#### United States Environmental Protection Agency Regions 1 and 2

Informational Webinar

#### Dredging and Dredged Material Management

#### Dredging Permit Process, Testing, and Dredged Material Disposal



April 3, 2014

#### AGENDA

9:30am – 10:30am Presentation 1: Dredging/Dredged Material Management 10:30am – 11:00am Q&A/Discussion

11:00 am – 12:00 pm
Presentation 2: Dredged Material Permit Process and Testing
12:00 pm – 12:30 pm
Q&A/Discussion



#### Dredging and Dredged Material Management

#### Patricia Pechko U.S. Environmental Protection Agency April 3, 2014





The removal of sediments from the bottom of lakes, rivers, harbors and other water bodies.

 Navigation dredging provides and maintains safe depths for vessels
 -maintenance vs. construction

Remediation dredging



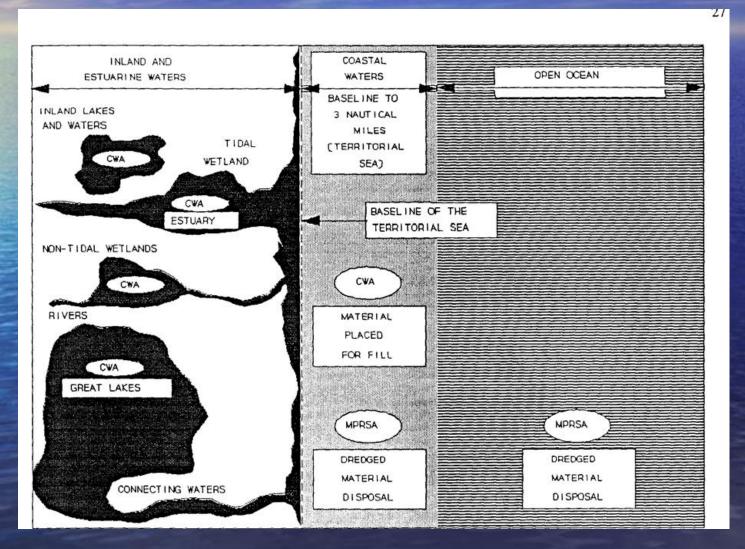
#### **Types of Materials**

 Rock Gravel • Coarse Sand Fine Sand Silt Clay Mixture

| PHE - mm<br>COVERSION<br>0 = log_2 (d in mm)<br>1µm = 0.001mm         ш         ш         б         б         ш         б         ц |                     |                                | SIZE TERMS                      |  | SIEVE  |   | diameters<br>grains<br>sieve size              | Number<br>of grains  |   | Settling<br>Velocity   |  | Threshold<br>Velocity        |   |  |
|---|---------------------|--------------------------------|---------------------------------|--|--|---|--|--|---|--|--|------------------------------|---|--|
| φÌ  | 1                   |                                | Fractional<br>and<br>Decimal In | Wentworth,1922)<br>BOULDERS<br>(2-80)<br>COBBLES |  | ASTM No.<br>(U.S. Standard)                             | Tyler<br>Mesh No.                              | Intermediate diamete<br>of natural grains<br>equivalent to sieve s   | per mg  |  | (Quartz,<br>20°C)  |                              | for traction<br>cm/sec  |  |
| -8-   | -200                | - 256 - 10.1*<br>- 128 - 5.04* |                                 |  |  |   |  |  | Quartz<br>spheres   | Natural<br>sand  | Spheres<br>(Gibbs, 1971)   | Crushed                      | T<br>8 (Nevin,1946)   | (modified from<br>Hjuistrom,1939)  |
| -6-   | -50                 | 64.0<br>53.9<br>45.3           | - 2.52"                         |  | very   | 2 1/2*  | 2"   |  |   |  |  | 2                            |   | 1 m<br>above<br>bottom   |
| -5 -  | -40 -               | 33.1<br>32.0<br>25.9           | -1.26*                          |  | coarse                                       | 1 1/2*<br>1 1/4"<br>1.06"                               | 1 1/2"<br>- 1.05"<br>742"<br>525"<br>371"<br>3 |  |   |  | - 100<br>- 90<br>- 80<br>- 70<br>- 60<br>- 50<br>- 40<br>- 30  | - 50<br>- 40<br>- 30<br>- 20 | - 150   |  |
| -4 -  | -20                 | 22.6<br>17.0<br>16.0<br>13.4   | -0.63"                          | ES   | coarse                                       | 3/4"<br>5/8"<br>1/2"                                    |  |  |   |  |  |                              | - 100   |  |
| -3-   | -10                 | 11.3<br>9.52<br>8.00<br>6.73   | - 0.32*                         | PEBBL  | medium                                       | $\begin{array}{cccccccccccccccccccccccccccccccccccc$    |  |  |   |  |  |                              | - 90  | - 100  |
| -2-   | -5 -                | 5.66<br>4.76<br>4.00           | - 0.16*                         | -  | fine   |   | 4 5  |  |   |  |  |                              | - 70  |  |
| -1-   | -3 -2               | 3.36<br>2.83<br>2.38<br>2.00   | -0.08"                          |  | fine<br>Granules                             |   | 5 7<br>5 8<br>9                                |  |   |  |  |                              | - 50  |  |
| 0-  | _, _                | 1.63<br>1.41<br>1.19<br>1.00   | mm<br>- 1                       |  | very<br>coarse                               |   | - 1.2  | 72   | 6   | - 20   | - 10   | - 40                         | - 50  |  |
| 1-  |                     | .840<br>.707<br>.545<br>.500   | - 1/2                           |  | coarse                                       |   | - 20<br>- 24<br>- 28                           | 86   | - 2.0 - 1.5<br>- 5.6 - 4.5<br>- 15 - 13<br>- 43 - 35<br>- 120 - 91<br>- 350 - 240<br>- 1000 - 580<br>- 2900 - 170 | - 1.5<br>- 4.5<br>- 13<br>- 35<br>- 91<br>- 240<br>- 580<br>- 1700 | 1.5         10           4.5         9           13         5           35         3           91         2           240         1           580         0.5           1700         0.329           -         0.1           -         0.085 | 9876                         | - 30  |  |
|   | 4                   | .420<br>.354<br>.297           |                                 | SAND   | medium                                       |   | - 35<br>- 42<br>- 48                           | 42   |   |  |  | - 4                          |   | - 30   |
| 2-  | 2                   | .250<br>.210<br>.177<br>.149   | - 1/4                           |  | fine   |   | - 65<br>- 80                                   | 30<br>215  |   |  |  | - 2                          | - 20 - 26<br>— Minimum<br>(Inman,1949)  | mum  |
| 3-  | =1 =                | .125<br>.105<br>.088<br>.074   | - 1/8                           | i.   | very<br>fine                                 |   | 115 115 115 115 115 115 115 115 115 115        | 155<br>115   |   |  |  | - 1.0                        |   |  |
| 4-  | 05                  | .062<br>.053<br>.044           | - 1/16                          |  | coarse                                       | 200<br>230<br>270<br>325<br>400                         |  | ote: Applies to subangular to<br>subrounded quartz sand<br>( in mm ) |   |  |  | Stokes Law (R = 6rm\v)       | ttom<br>und   | on   |
| 5-  | 03 -                | .037<br>.031                   | - 1/32                          |  | medium                                       | tter  |  |  |   |  |  |                              | te: The relation between the beginning<br>of traction transport and the velocity<br>pends on the height above the bottom<br>that the velocity is measured, and on<br>other factors. |  |
| 6-  | 01                  | .016                           | - 1/64                          | SILT   | fine   | e: Some sieve openings di<br>slightly from phi mm scale |  |  |   |  |  |                              |   |  |
| 7-  | -                   | .008                           | - 1/128                         |  | very   |   |  |  |   | suben;   |  |                              | n betw  | tion between<br>ransport and<br>the height abc<br>city is measi<br>other factors |
| 8-  | 005<br>004 —<br>003 | .004                           | - 1/256                         |  | fine<br>Clay/Silt<br>boundary<br>for mineral |   |  |  |   | plies to   |  |                              | The relation between<br>raction transport and<br>ds on the height abo<br>the velocity is measu<br>other factors.  |  |
| 9-  | 002 —               | .002                           | - 1/512                         | CLAY   | analysis                                     | Note: Sor<br>slight)                                    | Note: Sieve<br>much as 29                      | Note: App<br>subrou  |   | te: App<br>subrot  | -0.00036   |                              | Note: The<br>of tract   | depends o<br>that the  |



# Regulation of Dredged Material Jurisdictional Boundaries





## **Common Dredges**

#### Mechanical/Hydraulic



#### **Common Dredges**

- Mechanical
   Clamshell (most common in LIS)
   Backhoe
- Hydraulic
   Hopper
   Pipeline/Cutterhead



# Dredges - Mechanical

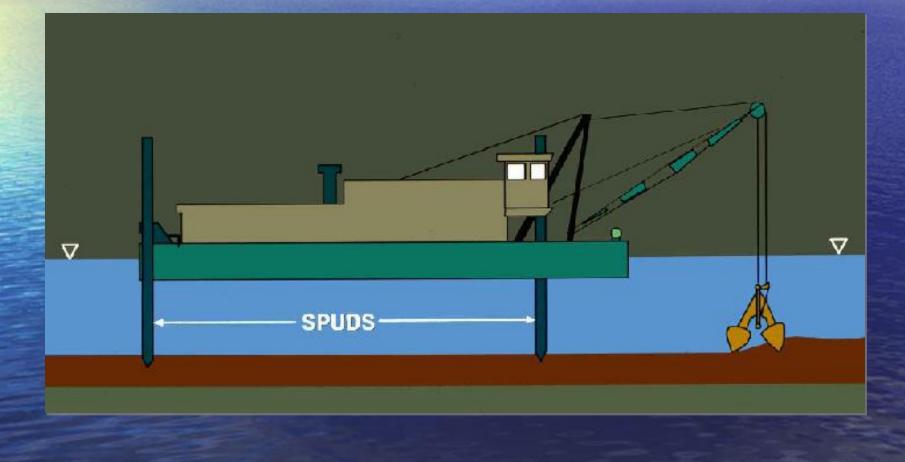


Clamshell

Backhoe



#### **Dredges - Mechanical**

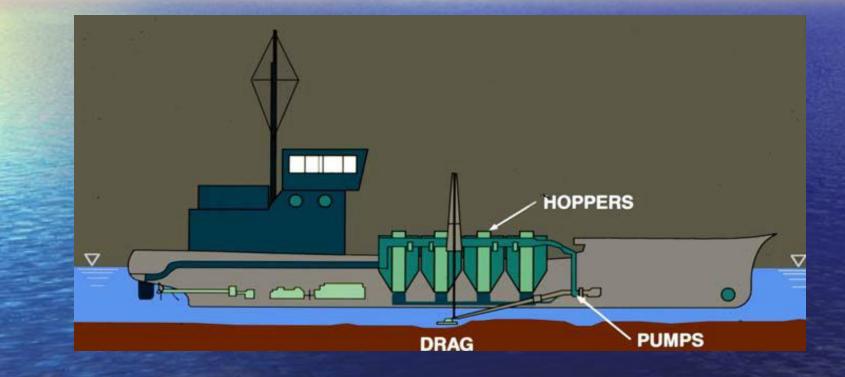


# Dredges – Hydraulic - Hopper





# Dredges – Hydraulic - Hopper





# Dredges – Hydraulic - Hopper





#### Dredges – Hydraulic Hopper





#### Dredges – Hydraulic Pipeline/Cutterhead



# Dredges – Hydraulic Pipeline/Cutterhead





#### **Containment Vessels**



#### **Best Management Practices**

**Best Management Practices (BMPs) are** methods and measures employed to reduce the potential for, and magnitude of, adverse environmental impacts resulting from a dredging or disposal activity. The effectiveness of a particular BMP will vary with the on-site conditions. The applicability and use of a particular BMP for a dredging or disposal activity will be evaluated on a case-by-case basis and may be included in permit conditions.



#### **Best Management Practices**

**Closed** bucket

Hydraulic dredging

Limiting barge overflow

Shunting

Seasonal/Migratory windows

**Tidal Dredging** 

Silt Curtains

**Dredging practices** 

**Disposal practices** 

Capping/Sequential Dredging



## Dredged Material Management/Disposal





#### **Contamination**

Dredged material can be contaminated to varying degrees by: -Metals

-Organics

-Project Specific (e.g., nutrients, TBT)





#### "Toxic/Hazardous Materials"

Dredged materials are not sewage sludge, garbage nor toxic or hazardous waste. • Materials meeting the definition of these wastes are not suitable for disposal in Waters of the United States and are managed under applicable regulatory or remediation programs at the federal and state level.



# **Toxic/Hazardous Materials Authorities and Programs**

- Toxic Substances Control Act (TSCA)
   PCBs
- Resource Conservation and Recovery Act (RCRA)
  - Subtitle D Solid Wastes
  - Subtitle C Hazardous Waste
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA aka Superfund)



## Dredged Material Management Options

Ocean or Open Water Placement
Confined Placement

Confined Disposal Facilities (CDFs)
Contained Aquatic Disposal (CADs)

Beneficial Use
Landfill/upland disposal facility





# **Open Water Placement**

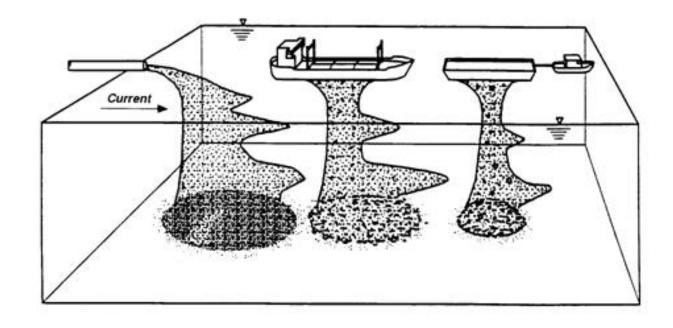


# Ocean/Open Water Placement (unrestricted)

Pipeline placement

Hopper placement

Barge placement





## Site Management and Monitoring

prevent significant adverse environmental impacts

- recognize and correct any potential unacceptable conditions before they cause any significant adverse impacts to the marine environment or present a navigational hazard to commercial waterborne vessel traffic;
- determine and enforce compliance with ocean disposal permit conditions;
- provide a baseline assessment of conditions at the site; outline a program for monitoring the site;

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- describe special management conditions/practices to be implemented at the site;
- estimate the quantity of material to be disposed at the site, considering the presence, nature, and bioavailability of the contaminants in the dredged material;
- specify the intended use and possible closure date, if necessary, of the site;
- provide a schedule for review and revision of the SMMP



#### DAMOS

DAMOS (Disposal Area Monitoring System) is a multi-disciplinary environmental program started in 1977 by the New England District of the U.S. Army Corps of Engineers to manage and monitor offshore dredged material disposal sites from Long Island Sound to Maine. Program information is shared with the scientific community and public through media such as technical reports, papers, and brochures.

www:http://www.nae.usace.army.mil/Missions/DisposalAreaMonitoringSystem(DAMOS).aspx

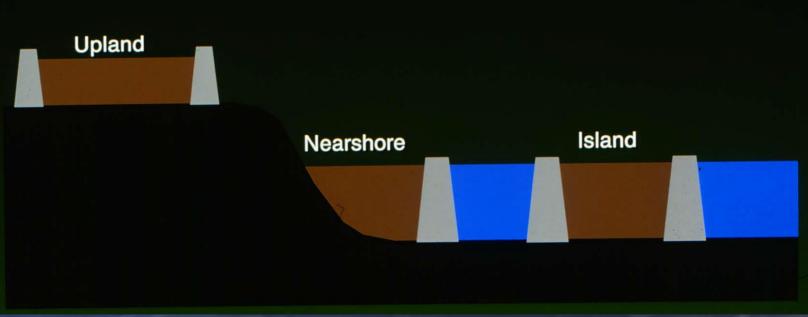


# **Confined Disposal**



#### **Confined Disposal Facility**

#### **Confined Disposal Areas May Be Constructed As**





## **Confined Disposal Facility**



ALCONOMIC ....

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# Contained Aquatic Disposal (CAD)





# **Beneficial Use (BU)**



#### **Beneficial Use (BU)**

Beneficial use is utilizing dredged sediments as resource materials in productive ways which provide environmental, economic, or social benefit.

Beneficial use is the preferred management management option.

## **Beneficial Use**

Case by case basis. Needs and opportunities. Generally requires a local sponsor. Logistical and cost constraints. Additional regulatory requirements Material suitability limitations (physical and chemical)



# Potential Beneficial Uses Aquatic

- Remediation of contaminated open water sites
- Emergent habitat creation/enhancement/ restoration
  - Coastal or freshwater marsh
  - Bird habitat (e.g. islands, dunes)
- In-water habitat creation/enhancement/restoration
  - Shellfish beds
  - Artificial reefs
- Bathymetric recontouring of degraded aquatic areas
- Beach fill/nourishment
- Shoreline stabilization



# Potential Beneficial Uses Land

Remediation of Brownfields sites
Grading material/Aggregate
Landfill cover (final and daily)
Mine reclamation



# **Beneficial Use (BU)**

|  | Dredged Material Sediment Type |                  |                      |                |         |  |  |  |  |
|--|--------------------------------|------------------|----------------------|----------------|---------|--|--|--|--|
| Examples of Beneficial Use<br>Activities | Rock                           | Gravel &<br>Sand | Consolidated<br>Clay | Silt/Soft Clay | Mixture |  |  |  |  |
| Engineered Uses                          |                                |                  |                      |                |         |  |  |  |  |
| Land creation                            | х                              | x                | x                    | x              | х       |  |  |  |  |
| Land improvement                         | x                              | x                | x                    | x              | х       |  |  |  |  |
| Berm creation                            | x                              | x                | x                    |                | х       |  |  |  |  |
| Shore protection                         | x                              | x                | x                    |                |         |  |  |  |  |
| Replacement fill                         | х                              | x                |                      |                | х       |  |  |  |  |
| Beach nourishment                        |                                | x                |                      |                |         |  |  |  |  |
| Capping                                  |                                | x                | x                    |                | х       |  |  |  |  |
| Construction materials                   | х                              | x                | x                    | x              | х       |  |  |  |  |
| Aquaculture                              |                                |                  | x                    | x              | х       |  |  |  |  |
| Topsoil                                  |                                |                  |                      | x              | х       |  |  |  |  |
| Wildlife habitats                        | x                              | x                | x                    | x              | х       |  |  |  |  |
| Fisheries improvement                    | x                              | x                | x                    | x              | х       |  |  |  |  |
| Wetland restoration                      |                                |                  | x                    | x              | х       |  |  |  |  |



## Saltmarsh Restoration Jamaica Bay



# Saltmarsh Enhancement Thin-Layer Spray Application Pepper Creek, Delaware



# Habitat Restoration Poplar Island





#### Land Remediation

The Processing and Beneficial Use of Fine-Grained Dredged Material A Manual for Engineers



Ali Maher Ph.D Center for Advanced Infrastructure and Transportation, Rutgers Universit

W. Scott Douglas New Jersey Department of Transportation, Office of Maritime Resources

> Farhad Jafari Soilteknik, Inc.

Joel Pecchioli New Jersey Department of Environmental Protection





#### LIS DMMP Upland, Beneficial Use and Sediment Dewatering Site Inventory - Final Report



CONTRACT NO. DACW33-03-D-0004 Delivery Order No. 43

October 2009

#### **Final Report**

Long Island Sound Dredged Material Management Plan

Upland, Beneficial Use, and Sediment De-watering Site Inventory





#### FINAL

Long Island Sound Dredged Material Management Plan (LIS DMMP) Investigation of Potential Nearshore Berm Sites for Placement of Dredged Materials

Contract No. W912WJ-09-D-0001-0040



Prepared For: United States Army Corps of Engineers New England District 696 Virginia Road Concord, MA 01742

Prepared By: Woods Hole Group, Inc. 81 Technology Park Drive East Falmouth, MA 02536

November 2012





Patricia Pechko USEPA, Region 2 pechko.patricia@epa.gov

212-637-3796

