

Gowanus Canal Public Information Meeting



U.S. Environmental Protection Agency

Region 2

January 24, 2012



Presentation Overview

- ◆ **Background**
- ◆ **Feasibility Study overview**
- ◆ **Next steps**

Background

Site Location

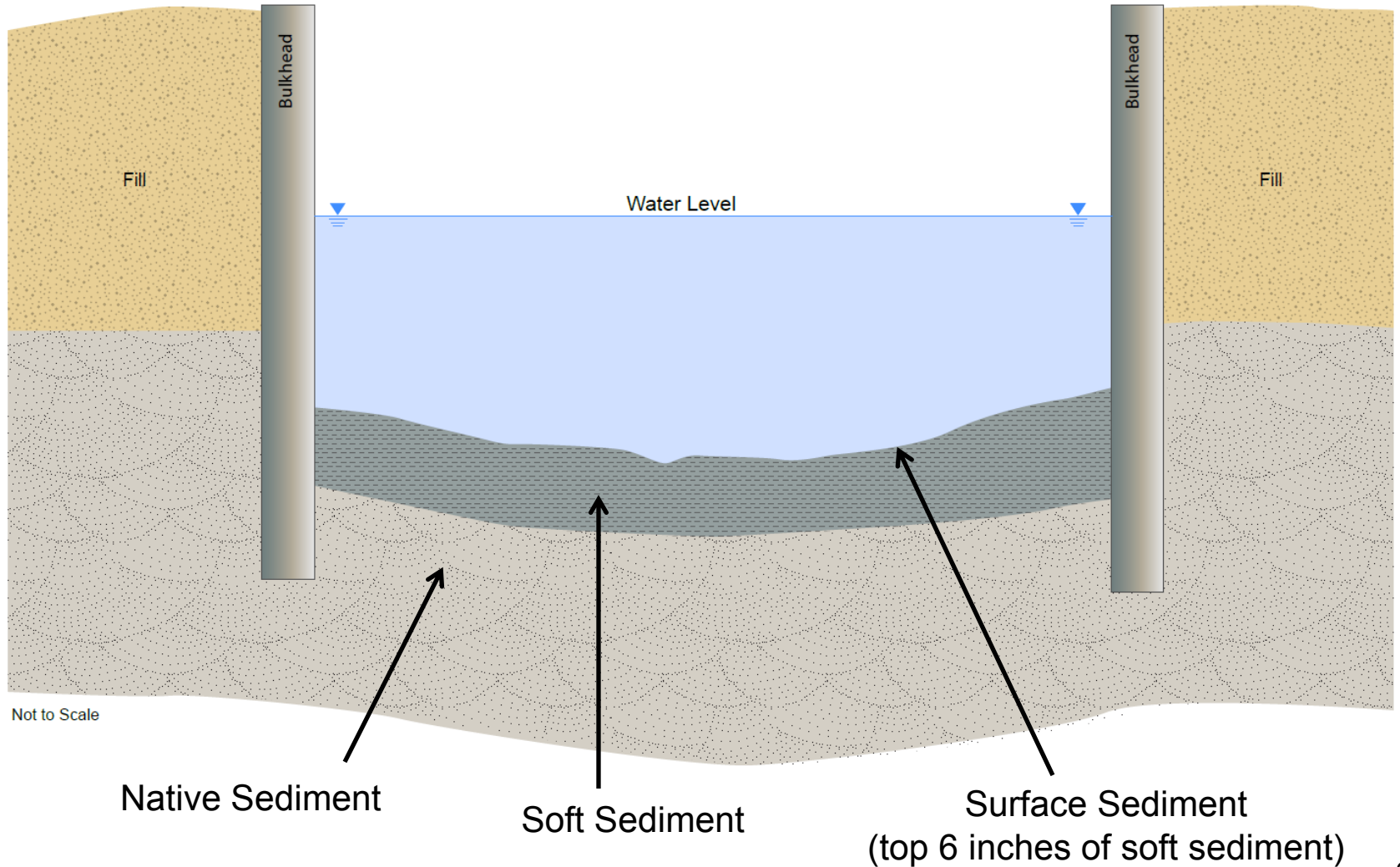


Gowanus Canal
Project Area

Project History & Schedule

- ✓ **Gowanus Canal placed on the National Priorities List – March 2010**
- ✓ **Remedial Investigation Report – January 2011**
- ✓ **Feasibility Study – December 2011**
- ◆ **Proposed Plan – 6 to 8 months after Feasibility Study completion**
- ◆ **Selection of Remedy – end of 2012**

Gowanus Canal Sediment Layers



Contaminants of Concern

◆ Soft Sediment

- Polycyclic Aromatic Hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs)
- Metals (barium, cadmium, copper, lead, mercury, nickel, silver)
- Non-aqueous phase liquid (NAPL)

◆ Native Sediment

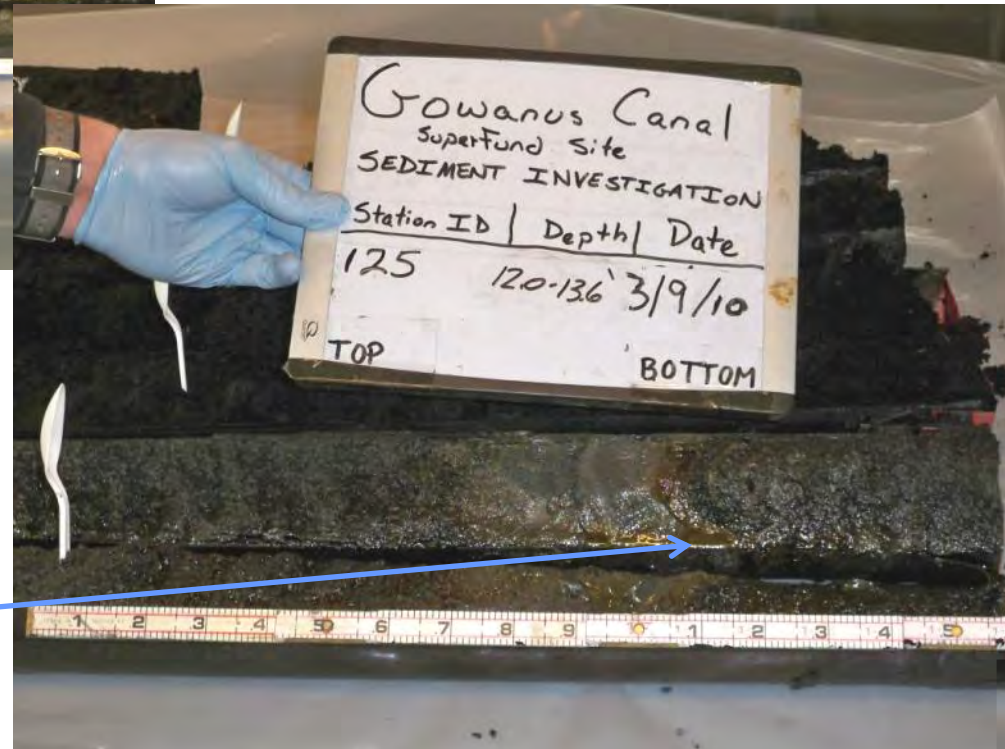
- PAHs
- Non-aqueous phase liquid (NAPL)

Soft and Native Sediment Layers



Soft Sediment

Native Sediment



NAPL

Conceptual Site Model

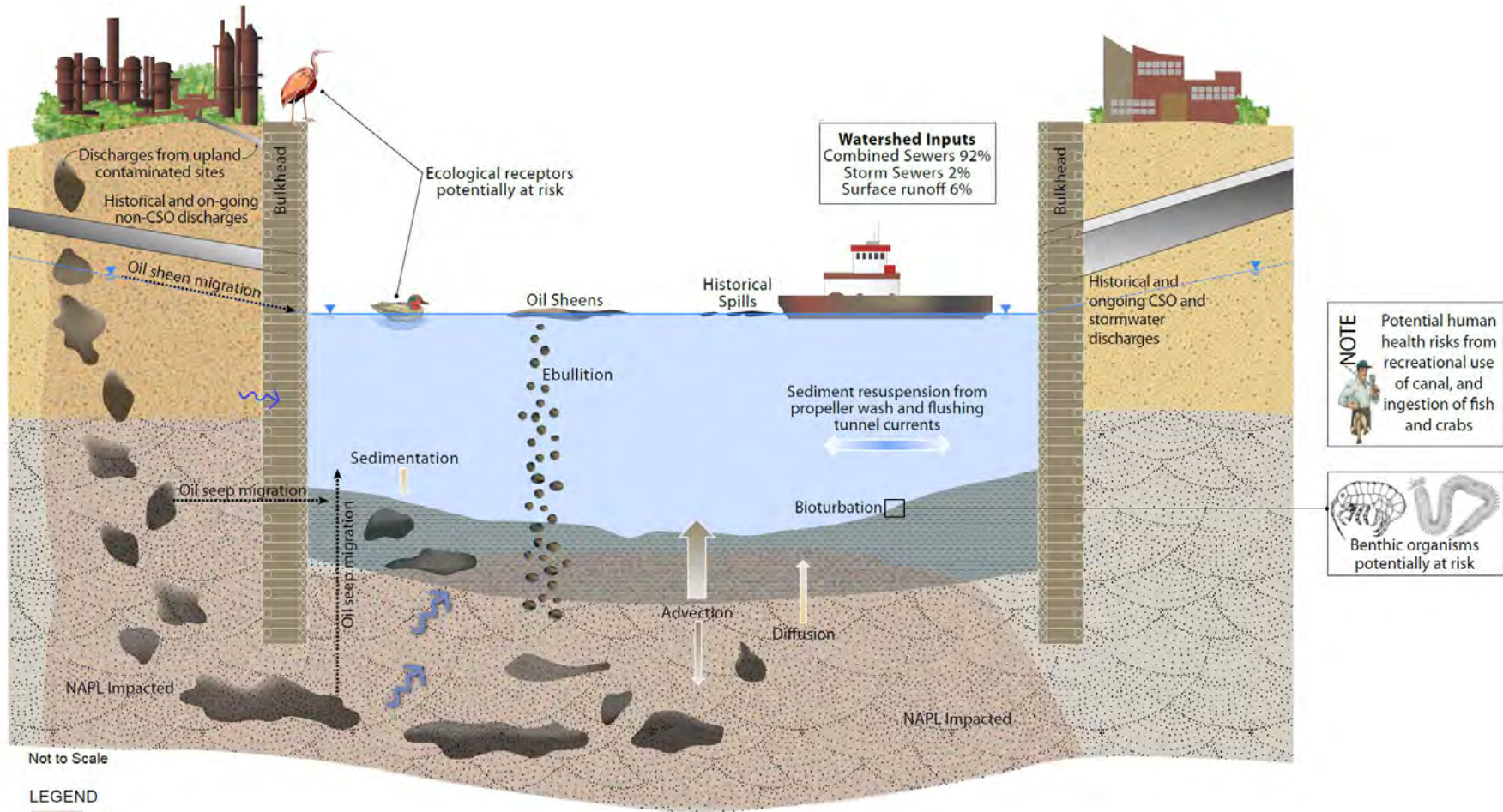


FIGURE 1-8
 Conceptual Site Model
 Gowanus Canal Feasibility Study
 Brooklyn, New York

Feasibility Study (FS) Overview

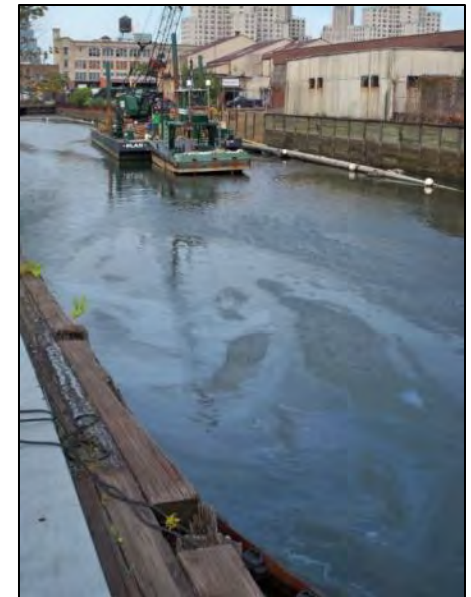
Key FS Considerations

- ◆ **Recontamination concerns**
 - Source control
 - NAPL in sediment is deeper than the practical depth of removal
- ◆ **A large portion of the bulkheads are in poor condition**



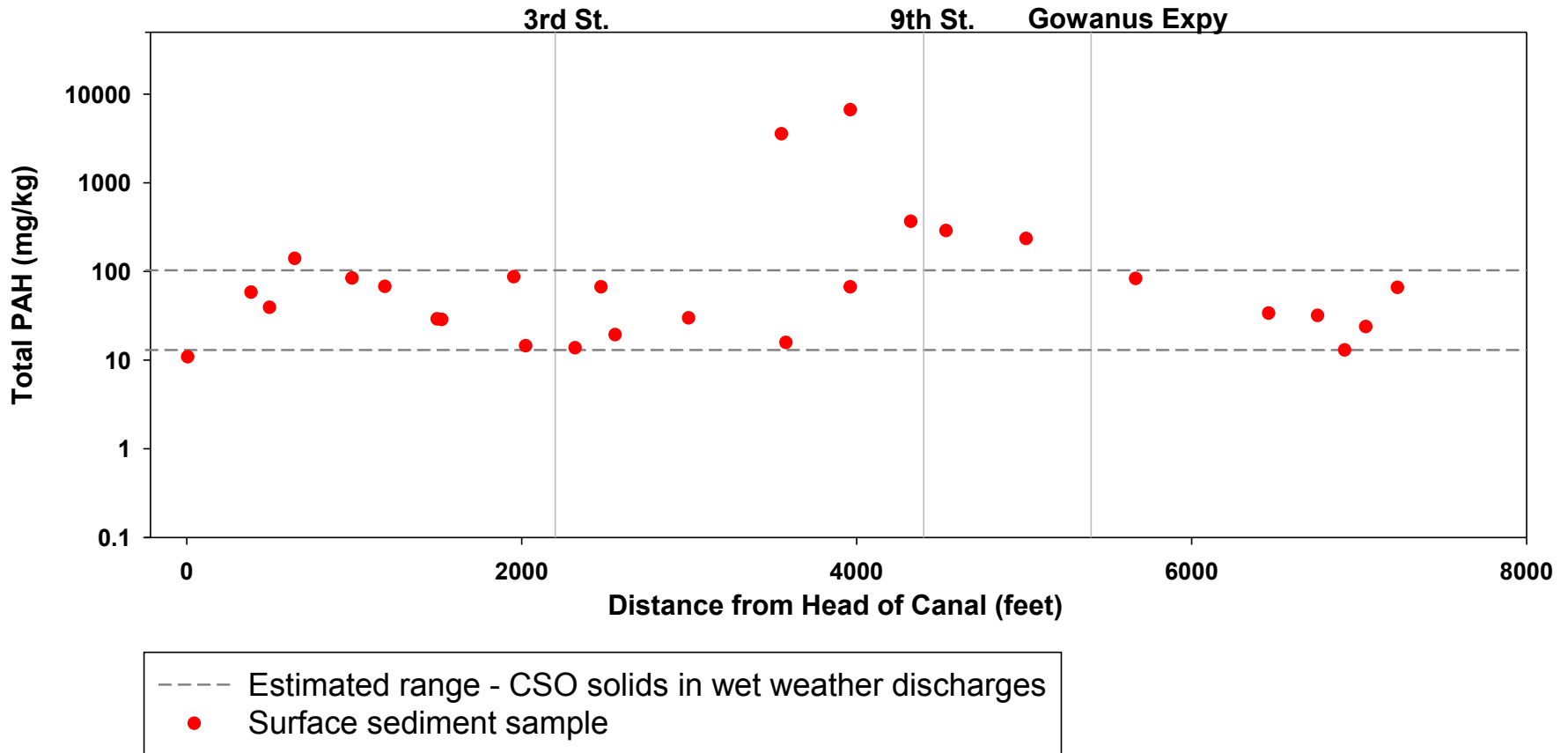
Source Control

- ◆ **Source control required for any alternative to be effective**
- ◆ **Sources include:**
 - **CSO and stormwater discharges**
 - **Discharges from former MGP sites**
 - **Contaminated groundwater discharge**
 - **Street runoff**
 - **Discharges from unpermitted pipes**



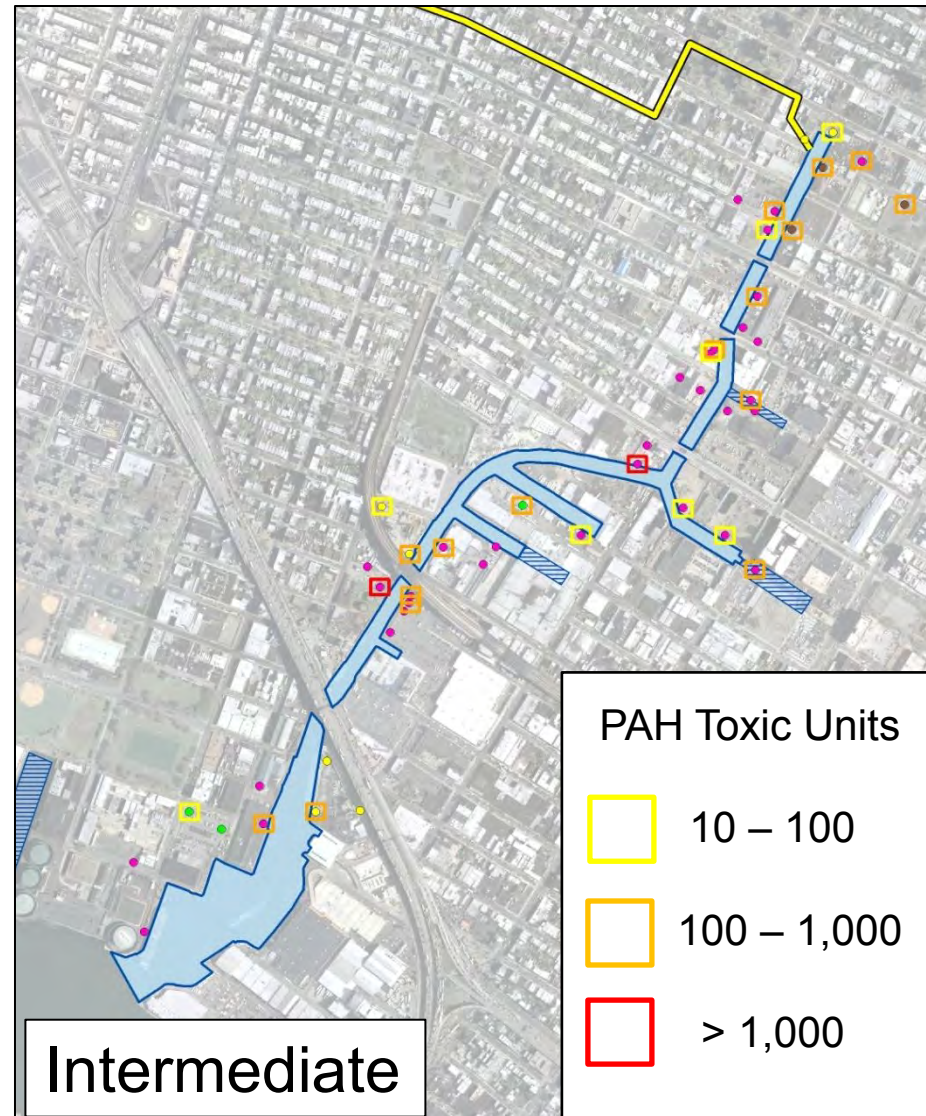
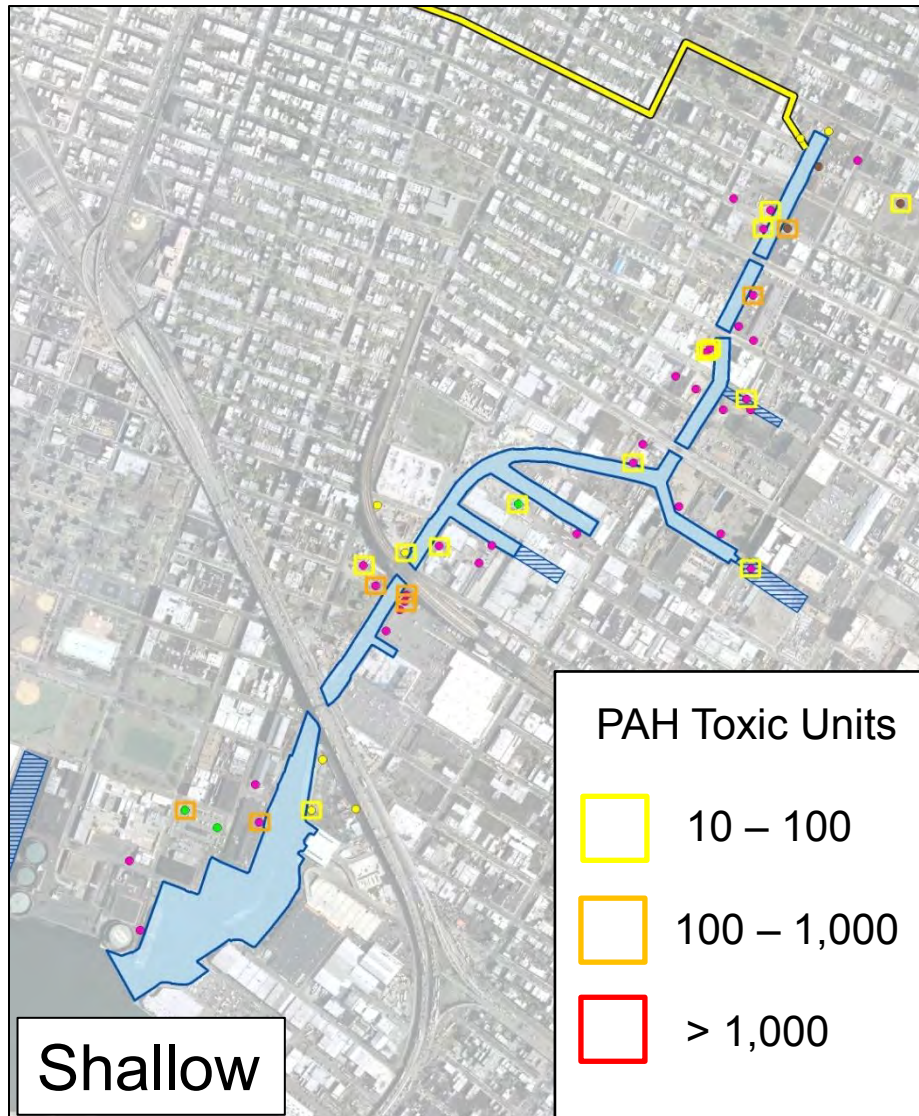
Combined Sewer and Stormwater Discharges

Total PAHs in Surface Sediment



Concentrations of PAHs and metals in surface sediment are similar to estimated concentrations in CSO solids discharged during wet weather 13

Contaminated Groundwater Discharge



PAH Toxic Unit indicates potential for groundwater to recontaminate the canal

Feasibility Study Process

◆ Six Main Steps

- 1. Develop Remedial Action Objectives**
- 2. Develop Preliminary Remediation Goals**
- 3. Define Remediation Target Areas**
- 4. Identify and Screen Remedial Technologies**
- 5. Develop and Screen Remedial Alternatives**
- 6. Evaluate Remedial Alternatives in Detail**

Step 1

Develop Remedial Action Objectives

Step 1 - Remedial Action Objectives

◆ Ecological

- Reduce toxicity to benthic (bottom-dwelling) organisms from direct contact with PAHs, PCBs, and metals in sediment
- Reduce risk to herbivorous (plant-eating) birds from dietary exposure to PAHs

Step 1 - Remedial Action Objectives (continued)

◆ Human Health

- Reduce risk from exposure to PAHs in sediment and surface water during recreational use of the canal or from exposure to canal overflow**
- Reduce risk from ingestion of PCB-contaminated fish and shellfish collected from the canal**

Step 1 - Remedial Action Objectives (continued)

◆ NAPL Mitigation

- Prevent migration of NAPL into the canal after the remedial action is completed**
- Prevent NAPL from acting as source of contaminants to groundwater discharging to canal**

Step 2

Develop Preliminary Remediation Goals

Step 2 – Preliminary Remediation Goals (PRGs)

◆ Ecological Protection

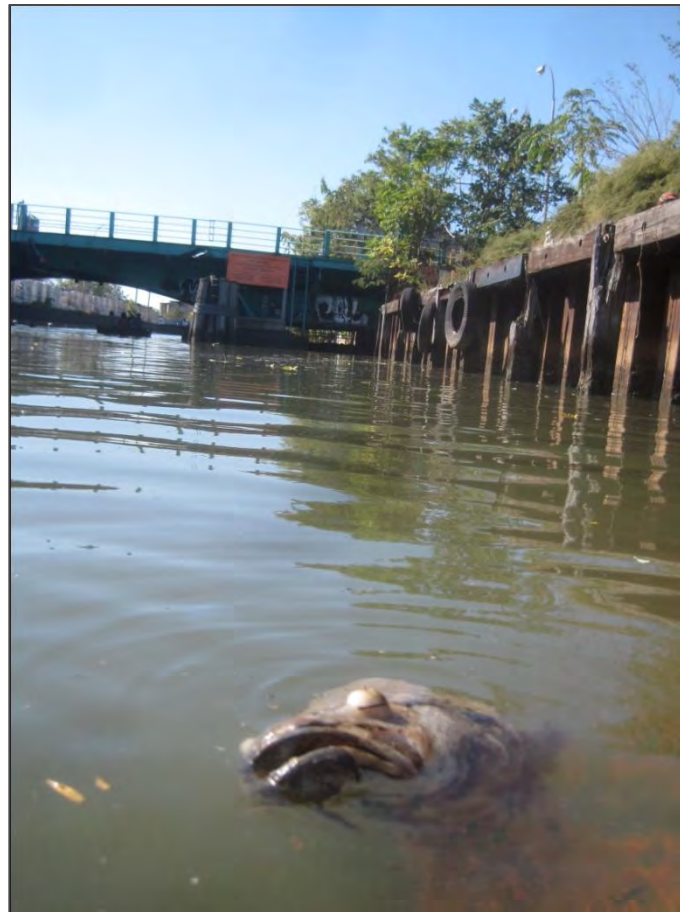
- PRGs for Total PAHs range from 7.8 to 290 mg/kg**
- Cleanup based on total PAHs will also address PCBs and metals**

◆ Human Health Protection

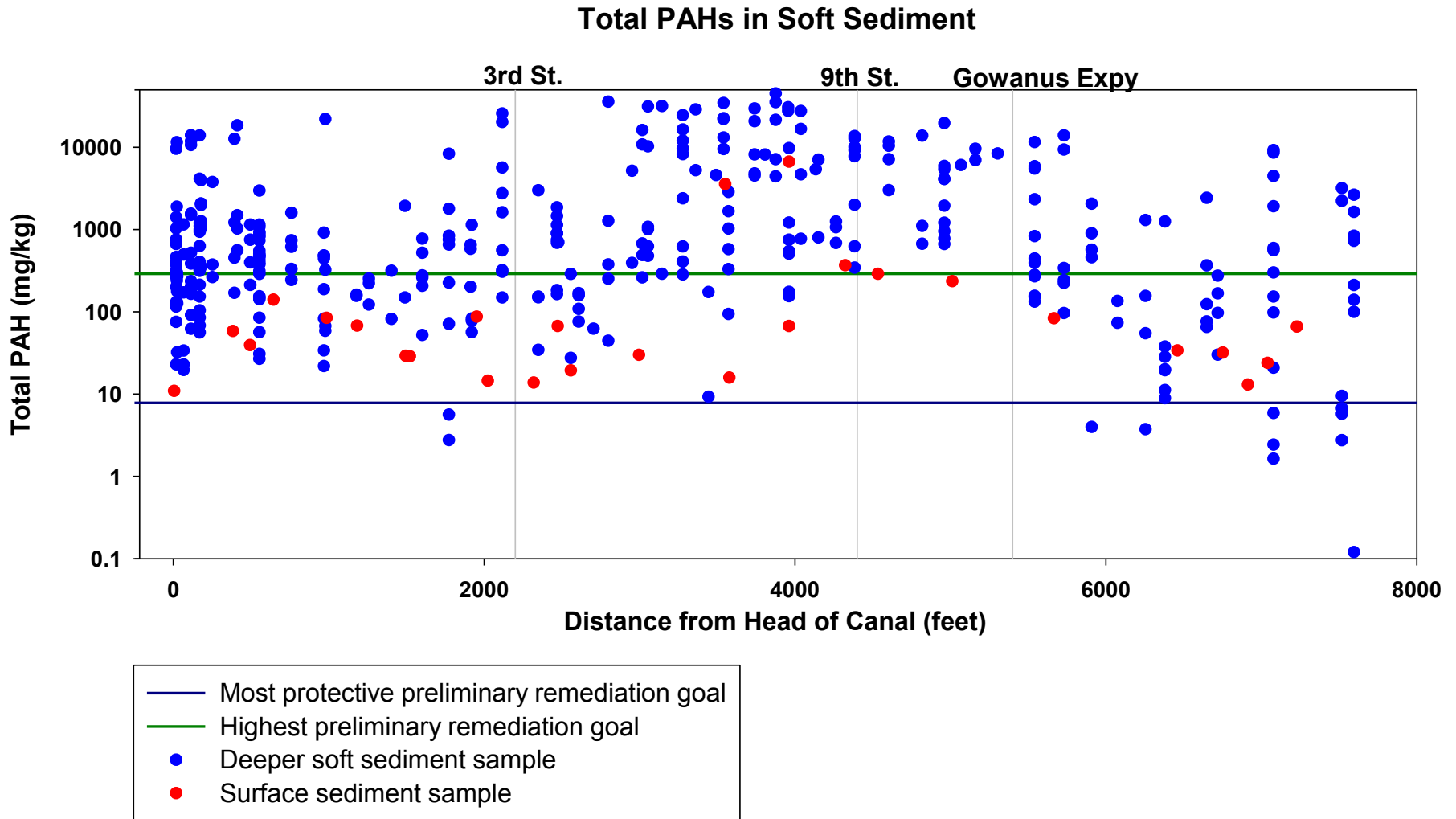
- PRGs were developed for six individual PAHs**
- For fish/shellfish ingestion, cleanup based on PAHs will also address PCBs in the canal**

Step 3

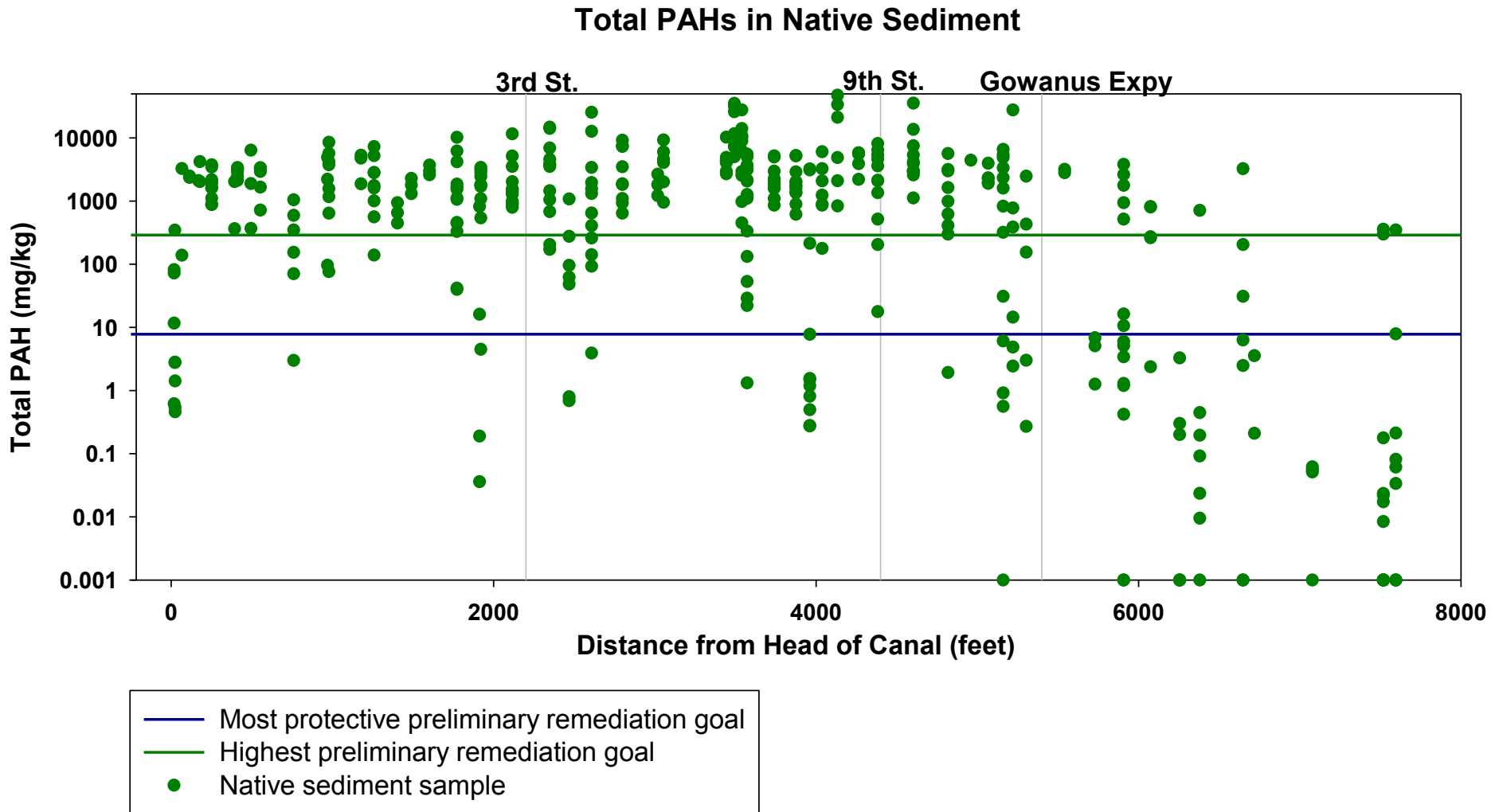
Define Remediation Target Areas



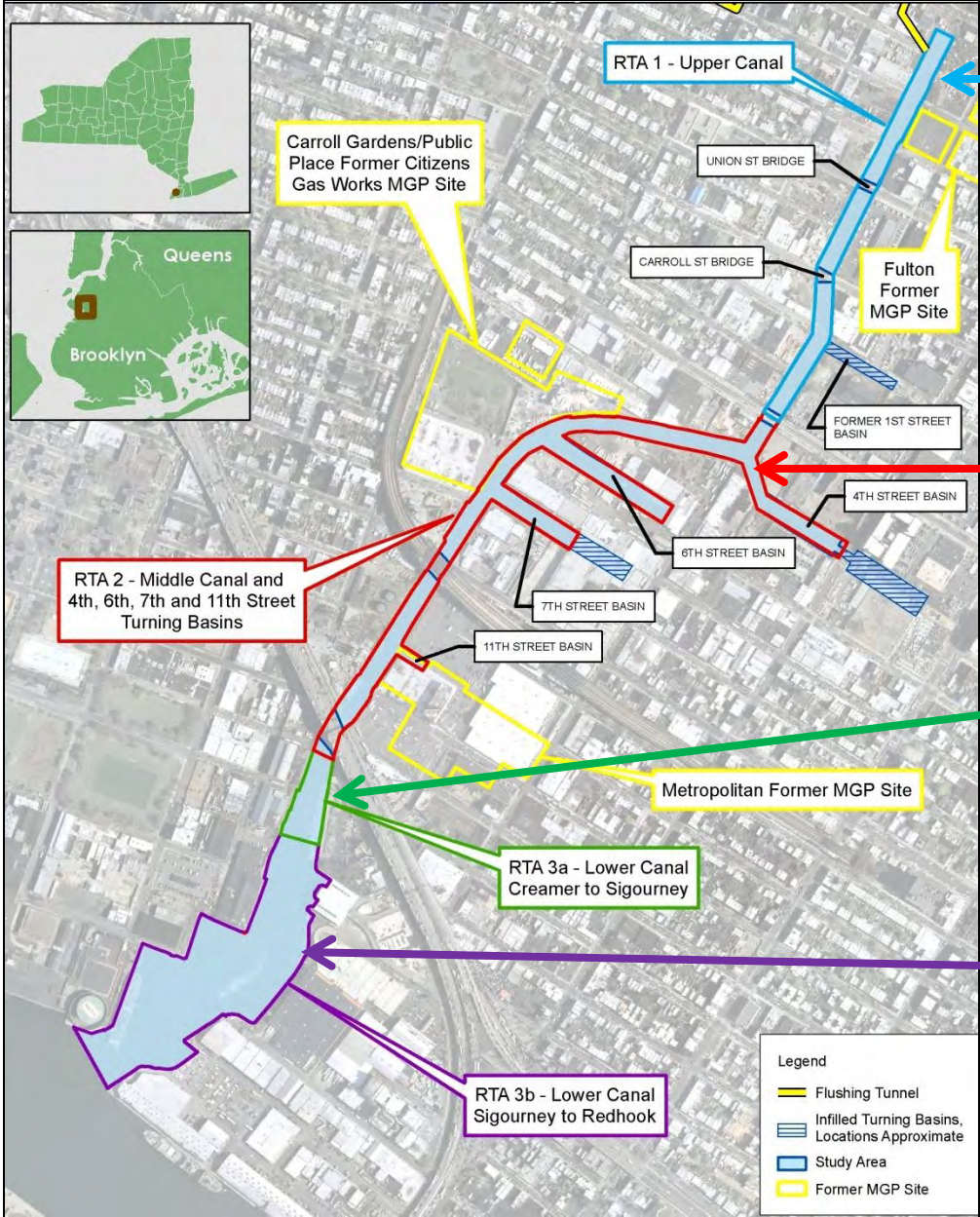
Step 3 – Define Remediation Target Areas: Soft Sediment



Step 3 – Define Remediation Target Areas: Native Sediment



Step 3 – Define Remediation Target Areas (RTAs)



RTA 1
Upper Canal
Intermediate level of contamination

RTA 2
Middle Canal
Highest level of contamination

RTA 3a
Lower Canal
Lowest level of contamination, shallower

RTA 3b
Lower Canal
Lowest level of contamination, deeper

Step 4

Identify and Screen Remedial Technologies

Step 4 - Technology Identification and Screening

- ◆ **Identified potential sediment cleanup technologies**
 - **Dredging (removal)**
 - **Containment (capping)**
 - **In situ (in place) Treatment**
 - **Monitored Natural Recovery**
 - **Dredged Sediment Treatment, Beneficial Use, or Disposal**
 - ◆ *Treatment (e.g. thermal treatment, stabilization)*
 - ◆ *Beneficial use (e.g. construction fill, landfill cover)*
 - ◆ *Disposal (e.g., landfill, confined disposal facility [CDF])*

Step 4 - Technology Identification and Screening

- ◆ **Potential technologies screened based on:**
 - **Effectiveness**
 - **Implementability**
 - **Cost**
- ◆ **Technologies that were retained were combined into seven remedial alternatives**

Step 5

Develop and Screen Remedial Alternatives

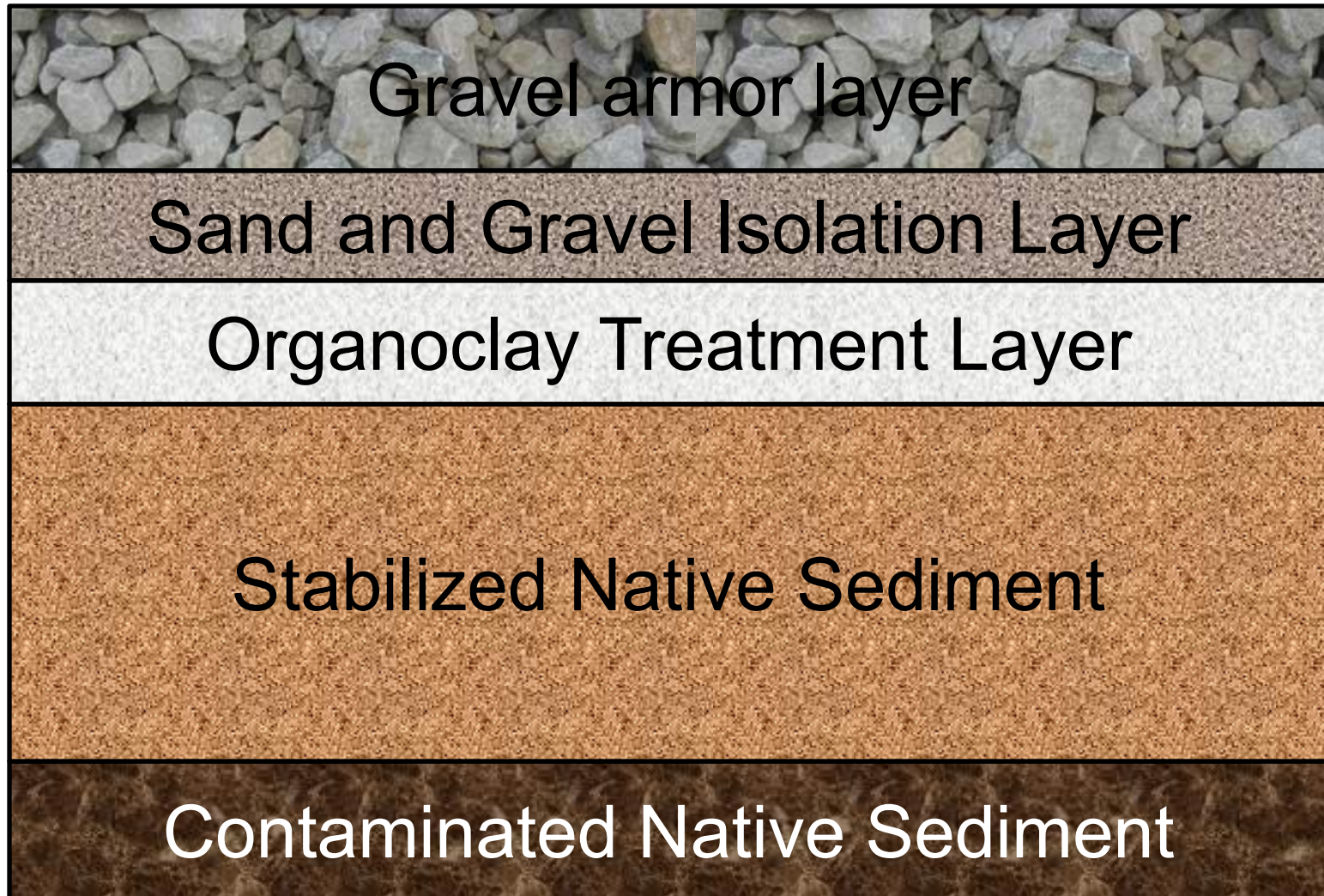
Step 5 – Sediment Dredging and Capping Alternatives

- 1 No Action**
- 2 Dredge some soft sediment
Two-layer cap (isolation and armor layers)**
- 3 Dredge some soft sediment
Three-layer cap (treatment, isolation, and armor layers)**
- 4 Dredge all soft sediment
Two-layer cap (isolation and armor layers)**
- 5 Dredge all soft sediment
Three-layer cap (treatment, isolation, and armor layers)**
- 6 Dredge all soft sediment
Solidify top of native sediment
Two-layer cap (isolation and armor layers)**
- 7 Dredge all soft sediment
Solidify top of native sediment
Three-layer cap (treatment, isolation, and armor layers)**

Conceptual Three-Layer Cap



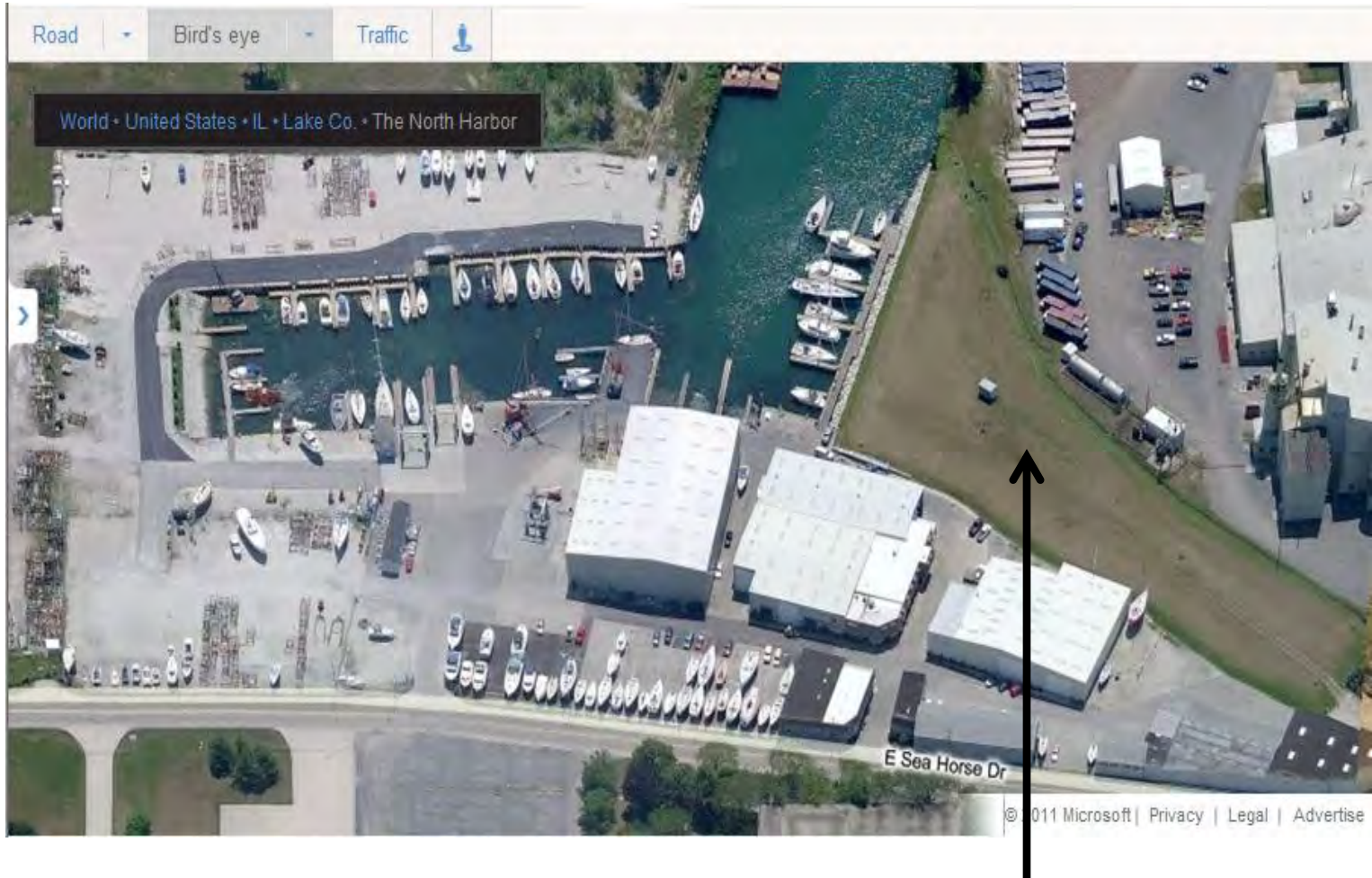
Conceptual Three-Layer Cap with In situ Stabilization



Step 5 - Sediment Treatment and Disposal Alternatives

- A Offsite thermal desorption, beneficial use**
- B Offsite disposal (landfill)**
- C Offsite cogeneration, beneficial use**
- D Offsite stabilization, beneficial use**
- E Onsite stabilization, beneficial use**
- F Offsite stabilization and disposal in onsite constructed Confined Disposal Facility (CDF)**
- G Onsite stabilization and disposal in onsite constructed CDF**

Aerial Photograph of Confined Disposal Facility (CDF) - Waukegan Harbor



Confined Disposal Facility

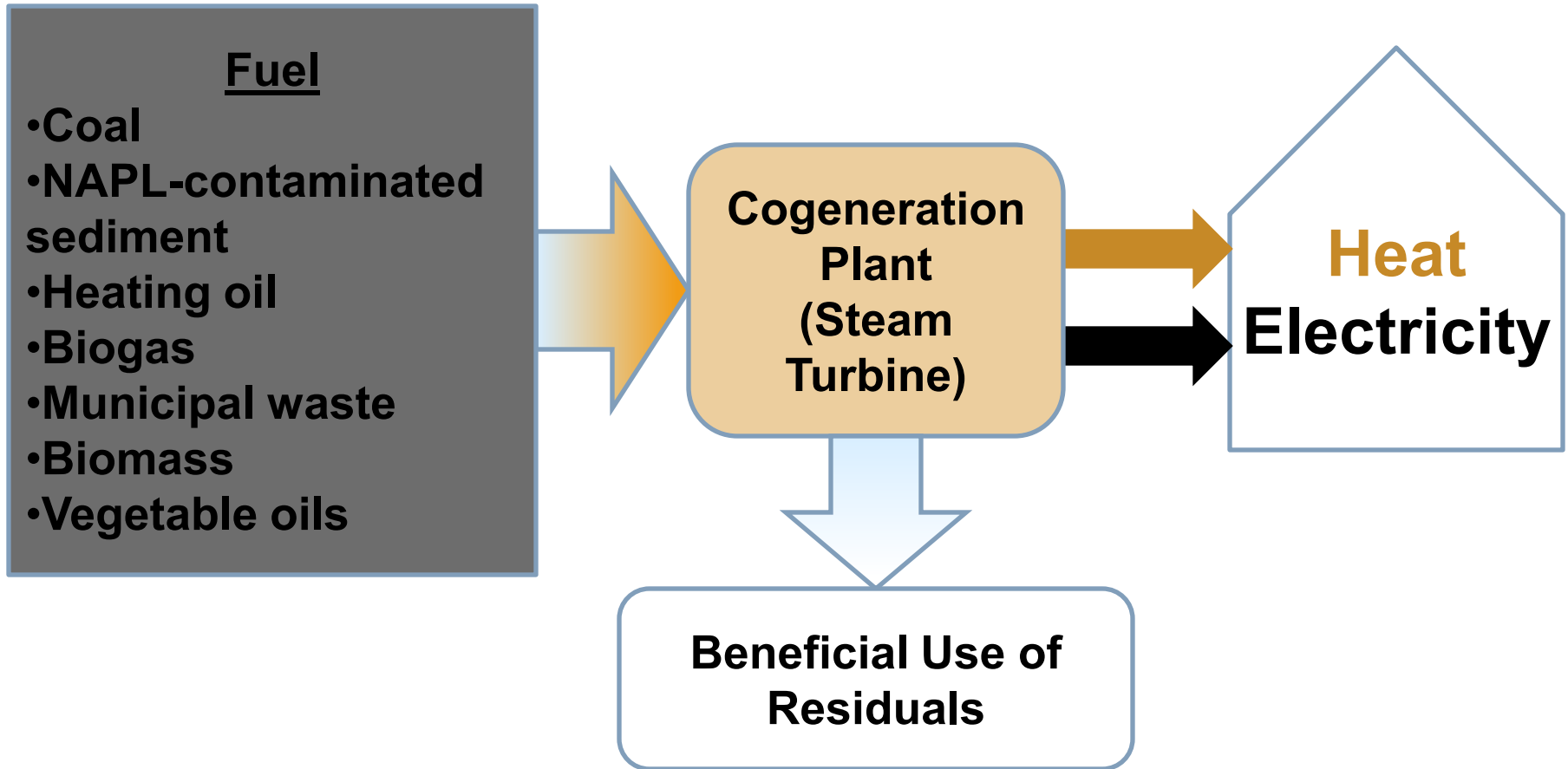
Photographs of Deep Mixing for Stabilization



Cogeneration Facility



Cogeneration Process



Step 5 - Alternative Screening

- ◆ **Alternatives screened for each RTA based on:**
 - **Technical Effectiveness**
 - **Implementability**
 - **Cost**
 - ◆ *Cost was not used to screen out alternatives*

Step 5 – Alternative Screening Results

- 1 **No Action**
- 2 Dredge some soft sediment
Two-layer cap (isolation and armor layers)
- 3 Dredge some soft sediment
Three-layer cap (treatment, isolation, and armor layers)
- 4 Dredge all soft sediment
Two-layer cap (isolation and armor layers)
- 5 **Dredge all soft sediment**
Three-layer cap (treatment, isolation, and armor layers)
- 6 Dredge all soft sediment
Solidify top of native sediment
Two-layer cap (isolation and armor layers)
- 7 **Dredge all soft sediment**
Solidify top of native sediment
Three-layer cap (treatment, isolation, and armor layers)

*Alternatives
5 and 7
retained for
detailed
evaluation*



Step 5 - Screening - Sediment Treatment and Disposal Alternatives

	RTA1	RTA 2	RTA 3
A Offsite thermal desorption, beneficial use	Y	Y	Y
B Offsite disposal (landfill)	Y	Y	Y
C Offsite cogeneration, beneficial use	Y	Y	Y
D Offsite stabilization, beneficial use	Y	N	Y
E Onsite stabilization, beneficial use	Y	N	Y
F Offsite stabilization and disposal in onsite CDF	N	N	Y
G Onsite stabilization and disposal in onsite CDF	N	N	Y

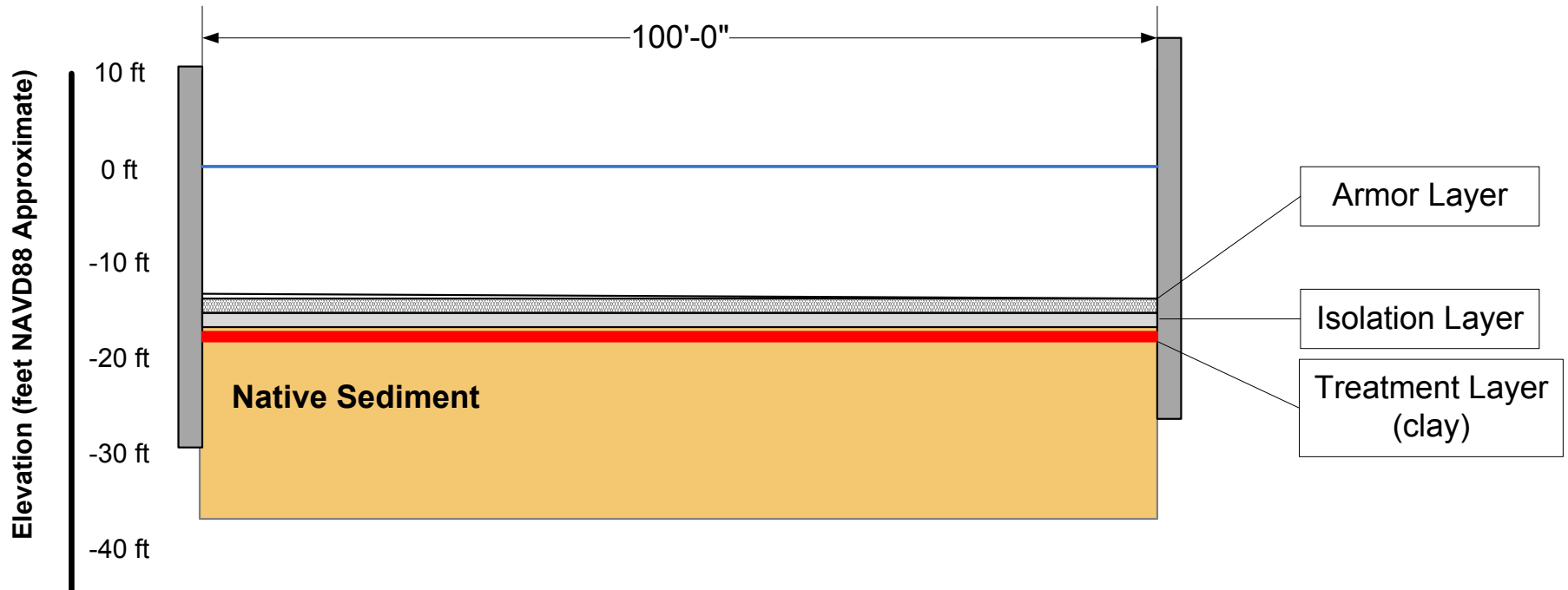
Y – yes (retained)

N – no (screened out)

Step 6

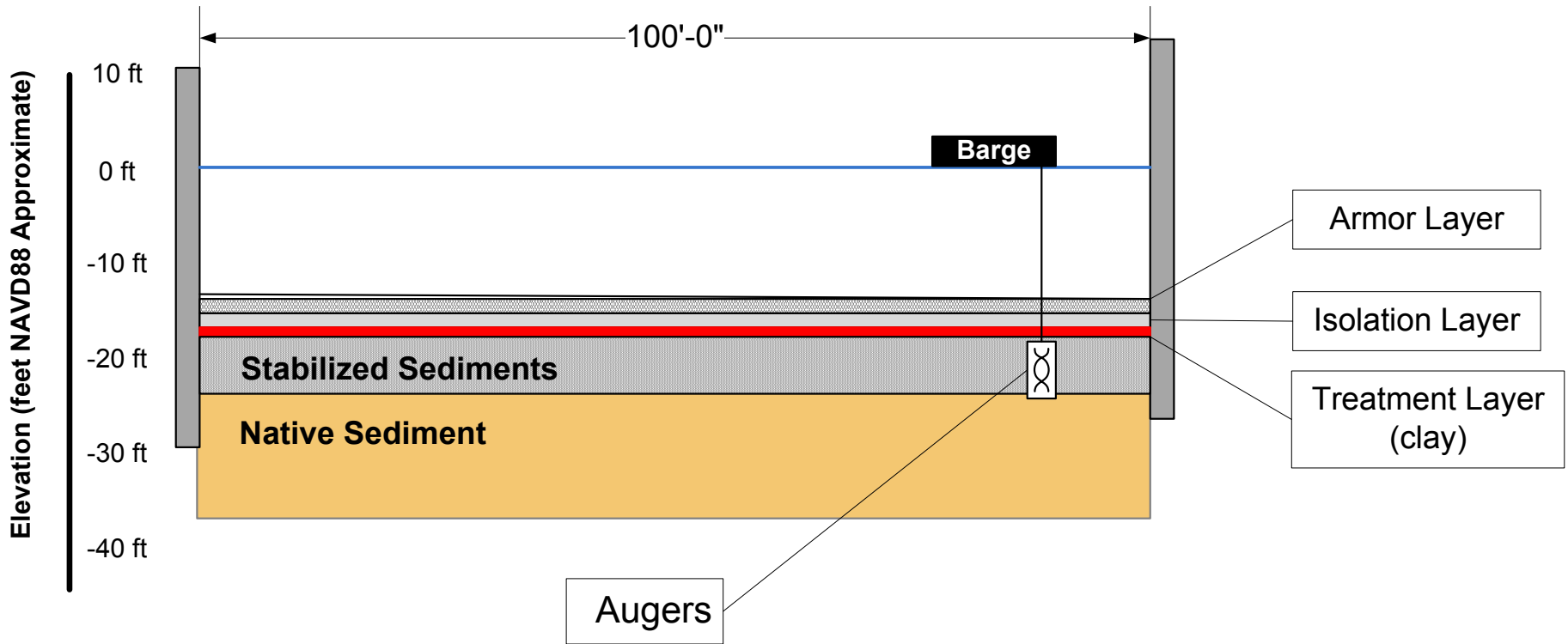
Evaluate Remedial Alternatives in Detail

Example - Alternative 5 for RTA 1



RTA 1 Cap Configuration – Alternative 5

Example – Alternative 7 for RTA 1



RTA 1 Cap Configuration – Alternative 7

Proposed In situ Stabilization Areas



Areas proposed for in situ stabilization show potential for active upward migration of NAPL from native sediment

Step 6 - Detailed Evaluation of Alternatives

- ◆ **Evaluated alternatives using criteria established by the National Contingency Plan**
 - **Threshold Criteria**
 - ◆ *Overall Protection of Human Health and the Environment*
 - ◆ *Compliance with “applicable or relevant and appropriate requirements” (ARARs)*
 - **Balancing Criteria**
 - ◆ *Long-term Effectiveness and Permanence*
 - ◆ *Reduction of Toxicity, Mobility or Volume through Treatment*
 - ◆ *Short-term Effectiveness*
 - ◆ *Implementability*
 - ◆ *Cost*
 - **Modifying Criteria**
 - ◆ *State and Community Acceptance - considered after State and public comments are received on the Proposed Plan*
- ◆ **Sustainability**

Step 6 - Evaluation of Sediment Dredging and Capping Alternatives

Criteria	Alternative 1 No Action	Alternative 5 Dredge all Soft Sediment Three-layer Cap	Alternative 7 Dredge all Soft Sediment Stabilize Three-layer Cap
Overall Protection of Human Health and Environment	Does not meet	Meets	Meets
Compliance with ARARs	Does not meet	Meets	Meets
Long-Term Effectiveness	Low	High	High
Reduction of Toxicity, Mobility, or Volume Through Treatment	Low	High	High
Short-Term Effectiveness	High	Moderate	Moderate
Implementability	High	Moderate	Low to Moderate

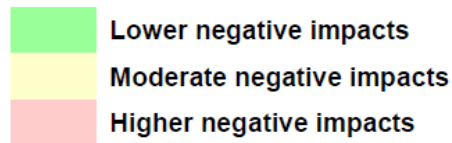
Step 6 - Evaluation of Sediment Treatment and Disposal Options

Criteria	Option A: Thermal Desorption	Option B: Offsite Landfill	Option C: Co-gen	Option D: Offsite Stabilization, Beneficial Use	Option E: Onsite Stabilization, Beneficial Use	Option F: Offsite Stabilization, CDF	Option G: Onsite Stabilization, CDF
Overall Protection of Human Health and Environment	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Compliance with ARARs	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Long-Term Effectiveness	High	High	High	Low to Moderate	Low to Moderate	Moderate to High	Moderate to High
Reduction of Toxicity, Mobility, or Volume Through Treatment	High	Moderate	High	Moderate	Moderate	Moderate	Moderate
Short-Term Effectiveness	Moderate to High	Moderate to High	Moderate to High	Moderate to High	Moderate to High	Moderate to High	Moderate to High
Implementability	Moderate	Moderate to High	Moderate	Moderate	Moderate	Moderate	Moderate

Step 6 – Sustainability Evaluation

Sustainability Impacts	Option A Offsite Thermal Desorption, Offsite Beneficial Use	Option B Offsite Landfill Disposal	Option C Offsite Cogeneration, Offsite Beneficial Use	Option D Offsite Stabilization, Offsite Beneficial Use
Energy Consumed/Fossil Fuel Depletion				
Green House Gas and Other Air Emissions				
Transportation Impacts				
Waste Reduction, Reuse, and Recycling				
Overall sustainability impacts	High	Moderate to high	Moderate	Moderate

Sustainability Impacts	Option E Onsite Stabilization, Onsite Beneficial Use	Option F Offsite Stabilization and Onsite Disposal in Constructed CDF	Option G Onsite Stabilization and Onsite Disposal in Constructed CDF
Energy Consumed/Fossil Fuel Depletion			
Green House Gas and Other Air Emissions			
Transportation Impacts			
Waste Reduction, Reuse, and Recycling			
Overall sustainability impacts	Low	Low	Low



Step 6 - Summary of Estimated Costs

	Lowest Cost Disposal Option ¹	Highest Cost Disposal Option ²
Alternative 5 Dredge all soft sediment Three-layer cap	\$351 M	\$439 M
Alternative 7 Dredge all soft sediment Solidify top of native sediment Three-layer cap	\$369 M	\$456 M

Cost of No Action alternative is \$0

**¹ Offsite thermal desorption and beneficial use for RTAs 1 and 2
Onsite stabilization and disposal in onsite CDF for RTA 3**

² Offsite cogeneration for RTAs 1, 2, and 3

Next Steps

Next Steps

- ◆ **Treatability Studies / Pilot Testing**
- ◆ **Ongoing coordination with NYCDEP, NYSDEC, National Grid, and others**
- ◆ **Proposed Plan**
- ◆ **Selection of Remedy**

Questions?