River OU-2
Proposed Remedial Action Plan
BASF Corporation
Rensselaer, New York

SCALE	DATE	PROJECT NO.
See Insets	10/15	60323713

AECOM

Figure Number

B-4

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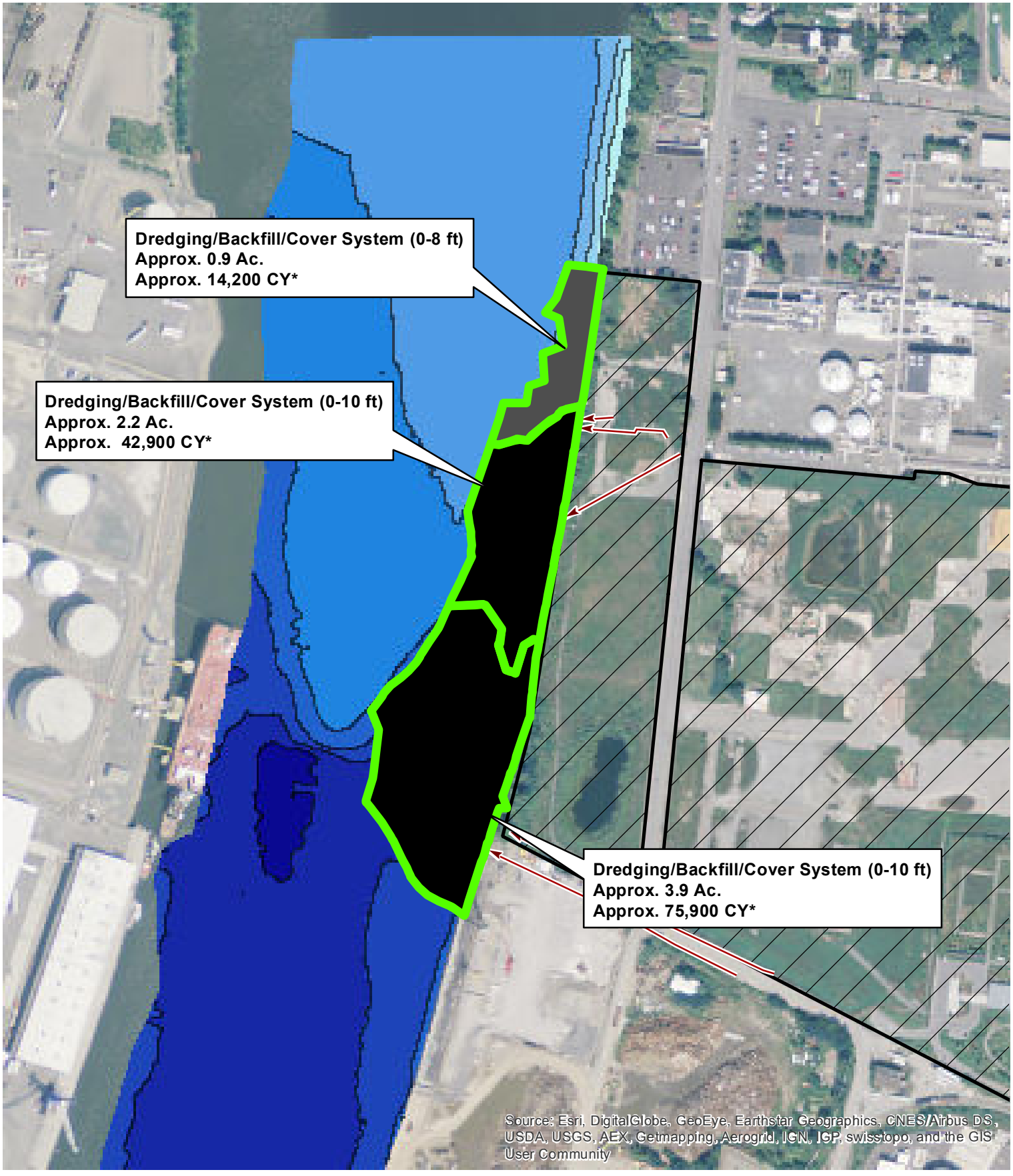

Depth (Feet - MLLW)

-45 - -40 | -39 - -35 | -34 - -30 | -29 - -25 | -24 - -20 | -19 - -15 | -14 - -10 | -9 - -5 | -4 - 0

0 50 100 200 300 400 500 Feet

*Note: Dredge volumes include 0.5 foot overdredge and 15% side wall slough factor

Northern FS Study Area
Alternative 6
Hudson River OU-2
Proposed Remedial Action Plan
BASF Corporation
Rensselaer, New York

SCALE	DATE	PROJECT NO.
See Insets	10/15	60323713

AECOM

Figure Number

B-5

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Southern FS Study Area

0 75 150 300 Feet

Southern FS Study Area
Alternatives Implementation Area
Hudson River OU-2
Proposed Remedial Action Plan
BASF Corporation
Rensselaer, New York

SCALE	DATE	PROJECT NO.
See Insets	10/15	60323713

AECOM

Figure Number

B-6

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