Connecticut Department of
Energy & Environmental Protection
Bureau of Water Protection & Land Reuse
Office of Long Island Sound Programs

CPPU USE ONLY
App #:
Doc #:
Check #:

~~Permit~~ Application for Programs Administered by the Office of Long Island Sound Programs

IMPORTANT - Please refer to the instructions (DEP-OLISP-INST-100) for completing this application form to ensure that all required information is provided. Print or type all information within the form, providing additional pages as necessary.

Part I: ~~Permit~~ Type and Fee Information

Check only one of the boxes below identifying the applicable state ~~permit~~ program(s). You must submit the initial fee indicated below with this application.

Type of ~~Permit~~	Initial Fee
☐ **Structures, Dredging & Fill** *CGS sec. 22a-361* *[#1085]*	$660.00
☐ **Structures, Dredging & Fill and 401 Water Quality Certificate** *[#1632]*	$660.00
☐ **Structures, Dredging & Fill, and Tidal Wetlands** *CGS sec. 22a-361 & sec. 22a-32* *[#438]*	$660.00
☐ **Structures, Dredging & Fill, and Tidal Wetlands and 401 Water Quality Certificate** *[#417]*	$660.00
☒ **401 Water Quality Certificate** *33 U.S.C. 1341* ***(For Federal Use Only)*** *[#1195]*	None

Note: The fee for municipalities is 50% of the above listed rates. Additional fees based on the water area occupied by the project will be invoiced. The application will not be processed without the initial fee. The fee shall be non-refundable and shall be paid by check or money order to the Department of Energy and Environmental Protection.

Town where site is located: **Stratford, Milford**

Brief Description of Project: Maintenance dredging of the Housatonic River Federal Navigation Project.

If there are any changes or corrections to your company/facility or individual name, mailing or billing address or contact information, please complete and submit the Request to Change Company/Individual Information to the address indicated on the form. For any other changes you must contact the specific program from which you hold a current DEEP license. If there is a change in ownership, please contact the Permit Assistance Office for questions concerning license transfers at 860-424-3003.

Part II: Applicant Information

- ***If an applicant is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, registrant's name shall be stated ***exactly*** as it is registered with the Secretary of State. Please note, for those entities registered with the Secretary of State, the registered name will be the name used by DEEP. This information can be accessed at the Secretary of State's database (CONCORD). (www.concord-sots.ct.gov/CONCORD/index.jsp)***
- *If an applicant is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).*

1. Applicant Name: US Army Corps of Engineers

Mailing Address: **696 Virginia Rd**

City/Town: **Concord** State: **MA** Zip Code: **01742**

Business Phone: **978-318-8288** ext.

Contact Person: **Jack Karalius** Title: **Project Manager**

*E-mail: **Jack.Karalius@usace.army.mil**

*By providing this e-mail address you are agreeing to receive official correspondence from the department, at this electronic address, concerning the subject application. Please remember to check your security settings to be sure you can receive e-mails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes.

a) Applicant Type (check one):

☐ individual ☒ federal agency ☐ state agency ☐ municipality ☐ tribal

☐ ***business entity (*If a business entity complete i through iii):

i) check type: ☐ corporation ☐ limited liability company ☐ limited partnership ☐ limited liability partnership ☐ statutory trust ☐ Other: _____

ii) provide Secretary of the State business ID #:_____This information can be accessed at database (CONCORD). **(www.concord-sots.ct.gov/CONCORD/index.jsp)**

iii) ☐ Check here if you are **NOT** registered with the Secretary of State's office.

b) Applicant's interest in property at which the proposed activity is to be located:

☐ site owner ☐ option holder ☐ lessee

☐ easement holder ☐ operator ☒ other (specify): Federal Navigation Project

☐ Check if any co-applicants. If so, attach additional sheet(s) with the required information as requested above.

Note: If the applicant is not the owner, submit written permission from the owner as Attachment B.

2. List billing contact, if different than the applicant.

Name:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

Contact Person: Title:

E-mail:

3. List primary contact for departmental correspondence and inquiries if different than applicant.

Name:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

Contact Person: Title:

*E-mail:

Part II: Applicant Information (continued)

4. List Site Owner, if different than applicant:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.
Contact Person: Title:
E-mail:

5. List Facility Owner, if different than applicant:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.
Contact Person: Title:
E-mail:

6. List attorney or other representative, if applicable.

Firm Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.
Attorney: Title:
E-mail:

7. List all engineer(s), surveyor(s) and/or other consultant(s) employed or retained to assist in preparing the application and designing or constructing the activity.

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.
Contact Person: Title:
E-mail:

Service Provided:

☐ Check if additional Applicant Information sheets are included, and label and attach them to this sheet.

8. A pre-application meeting with Office of Long Island Sound Program (OLISP) staff is strongly recommended prior to application submission. Please note the meeting date and OLISP staff person's name:

Staff Name: **Kristen Bellantluono and George Wisker** Meeting Date: **1/29/2011, 2/22/2012**

Part III: Project Information

1. Describe the proposed regulated work and activities in a detailed narrative, including the number and dimensions of structures. Refer to both the instructions and Appendix A of the instructions (Activity Specific Instructions).

The proposed work involves maintenance dredging of the lower section of the Federal Navigation Project in the Housatonic River. Up to 100,000 cubic yards (cy) of predominantly sandy material from shoal areas south of the Route 1 bridge will be dredged. Although the authorized depth of the channel is -18 feet MLLW, the shoal areas will only be dredged as deep as to - 14 feet MLLW to accommodate the depth needed for the current ship traffic on the river. All areas of the river below the route 1 bridge with depths less than -14 ft MLLW will be dredged (see maps in Attachment I for specific locations of the dredge areas). Dredge material will be placed in the nearshore environment in specified areas located off of Point No Point, Stratford, CT. Current available funding will most likely limit dredging to 50,000 cy. The proposed work will be performed over a 2-3 month period between October 1 and March 31 in the year(s) in which funds become available. The material will be dredged with the government-owned special purpose hopper dredge "Currituck" or with a mechanical dredge and bucket. A berm will be created with the dredge material in the nearshore evironment within specified areas (see map in Attachment I). The sites are bounded between the - 8 and - 11 foot MLLW depth contours. The more western site is about 17 acres in area and the other site is about 9 acres. The western berm will be created and before any material will be placed in the more eastern placement area.

2. **a.** Describe the construction activities involved for the project in detail, including methods, sequencing, equipment, and any alternative construction methods that might be employed.

The dredging and disposal will be performed by the government-owned special-purpose hopper dredge, the "Currituck." This is a self-propelled, self contained dredge that uses a pump to suction bottom sediments through 2 arms into a hopper with the dredge. When the hopper is full (it holds approximately 300 cy), the Currituck will move to the nearshore placement site, and the material is released by splitting the hull.

Mechanical bucket dredging involves the use of a barge-mounted crane, hoe or cable-arm with a bucket to dig the material from the harbor bottom. The material is placed in a scow for transport to the placement site by tug. the material will be discharged at the placement site by using preset coordinates monitored by the tug.

b. Describe any erosion and sedimentation or turbidity control installation and maintenance schedule and plans in detail.

Maintenance dredging of the shoal portions of the channel with a hopper dredge will release some of the finer sediments into the water column along with the overflow from the hoppers. If a mechanical dredge is used resuspension of sediments is generally due to the dynamic impact of the bucket on the channel bottom, the spillage and leakage from the filled bucket, and the washing action of the empty bucket falling through the water column. Since sand is being dredged, sediments should rapidly settle out of the water column.

c. Indicate the length of time needed to complete the project and identify any anticipated time period restrictions.

The work will be performed during a 2-3 month period between Oct 1 through March 31 to avoid the anadromous fish runs (April 1- June 30) and shellfish spawning seasons (July 15-Sept 30).

Part III: Project Information (continued)

3. Describe the purpose of, the need for, and intended use of the proposed activities. (For example, private recreational boating, marina, erosion protection, public infrastructure, etc.)

To maintain the most shoaled portions in the lower Housatonic River Federal channel south of the Route 1 Bridge to a depth of 14 feet MLLW to improve ease and safety through the navigation channel. The intended use of the FNPs is primarily for recreational boating, although small commercial and fishing vessels also use the river. In Stratford there are 7 marinas with a total of 714 slips available, Milford has 3 marina and 246 slips and Shelton also has 3 marinas with 188 slips. There are 87 harbor moorings and 18 residential docks along the river. Additionally eleven commercial fishing vessels use these marinas. Commercial tugs and barges can be found on the river for repairs and marine construction.

4. Identify and describe all coastal or aquatic resources on the site by checking the appropriate box and describe the expected impact on these resources. You may add addenda as necessary as Attachment M.

Coastal/Aquatic Resources	On-site	Adjacent	Describe Expected Impact
Coastal bluffs and escarpments	☐	☐	
Rocky Shorefront	☐	☐	
Beaches and Dunes	☐	☒	**Potential increase of sand on the beach as the sediment moves**
Intertidal Flats	☐	☐	
Tidal Wetlands	☐	☐	
Fresh Water Wetlands and Watercourses	☐	☐	
Estuarine Embayments	☐	☒	**Short-term and localized increase in turbidity and resuspension of sediments from dredging activitie**
Coastal Hazard Areas	☐	☐	
Developed Shorefront	☐	☐	
Islands	☐	☐	
Near shore Waters	☒	☒	**Short-term and localized increase in turbidity and resuspension of sediments at disposal site.**
Offshore Waters	☐	☐	
Shorelands	☐	☐	
Shellfish Concentration Areas	☐	☐	
Wildlife Resources and Habitat	☐	☐	
Benthic (bottom) Habitat	☒	☐	**Maintenance dredging will remove the benthic habitat of shoal areas and placement will bury the current benthic habitat but function will be re-established in a short time period.**
Indigenous aquatic life, including shellfish and finfish	☒	☐	**Removal of food source within the dredged channel and burial at placement site but will be recolonized from local recruitment.**
Submerged Aquatic Vegetation	☐	☐	

Part III: Project Information (continued)

5. Identify whether the proposed activities will impact the following categories. If so, describe the expected impact, adding addenda as necessary as Attachment M.

Categories	Yes	No	Describe Expected Impact
Prevention or alleviation of shoreline erosion and coastal flooding	☐	☒	
Use and development of adjoining uplands	☐	☒	
Use and development of adjacent lands and properties	☐	☒	
Improvement of coastal and inland navigation for all vessels, including small craft for recreational purposes	☒	☐	**Maintenance dredging of navigation channels to remove shoals creating potentially hazardous conditions.**
Pollution control	☐	☒	
Water quality	☒	☐	**Temporary and localized increase in turbidity and sediment resuspension, but due to clean sediments, no adverse impacts.**
Water circulation and drainage	☐	☒	
Recreational use of public water	☒	☐	**Maintenance dredging will provide for safe access through the navigation channel.**
Management of coastal resources	☐	☒	
Public health and welfare	☐	☒	
The protection of life and property from flood, hurricane and other natural disasters	☐	☒	

6. Identify and evaluate any potential beneficial and adverse impacts to:

a. navigation: (include federal and local navigation channels and distance to nearby docks)

The proposed project will result in significant benefits with respect to improved ease and safety of navigation and improved public access to, and use of, the public trust lands and waters of the State. Maintenance of the Federal channel to -14 feet MLLW will improve boating access to and from the Housatonic River and Long Island Sound. Adverse impacts will be limited to temporary obstructions to navigation during dredging.

b. public access to, and public use of, public trust lands and waters waterward of mean high water:

See Paragraph 6.a. above.

Part III: Project Information (continued)

7. Describe how the proposed work will be a water-dependent use(s) of the property or will physically support water-dependent use(s) of the property, such as marinas, recreational and commercial fishing, boating facilities, shipyards and boat building facilities. Please do not include private recreation docks in this category. Include how upland facilities, such as sanitary facilities, designated parking, boat repair and sales, winter storage, etc., will support water-dependent uses on-site.

The Housatonic River Federal Navigation Project is a water-dependent use as defined in th CT Coastal Management Act (See CGS Sec. 22a-93(16)). Maintenance dredging of the Federal project (channel) will support the traditional water-dependent activities in the River that depend on the ease and safety of navigation between the River and Long Island Sound. These water-dependent activities include, but are not limited to, recreational and commercial boating.

8. Identify and evaluate the potential adverse impacts of the proposed work upon future water-dependent development opportunities and activities.

The proposed work will have no adverse impacts on future water-dependent development opportunities and activities. Maintenance dredging of the lower Housatonic River Federal channel to restore a depth of -14 ft MLLW to shoaled portions of the channels will help to maintain the viability of existing water-dependent facilities, including public and private water access facilities in the River, and will enhance existing and future water-dependent activities in the River.

9. Discuss the alternatives to the proposed project which were considered and indicate why they were rejected.

Alternate disposal options that have been considered include nearshore disposal, open ocean disposal, beach disposal, and upland disposal. Nearshore disposal was the preferred alternative, placing the material nearshore off of Point No Point. The material will be placed to build a berm within the placement area. The berm under most wind and wave condition will be stable and provide a level of protection of the shore from the wave energy. Under certain storm and wave conditions the material will move, the direction of movement will depend on the wind and waves. Although the material is suitable for placement on a beach as well as nearshore, funding is limited and it costs more to pump the material on beach. If shell material is spread over the larger placement area, the sand would most likely move from the area, the direction would depend on the wind and waves but most likely offshore. The shell would be left enchancing the habitat for oyster spat settlement.
Central Long Island Sound (CLIS) Disposal Site is the closest designated open water placement site and it is around 12 miles from the mouth of the Housatonic River. Also USACE would prefer to use the sand beneficially instead of placing clean dredged material in an open water site.

The town looked into several upland disposal options, but no viable options were found and upland disposal would remove the sand from the littoral zone.

Direct beach nourishment was a viable alternative, but requires cost sharing with a local sponsor.

See Attachment M - Housatonic River EA section 4.4 for more details on disposal alternatives.

Part III: Project Information (continued)

10. After all measures to eliminate or minimize adverse impacts have been incorporated in the proposed project, describe why any adverse impacts that remain should be deemed acceptable by OLISP.

The objective of this project is to provide safe navigation within the Housatonic River Federal Navigation Project for recreational and commercial vessels. Since the anticipated environmental impacts are minor, the benefits to the public from the dredging project should outweigh the adverse impacts. As mentioned in previous sections, any adverse impacts should be minor and temporary - for example; dredging operations will cause turbidity that may result in short-term, localized disturbance to marine life in the vicinity of the dredge; and dredging and dredged material placement activities will cause short-term suspension of sandy material in the water column. And although there will be a temporary increase in turbidity in the immediate dredging and placement areas, disturbances will be short-lived, localized, and not significant.

11. a. Is any portion of the work for which authorization is being sought now complete or under construction?

☐ Yes ☒ No ***If No, skip to question #12***.

b. Specify what parts of the proposed work have been completed or are under construction.

c. Indicate when such work was undertaken or completed. Identify completed portions on the plans submitted.

d. When did you acquire interest in this property?

e. Were you responsible for the unauthorized activity as a result of actions taken before the acquisition of the property? ☐ Yes ☐ No If Yes, explain.

Part III: Project Information (continued)

f. Did you know or have reason to know of the unauthorized activity? ☐ Yes ☐ No If Yes, explain.

g. Is this application associated with an enforcement action pending with DEEP? ☐ Yes ☐ No

If Yes, explain:

12. Is there or will there be any federal and/or state funding of this project? ☒ Yes ☐ No If Yes, explain.

This is a Federally authorized project that will be paid for by state funding.

☐ Check here if additional Project Information sheets are necessary, and label and attach them to this sheet.

Part IV: Site and Resource Information

1. SITE NAME AND LOCATION

Name of Site : **Lower Housatonic River**

Street Address or Location Description:

City/Town: **Stratford, Milford** State: **CT** Zip Code:

Tax Assessor's Reference: Map Block Lot

Latitude and longitude of the exact location of the proposed activity in degrees, minutes, and seconds or in decimal degrees: Latitude: Longitude:

Method of determination (check one):

☐ GPS ☐ USGS Map ☐ Other (please specify):

If a USGS Map was used, provide the quadrangle name:

2. INDIAN LANDS: Is or will the facility be located on federally recognized Indian lands? ☐ Yes ☐ No

3. COASTAL AREA: Is the project site located in a municipality within the coastal area? (check town list in the instructions) ☒ Yes ☐ No

4. ENDANGERED OR THREATENED SPECIES: According to the most current "State and Federal Listed Species and Natural Communities Map", is the project site located within an area identified as a habitat for endangered, threatened or special concern species or located less than ½ mile upstream or downstream of such an area? ☒ Yes ☐ No Date of Map: **Dec 2011**

Part IV: Site Information (continued)

If yes, complete and submit a *Request for NDDB State Listed Species Review Form* (DEP-APP-007) to the address specified on the form. **Please note NDDB review generally takes 4 to 6 weeks and may require additional documentation from the applicant.**

A **copy** of the completed *Request for NDDB State Listed Species Review Form* **and** the CT NDDB response ***must*** be submitted with this completed application as Attachment C.

For more information visit the DEEP website at www.ct.gov/dep/nddbrequests or call the NDDB at 860-424-3011.

5. AQUIFER PROTECTION AREAS: Is the site located within a town required to establish Aquifer Protection Areas, as defined in section 22a-354a through 354bb of the General Statutes (CGS)?

☐ Yes ☒ No To view the applicable list of towns and maps visit the DEEP website at www.ct.gov/deep/aquiferprotection

If yes, is the site within an area identified on a Level A map? ☐ Yes ☐ No

If yes, is the site within an area identified on a Level B map? ☐ Yes ☐ No

If your site is on a Level A map, check the DEEP website, Business and Industry Information (www.ct.gov/deep/aquiferprotection) to determine if your activity is required to be registered under the Aquifer Protection Area Program.

If your site is on a Level B map, no action is required at this time, however you may be required to register under the Aquifer Protection Area Program in the future when the area is delineated as Level A.

6. SHELLFISH COMMISSION: Does your town have a shellfish commission? ☒ Yes ☐ No

If yes, you must submit a completed *Shellfish Commission Consultation Form* (DEP-OLISP-APP-101D) with this application as Attachment D.

7. HARBOR MANAGEMENT COMMISSION: Does your town have a Harbor Management Commission?

☒ Yes ☐ No

If yes, you must submit a completed *Harbor Management Commission Consultation Form* (DEP-OLISP-APP-101E) with this application as Attachment E.

8. DEPARTMENT OF AGRICULTURE/BUREAU OF AQUACULTURE: If the subject site is located in a specific area as explained in Part IV, item 8 of the application instructions (DEP-OLISP-INST-100), you must submit a completed *Department of Agriculture/Bureau of Aquaculture Consultation Form* (DEP-OLIS-APP-101F) as Attachment F.

9. CONSERVATION OR PRESERVATION RESTRICTION: Is the property subject to a conservation or preservation restriction? ☐ Yes ☒ No

If yes, proof of written notice of this application to the holder of such restriction or a letter from the holder of such restriction verifying that this application is in compliance with the terms of the restriction, must be submitted as Attachment G.

10. Indicate the number and date of issuance of any previous state coastal ~~permits~~ or certificates issued by DEEP authorizing work at the site and the names to whom they were issued.

Permit/COP Number	*Date Issued*	*Name of Permittee/Certificate Holder*

Part IV: Site Information (continued)

11. Identify any changes in conditions of the site (including ownership, development, use, or natural resources) since the issuance of the most recent state ~~permit~~ or certificate authorizing work at the site.

N/A

12. a. Identify and describe the existing municipal zoning classification of the site.

The dredge site is located in the Housatonic River and is not subject to local zoning. The placement sites are off of private and State beaches.

b. Identify and describe the existing land use(s) on and adjacent to the site.

Historically industrial and commercial operations dominated the waterfront, several major industries remain. Newer development consists of residential and water-dependent commercial uses, including marinas.

13. Provide the name of the waterbody at the site of proposed work.

Housatonic River, Long Island Sound

14. a. Provide the elevations of the high tide line, mean high water and mean low water at the site and the reference datum used. Refer to the instructions regarding elevation datum.

HTL = **in river** MHW = **5.5'** MLW = **0.0'** Datum = **MLLW**

☐ Check that an orthometric conversion table has been provided in Attachment M if using the NAVD88 datum.

b. Indicate how these above elevations were determined. **Corps**

15. Identify the locations of any osprey nesting platforms within 500 feet of the project site.

None known

Part V: Supporting Documents

The supporting documents listed below must be submitted with the application and labeled as indicated. The specific information required in each attachment is described in the *Instructions for Completing a ~~Permit~~ Application for Programs Administered by the Office of Long Island Sound Programs* (DEP-OLIS-INST-100). Check the box by the attachments listed to indicate that they have been submitted.

☒ Attachment A: Executive Summary; summarize the information contained in the complete application which must include a description of the proposed regulated activities and a synopsis of the environmental and engineering analyses of the impact of such activities. Include a list of the titles of all plans, drawings, reports, studies, appendices, or other documentation which are attached as part of the application.

☐ Attachment B: If the applicant is not the owner, submit written permission from the owner as Attachment B.

☒ Attachment C: **Copy** of the completed *Request for NDDB State Listed Species Review Form* (DEP-APP-007) **and** the NDDB response, if applicable.

☒ Attachment D: *Shellfish Commission Consultation Form* (DEP-OLIS-APP-101D), if applicable.

☒ Attachment E: *Harbor Management Commission Consultation Form* (DEP-OLIS-APP-101E), if applicable.

☒ Attachment F: *Department of Agriculture/Bureau of Aquaculture Consultation Form* (DEP-OLIS-APP-101F), if applicable.

☐ Attachment G: Conservation or Preservation Restriction Information, if applicable.

☒ Attachment H: *Applicant Compliance Information Form* (DEP-APP-002).

☒ Attachment I: Provide plans of the project as Attachment I. They must be 8 1/2" x 11" scaled plans of the site and proposed work, with the datum of the measurements noted, including:

a. A Vicinity Map;

b. A Tax Assessor's Map showing the Map, Block and Lot #, subject property and immediately adjacent properties;

c. Plan Views showing existing and proposed conditions, including vessel berthing arrangement, based on a site survey prepared by a licensed surveyor; and

d. An Elevation or Cross-Section View showing existing and proposed conditions, including vessel berthing arrangement, based on a site survey prepared by a licensed surveyor.

Please refer to Attachment I of the instructions for identification and discussion of required plan components.

☐ Attachment J: Photographs showing existing conditions of the site.

☐ Attachment K: Abutting or adjacent property owner information; including names and mailing addresses and names and addresses of shellfish bed owners or lessees.

☐ Attachment L: Applicant Background Information Form (DEP-APP-008) (if applicable).

☒ Attachment M: Other Information: Any other information the applicant deems relevant or is required by DEEP.

☐ Attachment N: US. Army Corps of Engineers Consultation Form (DEP-OLISP-APP-101N)

Part VI: Applicant Certification

The applicant(s) *and* the individual(s) responsible for actually preparing the application must sign this part. An application will be considered insufficient unless *all* required signatures are provided.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief.

I understand that a false statement in the submitted information may be punishable as a criminal offense, in accordance with section 22a-6 of the General Statutes, pursuant to section 53a-157b of the General Statutes, and in accordance with any other applicable statute.

I certify that this application is on complete and accurate forms as prescribed by the commissioner without alteration of the text.

I certify that I will comply with all notice requirements as listed in section 22a-6g of the General Statutes."

Jack Karalius	June 26, 2012
Signature of Applicant	Date
Jack Karalius	Project Manager
Name of Applicant (print or type)	Title (if applicable)
Valerie Cappola	6/26/2012
Signature of Preparer (if different than above)	Date
Valerie Cappola	Marine Ecologist
Name of Preparer (print or type)	Title (if applicable)

☐ Check here if additional signatures are required. If so, please reproduce this sheet and attach signed copies to this sheet. You must include signatures of any person preparing any report or parts thereof required in this application (i.e., professional engineers, surveyors, soil scientists, consultants, etc.)

Note: Please submit the completed Application Form, Fee, and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Please remember to publish notice of the permit application immediately after submitting your completed application to DEEP. Send a copy of the notice to the chief elected official of the municipality in which the regulated activity is proposed, and provide DEEP with a copy of the notice, as described in the instructions, attached to a completed "Certification of Notice Form (DEP-APP-005A)".

ATTACHMENT A

1. Executive Summary (project description)

The proposed work involves maintenance dredging of the Federal Navigation Project at Housatonic River below the Route 1 Bridge. The existing Federal navigation project provides for an 18-foot deep, 200-foot wide main channel from the mouth of the river to the lower end of Culvers Bar (approximately five miles distance), a 7-foot deep, 100-foot wide channel to Derby and Shelton (a total length of about 13 miles), and three jetties.

The purpose of the proposed action is to meet the navigational needs of the existing commercial and recreational vessel traffic. Natural shoaling processes have reduced the available depths in the 18-foot channel to as shallow as 3.5 feet. Given these conditions and current vessel drafts, shoaling within the project is limiting safe navigation. Maintenance dredging of the project is needed to provide safe access to the project at all tide stages.

The U.S. Army Corps of Engineers proposes to dredge up to 100,000 cubic yards (cy) of predominantly sandy material from shoal areas south of the Route 1 bridge. These shoal areas will be dredged to - 14 feet Mean Lower Low Water (MLLW) not to the authorized depth since the current vessel traffic does not require the deeper depths authorized for the Housatonic River FNP.

The shoal material would be dredged with a government special purpose hopper dredge or a mechanical dredge and placed in the nearshore environment off of Point No Point in Stratford Connecticut. If approved by the State of Connecticut, shell material from the entrance to the channel will be spread out within a specified area, otherwise this material and the mostly sand shoal will be placed in berm in a specific area. The quantity of shoal material to be dredged during one dredge event will depend on the available funds at the time of dredging. It is anticipated that funds for only half of the material will be available in 2012 and this work will be completed using the government-owned special purpose dredge, *Currituck*. The proposed work will be performed over a two to three month period between October 1 and March 31 in the year(s) in which funds become available.

ATTACHMENT A

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a. Application Transmittal Form (DEP-APP-001)

b. Application for Office of Long Island Sound Programs (DEP-OLIS-APP-100)

c. Supporting Documents

- **Attachment C**: Copy of completed Request for NDDB State Listed Species Review form
- **Attachment D**: Shellfish Commission Consultation Form
- **Attachment E**: Harbor Management Commission Consultation Form
- **Attachment F:** Department of Agriculture/Bureau of Aquaculture Consultation Form
- **Attachment H:** Application Compliance Information Form (DEP-APP-002)
- **Attachment I**: Project Plans
    - a Vicinity Map with dredge area and placement sites
    - b Plan views- 11" x -17" V-101, full size maps of condition survey, pages V-102, V-105, V-106, V-107, V-108 – already sent to Kristen Bellantuono. In this package 8" X 11" of above pages - Electronic version has all pages
    - c Cross Section 8" X 11"
- **Attachment M**: On CD –
    - o **M1** - Draft Environmental Assessment (EA) for Maintenance Dredging of the Housatonic River Federal Navigation Project, Stratford and Milford, Connecticut, includes physical and chemical testing (Appendix B of EA), placement site survey and benthic analyses (Appendices E and F of EA).

- **M2** - Coordination with State Agencies for WQC

- **M3** - Modeling Report - USACE. 2012. Housatonic River Nearshore Disposal. Coastal Engineering, Water Management Section, Concord, Massachusetts. March 2012, pp.38.

Attachment C - USACE Housatonic River

From: DEEP Nddbrequest
To: Cappola, Valerie A NAE
Cc: Karalius, Jack NAE
Subject: RE: Housatonic River NDDB Request (UNCLASSIFIED)
Date: Friday, May 04, 2012 2:50:10 PM

We received your request, thank you.

Karen.

_____
From: Cappola, Valerie A NAE [Valerie.A.Cappola@usace.army.mil]
Sent: Friday, May 04, 2012 2:06 PM
To: DEEP Nddbrequest
Cc: Karalius, Jack NAE; Cappola, Valerie A NAE
Subject: Housatonic River NDDB Request (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Attached is our NDDB request for maintenance dredging of the Housatonic River Federal channel south of the Route 1 Bridge in Stratford, CT.

Valerie A. Cappola, Ph.D.
Marine Ecologist

Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8067; Fax - (978) 318-8560
valerie.a.cappola@usace.army.mil

Classification: UNCLASSIFIED
Caveats: NONE

Connecticut Department of
Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division

CPPU USE ONLY
App #:_____
Doc #:_____
Check #: No fee required
Program: Natural Diversity Database Endangered Species
Hardcopy _____ Electronic _____

Request for Natural Diversity Data Base (NDDB) State Listed Species Review

Please complete this form in accordance with the instructions (DEP-INST-007) to ensure proper handling of your request.
There are no fees associated with NDDB Reviews.

Part I: Preliminary Screening

Before submitting this request, you must review the Natural Diversity Data Base "State and Federal Listed Species and Significant Natural Communities Maps" found on the DEEP website. Follow the instructions on the map or in this form's instruction document. These maps are updated twice a year, usually in June and December.

Does your site, including all affected areas, meet the screening criteria according to the instructions:

☒ Yes ☐ No

Enter the date of the map reviewed for pre-screening: **3/22/2012**

Part II: Requester Information

***If the requester is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, the company name shall be stated **exactly** as it is registered with the Secretary of State. This information can be accessed at CONCORD.*

If the requester is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).

1. Requester Company Name*: **US Army Corps of Engineers**

Name: **Jack Karalius**

Address: **696 Virginia RD**

City/Town: **Concord** State: **MA** Zip Code: **01742**

Business Phone: **978-318-8067** ext. Fax: **978-318-8288**

E-mail: **Jack.Karalius@usace.army.mil**

By providing this email address you are agreeing to receive official correspondence from the department, at this electronic address, concerning this request. Please remember to check your security settings to be sure you can receive emails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes.

Requester can best be described as:

☐ Business Entity ☒ Federal Agency ☐ Municipal govt. ☐ State agency ☐ Individual
☐ Tribe ☐ Other (specify):

Acting as (Affiliation), pick one:

☐ Property owner ☐ Consultant ☐ Engineer ☐ Facility owner ☐ Applicant
☐ Biologist ☐ Pesticide Applicator ☒ Other representative: **Project Manager**

Part II. Requester Information (continued)

2. List Primary Contact to receive Natural Diversity Data Base correspondence and inquiries, if different from requester.

Company: **US Army Corps of Engineers**

Contact Person: **Valerie Cappola** Title: **Marine Ecologist**

Mailing Address: **696 Virginia Rd**

City/Town: **Concord** State: **MA** Zip Code: **01742**

Business Phone: **978-318-8067** ext. Fax: **978-318-8560**

E-mail: **valerie.a.cappola@usace.army.mil**

By providing this email address you are agreeing to receive official correspondence from the department, at this electronic address, concerning this request. Please remember to check your security settings to be sure you can receive emails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes.

Part III: Site Information

This request can only be completed for one site. A separate request must be filed for each additional site.

1. SITE NAME AND LOCATION

Site Name or Project Name: **Housatonic River and nearshore location off of Point No Point**

Town(s): **Stratford, Milford**

Street Address or Location Description:

Size in acres, or site dimensions:

Latitude and longitude of the center of the site in decimal degrees (e.g., 41.23456 -71.68574):

Latitude: Longitude:

Method of coordinate determination (check one):

☐ GPS ☐ Photo interpolation using CTECO map viewer ☐ Other (specify):

2a. Describe the current land use and land cover of the site.

Housatonic River and Long Island Sound

b. Check all that apply and enter the size in acres or % of area in the space after each checked category.

☐ Industrial/Commercial _____ ☐ Residential _____ ☐ Forest _____

☐ Wetland _____ ☐ Field/grassland _____ ☐ Agricultural _____

☒ Water 100 ☐ Utility Right-of-way _____

☐ Transportation Right-of-way _____ ☐ Other (specify): _____

Part IV: Project Information

1. PROJECT TYPE:

Choose Project Type: Dredging , If other describe: _____

2. Is the subject activity limited to the maintenance, repair, or improvement of an existing structure within the existing footprint? ☒ Yes ☐ No If yes, explain.

Maintenance dredging of a Federal Navigation Project

3. Give a detailed description of the activity which is the subject of this request and describe the methods and equipment that will be used.

USACE proposes to dredge up to 100,000 cubic yards (cy) of predominantly sandy material from shoal areas south of the Route 1 bridge. These shoal areas will be dredged to 14 feet MLLW not to the authorized depth. Currently there are only funds available to dredge about 50,000 cy of material, so the shoals will be dredged to a depth of 12 to 13 feet and the remaining material will be dredged when funds are available. It will take about 2 to 3 months to complete the project.

The shoal material would be dredged with the government-owned special purpose hopper dredge, Currituck, or a mechanical dredge and placed at a nearshore site located off of Point No Point in Stratford Connecticut. The sandy material will be placed in a berm to help protect the shore and it is anticipiated to move within the littoral zone with a large enough storm. According to Dave Carey (Bureau of Aquaculture) there is a lot ofshell material within the channel entrance that should be spread out over the larger placment area (see map) to enhance shellfish habitat. We are still to hear if the state would allow the the material to be spread in the larger placement site, if not all material will be placed in the berm. For the first round of dredging, the Currituck will dredge approximately 50,000 cy of material.

4. Provide a contact for questions about the project details if different from Part II primary contact.

Name:

Phone:

E-mail:

Part V: Request Type and Associated Application Type

Check *one* box from either Group 1 *or* Group 2, indicating the appropriate category for this request.

Group 1. If you check one of these boxes, fill out Parts I – VII of this form and submit the required attachments A and B.

- ☐ Preliminary screening was negative but an NDDB review is still requested
- ☐ Request regards a municipally regulated or unregulated activity (no state permit/certificate needed)
- ☐ Request regards a preliminary site assessment or project feasibility study
- ☐ Request relates to land acquisition or protection
- ☐ Request is associated with a *renewal* of an existing permit, with no modifications

Group 2. If you check one of these boxes, fill out Parts I – VII of this form and submit required attachments A, B, *and* C.

- ☒ Request is associated with a *new* state or federal permit application
- ☐ Request is associated with modification of an existing permit
- ☐ Request is associated with a permit enforcement action
- ☐ Request regards site management or planning, requiring detailed species recommendations
- ☐ Request regards a state funded project, state agency activity, or CEPA request

If you are filing this request as part of a state or federal permit application enter the application information below.

Permitting Agency and Application Name:
DEEP, 401 Water Quality Certificate

State DEEP Application Number, if known: _____

State DEEP Enforcement Action Number, if known: _____

State DEEP Permit Analyst/Engineer, if known: _____

Is this request related to a previously submitted NDDB request? ☐ Yes ☒ No

Enter the previous NDDB Request Number(s), if known: _____

Part VI: Supporting Documents

Check each attachment submitted as verification that *all* applicable attachments have been supplied with this request form. Label each attachment as indicated in this part (e.g., Attachment A, etc.) and be sure to include the requester's name, site name and the date. **Please note that Attachments A and B are required for all requesters.** Attachment C (DEP-APP-007C) is supplied at the end of this form.

☐ Attachment A:	**Overview Map:** an 8 1/2" X 11" print/copy of the relevant portion of a USGS Topographic Quadrangle Map clearly indicating the exact location of the site.
☐ Attachment B:	**Detailed Site Map:** fine scaled map showing site boundary details on aerial imagery with relevant landmarks labeled. (Site boundaries in GIS [ESRI ArcView shapefile, in NAD83, State Plane, feet] format can be substituted for detailed maps, see instruction document)
☐ Attachment C:	**Supplemental Information, Group 2 requirement (attached, DEP-APP-007C)** ☐ Section i: Supplemental Site Information and supporting documents ☐ Section ii: Supplemental Project Information and supporting documents

Part VII: Requester Certification

The requester *and* the individual(s) responsible for actually preparing the request must sign this part. A request will be considered incomplete unless all required signatures are provided.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief."

Jack Karalius Signature of Requester	5-4-12 Date
Jack Karalius Name of Requester (print or type)	**Project Manager** Title (if applicable)
Valerie Cappola Signature of Preparer (if different than above)	5-4-12 Date
Valerie Cappola Name of Preparer (print or type)	**Marine Ecologist** Title (if applicable)

Note: Please submit the completed Request Form and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Or email request to: **dep.nddbrequest@ct.gov**

Attachment C: Supplemental Information, Group 2 requirement

Section i: Supplemental Site Information

1. Existing Conditions

Describe all natural and man-made features including wetlands, watercourses, fish and wildlife habitat, floodplains and any existing structures potentially affected by the subject activity. Such features should be depicted and labeled on the site plan that must be submitted. Photographs of current site conditions may be helpful to reviewers.

☐ **Site Photographs (optional) attached**

☐ **Site Plan/sketch of existing conditions attached**

2. Biological Surveys

Has a biologist visited the site and conducted a biological survey to determine the presence of any endangered, threatened or special concern species ☐ Yes ☒ No

If yes, complete the following questions and submit any reports of biological surveys, documentation of the biologist's qualifications, and any NDDB survey forms.

Biologist(s) name:

Habitat and/or species targeted by survey:

Dates when surveys were conducted:

☐ **Reports of biological surveys attached**

☐ **Documentation of biologist's qualifications attached**

☐ **NDDB Survey forms for any listed species observations attached**

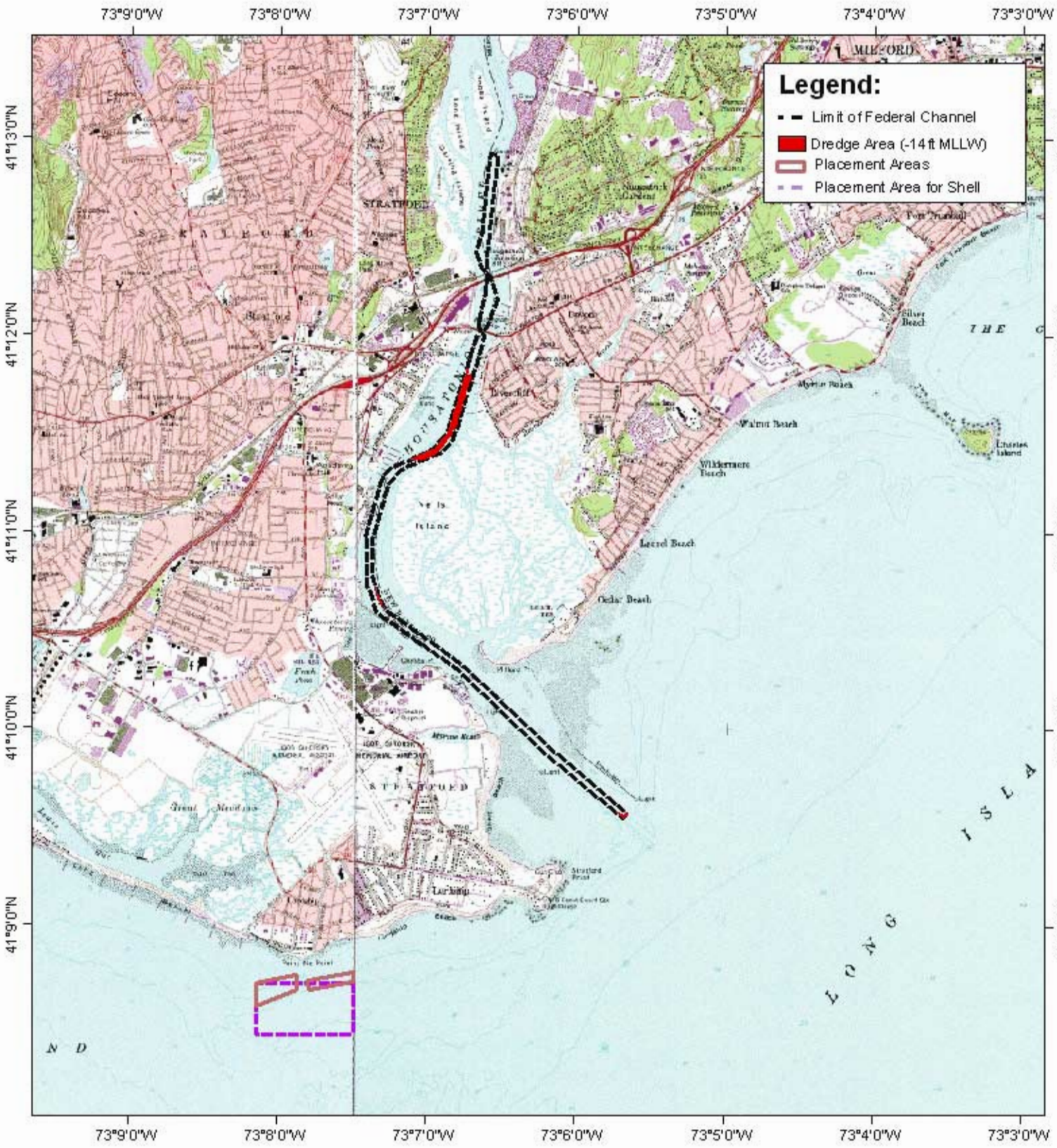
Section ii: Supplemental Project Information

1. Provide a schedule for all phases of the project including the year, the month and/or season that the proposed activity will be initiated and the duration of the activity.

   Dredging will take 2 to 3 months to complete, the first 50,000 cy of material will be dredged between Oct 1, 2012 and March 31, 2013. Additional dredging will be completed with the Currituck or a mechanical dredge, no dredging will occur from April 1 through June 30 to protect the anadroumous fish runs or from July 15 through September 30 to protect oyster spawning.

2. Describe and quantify the proposed changes to existing conditions and describe any on-site or off-site impacts. In addition, provide an annotated site plan detailing the areas of impact and proposed changes to existing conditions.

☐ **Annotated Site Plan attached**



US Army Corps of Engineers
New England District

HOUSATONIC RIVER FNP
STRATFORD AND MILFORD, CT
DREDGE AREAS FROM 2011 USACE SURVEY

0 2,500 5,000 7,500 10,000 Feet

0 0.8 1.2 1.8 2.4 Miles

1:50,000

USGS QUAD SHEETS 109 AND 110

GCS NAD1983

Connecticut Department of
Energy & Environmental Protection
Bureau of Water Protection & Land Reuse
Office of Long Island Sound Programs

ATTACHMENT D: SHELLFISH COMMISSION

DEEP ~~PERMIT~~ CONSULTATION FORM

You need to complete and submit this form only if your town has a Shellfish Commission.

To the applicant- Prior to the submission of your permit application to the Connecticut Department of Energy and Environmental Protection- Office of Long Island Sound Programs (DEEP- OLISP), please complete Part I and submit this form to your local shellfish commission (contact the town for the appropriate contact person) with a location map of your site and project plans. Once the commission returns the completed form to you, please submit it along with your permit application to the DEEP.

Part I: *To be completed by APPLICANT*

1. List applicant information.

Name: **US Army Corps of Engineers**
Mailing Address: **696 Virginia Rd**
City/Town: **Concord** State: **MA** Zip Code: **01742**
Business Phone: **978-318-8067** ext. Fax: **978-318-8560**
Contact Person: **Valerie Cappola** Title: **Marine Ecologist**
Email: **valerie.a.cappola@usace.army.mil**

2. List engineer/surveyor/agent information.

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext. Fax:
Contact Person: Title:
Service Provided:

3. Site Location:

Street Address or Location Description: **Housatonic River and nearshore location off Point No Point**
City/Town: **Stratford** State: **CT** Zip Code:
Tax Assessor's Reference: Map Block Lot

4. Are plans attached? ☐ Yes ☒ No If Yes, provide date of plans:

5. Provide or attach a brief, but thorough description of the project: Maintenance dredging of the Housatonic River of up to 100,000 cubic yards of predominantly sandy material from shoal areas south of the Route 1 bridge. These shoal areas could be dredged as deep as to - 14 feet MLLW but not to the authorized depth. Dredge material will be placed in the nearshore environment off of Point No Point, Stratford, CT. Current avaialable funding will most likely limit dredging to 50,000 cy

Part II: *To be completed by SHELLFISH COMMISSION*

This consultation form is required to be submitted as part of an application for a Structures, Dredging & Fill permit (section 22a-361 CGS) and/or Tidal Wetlands permit (section 22a-32 CGS) to the DEEP- OLISP. The application has not yet been submitted to the DEEP. Please review the enclosed materials and determine whether the project will adversely impact shellfish beds. You may also provide comments or recommendations regarding the proposal. Should you have any questions regarding this process, please call DEEP-OLISP at (860) 424-3034 to speak with the analyst assigned to the town in which the work is proposed. **Please return the completed form to the applicant.**

SHELLFISH COMMISSION DETERMINATION:

Project located on (check one): ☐ natural bed ☐ state bed ☐ local bed ☐ none
☐ other, please specify:

If project is located upon a franchised or leased shellfish bed, please provide the owner or lessee's contact information below.

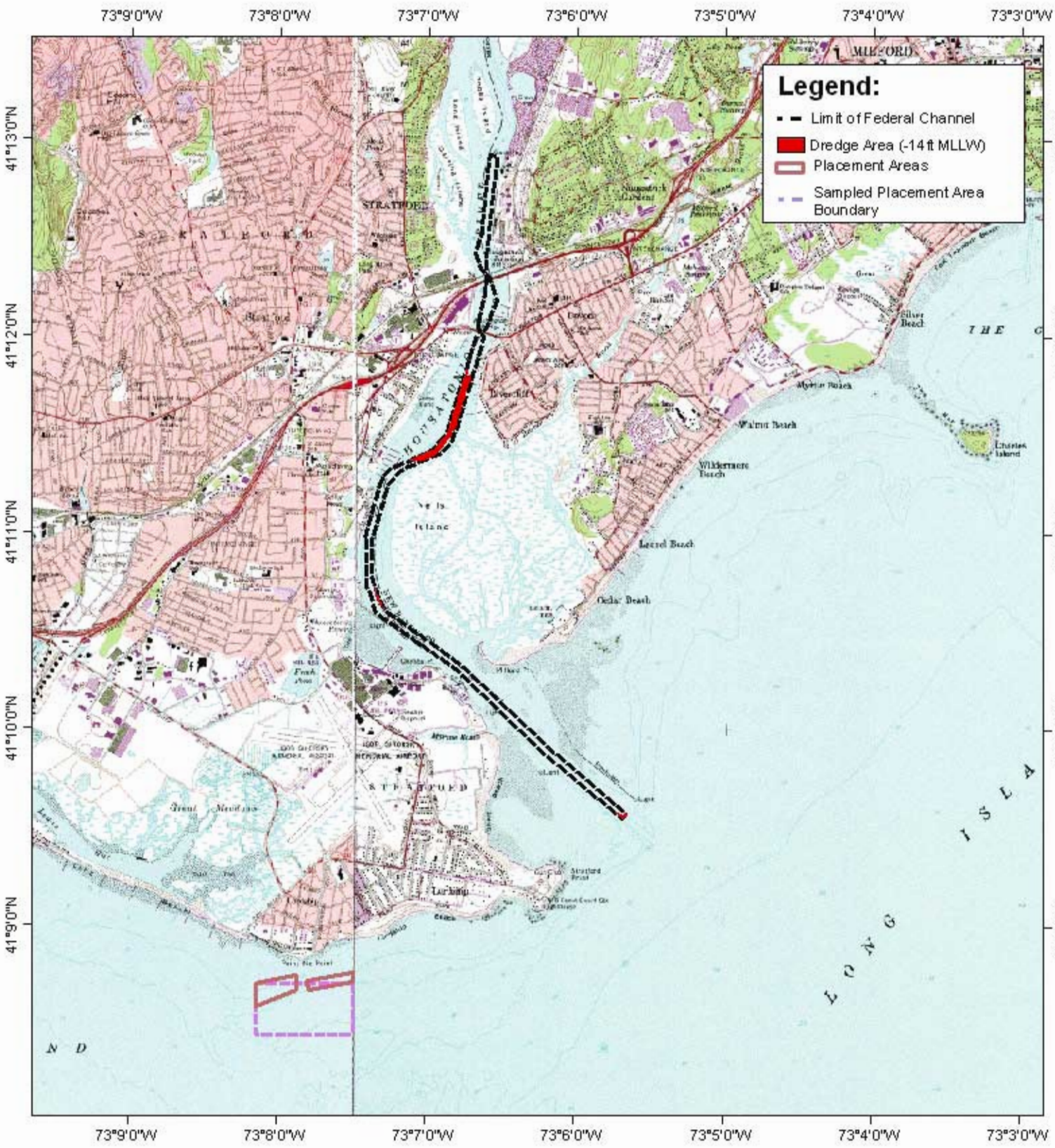
Check one of the following:

☐ I have determined that the work described in Part I of this form and attachments **WILL NOT** adversely impact a shellfish area.

☐ I have determined that the work described in Part I of this form and attachments **WILL** adversely impact a shellfish area. A summary of the Shellfish Commission's project-specific concerns/comments is described below or attached.

COMMENTS/RECOMMENDATIONS (check the box if attached: ☐):

Signature of Commission Representative	Date
Print Name of Commission Representative	Title



US Army Corps of Engineers
New England District

HOUSATONIC RIVER FNP
STRATFORD AND MILFORD, CT
DREDGE AREAS FROM 2011 USACE SURVEY

0 2,500 5,000 7,500 10,000 Feet

0 0.8 1.2 1.8 2.4 Miles

1:50,000

USGS QUAD SHEETS 109 AND 110

GCS NAD1983

Attachment D- USACE Shellfish Commission form

From: Cappola, Valerie A NAE
To: "tgckc@att.net"
Subject: maintenance dredging of the Housatonic River (UNCLASSIFIED)
Date: Wednesday, June 13, 2012 3:05:00 PM

Classification: UNCLASSIFIED
Caveats: NONE

Tim Barber,

I have everything ready to submit the WQC application for the Housatonic River Maintenance Dredging except for the Stratford Shellfish Commission Consultation form. Will you be having a meeting in the near future to have this form signed?

Thanks for your help.

Valerie A. Cappola, Ph.D.
Marine Ecologist

Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8067; Fax - (978) 318-8560
valerie.a.cappola@usace.army.mil

Classification: UNCLASSIFIED
Caveats: NONE

Attachment D- USACE Shellfish Commission form

From: David Carey
To: tim barber
Cc: Cappola, Valerie A NAE
Subject: shellfish commision signoff
Date: Friday, May 25, 2012 1:41:00 PM
Attachments: shellfishcommconsult.2[1].doc

Tim: lease use this form and send to myself or valetrie

Connecticut Department of
Energy & Environmental Protection
Bureau of Water Protection & Land Reuse
Office of Long Island Sound Programs

ATTACHMENT E: HARBOR MANAGEMENT COMMISSION DEEP PERMIT CONSULTATION FORM

You need to complete and submit this form only if your town has a Harbor Management Commission.

To the applicant- Prior to the submission of your permit application to the Connecticut Department of Energy and Environmental Protection- Office of Long Island Sound Programs (DEEP- OLISP), please complete Part I and submit this form to your local harbor management commission (contact the town for the appropriate contact person) with a location map of your site and project plans. Once the commission returns the completed form to you, please submit it along with your permit application to the DEEP.

Part I: *To be completed by APPLICANT*

1. List applicant information.

Name: **US Army Corps of Engineers**
Mailing Address: **696 Virginia Rd**
City/Town: **Concord** State: **MA** Zip Code: **01742**
Business Phone: **978-318-8067** ext. Fax: **978-318-8560**
Contact Person: **Valerie Cappola** Title: **Marine Ecologist**
E-mail: **valerie.a.cappola@usace.army.mil**

2. List engineer/surveyor/agent information.

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext. Fax:
Contact Person: Title:
Service Provided:

3. Site Location:

Street Address or Location Description: **Housatonic River and nearshore location off of Point No Point**

City/Town: **Stratford** State: **CT** Zip Code:

Tax Assessor's Reference: Map Block Lot

4. Are plans attached? ☐ Yes ☒ No If Yes, provide date of plans:

5. Provide or attach a brief, but thorough description of the project: Maintenance dredging of the Housatonic River of up to 100,000 cubic yards of predominantly sandy material from shoal areas south of the Route 1 bridge. These shoal areas could be dredged to as deep as to -14 feet MLLW but not to authorized depth. Dredge material will be placed in the nearshore environment off of Point No Point, Stratford, CT. Current avaialable funding will most likely limit dredging to 50,000 cy

Part II: *To be completed by HARBOR MANAGEMENT COMMISSION*

This consultation form is required to be submitted as part of an application for a Structures, Dredging & Fill permit (section 22a-361 CGS) and/or Tidal Wetlands permit (section 22a-32 CGS) to the DEEP- OLISP. The application has not yet been submitted to the DEEP. Please review the enclosed materials and determine whether the project is consistent or inconsistent with your local Harbor Management Plan. You may also provide comments or recommendations regarding the proposal. Should you have any questions regarding this process, please call DEEP-OLISP at (860) 424-3034 to speak with the analyst assigned to the town in which the work is proposed. **Please return the completed form to the applicant.**

HARBOR MANAGEMENT COMMISSION DETERMINATION:

Check one of the following:

☒ The Commission has determined that the work as described in Part I of this form and attachments is **CONSISTENT** with the harbor management plan.

☐ The Commission has determined that the work as described in Part I of this form and attachments is **INCONSISTENT** with the following section of the harbor management plan:

COMMENTS/RECOMMENDATIONS (or check here if attached: ☒):

Bill Rock /cc
Signature of Commission Representative

April 20, 2012
Date

Bill Rock
Print Name of Commission Representative

Chairman, Stratford Water-front Harbor Management
Title

TOWN OF STRATFORD
offering more from forest to shore

Waterfront & Harbor Management
2725 Main Street, Stratford CT 06615
www.townofstratford.com

April 19, 2012

Mr. Ed O'Donnell
Chief, Navigation Section
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, Massachusetts 01742

Subject: Maintenance dredging of the Housatonic River federal navigation channel

Dear Mr. O'Donnell:

The Stratford Waterfront and Harbor Management Commission (WHMC) has reviewed the plans prepared by the U.S. Army Corps of Engineers (USACE) for maintenance dredging of the Housatonic River federal navigation channel (the channel). Completion of those plans, prepared in consultation with and at the request of the WHMC, represents an important milestone in what has been a multi-year planning process to maintain the channel.

Maintenance of the channel has become an increasingly important matter. The channel, which has not been dredged since 1976, is subject to ongoing shoaling as determined by surveys conducted by the Corps. The most recent survey, in 2011, shows that navigable depths in several sections of the channel have been significantly reduced over time, restricting the passage of vessels during a major part of the tide cycle.

As the principal municipal agency with responsibility for pursuing maintenance dredging of the channel, the WHMC recognizes that the viability of many water-dependent activities and businesses in the Town of Stratford depends on continued ease and safety of navigation in the channel. For a number of years the WHMC has been working cooperatively with the USACE to accomplish the needed maintenance dredging in the most economical and environmentally sound manner, with the understanding that the regulatory and funding process for dredging projects involves a number of agencies and is inherently complex and uncertain.

In 2010, following a request by the WHMC, the USACE obtained funds from the USACE's Low Use Navigation Pilot Project to support planning for maintenance dredging of the channel. Funds available through this program can be used by the USACE to evaluate non-traditional ways of achieving maintenance of relatively low-use harbors and waterways served by federal navigation projects. The proposed maintenance dredging plans were then developed through a cooperative process involving the USACE, WHMC, the Office of Long Island Sound Programs (OLISP) of the Connecticut Department of Energy and Environmental Protection (DEEP),

Connecticut Department of Transportation, and the Connecticut Department of Agriculture's Bureau of Aquaculture. (DA/BA).

As now planned, maintenance dredging of specific sections of the channel downstream of the Route 1 bridge would be conducted during the next dredging season which begins on or about October 1, 2012 and will extend into 2013. The proposed maintenance dredging project would be conducted utilizing a USACE hopper dredge, and the dredged material would be placed in a delineated nearshore area of Long Island Sound off the Stratford shoreline in the vicinity of Point No Point. The equipment to be used is specially designed for dredging relatively small volumes of sandy material and therefore is well suited for the planned project which will focus on the most significant areas of shoaling in the Housatonic River channel. Those areas will be restored to depths needed for safe navigation by vessels currently using the channel.

The material to be dredged has undergone rigorous testing by both the USACE and DEEP. It has been determined by the USACE, U.S. Environmental Protection Agency, and DEEP that this material consists of sand suitable for beach nourishment and placement in coastal waters without causing any significant adverse impacts on the natural environment. The nearshore dredged material placement site was identified following surveys and scientific analyses conducted by the USACE to ensure that the dredged material, when placed in this site, will not adversely affect shellfish resources or other marine life in any significant way. The DA/BA, acting as the state agency responsible for managing shellfish resources, participated in the planning to identify the proposed dredged material placement site and supports its use for the intended purpose.

Once it has been approved by the DEEP, the proposed dredged material placement site will be available for use during future maintenance dredging operations in the navigation channel, thereby facilitating future dredging operations.

In March of this year, Stratford Mayor John A. Harkins and the WHMC requested assistance from the Connecticut Department of Transportation for the purpose of obtaining an authorization of dredging funds from the State Bond Commission in the amount of $750,000.00. That amount, if authorized, would be transferred to the USACE and used to conduct the proposed maintenance dredging project. It is estimated by the USACE that the amount requested will cover the cost of dredging approximately 50,000 cubic yards of sediment to restore identified sections of the channel to a depth of approximately 12 feet at Mean Lower Low Water (MLLW).

Areas to be dredged and the proposed nearshore dredged material placement site are shown on plans prepared by the USACE and provided to the WHMC for final review prior to submittal of those plans to the DEEP OLISP by the USACE. State approval of the plans by the DEEP OLISP is needed before the proposed work may proceed. The USACE will seek state approval to dredge up to 100,000 cubic yards of sediment in order to allow for continued maintenance dredging to a channel depth of approximately 14 feet MLLW at such time as additional funds may be obtained.

During its meeting on February 8, 2012, the WHMC considered the dredging plans and approved a motion to support implementation of those plans. The WHMC has determined that the proposed plans are consistent with the Stratford Harbor Management Plan adopted by the Town

Council and approved by the State of Connecticut. In addition, the WHMC finds that implementation of the proposed plans will serve to advance the provisions of the Harbor Management Plan that call for carefully planned maintenance dredging to provide for the continued viability of boating facilities, safe and efficient navigation, and minimal disruption of natural systems and values.

In conclusion, the WHMC is greatly appreciative of the USACE's dedicated efforts, on behalf of the Town of Stratford and other Housatonic River towns, to plan and carry out an economically feasible and environmentally sound maintenance dredging project that will help ensure continued safe and beneficial use of the channel. The WHMC remains committed to working cooperatively with you and to providing additional assistance to the USACE as necessary to implement the dredging plans.

If you require any additional information please contact me (203) 377-6537 or brock@snet.net.

Sincerely,

Bill Rock

Bill Rock. Chairman

Enclosure

cc:
Honorable John A. Harkins, Mayor of Stratford
U.S. Congresswoman Rosa DeLauro
Ms. Kristen Bellantuono, Office of Long Island Sound Programs
Ms.Valerie Cappola, Environmental Section, U.S. Army Corps of Engineers
Mr. Jack Karalius, Project Manager, U.S. Army Corps of Engineers
Commissioner James P. Redeker, Connecticut Department of Transportation
Mr. Joe Salvatore, Dredging Coordinator, Connecticut Department of Transportation
Mr. Brian Thompson, Director, Office of Long Island Sound Programs
Mr. George Wisker, Office of Long Island Sound Programs

Connecticut Department of
Energy & Environmental Protection

Applicant Compliance Information

DEEP ONLY
App. No. _____
Co./Ind. No. _____

Applicant Name: US Army Corps of Engineers

Mailing Address: **696 Virginia Rd**

City/Town: **Concord** State: **MA** Zip Code: **01742**

Business Phone: **978-318-8288** ext.: Fax: **978-318-8891**

Contact Person: **Jack Karalius** Phone: ext.

*E-mail: **jack.karalius@usace.army.mil**

If you answer *yes* to any of the questions below, you must complete the Table of Enforcement Actions on the reverse side of this sheet as directed in the instructions for your permit application.

A. During the five years immediately preceding submission of this application, has the applicant been convicted in any jurisdiction of a criminal violation of any environmental law?

☐ Yes ☒ No

B. During the five years immediately preceding submission of this application, has a civil penalty been imposed upon the applicant in any state, including Connecticut, or federal judicial proceeding for any violation of an environmental law?

☐ Yes ☒ No

C. During the five years immediately preceding submission of this application, has a civil penalty exceeding five thousand dollars been imposed on the applicant in any state, including Connecticut, or federal administrative proceeding for any violation of an environmental law?

☐ Yes ☒ No

D. During the five years immediately preceding submission of this application, has any state, including Connecticut, or federal court issued any order or entered any judgement to the applicant concerning a violation of any environmental law?

☐ Yes ☒ No

E. During the five years immediately preceding submission of this application, has any state, including Connecticut, or federal administrative agency issued any order to the applicant concerning a violation of any environmental law?

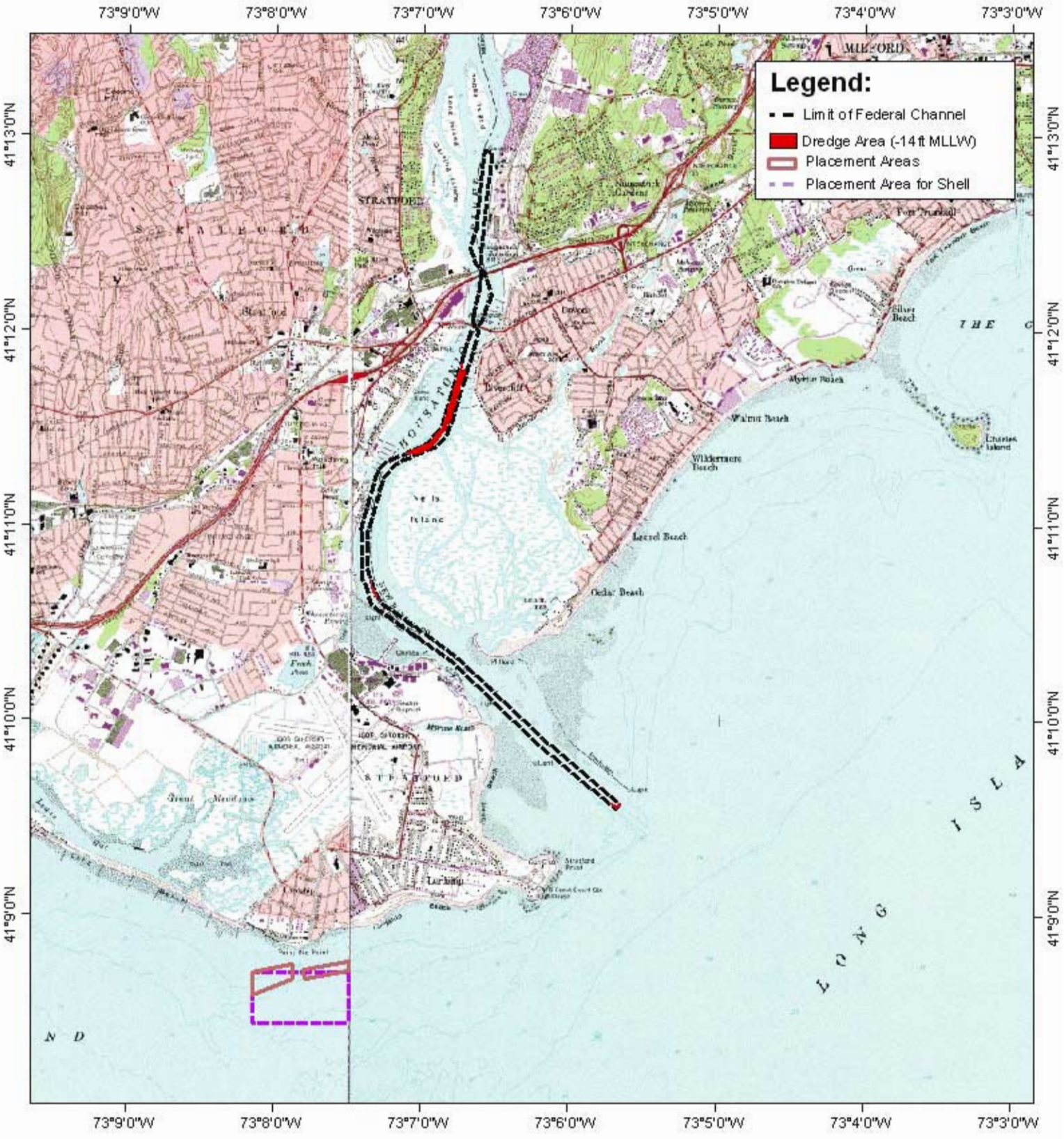
☐ Yes ☒ No

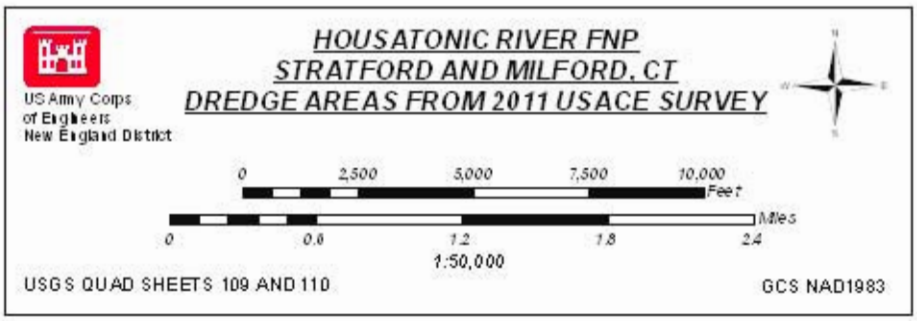
Table of Enforcement Actions

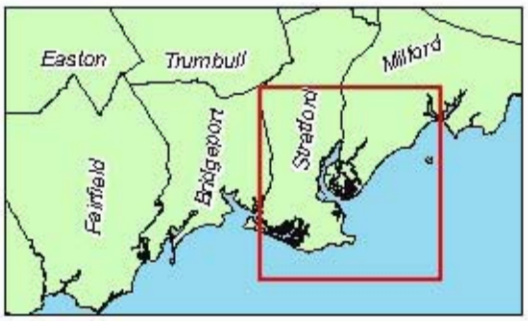
(1) Type of Action	(2a) Date Commenced	(2b) Date Terminated	(3) Jurisdiction	(4) Case/Docket/ Order No.	(5) Description of Violation

☐ Check the box if additional sheets are attached. Copies of this form may be duplicated for additional space.

Attachment Ia



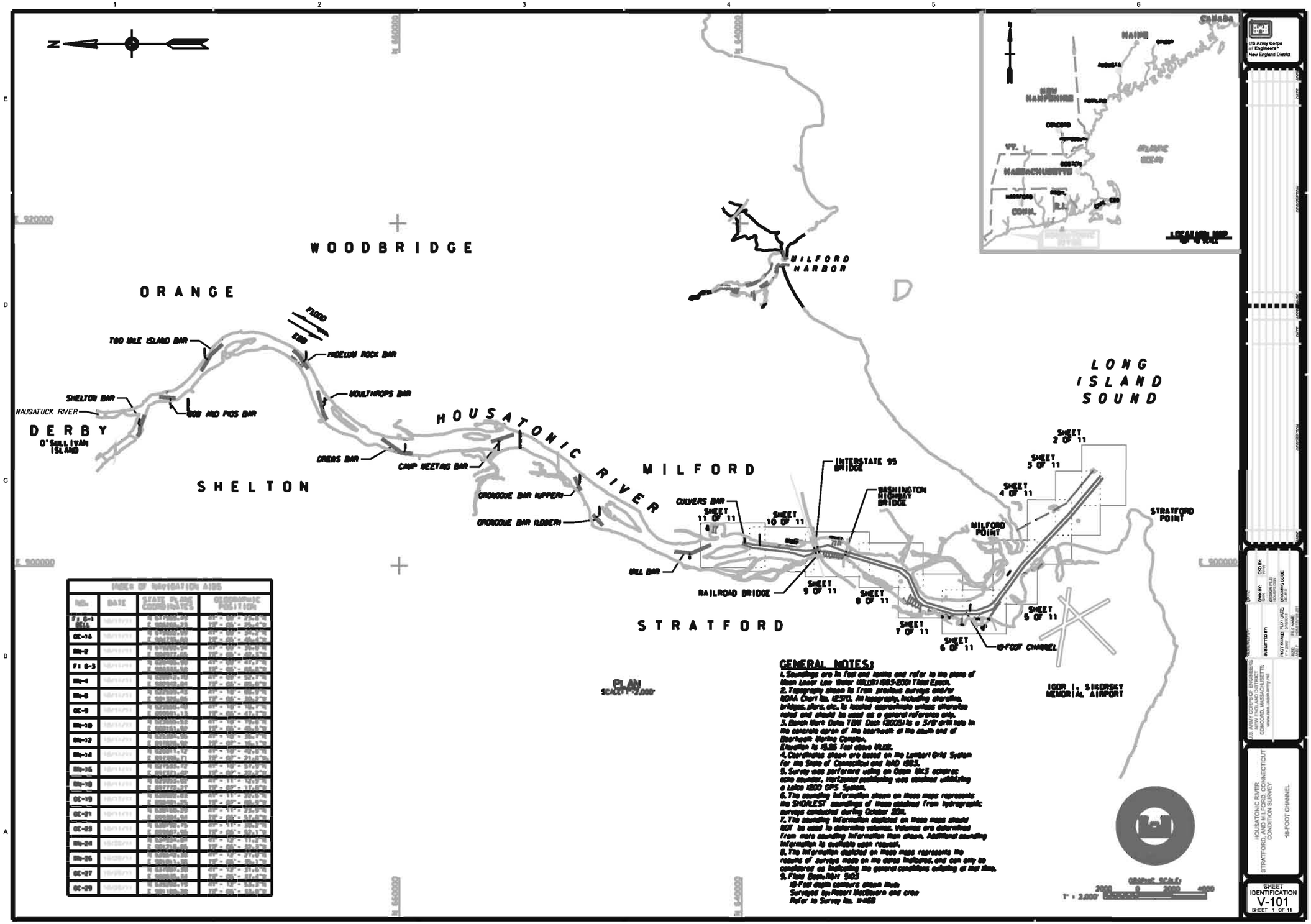




Attachment Ia

Housatonic River: Coordinates for nearshore placement sites off of Point No Point, CT

Corner	Latitude	Longitude
NW	41.14509536060	-73.13564293610
SW	41.14314904180	-73.13563144550
SE	41.14452594380	-73.13113577400
NE	41.14576247840	-73.13112351590
NW	41.14531503120	-73.12980482850
SW	41.14447685090	-73.12967388890
SE	41.14527457970	-73.12473667850
NE	41.14598306110	-73.12478222750



INDEX OF NAVIGATION AIDS

No.	DATE	STATE PLANE COORDINATES	GEOGRAPHIC POSITION
Fl G-1 BELL			
GC-1A			
Mp-2			
Fl G-3			
Mp-4			
Mp-6			
GC-8			
Mp-10			
Mp-12			
Mp-14			
Mp-16			
Mp-18			
GC-19			
GC-21			
GC-23			
Mp-24			
Mp-26			
GC-27			
GC-29			

PLAN
SCALE 1"=2,000'

GENERAL NOTES:

1. Soundings are in feet and tenths and refer to the plane of Mean Lower Low Water (MLLW) 1983-2001 Tidal Epoch.
2. Topography shown is from previous surveys and/or NOAA Chart No. 12370. All topography, including obstacles, bridges, piers, etc., is located approximate unless otherwise noted and should be used as a general reference only.
3. Bench Mark Data: TBM Disk (2005) is a 3/8 drill hole in the concrete apron of the boathouse at the south end of Stratford Marina Complex.
Elevation is 15.55 Feet above MLLW.
4. Coordinates shown are based on the Lambert Grid System for the State of Connecticut and NAD 1983.
5. Survey was performed using an Odom DF3 echotrac echo sounder. Horizontal positioning was obtained utilizing a Leica 1200 GPS System.
6. The sounding information shown on these maps represents the SHOALEST soundings of those obtained from hydrographic surveys conducted during October 2014.
7. The sounding information depicted on these maps should NOT be used to determine volumes. Volumes are determined from more sounding information than shown. Additional sounding information is available upon request.
8. The information depicted on these maps represents the results of surveys made on the dates indicated, and can only be considered as indicating the general conditions existing at that time.
9. Fixed Bank/Rock (BR)
18-Foot depth contours shown thus
Surveyed by: Robert MacSwain and crew
Refer to Survey No. H-468

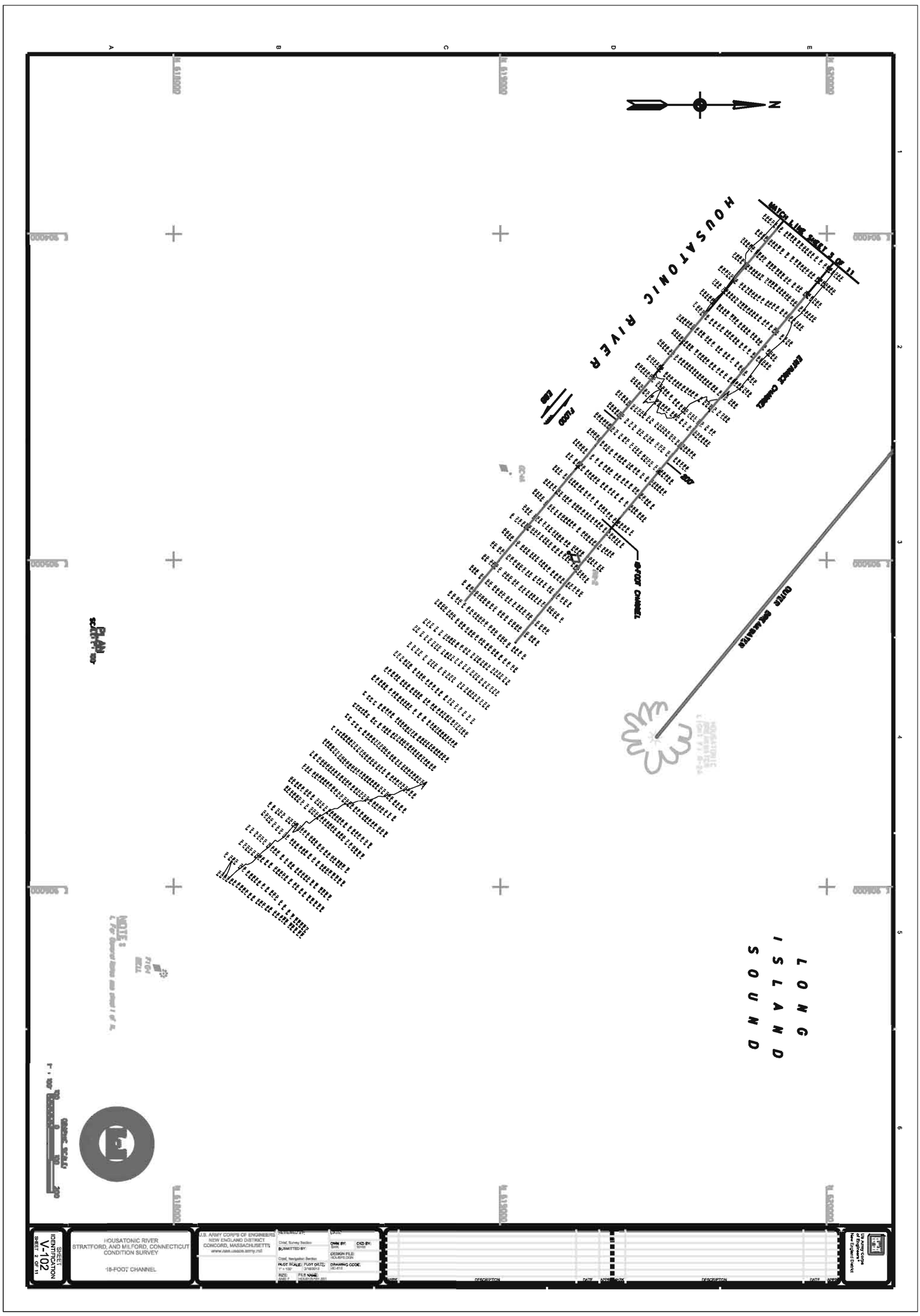
IGOR I. SIKORSKY MEMORIAL AIRPORT

GRAPHIC SCALE
1" = 2,000'
2000 0 2000 4000

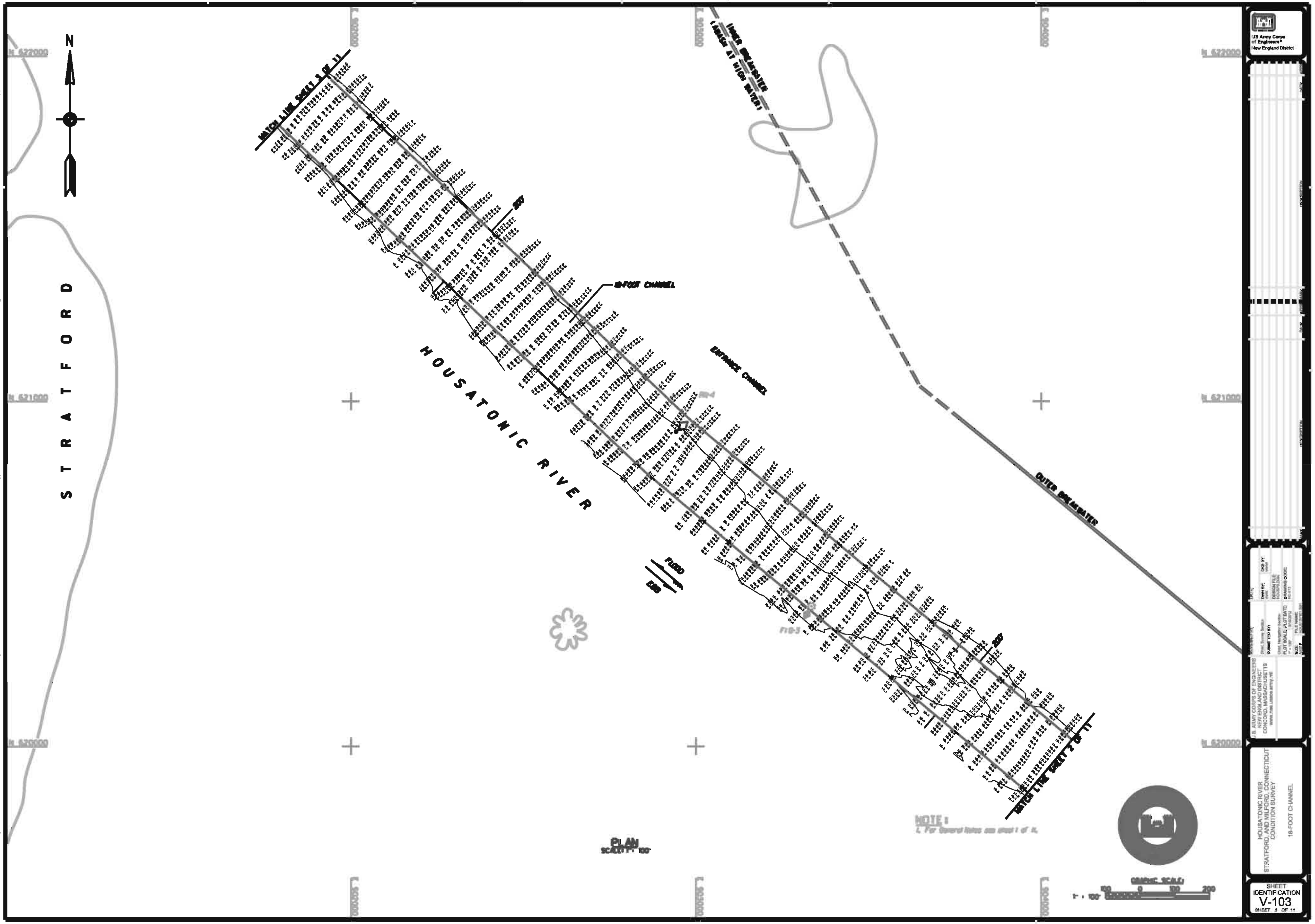
HOUSATONIC RIVER
FEDERALLY MAINTAINED CHANNELS
STRATFORD TO MILFORD, CONNECTICUT
CONDITION SURVEY
18-FOOT CHANNEL

SHEET IDENTIFICATION
V-101
SHEET 1 OF 11

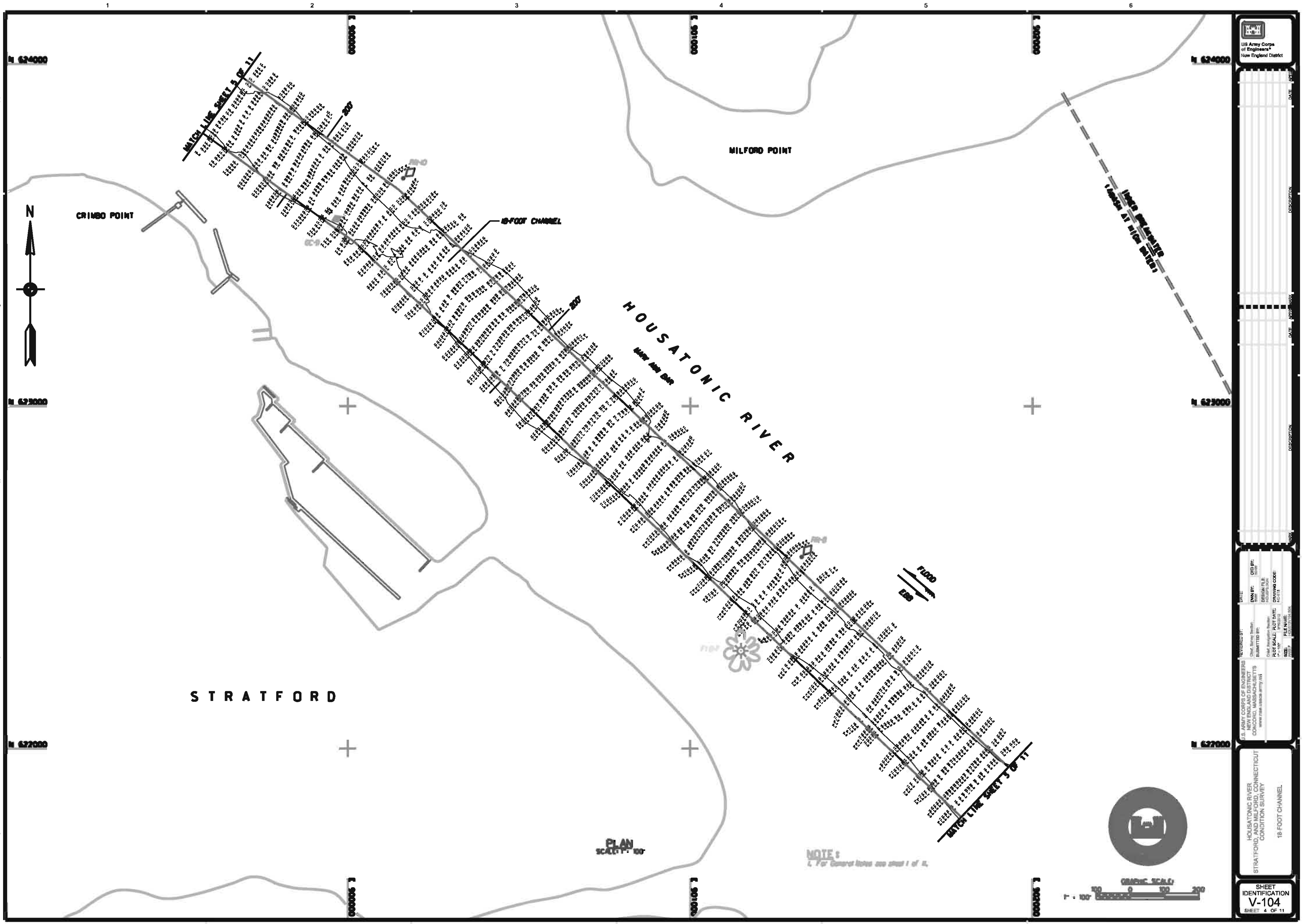
Attachment Ic: USACE Housatonic River FNP



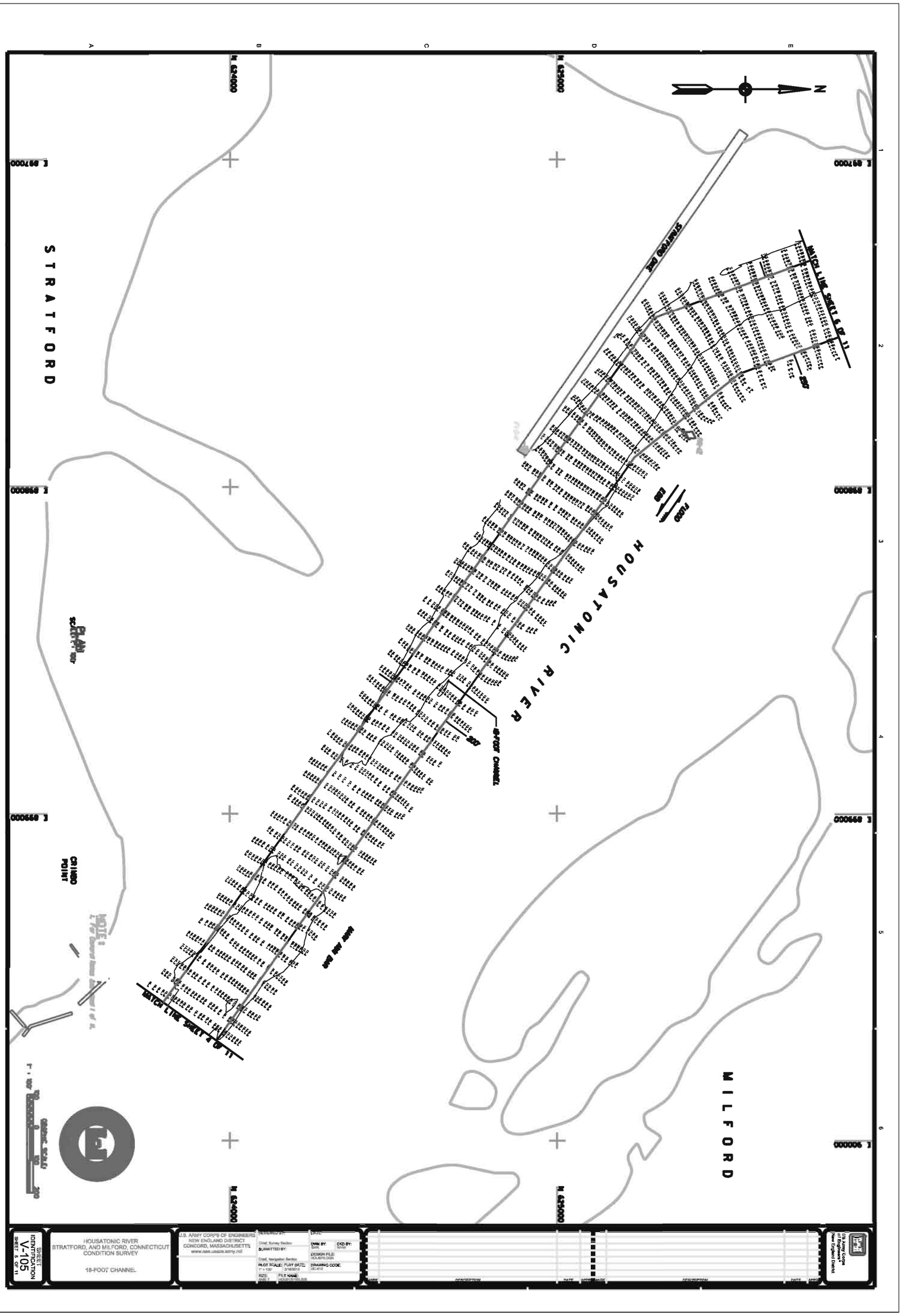
Attachment Ic: USACE Housatonic River FNP



Attachment Ic: USACE Housatonic River FNP



Attachment Ic: USACE Housatonic River FNP



1 2 3 4 5 6

E D C B A

N

MILFORD

MELLS ISLAND

E 998000

HOUSATONIC RIVER

FLOOD

EBB

18-FOOT CHANNEL

BRIDGE

MILFORD MELLS ISLAND

N 629000 N 630000 N 631000 N 632000

BROWN'S BOAT WORKS

E 997000

MARINA

STRATFORD

MARINA

HARBOR WOODS CLUB

SEWER TREATMENT PLANT

NOTE:
1. For General Notes see sheet 1 of 11.

PLAN
SCALE 1" = 100'

GRAPHIC SCALE
1" = 100'
100 0 100 200

N 629000 N 630000 N 631000

U.S. Army Corps of Engineers®
New England District

DATE:
DSN #:
CSD #:
DESIGN FILE:
DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
APPROVED BY:
SCALE: 1"=100'
DATE:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
DESIGN BRANCH, PROJECTS
www.nae.usace.army.mil

HOUSATONIC RIVER
STRATFORD AND MILFORD, CONNECTICUT
CONDITION SURVEY

18-FOOT CHANNEL

SHEET IDENTIFICATION
V-106
SHEET 6 OF 11

MILFORD

HOUSATONIC RIVER

MELLS ISLAND

STRATFORD

NUMEROUS PRIVATE FLOATS ALONG SHORELINE. NOT SHOWN

PODATUCK YACHT CLUB

HOUSATONIC MARINA

PAUL'S DIESEL SERVICE, INC.

BREWERS STRATFORD MARINA

BROAN'S BOAT WORKS

18-FOOT CHANNEL

MATCH LINE SHEET 6 OF 11

MATCH LINE SHEET 8 OF 11

PLAN

NOTE:

1. For General Notes see sheet 1 of 11.

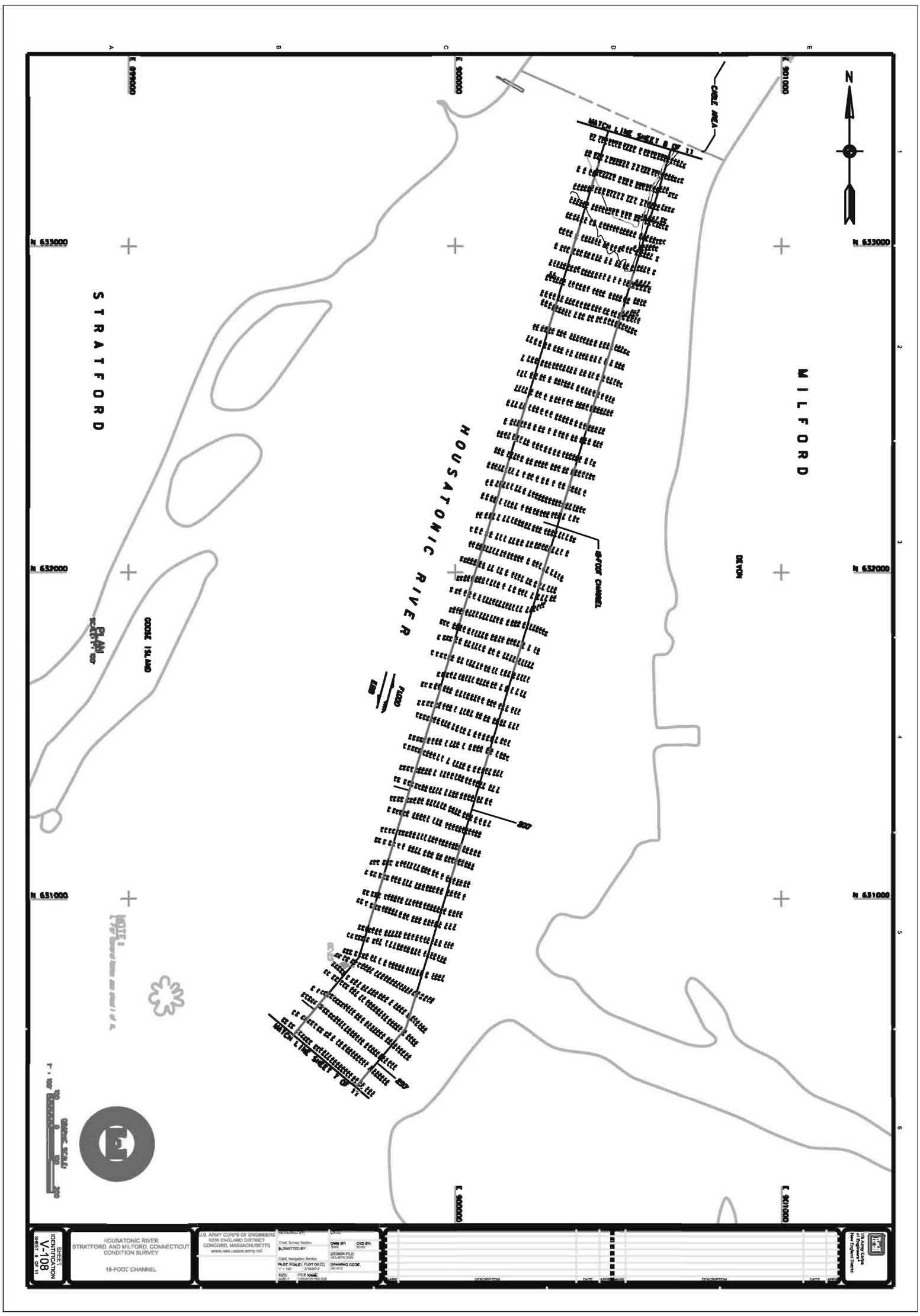
U.S. Army Corps of Engineers
New England District

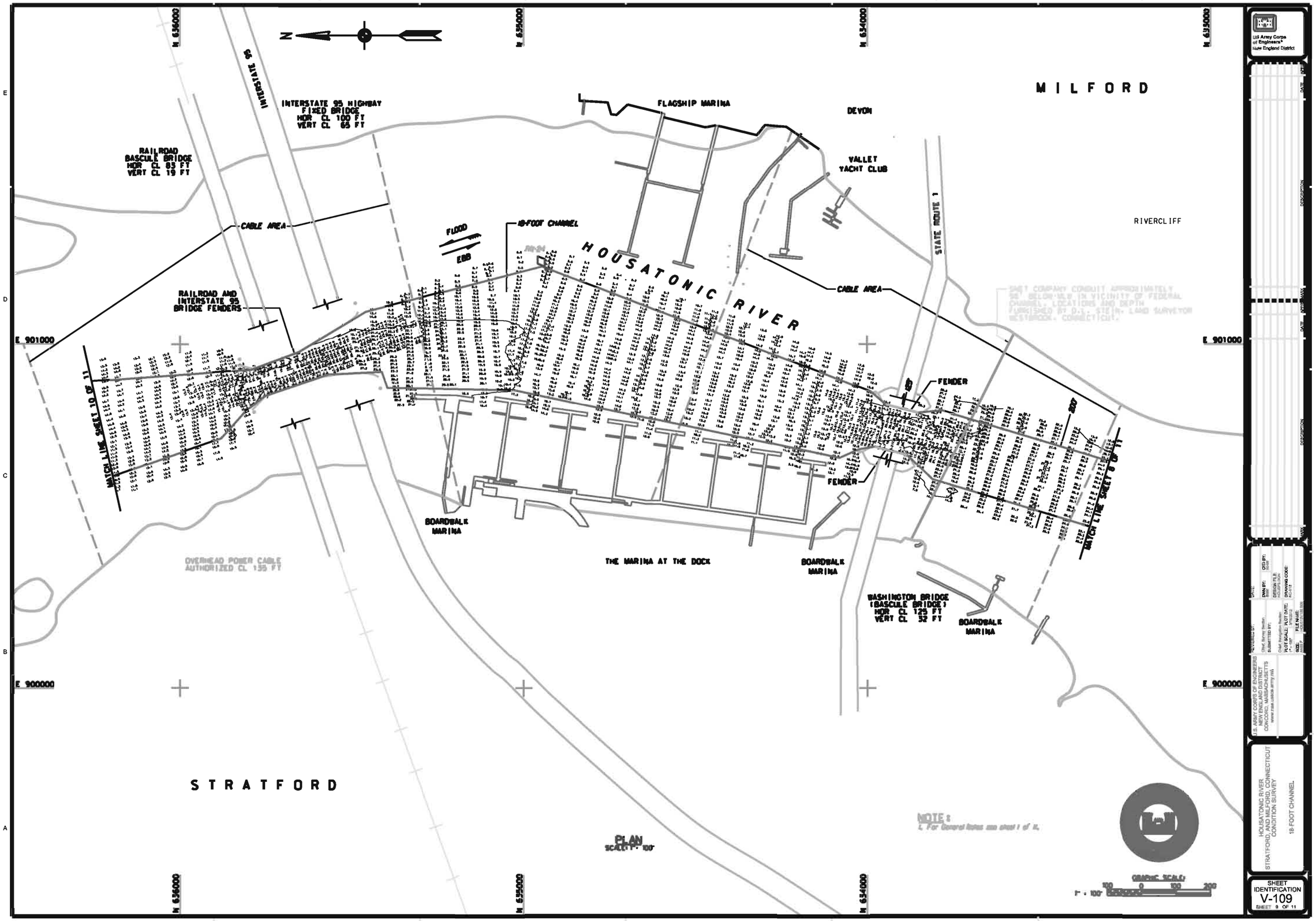
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS
www.nae.usace.army.mil

HOUSATONIC RIVER
STRATFORD AND MILFORD, CONNECTICUT
CONDITION SURVEY
18-FOOT CHANNEL

SHEET IDENTIFICATION
V-107
SHEET 7 OF 11

Attachment Ic: USACE Housatonic River FNP





MILFORD

DEVON

POWER PLANT

CABLE AREA

HOUSATONIC RIVER

LONG ISLAND

CARTING ISLAND

PEACOCK ISLAND

STRATFORD

18-FOOT CHANNEL

FLOOD

EBB

PLAN

N. 639000

N. 638000

N. 637000

E. 902000

E. 901000

E. 900000

US Army Corps of Engineers
New England District

HOUSATONIC RIVER
NAVIGATION PROJECTS, CONNECTICUT
STRATFORD TO MILFORD HARBOR
CONDITION SURVEY

18-FOOT CHANNEL

SHEET IDENTIFICATION
V-110
SHEET 10 OF 11

1 2 3 4 5 6

E D C B A

N 642000 N 641000 N 640000 N 639000

E 902000 E 901000 E 900000

N

CASBELL COVE MARINA

CASBELL COVE

SEWER TREATMENT PLANT

MILFORD

HOUSATONIC RIVER

FLOOD

EBB

7-FOOT MILL BAR

7-FOOT CHIVERS BAR

MATCH LINE SHEET 11 OF 11

18-FOOT CHANNEL

STRATFORD

POPES ISLAND

LONG ISLAND

PLAN
SCALE: 1" = 100'

NOTE:
1. For General Notes see sheet 1 of 11.

GRAPHIC SCALE
1" = 100'
100 0 100 200

US Army Corps of Engineers
New England District

APP'D
DATE
DESCRIPTION
DATE
MARK
DESCRIPTION
MARK

DRN BY:
CHD BY:
DESIGN FILE:
DRAWING CODE:
PLOT SCALE:
PLOT DATE:
SIZE:
FILE NAME:

Submitted by:
Chief, Survey Section
Approved by:

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS
www.nae.usace.army.mil

HOUSATONIC RIVER
STRATFORD, AND MILFORD, CONNECTICUT
CONDITION SURVEY
18-FOOT CHANNEL

SHEET IDENTIFICATION
V-111
SHEET 11 OF 11

U.S. ARMY ENGINEER DISTRICT
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

April 19, 2012

APPROVED BY:

DATE BY:

HOUSATONIC RIVER
STRATFORD AND MILFORD, CONNECTICUT
CROSS SECTION OF CHANNEL LIMIT

CROSS SECTION AT STA. 177+50

Sheet No. 2 of 2 Sheets

SCALE:
HOR. 1" = 100'
VERT. 1" = 20'

M1 – Environmental Assessment for Maintenance Dredging of the Housatonic River Federal Navigation Project

On CD or separate Folder

M2 – Coordination with State Agencies for WQC

Attachment M2- USACE Coordination for WQC

From: Wisker, George
To: Cappola, Valerie A NAE
Subject: FW: Housatonic FNP dredge project
Date: Thursday, May 10, 2012 8:11:49 AM

Here is the other comment mark sent; as of this AM nothing yet from Dave Carey

George

From: Johnson, Mark
Sent: Friday, May 04, 2012 10:01 AM
To: Wisker, George; Bellantuono, Kristen
Subject: Housatonic FNP dredge project

George and Kristen-

When I reviewed the proposed placement site off Point no Point I gave some thought to whether it was an important recreational fishing area and concluded it was not. I talked with two people yesterday to re-assure myself of that. The first person is an avid fisherman who has been fishing the Housatonic and local area in Long Island Sound for many years. He said the area off Point No Point is occasionally fished by people in small boats but it is not what one would call a popular or destination fishing spot. He suggested I talk with the owner of Stratford Bait and Tackle, whom is in tune with local fishing patterns. The tackle shop owner told me basically the same thing, and after explaining the project he didn't expect the placement of material in the site to be a problem either for fish habitat or anglers. So, it appears that the project should not affect recreational angling in a significant way.

Nonetheless, as we discussed yesterday George, I do support your suggestion to the Corps that an informational meeting be held in coordination with the town of Stratford. That would help get the project information out to the broader angling and non-angling community. I think it likely that there will be no significant objections once people understand the project. Also, getting the word out about the project would help prevent any problems when the project is actually underway. (Assuming the work is prohibited during the anadromous fish migration and shellfish spawning periods, then the work would occur sometime during the period October 1 to March 31, and it is possible that someone could be fishing out off the point in October or even November.)

Mark

Attachment M2- USACE Coordination for WQC

From: Wisker, George
To: Cappola, Valerie A NAE
Subject: FW: Housatonic dredge material placement
Date: Thursday, May 10, 2012 8:10:35 AM

Val,
Here is the first of Mark Johnson's comments; other to follow

-----Original Message-----
From: Johnson, Mark
Sent: Wednesday, May 02, 2012 3:02 PM
To: Wisker, George; Bellantuono, Kristen
Cc: Carey, Dav
Subject: RE: Housatonic dredge material placement

George and Kristen-

After reviewing the information provided by Valerie (i.e. benthic grabs, sediment samples and side scan), I do not anticipate any adverse long-term effects to fish habitat if the dredged material is placed within the site boundary under discussion (defined by the purple box). The benthic habitat in this area, which measures 1,600 ft x 3,000 ft, appears to be relatively similar throughout. The substrate is primarily sand with shell fragments. Aggregations of slipper shells and scattered clumps of green and red macroalgae were observed. Benthic macroinvertebrates, as characterized by six samples taken with a benthic grab, were low in abundance and diversity. Of most interest was the presence of surf clams, which were observed in five of the six samples and so appear to be distributed throughout the area. Short-term impacts will result from burial of this habitat and organisms, but the material being deposited is similar to what is there now - sand and shell - and so as the sand is spread by wave action I expect recovery to conditions similar to what currently exists.

My only suggestion is that the actual disposal boundary be drawn some distance inward from the perimeter of the site (distance to be discussed). I suggest this because we do not have habitat characterizations outside the site boundary. I think it is likely that for some distance outside the site the bottom type is similar to that within the site, but nonetheless, with a buffer between the disposal locations and the current site boundary, whatever direction the sand ultimately moves we can still be reasonably assured it will have minimal effect if there are different habitats of interest just outside the site boundary.

Mark

-----Original Message-----
From: Wisker, George
Sent: Wednesday, May 02, 2012 9:15 AM
To: 'Cappola, Valerie A NAE'; Bellantuono, Kristen
Cc: Karalius, Jack NAE; Thompson, Brian; Carey, Dav; Johnson, Mark; Salvatore, Joseph R.
Subject: RE: (UNCLASSIFIED)

Hi Val,
Sorry for the delay in responding, we have all been overwhelmed with must-do tasks.
After we reviewed your narrative, Irene's modeling report, and the submitted plan of the new proposed placement sites, several questions arose.

We understand that to be cost and time effective, the Currituck must work on all tidal stages, not just high tide, and the unanticipated increase in material to be eventually dredged from 50 to 100 thousand cubic yards necessitated the shift of the now two disposal sites slightly offshore to deeper water.

However, we have concerns about placement of dredged material containing shell over the much larger area originally outlined during preliminary identification of disposal sites. Our concerns are twofold:

1)While the idea of placing shells in that area as cultch for oyster spat is appropriate, the Currituck's hydraulic dredging process will not selectively separate sand from shell, resulting in significant quantities of sand being discharged in the offshore area along with any shell. Since that area was not subject to the Corp's modeling efforts, we don't have any documentation of the potential sand movement, which may adversely impact shellfish and finfish habitats.

2)Placement of the sand off Pt No Point from the Housatonic dredging is ostensibly for beach nourishment purposes. The stated purpose is to keep the sand in the littoral system, if not facilitate placement to move sand to the beach. Absent additional modeling to show otherwise, we are concerned that, as you noted in your narrative, significant quantities of sand will move offshore and be precluded from, if not moving onto the beach, forming stable near shore berms that will reduce wave energy impacting the beach.

At this time, without further information, our preference is to place all of the dredged sands in the two areas outlined in red on your map and forgo placement of sand -shell mix over the larger area. If Dave Carey from Aquaculture and Mark Johnson from DEEP Fisheries would document no unacceptable impacts to shellfish beds or fisheries resources, respectively, would result from wider distribution of the sand/shell mixture, we would reconsider wider placement.

George E. Wisker
Environmental Analyst 3
CT Department of Energy and Environmental Protection
Office of Long Island Sound Programs
79 Elm St.
Hartford CT 06106-5127
(860) 424-3614 Fax (860) 424-4054
george.wisker@ct.gov

-----Original Message-----
From: Cappola, Valerie A NAE [mailto:Valerie.A.Cappola@usace.army.mil]
Sent: Monday, April 16, 2012 3:32 PM
To: Wisker, George; Bellantuono, Kristen
Cc: Karalius, Jack NAE
Subject: (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Hi George and Kristen,

The latest survey of the Housatonic River found that to dredge the river south of the Route 1 Bridge to -14 feet MLLW, there is 100,000 cy of material to remove. Current funding is only available for about 50,000 cy (will dredge to -12-13 ft). Since the Currituck can't only dispose only on the high tide as the modeling proposed, a disposal area between the - 8 and - 11 foot depth contours on the western side of the point, avoiding the modeled areas that would most likely move offshore was chosen for the berm. This area could not hold all 100,000 cy of material so another site on the eastern side of the point was included. The berms under most wind and wave condition will be stable and provide a level of protection of the shore from the wave energy. Under certain storm and wave conditions the material will move, the direction of movement will depend on the wind and waves.

See attached map, black dashed lines original proposed disposal area, red boxes placement sites to build the berms, green boxes were modeled areas.

Dave Carey wanted the shell from the river to be spread out over the larger originally proposed placement site. The shell would be dredged with sand, Dave is aware that the sand would move (most likely offshore) but the shell should be left behind creating habitat for oyster spat. The dredge captain would have to make a decision as to whether the material is mostly shell or sand and then either spread

it out over the larger disposal area or use it to build the berm. Future dredging if in the next few years would mostly likely not have the same amount of shell and would end up in the berm. The berm would be created in the western placement area first and once it is filled a berm will be built in the eastern site (red sites on map).

The question is can we make everyone happy and spread the shell with some sand in the larger area to create habitat and build a berm with the hopper loads that are mostly sand? My EA currently only considers creating the berms, I don't want to spend the time adding in the sections for spreading the shell/sand material throughout the larger placement area if it's not a possibility.

Also let me know if you need a copy of the modeling report.

Thanks,

Valerie

Valerie A. Cappola, Ph.D.
Marine Ecologist

Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8067; Fax - (978) 318-8560 valerie.a.cappola@usace.army.mil

Classification: UNCLASSIFIED
Caveats: NONE

M3 - Modeling Report

USACE. 2012. Housatonic River Nearshore Disposal

Housatonic River Nearshore Disposal

Coastal Engineering

Water Management Section

New England District, US Army Corps of Engineers

March 2012

Executive Summary

The goal of this work is to investigate the potential behavior of a nearshore berm to be constructed with sediments removed from the Housatonic River. Last dredging cycle, sediments removed from the Housatonic River located near Stratford, Connecticut, were placed in upland disposal areas which are unable to provide a source of sediment to eroded areas or otherwise reduce wave energy in the active littoral zone. The beach near Point No Point in Stratford, CT has limited sediments and is eroded as compared to adjacent beaches. Because of local and state agency interest, a coastal analysis was performed to determine if sediments placed in a nearshore berm could satisfy the following criteria: supply sediment to the starved beaches and prevent adverse impact to state-managed shellfish beds located adjacent to the site. All interested parties prefer the sandy material to be used beneficially rather than a traditional disposal method.

A total of 600,000 cubic yards (cy) of material would need to removed to restore the shipping channel its design depth of 18 ft MLLW. However, an investigation of the present channel usage led to a reduction in the necessary channel depth to only 14' MLLW. This initial dredging cycle, anticipated to be performed in the fall of 2012, will remove the shoals that are present in the channel resulting in approximately 50,000 cy to be placed in the nearshore berm. Presently, these shoals located throughout the 5 mile navigation channel pose a navigational hazard.

This coastal analysis consisted of both a review of available field data and a numerical component. Field data evaluated included bathymetry comparison, wave analysis using two local wave buoys and determination of the seaward depth of closure. Challenges of this study included unique bathymetry and highly variable fetch-limited waves. Non-linear berms were investigated due to complex shoal bathymetry. Results suggest that due to short period waves, the material would most likely not act as a feeder berm but could provide a level of protection from wave energy in the form of a stable berm. This analysis provided guidance for nearshore berm placement options to state and local interests.

Purpose

To evaluate the movement of a nearshore berm placed offshore of Point No Point, CT. Primary questions to be addressed are a) will the berm cover adjacent shellfish habitat and b) will the berm provide a source of sediment to the beach.

Preliminary Field Data Assessment

Bathymetry

Three overlapping bathymetric surveys exist which cover the placement area: a survey conducted in 2010 by NAE and two others in 2003 and 2001 both performed by NOAA. In order to establish base line observations of sediment movement over time, profiles were generated from these data. Since the overlapping extent between the surveys was very limited, only one profile was used for these observations. Figure 1 details the coverage of the different bathymetry sets in relation to the shoreline. 2006 topographic lidar coverage is provided and represented in light grey to denote shoreline location and the gap between the available nearshore data and the placement area. The wire frame used for the numerical flow grid development is also provided to denote the shoreline location

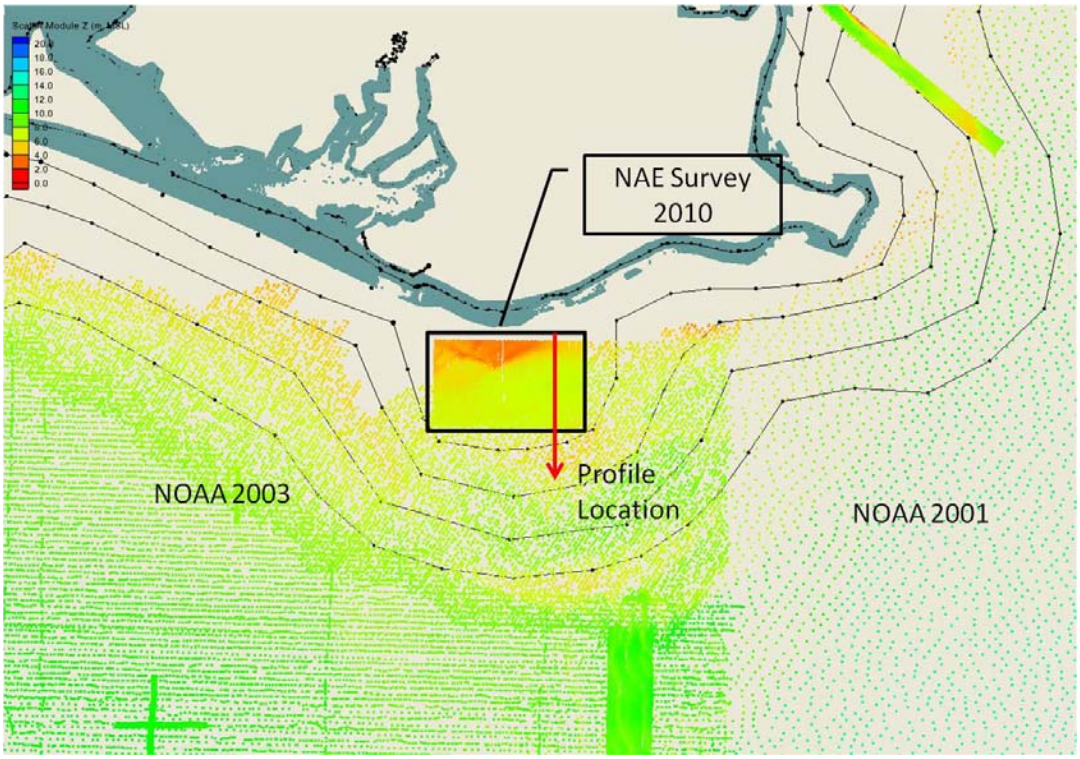


Figure 1: Bathymetry Coverages and Profile Location

Figure 2 shows the profile comparison between the three years available. Between 2003 and 2010, the profile shows little change; however, between 2001 and 2003, material appears to be removed from the profile. This simple comparison indicates sand movement occurs at depths of 5-6 meters up to a kilometer

offshore. For more information on volumes and rates of transport, more bathymetry sets within the time period of 2001 – 2010 would need to be available.

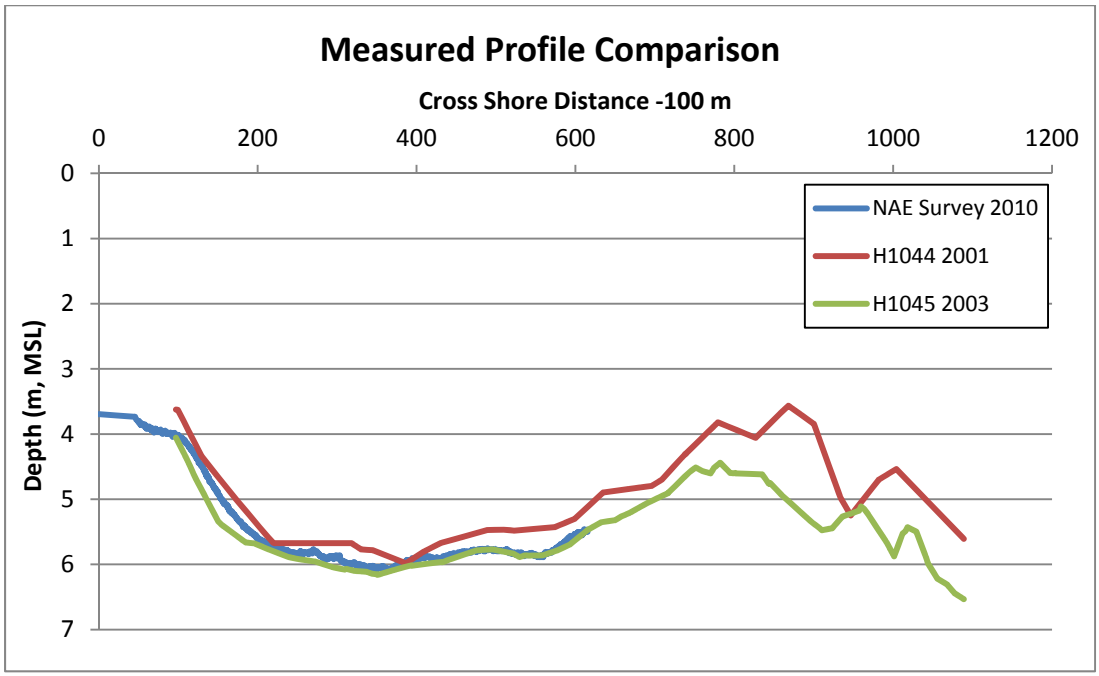


Figure 2: Measured Profiles Developed from Bathymetric Data (NAE Survey, NOAA).

Wave Analysis

The site lies roughly midway between two wave buoys, the Central Long Island Sound buoy (NDBC 44039) and Western Long Island Sound buoy (NDBC 44040). The buoys are operated by the University of Connecticut, Department of Marine Sciences and data are hosted online via NOAA National Data Buoy Center (NDBC). Both buoys have been in operation since 2004; however, the Western buoy lacked wave information for 2004 and 2005. The wave data from these devices were used to determine an effective wave height and ultimately a depth of closure. *Depth of closure* is an engineering criterion which represents an offshore bound of anticipated significant sediment transport. The following tables denote the wave statistics derived from the Central and Western Long Island Sound buoys.

Table 1. Central Long Island Sound Wave Statistics (NDBC 44039).

Year	H_{ave} (m)	T_{ave} (s)	H_{max} (m)	H_s (m)	T_s (s)
2004	0.36	3.33	1.70	0.69	3.67
2005	0.42	3.49	2.00	0.81	3.90
2006	0.56	3.81	2.00	1.03	4.47
2007	0.48	3.74	2.60	0.93	4.30
2008	0.45	3.57	2.70	0.86	4.06
2009	0.46	3.46	2.50	0.88	4.05
2010	0.50	3.52	2.40	0.92	4.17

Table 2. Western Long Island Sound Wave Statistics (NDBC 44040)

Year	H_{ave} (m)	T_{ave} (s)	H_{max} (m)	H_s (m)	T_s (s)
2004	No Data				
2005	No Data				
2006	0.23	3.29	1.30	0.46	3.30
2007	0.27	3.35	2.50	0.58	3.45
2008	0.25	3.22	1.90	0.64	3.52
2009	0.28	3.43	2.10	0.60	3.54
2010	0.27	3.16	3.20	1.09	4.75

H_{ave} and T_{ave} are the average values for wave height and period respectively over the entire wave record. H_{max} is the maximum wave height in the wave record. H_s and T_s are the values for the significant wave height and period which corresponds to the average of the highest 1/3 of the waves; this wave height is considered the design wave height. Significant wave heights range between 0.7 - 1 m on the eastern most buoy while the western station shows a slightly lower wave height range of 0.5 – 1 m. Wave periods are between 3 – 4.7 seconds which are short period waves. The combination of small wave height and short period indicates that most of the waves present in Long Island Sound are generated by winds.

Depth of Closure and Recommended Depth of Placement

Offshore berms can be constructed for one of two purposes; a feeder berm where the material is placed so that it nourishes the shoreline through cross-shore movement or a stable berm which is not designed to migrate but to reduce the wave energy so that the beach may build on its own with the existing sediment sources. A depth of closure (hc) is used to estimate the seaward limit of intense bed activity (Hallermeier 1978, 1981; Dean, 2008) and is developed from repetitive field measurements. This relationship uses an effective significant wave height (H_e) and an effective wave period (T_e) based on conditions exceeded only 12 hours per year (i.e., 0.14 percent of the time). This wave height represents an extreme case. The approximate equation for depth of closure is the following relationship (Eqn. III – 3 – 9, Dean, 2008).

$$h_c = 2.28H_e - 68.5\left(\frac{H_e^2}{gT_e^2}\right)$$

where g is acceleration due to gravity in metric units. The effective significant wave height (H_e) can be determined from the annual mean significant wave height (Hs) and the standard deviation of the significant wave height (σ_H). The effective significant wave height can be found by using the following relationship (Eqn. III – 3 – 10, Dean, 2008),

$$H_e = H_s + 5.6\sigma_H$$

Table 3. Depth of Closure Results

H_s (m)	T_s (m)	Standard Deviation	Effective Significant Wave Height (m), H_e	Depth of Closure (m), h_c	Depth of Closure (ft), h_c
0.77	3.9	0.31	2.52	4.85	14.77

This analysis indicates that the limit of the active berm is approximately 5 m therefore, for a berm that would be more likely to feed sand to the beach, the material shallower than 5 m. This depth is further supported by the measured profile comparison between three different surveys. Movement was evident in depths of 5 m; however, a significant data gap exists from the shoreline to 100 m offshore and the behavior of the shoreline overtime is not available. To increase the likelihood of the material nourishing the shoreline, the material should be placed as shallow as possible with the available equipment.

Numerical Modeling

Description of Model

The Coastal Modeling System (CMS) is an integrated two-dimensional numerical modeling system for simulating waves, current, water level, sediment transport and morphology change at coastal inlets and adjacent beaches as described by the Coastal Inlets Research Program (CIRP) (2012). Figure 3 shows the different model components, coastal processes included in the model and how the model components interact with each other. The CMS has been in developed for the past decade applied globally. The CMS has recently undergone a vigorous model verification and validation exercise (Demirbilek, 2011; Lin et al. 2011; Sanchez, et al. 2011a, 2011b). The CMS model was run using a variety of analytical, laboratory and field cases and for each examined model verification and validation. This exercise was performed for the wave, flow and sediment transport and morphology change components of CMS. CMS is supported within the Surface Water Modeling System (SMS 2010).

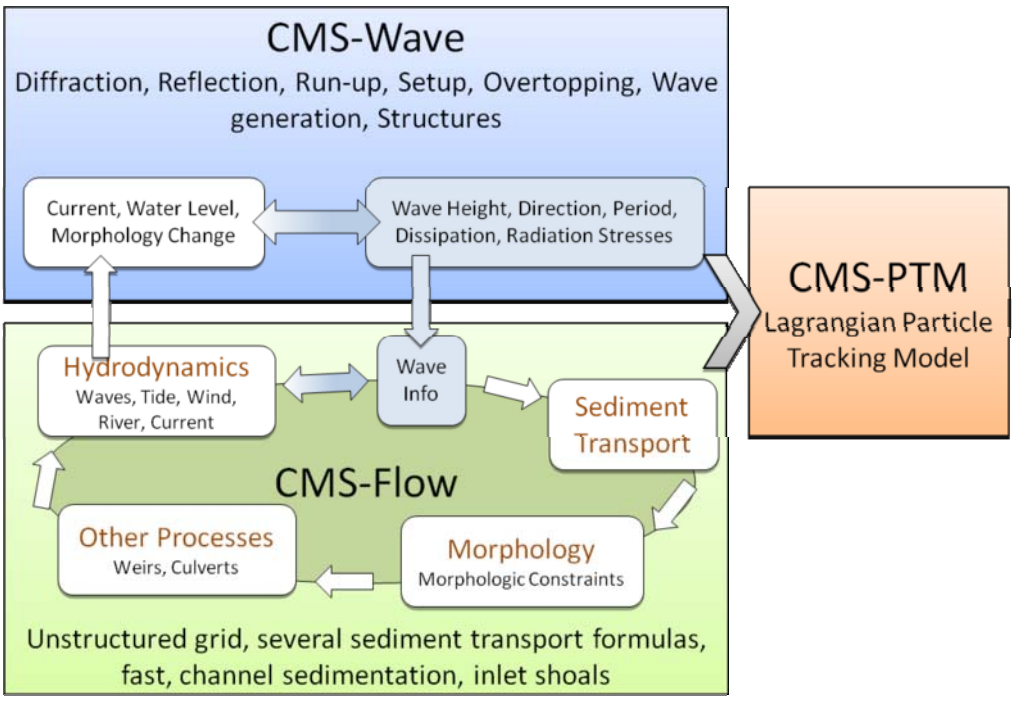


Figure 3. CMS Model Components (CIRP, 2012).

Model Set Up

The model set up approach includes generating a representative bathymetry, developing the wave and flow grids, generating input data to include wave spectra, offshore winds, and nearshore winds. The following sections detail the specifics of the model set up for the Housatonic Nearshore Placement application.

Bathymetry

Bathymetry can be considered the heart of a 2D numerical model and is used as the basis of the flow model grid. A variety of data sources were used to generate a representative bathymetry set to be used to generate the model grid. Hydrographic survey conducted in 2010 by NAE, several LIDAR (Light Detection and Ranging) datasets, National Ocean Survey (NOS) datasets and NOAA DEM Estuarine Bathymetry. The result is a singular bathymetry dataset; a regional set which covers the length of Long Island Sound and a secondary highly refined set restricted to the flow grid domain.

Available Field Data

Waves

The District maintains a directional wave buoy located offshore of Block Island, RI in cooperation with the Coastal Data Information Program (CDIP, 2012) at Scripps Institution of Oceanography at the University of California San Diego. This buoy has been in operation since September 2009 and the directional wave spectra developed from the wave data was used to drive the wave model. The data for this device is available online and updated every 30 minutes. The data generated from the buoy are co-hosted on the CDIP webpage (CDIP 154) and (NOAA) webpage as 44097. This buoy does not measure winds so these data were taken from another station.

Winds

Wind information is needed for both the wave and flow model as inputs. For the wave model, data from National Data Buoy Center (NDBC) station 44008 was used. This buoy is located farther offshore than the CDIP buoy to obtain 'clean' winds which are free from the effects of land masses. The Flow grid requires local winds as a forcing along with water levels. Thirty years of wind data was obtained for the Igor I Sikorsky Memorial Airport located in Bridgeport, CT approximately 1 mile inland from Point No Point. Data were obtained from the 14th Weather Squadron of the United States Air Force.

Sediment Characteristics

Sediment samples were collected from the Housatonic River as well as the proposed nearshore disposal site during two separate field investigations. The Housatonic field investigation was performed in 2000 while a focused field exercise was performed in October 2011 consisting of sediment grab samples, multi-beam survey and underwater video. Sediment cores were taken along a 5 mile stretch of the Housatonic River and grain size distributions developed. Sediments consisted mostly of sands with small amounts of silt and clay. The average D_{50} for all the sediment samples was 0.28 mm. This value was used as the transport grain size as well as the D_{50} dataset.

Beach grab samples were also collected in January 2012 to observe any grain size differences between the placement area and the material in the Housatonic River. The beach sediments were found to be coarser than the native sediment ranging from D_{50} = 0.82 mm to D_{50} =1.36 mm directly onshore of the proposed

placement area. It should be noted that due east of the site, finer sediments (D_{50} = 0.34 mm) existed. Grain size curves for these sediments are included in the appendices.

To combine the sediments taken from the disposal area and the beach to observe difference in grain size over bathymetry, a sediment map was constructed (Figure 4). It is hypothesized that finer sediments may have existed on the beach at one point but were transported directly offshore to form a distinctive shoal feature. Sediments taken from the shoal range between D_{50} = 0.19 mm and D_{50} = 0.23 mm which is closer to the size of sediments to be placed from the Housatonic (D_{50} = 0.28 mm).

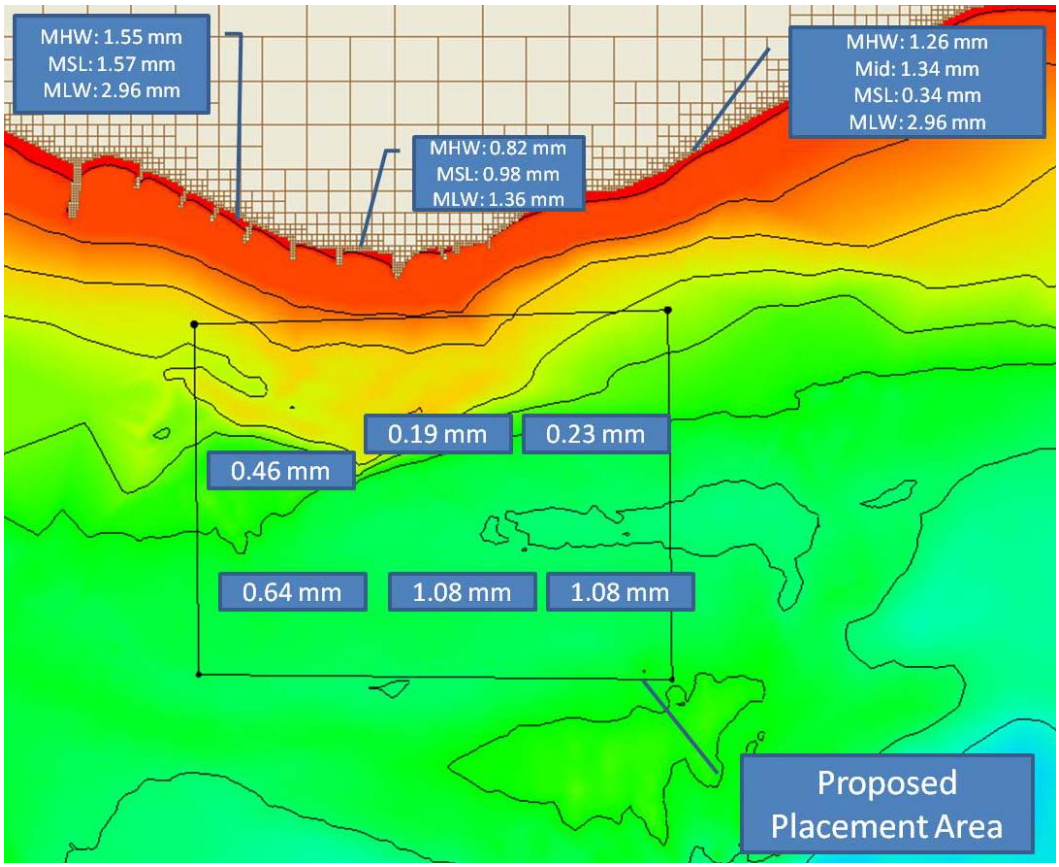


Figure 4. Grain Size map.

Grid Development

The CMS model uses variable sized rectangular cells for the grid and passes information between the Flow and Wave components. The wave and flow model grids can be different sizes to address the site's needs. The wave grid consists of over 120,000 active cells and encompasses the majority of Long Island Sound from Block Island to just beyond the study area in the western extent. The wave grid showing the bathymetry contours is shown in Figure 5. Darker blue colors indicate regions of the grid that have increased refinement t address complex bathymetry as well as provide highly refined wave information to the flow grid. The wave grid covers approximately 156 km in the alongshore direction (west to east) and 45 km in the cross shore direction (north to south).

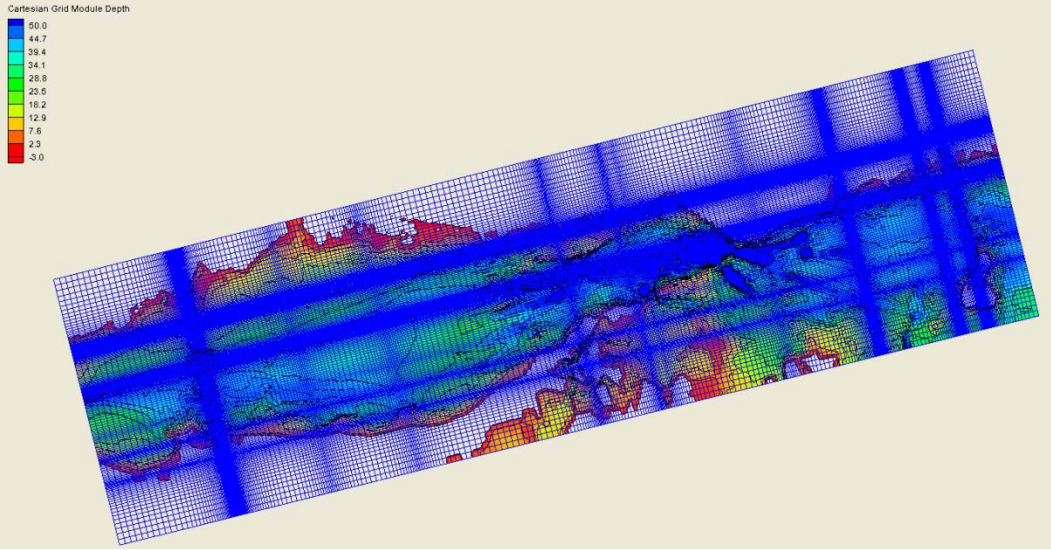


Figure 5. Wave Grid; darker blue areas indicate increase density of grid cells to increase resolution in areas of interest

The flow grid (Figure 6) uses the quadtree or telescoping grid capabilities of CMS and consists of approximately 85,000 ocean cells ranging from 5 m to 160 m cell size. A telescoping grid gives the user the ability to add refinement only to areas of interest or areas of complex bathymetry or topography. The flow grid extends approximately 7 km offshore from the project site and 11 km alongshore. This type of grid configuration increases computational efficiency which reduces run time in the flow model.

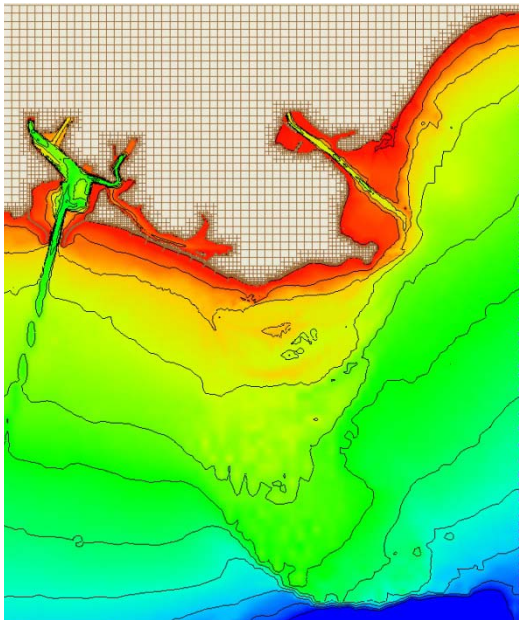


Figure 6. Flow Grid

Model Calibration

In order to gauge how well the model set up is comparing with nature, field data and calculated values are compared and goodness of fit values determined. The Bridgeport Tide gauge (NOAA 8467150) is located within the flow grid bounds and was used to demonstrate model performance. For model calibration, the model was run for 1 month and calculated values were extracted at the same location as the Bridgeport gauge. The measured and calculated values were then compared and the following statistical values determined (CIRP, 2012).

Root Mean-Squared Error:

$$RMSE(x_m, x_c) = \sqrt{\langle (x_m - x_c)^2 \rangle}$$

Relative Error:

$$Rel.Error = \sum \frac{X_m - X_c}{range} * 100$$

Where x_m = , x_c=, RMSE is… and Rel. Error is the relative percent error when comparing each measurement to the calculated value, as divided by the range in data. The following table details the goodness of fit statistics determined from the measured and calculated values for water elevation.

Table 4. Goodness of fit statistics for water elevation

Gauge	RMSE	Relative Error
Bridgeport Tide	0.44	4.81%

Observing the RMSE and Relative Error values, the model compares well with the field data. Under normal circumstances, currents, waves and morphology change would also be investigated for model performance. Field data were not available at the time of this work for comparison with the model. A visual inspection of the field data with the calculated values shows good correlation in phase but amplitude was lacking during a portion of the run (Figure 7). This is most likely due to the modeled water elevation data used to drive the flow model. A tidal database was developed using the ADvanced CIRCulation model (ADCIRC) which can be queried by location to develop water elevations for CMS model runs. The work is detailed in (Mukai et al 2002). The purpose of that work is to develop water elevations for locations in the Western North Atlantic Ocean, Gulf of Mexico and Caribbean Sea. The majority of the model refinement for this work is in open ocean locations and the coverage in Long Island Sound is of lower refinement which is most likely contributor to the amplitude difference between measured and calculated water elevation. Since the phase is correct and the relative error is below 10%, alternative runs can be performed.

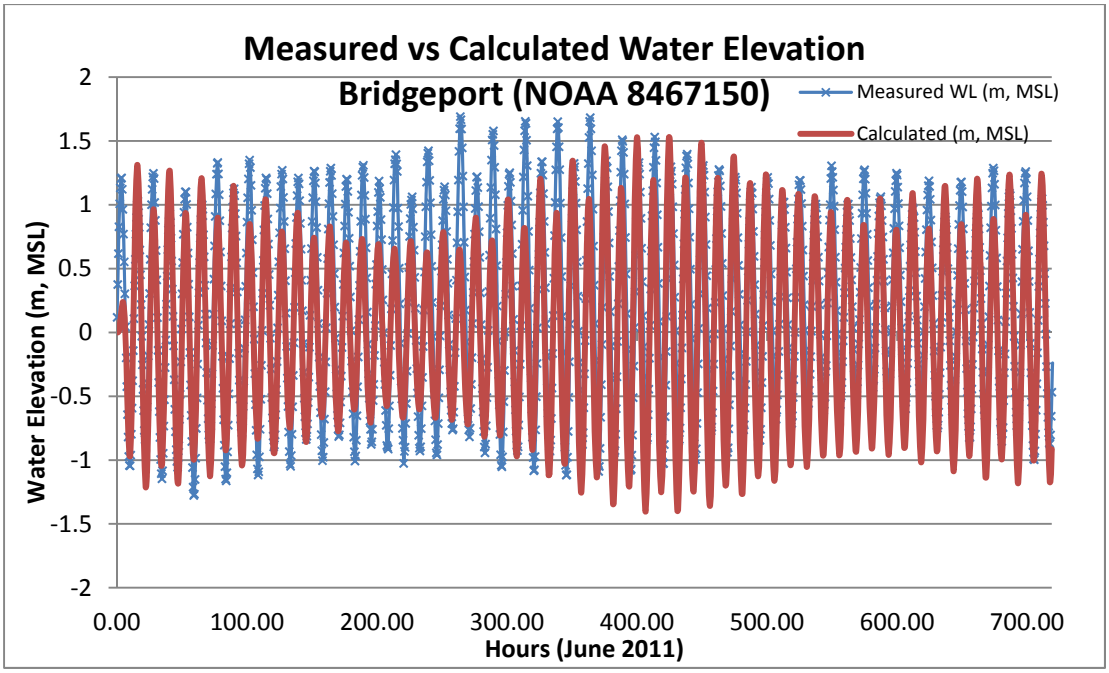


Figure 7. Comparison of measured and calculated water elevation (Bridgeport tide gauge 8467150).

Figure 7 details the measured and calculated water levels from the Bridgeport tide gauge. While the comparison in phase is good, the model is lacking amplitude in the beginning of the runtime. This is most likely due to strong weather periods during the time frame used which would not appear in calculated water level data.

Model Results

Once the model has been shown to have good comparison with field data, model alternatives can be constructed. Traditionally, berms should be constructed parallel to the shoreline following the depth contours. Because there is a shoal feature directly offshore from the site, several different approaches were investigated. A total of 5 berm alternative locations were considered; Alternatives 1 through 3 were located within the placement area whereas 4 and 5 were placed outside the area adjacent to the site. Each berm alternative was constructed for 50,000 and 100,000 cubic yards (cy) placement volumes and had similar behavior. Numerical berm construction placed material over the existing bathymetry in order to maintain the irregularities of the bathymetry and more closely match construction in reality. Figure 8 shows the locations of the berm alternatives in relation to the shoreline shown over the depth contours.

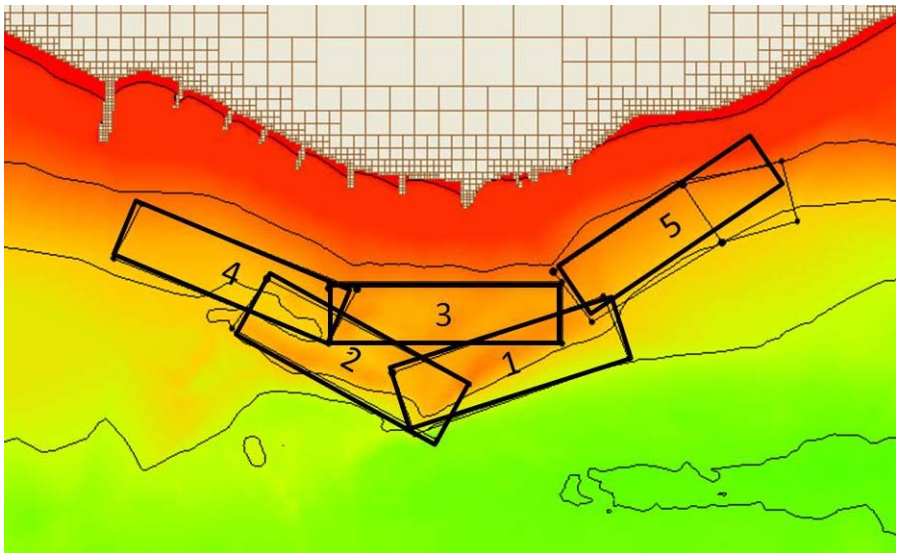


Figure 8. Berm alternative locations

Each berm alternative location and volume was run for a variety of time periods, 1 month, 3 months, 5 months and a winter month to observe how the berm evolves over time. The time period run was from summer to winter so that the earlier months could be used to smooth the bathymetry. This also was to observe the behavior of the berm during the most likely placement window in the fall to winter months. The following sections describe the virtual construction of each alternative, the location and plots of cross sections taken to observe morphologic behavior, and a comparison of the initial and final berm shape using the depth contours.

Berm Alternative 1

This alternative was located on the south eastern portion of the shoal directly offshore from the site. Berms are traditionally constructed at the same orientation as the bathymetry contour which was the motivation behind investigating this site. The material continually migrated offshore as well as alongshore to the east. Most of the movement occurred during months 1-3 but then stabilized between months 3-5. This behavior is expected both in the numerical model as well as in the field as nature will smooth the perturbation that the berm exhibits on the system. Figure 9 shows the berm initial depth contours and the locations of the cross sections. Figure 10 details the morphologic behavior of those cross sections over the time periods simulated.

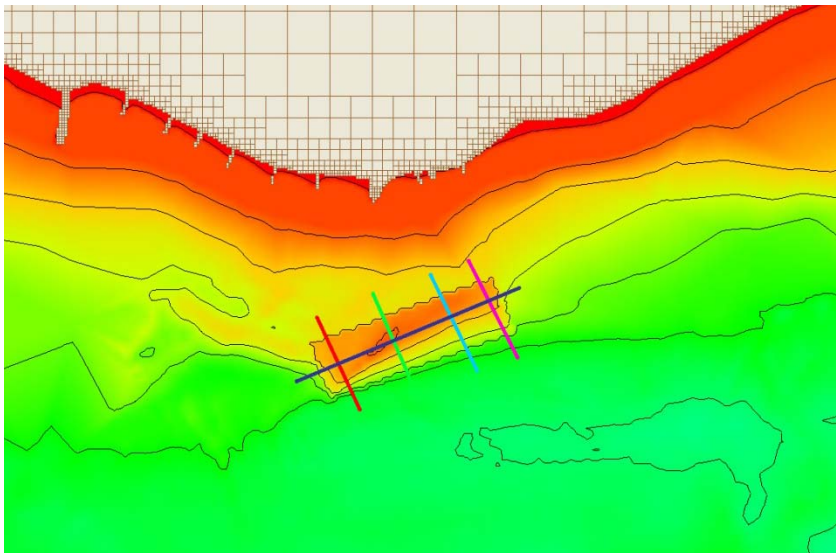


Figure 9. Berm 1: Initial depth contours and cross sections

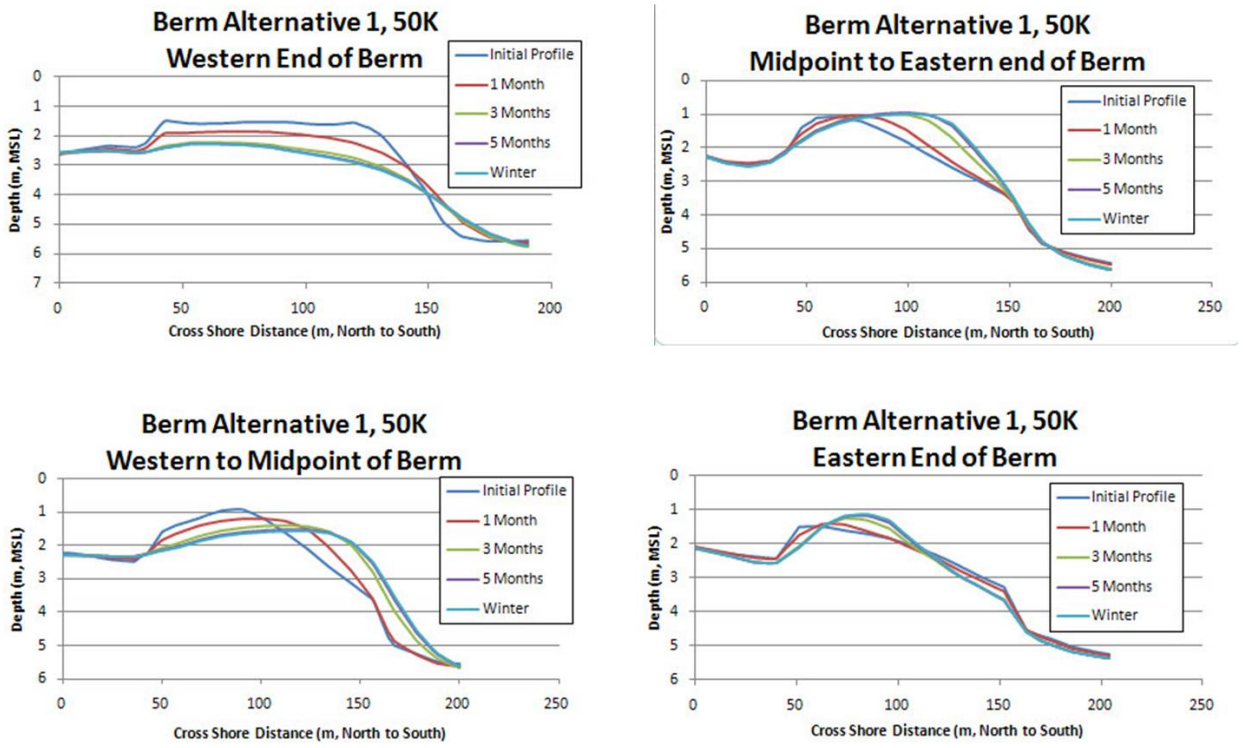


Figure 10. Berm 1 Cross shore Profiles.

As shown in Figure 10, material migrated offshore which can be observed for all time periods simulated for each cross section. More movement was observed on the western end of the berm which is most likely due to edge effects. Figure 11 shows the longitudinal arc which details the alongshore movement of material. Sediment was removed from the western end of the berm and deposited on the eastern end. This alongshore trend is also observed in the cross shore profiles where the morphologic change decreases relatively moving from west to east along the berm which was also observed in all alternatives.

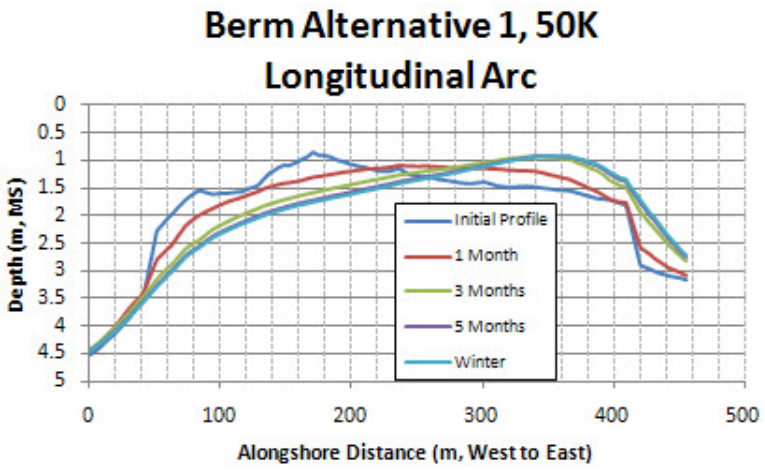


Figure 11: Berm 1 Alongshore Profile.

Figure 12 compares the initial berm and the final berm after 6 months of simulation time. The alongshore and cross shore components of sediment transport can be observed in the depth contour plots. The material adds to the shoal feature and further extends offshore and migrates to the east.

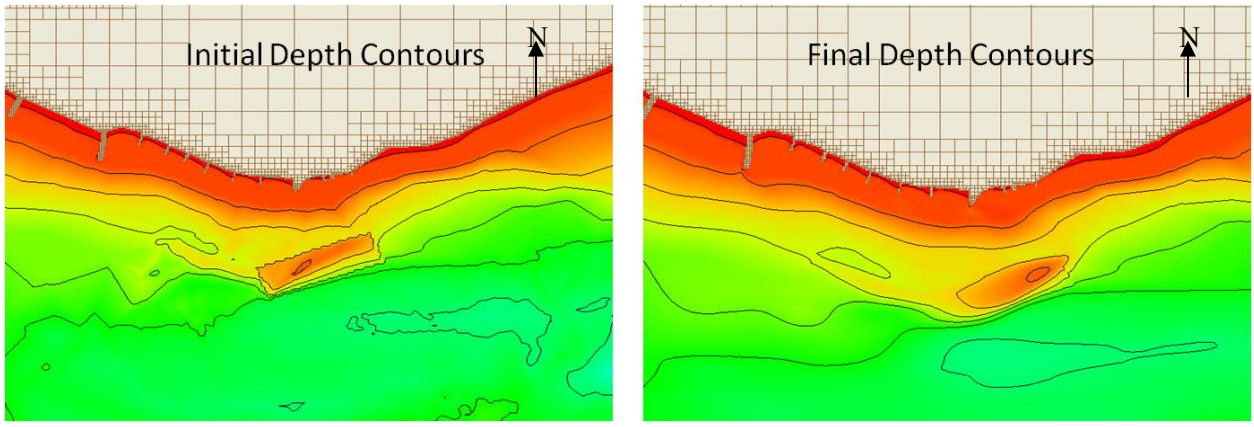


Figure 12. Berm 1 Initial and final depth comparison

Berm Alternative 2

This alternative was constructed opposite Alternative 1 on the western side of the shoal feature. The material migrated offshore and to the east but at a smaller rate than Alternative 1. Figure 13 shows the constructed berm location and the profiles over which morphology change was observed. Most of the cross shore movement occurred on the western end of the berm and the easternmost end which is roughly the beginning of Alternative 1. Figures 14 and 15 show the cross shore profiles and Figure 16 shows the alongshore movement. Figure 16 shows a West-East movement trend but not as severe as Alternative 1 most likely because the eastern end of this alternative is at the very tip of the shoal feature and movement at that location is mostly offshore.

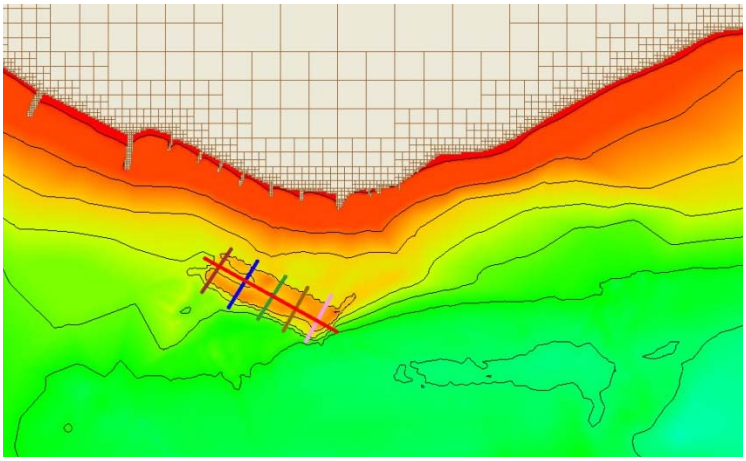


Figure 13. Berm 2 Initial depth contours, cross sections and longitudinal arc

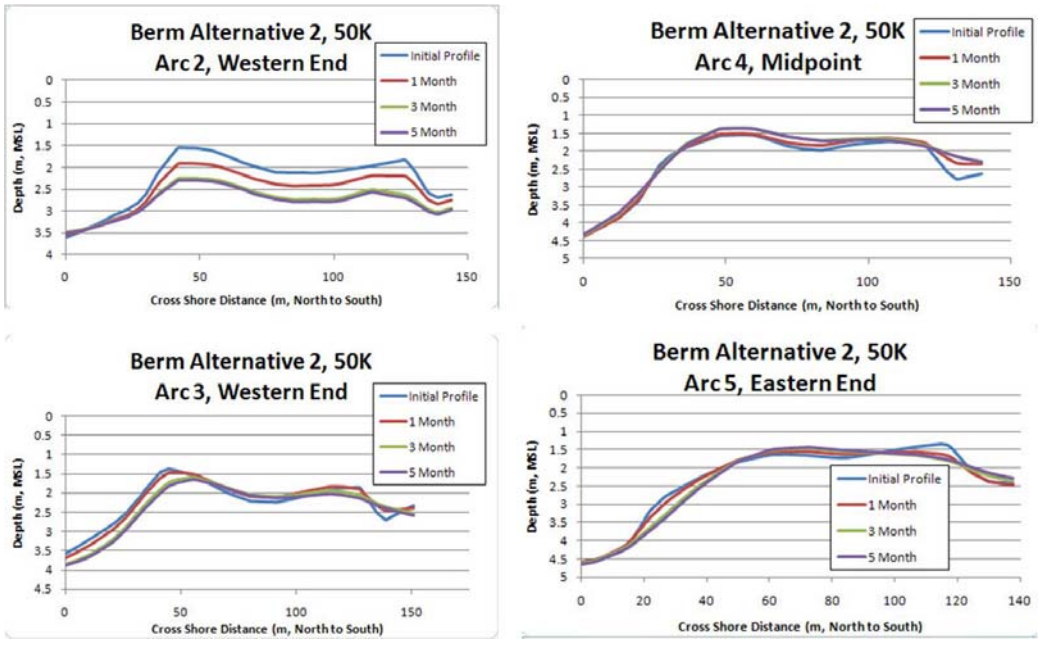


Figure 14. Berm 2 cross shore profiles Arcs 2-5.

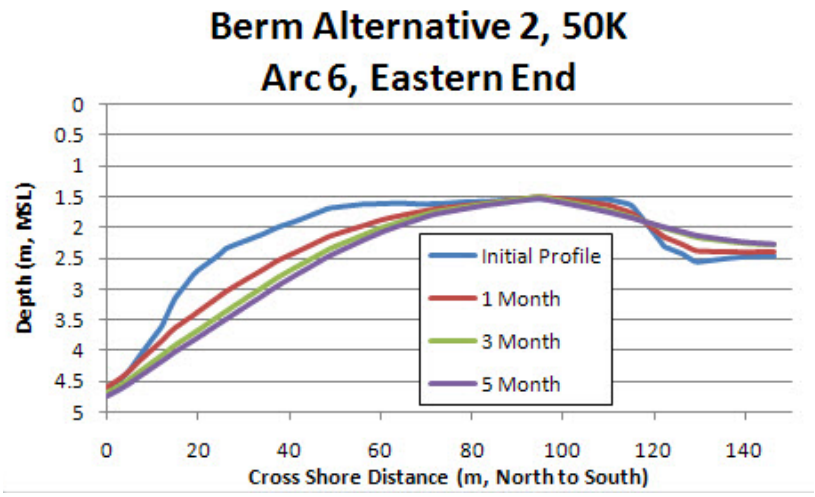


Figure 15. Berm 2 cross shore profile 6

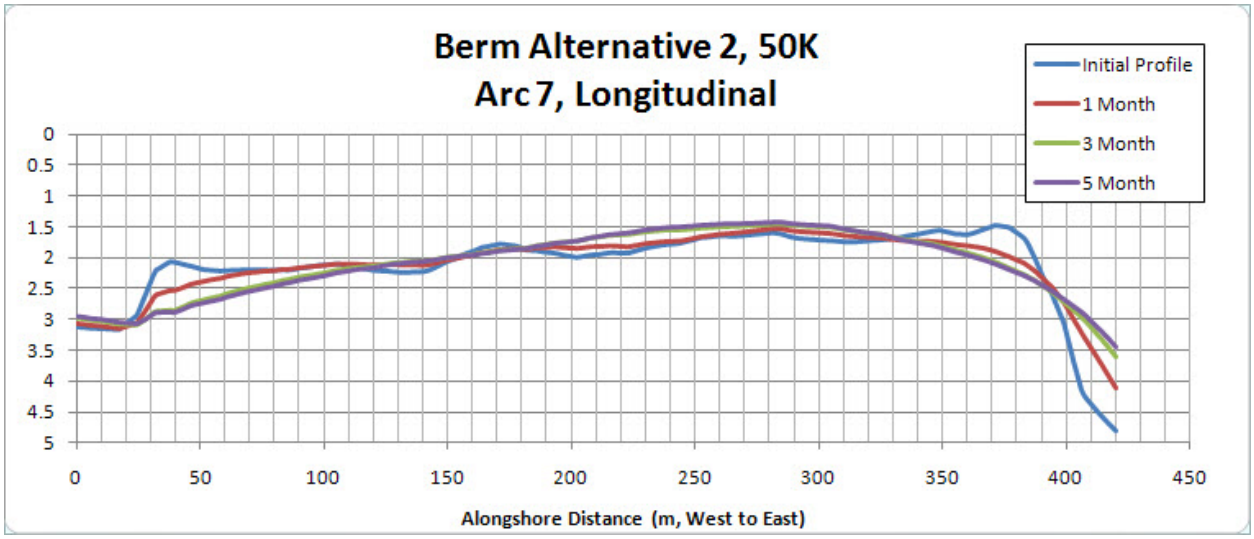


Figure 16. Berm 2 Alongshore Profile.

Figure 17 compares the initial berm bathymetry with the final berm bathymetry after 5 months of simulation time. The berm migrates both offshore and to the east. Deposition occurred in on the eastern side of the shoal point feature.

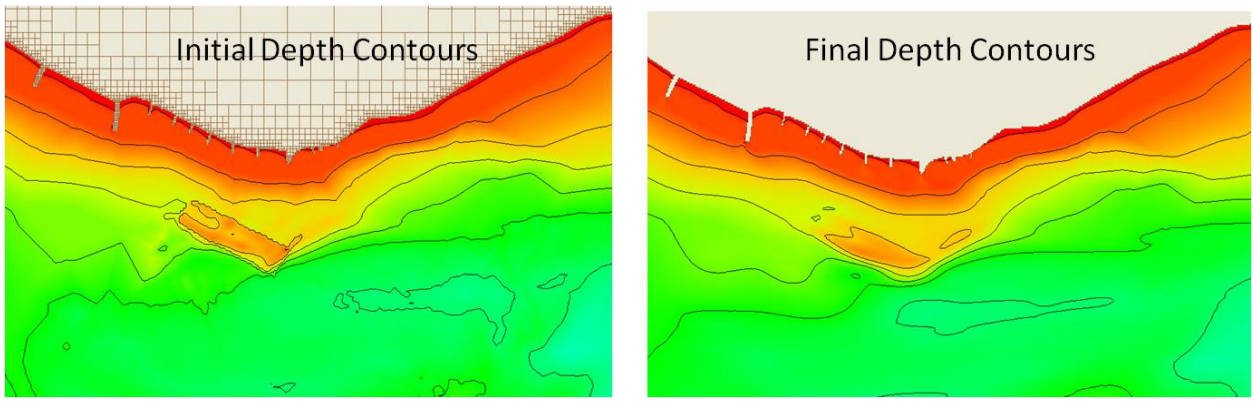


Figure 17. Berm 2 Initial and final depth comparison.

Berm Alternative 3

This alternative was constructed on top of the shoal feature that extends offshore independent of both the shoreline configuration as well as the depth contours with the shoal feature. This alternative showed movement on the western end of the berm but little movement on the eastern end. Figures 19 and 20 show the cross shore profiles and Figure 21 shows the alongshore movement from west to east.

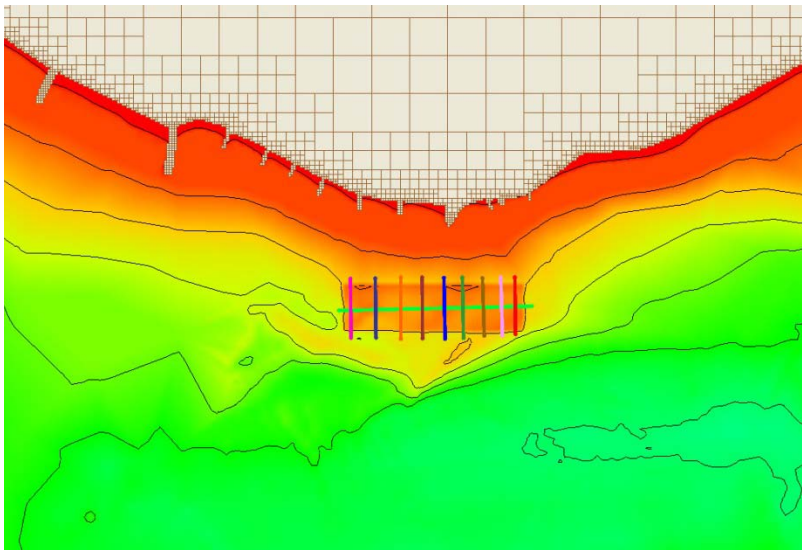


Figure 18. Berm 3 alternative initial depth contours and cross sections

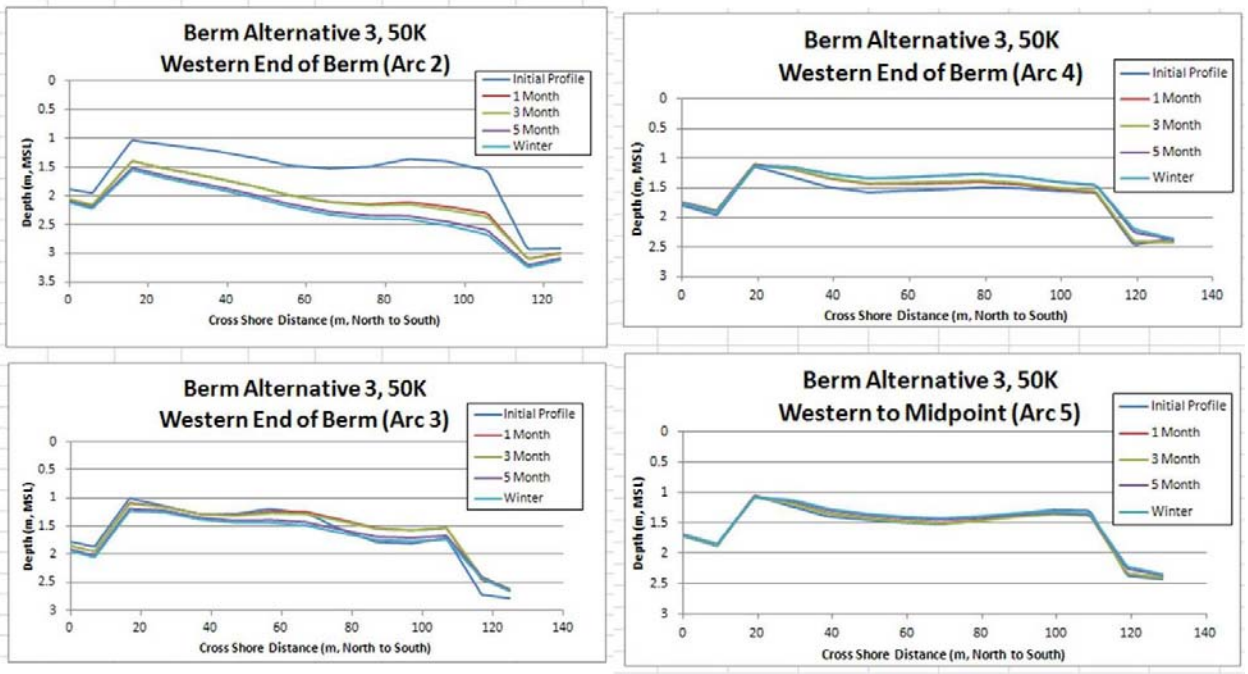


Figure 19. Berm 3 cross shore profiles Arc 2-5.

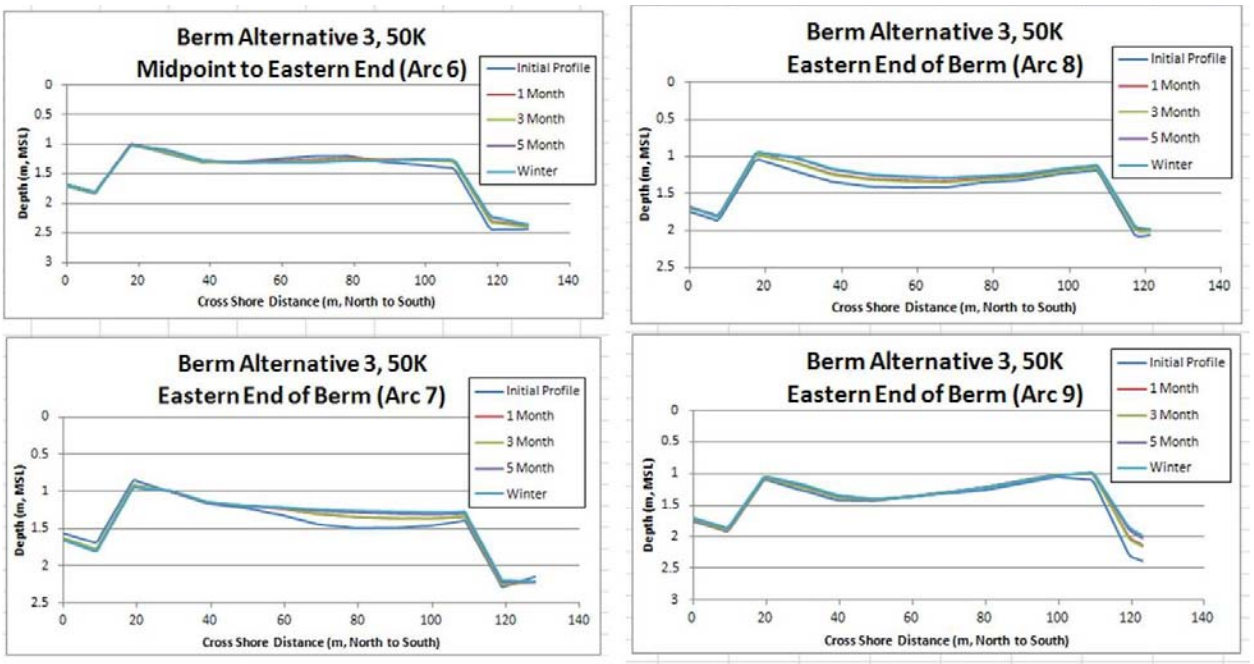


Figure 20. Berm 3 cross shore profiles Arc 6-9

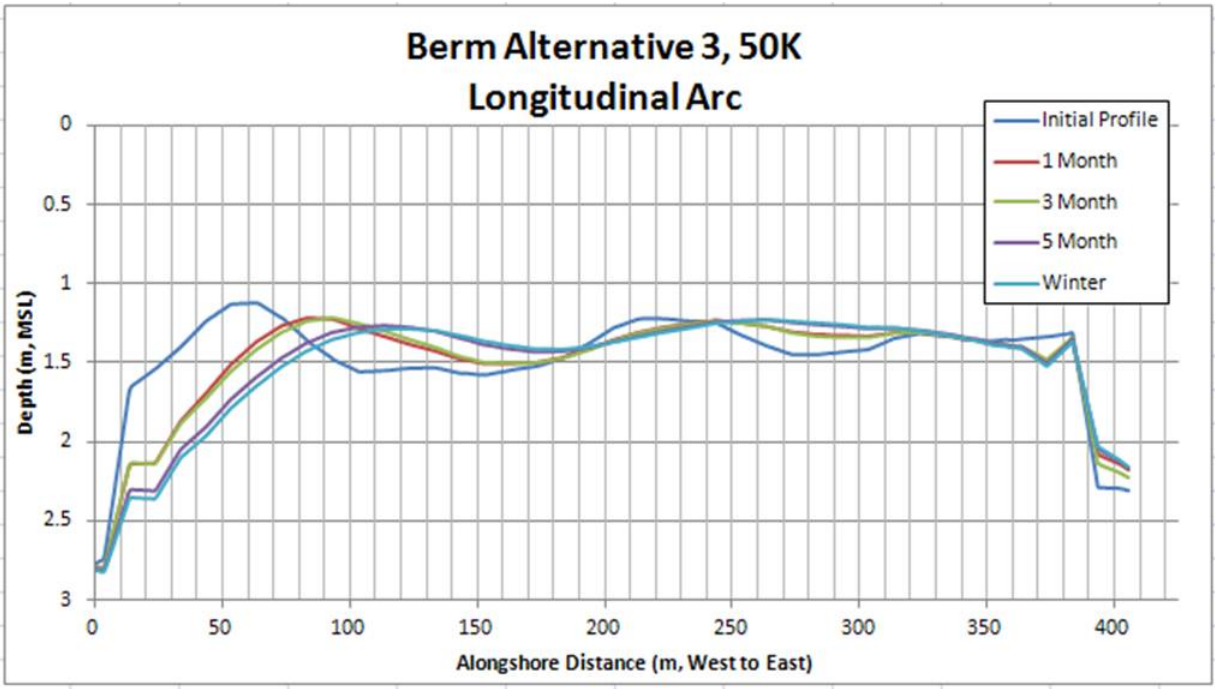


Figure 21. Berm 3 alongshore profile

Figure 22. Comparison of the initial berm bathymetry with the final berm bathymetry after 6 months of simulation time. The berm remains relatively stable with movement on the edges.

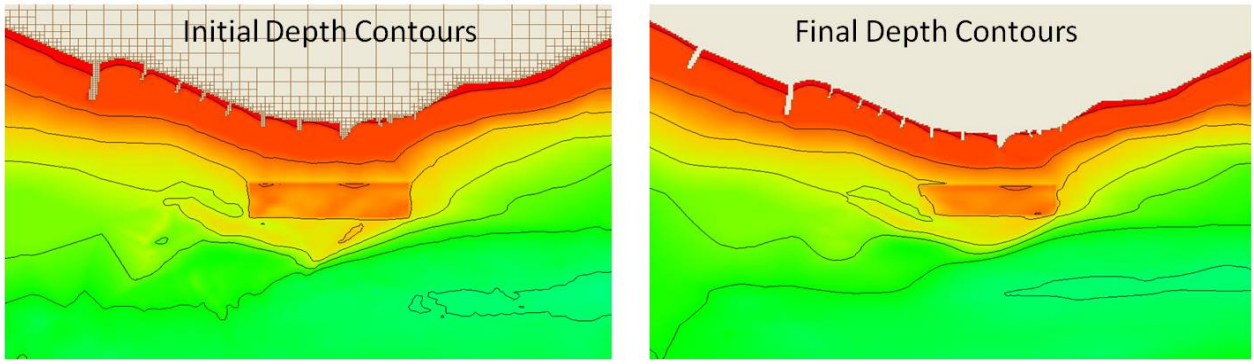


Figure 22. Berm Alternative 3 Initial and final depth comparison

Berm Alternative 4

Berm alternative 4 places the material on the western side of the shoal following the shoreline orientation and depth contours. Figure 23 shows the berm configuration and the cross sections used for morphological observations. The cross shore profile morphology change plots are shown in Figures 24 and 25. The alongshore profile is shown in Figure 26.

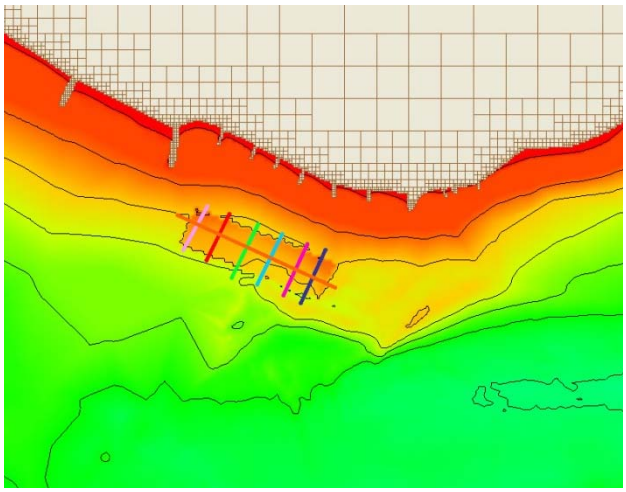


Figure 23.Berm 4 alternative initial depth contours and cross sections

The cross shore profiles shown in Figure 24 indicate that movement occurred on the western end of the berm, decreased towards the middle and increased again towards the eastern end of the berm. The eastern end of the berm is near the shoal where berm alternative 2 showed movement. This movement is most likely due to the currents in the area moving material offshore. Figure 26 shows the alongshore movement of material using the longitudinal arc. Material was moved from the western end of the berm towards to east but material was also moved on the eastern end of the berm further contributing to the shoal that extends offshore from the site.

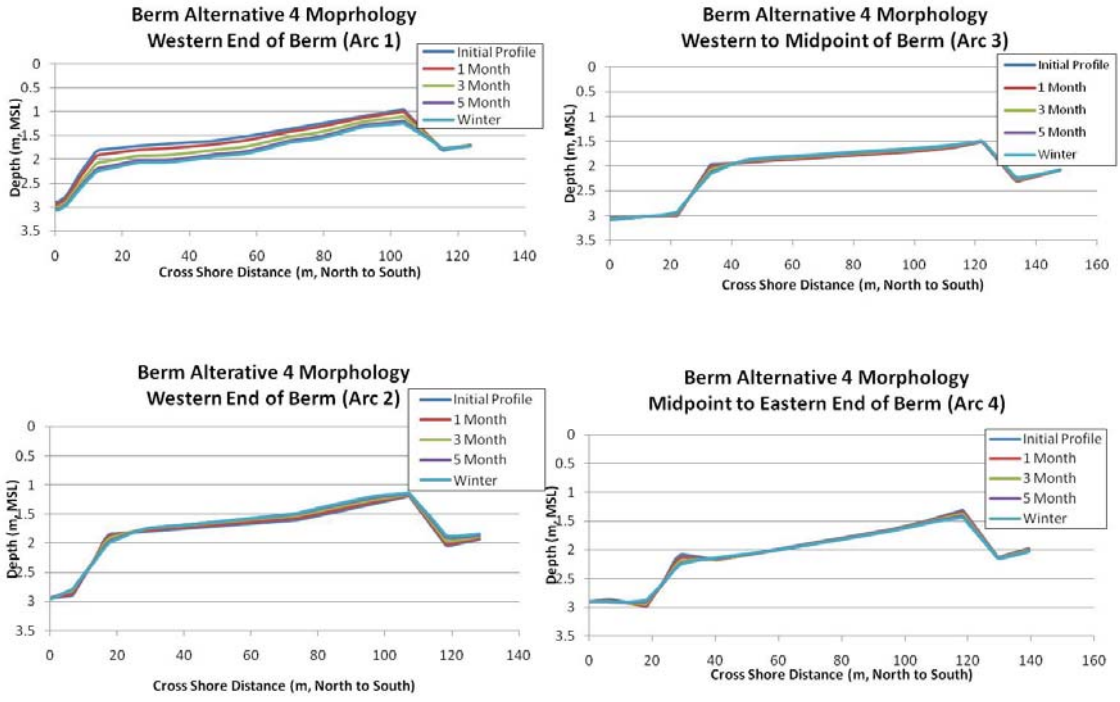


Figure 24. Berm 4 cross shore profiles Arc 1 - 4

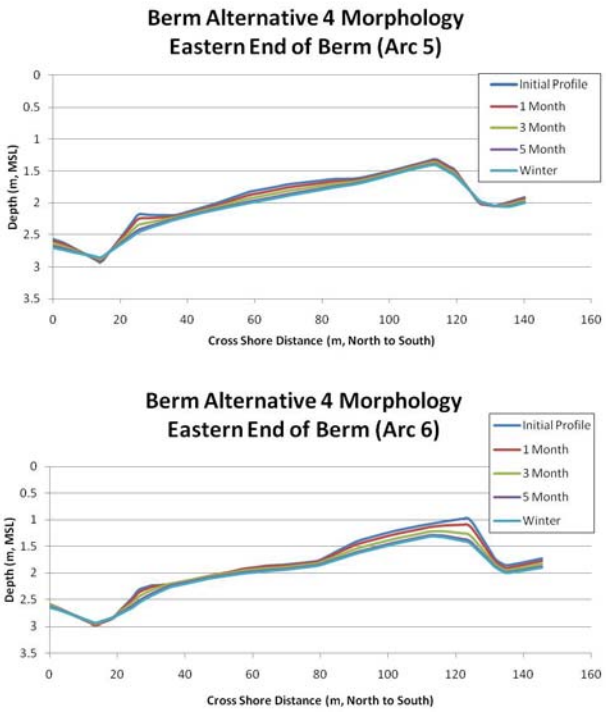


Figure 25. Berm 4 cross shore profiles Arc 5-6.

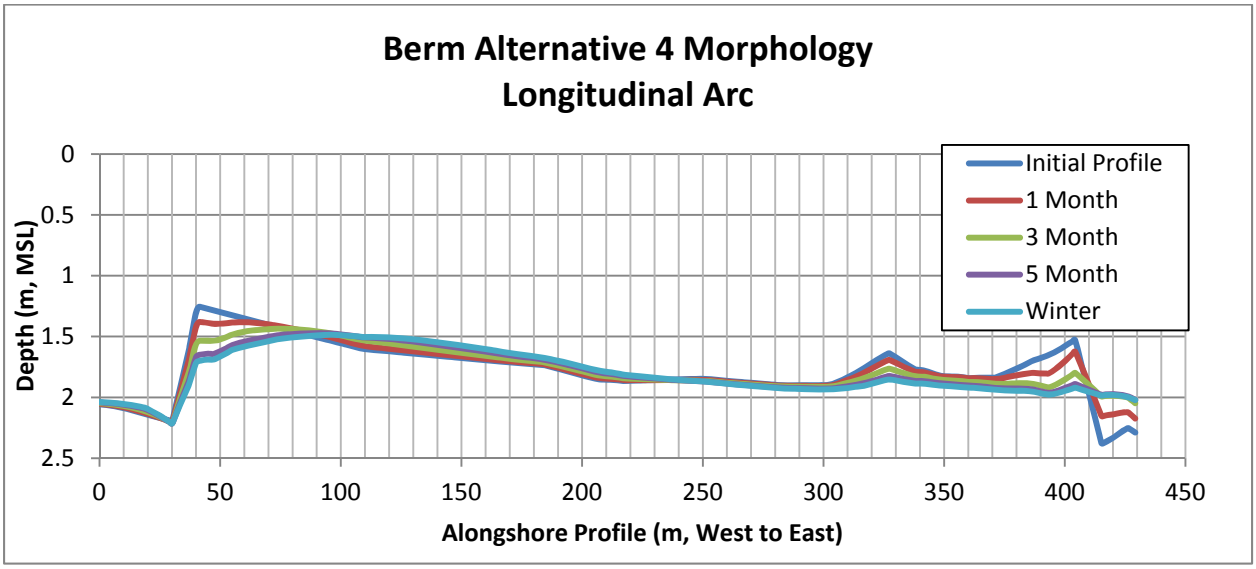


Figure 26. Berm 4 Alongshore profile

Figure 27 compares the initial berm bathymetry to the bathymetry over 6 months of simulation run time. As noted in the cross shore profiles, material towards the center of the berm remained relatively stable but the western and eastern end of the berm moved offshore and to the east. The movement of berm alternative 3 was far less than alternatives 1 and 2.

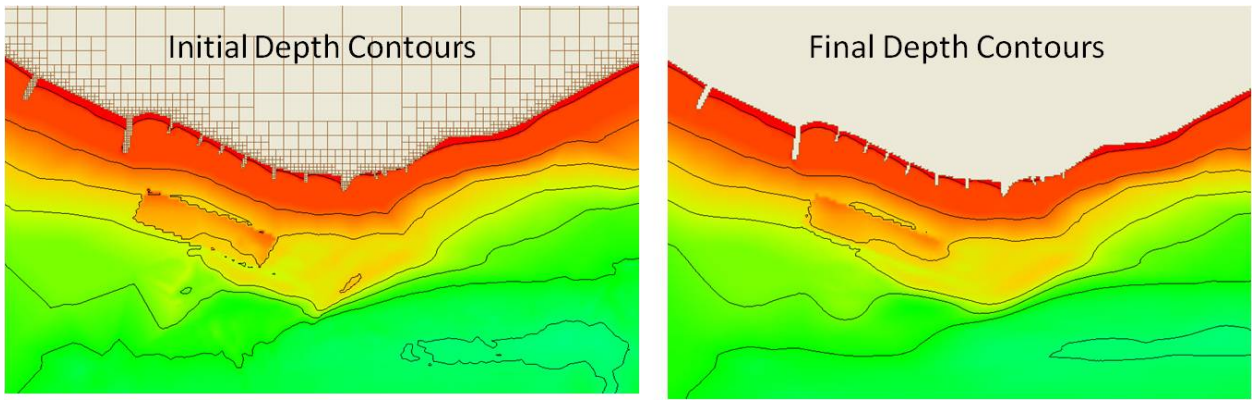


Figure 27. Berm Alternative 4 Initial and final depth comparison

Berm Alternative 5

Berm Alternative 5 moved the berm to the east following the depth contours and mimics the shoreline orientation. This alternative showed the least amount of movement however this behavior could be a product of limited and smoothed bathymetry information in this area and the dominant direction of sediment transport during this simulation period. Different forcing time period could be used to investigate the behavior. Figure 28 shows the berm configuration with profiles used to observe morphology change. Figures 29 – 31 includes charts of the cross shore and alongshore profiles showing the berm morphology change over the 6 month simulation run. Most of the movement of the berm occurred on the very western end of the berm as shown in Figure 29. This behavior is also shown in the alongshore movement in Figure 31.

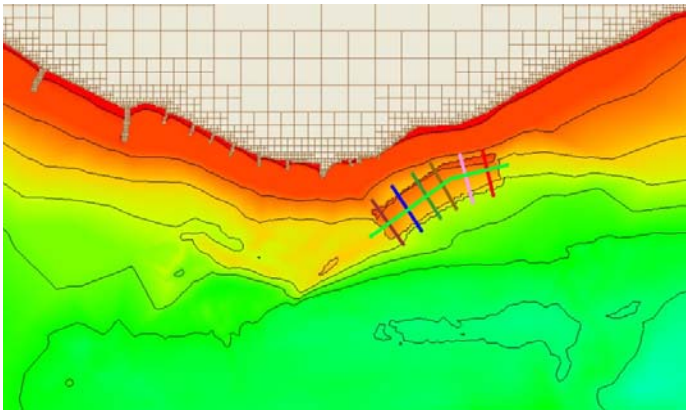


Figure 28. Berm 5 alternative initial depth contours and cross sections

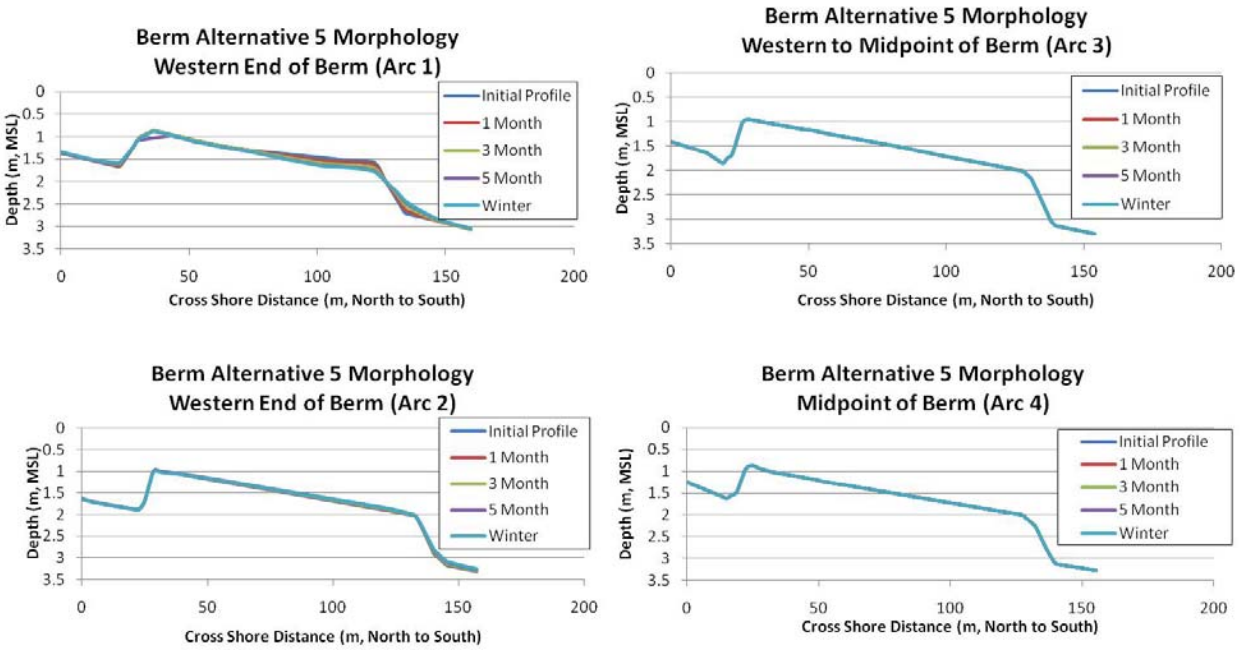


Figure 29. Berm 5 cross shore profiles Arc 1 – 4.

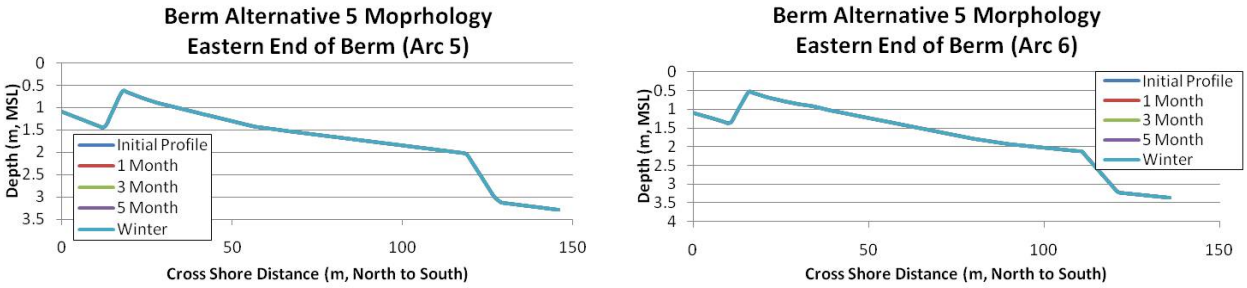


Figure 30. Berm 5 Cross shore Profiles Arcs 5-6.

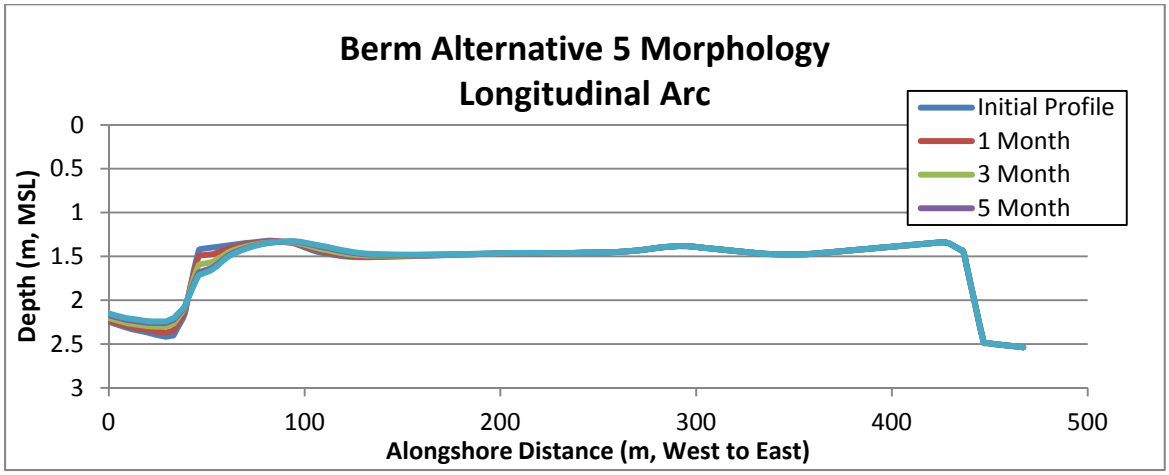


Figure 31. Berm 5 Alongshore Arc

Figure 32 compares the initial berm configuration with the ending bathymetry after 6 months of simulation time. The berm remained largely stable which is most likely a combination of limited bathymetry information in that area with the forcing characteristics of the simulation time period. More analysis should be performed to examine the behavior of the berm under different forcing conditions.

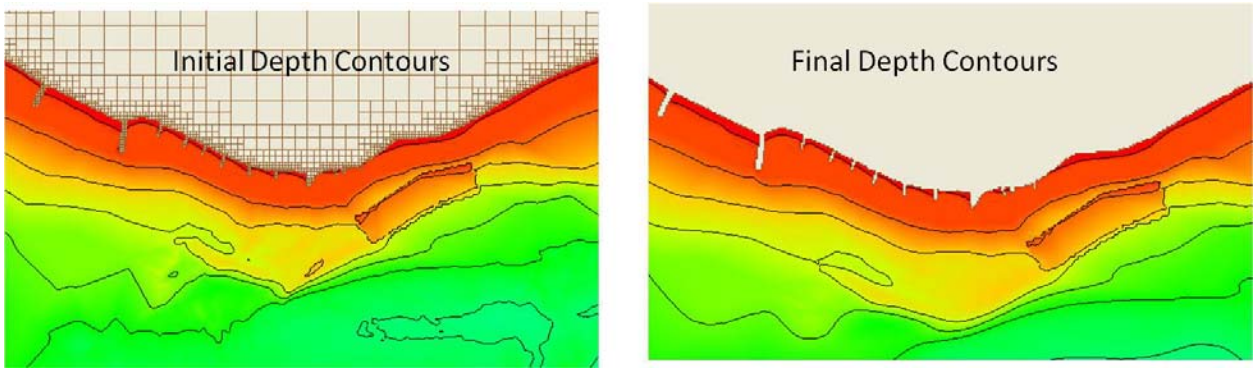


Figure 32. Berm Alternative 5 Initial and final depth comparison

Conclusions and Recommendations

Dredged sediment from the Houstatonic River should be placed in the shallowest depths allowed by the equipment available, using the bathymetry contours as a guide to orient the berm. A typical berm placement would be placed as a linear alongshore feature however the shoreline near Point No Point, which includes a shoal and a southerly-curving shoreline. A combination between Alternative 3 and 4 can be used as a stable berm with the potential for onshore sediment transport should favorable wave conditions occur. The observed direction of sediment transport from west to east is most likely due to the winds that occurred during the modeled time period from June through December. If future studies should occur, analysis could include different seasons (January through May) to observe changes in sediment transport direction and rate given different forcing. Since the recommended berm alternative is relatively stable, the potential for adverse impacts to shellfish beds is low. Figure 33 shows the location of the berm alternatives relative to the state managed shellfish beds. The locations were provided by CT DEP. It should be noted that extreme storm events have the capability to change the behavior of the berm and move sediment; these type of simulations were not modeled.

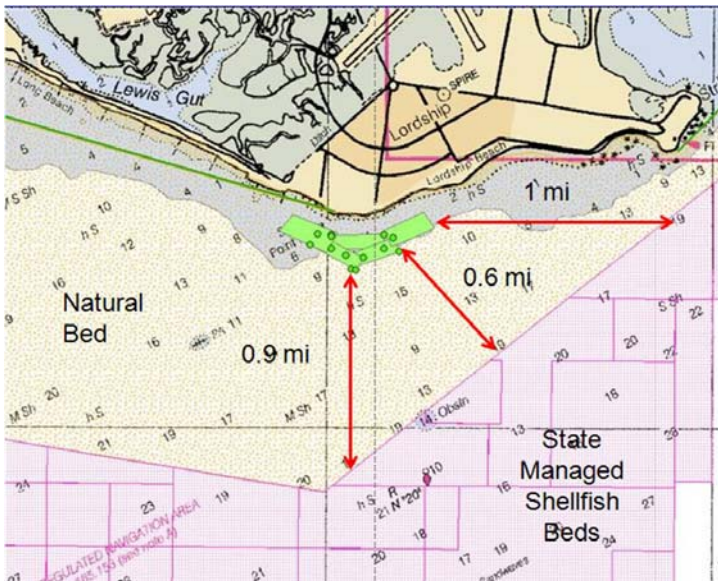


Figure 33. Berm alternative locations and shellfish bed areas.

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Appendices

Beach Grain Size Analysis Curves

US Army Corps of Engineers®
New England District

NAE ENVIRONMENTAL LABORATORY
Project Name: Point No Point Beach
Project Location: Stratford, CT

Date Collected: 01/05/12
Date Recieved: 01/09/12
Date Analyzed: 01/13/12

Preparation Method: ASTM D421-85 (reapproved 2002)

Analysis Method: ASTM D 422-63 (reapproved 2002) - Sieve Nos. 4, 10, 40, 100, 200

Lab SOP: Particle Size Analysis of Sediments - Without Hydrometer (October 2011)

Received By: RBL **Analyzed By:** CGB **Checked By:** RBL

Discussion: Ten samples were received by the lab upon completion of field activities. There were no deviations from the established laboratory testing protocols during preparation or analysis.

QA/QC Narrative: Not requested

Summary of Results:

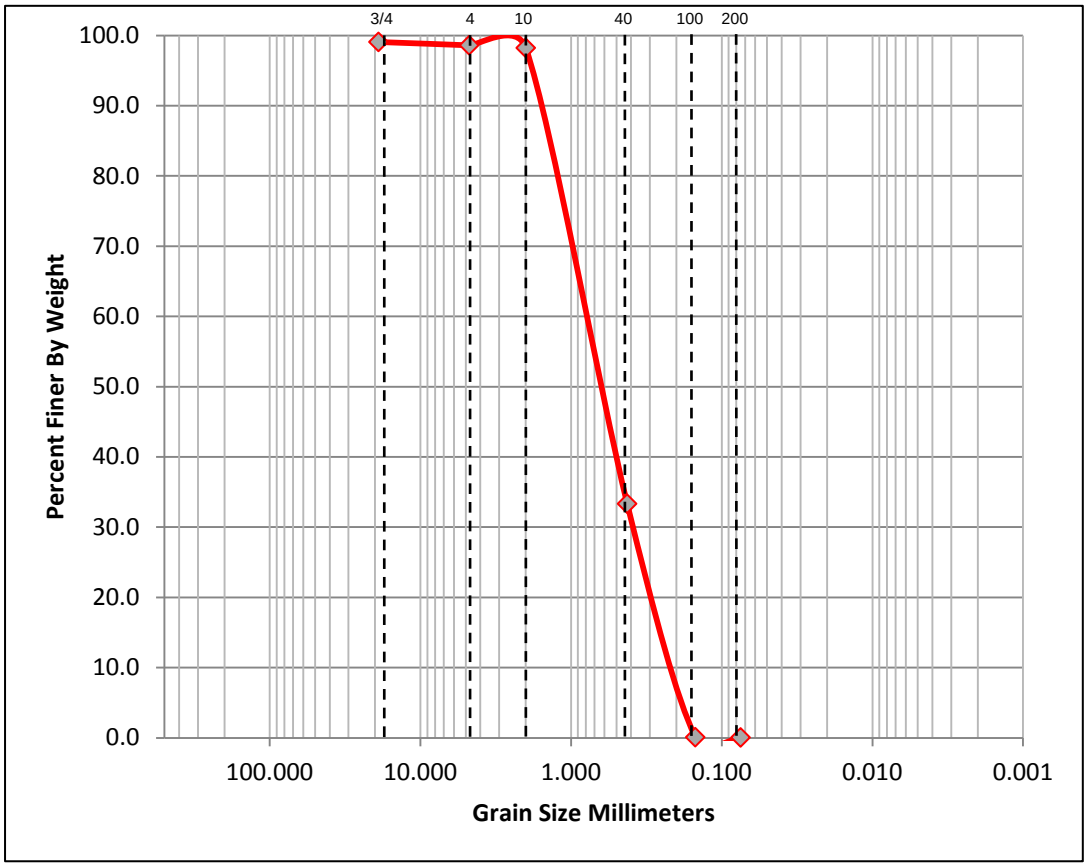
Sample ID	%Cobble	%Gravel		%Sand			%Fines
		Coarse	Fine	Coarse	Medium	Fine	
T1-S1	ND	ND	0.5	64.9	33.3	33.3	0.1
T1-S2	ND	3.2	5.8	2.0	60.3	28.7	0.0
T1-S3	ND	1.5	13.2	8.0	68.0	9.3	0.1
T2-S4	ND	14.0	16.7	7.1	42.9	19.2	0.0
T2-S5	ND	14.6	20.3	6.3	33.0	25.8	0.1
T2-S6	ND	13.7	25.7	16.3	39.1	5.1	0.1
T3-S7	ND	0.0	9.7	13.3	57.6	19.4	0.1
T3-S8	ND	3.6	13.9	12.3	48.3	21.9	0.0
T3-S9	ND	1.6	0.9	0.7	26.1	70.7	0.1
T3-S10	ND	7.1	29.3	21.0	25.1	17.6	0.0

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T1-S1

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	0.9	0.5	0.4	64.9	33.3	0.1	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2319	0.2733	0.3974	0.8295	1.0722	1.6789	3.20	4.62

Original Sample Weight (g)			1119.6	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.2	553.5	10.3	0.9	0.9	99.1
#4	4.750	489.4	494.7	5.3	0.5	1.4	98.6
#10	2.000	463.5	467.7	4.2	0.4	1.8	98.2
#40	0.425	354.7	1081.3	726.6	64.9	66.7	33.3
#100	0.150	328.8	700.9	372.1	33.2	99.9	0.1
#200	0.075	313.5	313.9	0.4	0.0	99.9	0.1

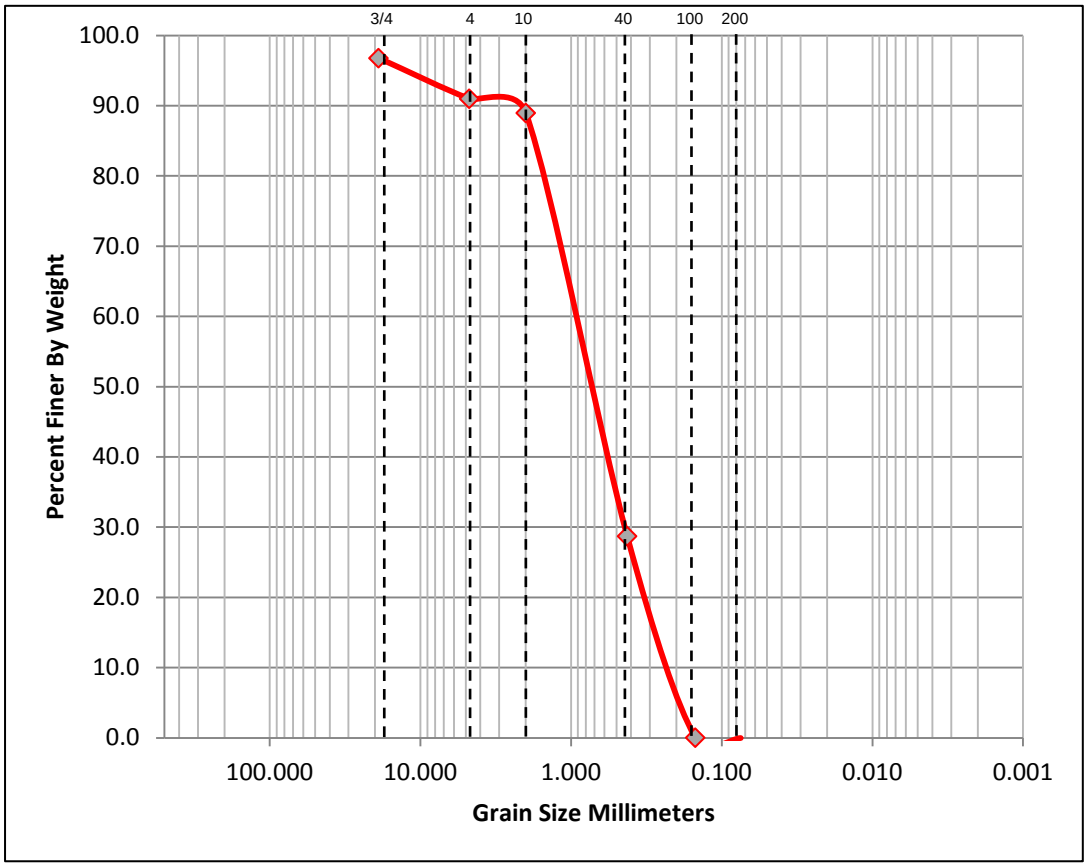
Sample Notes: SP: Poorly graded, grey/brown, sub-angular sand with a small amount of gravel. The gravel is subrounded (max size = 1 in.) 41 08' 51"N, 73 07' 51"W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T1-S2

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	3.2	5.8	2.0	60.3	28.7	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2456	0.2936	0.4588	0.9816	1.2430	1.8965	3.01	5.06

Original Sample Weight (g)			1193.8	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.1	581.7	38.6	3.2	3.2	96.8
#4	4.750	494.0	563.0	69.0	5.8	9.0	91.0
#10	2.000	470.1	494.3	24.2	2.0	11.0	89.0
#40	0.425	353.0	1072.3	719.3	60.3	71.3	28.7
#100	0.150	325.5	667.9	342.4	28.7	100.0	0.0
#200	0.075	316.5	317.0	0.5	0.0	100.0	0.0

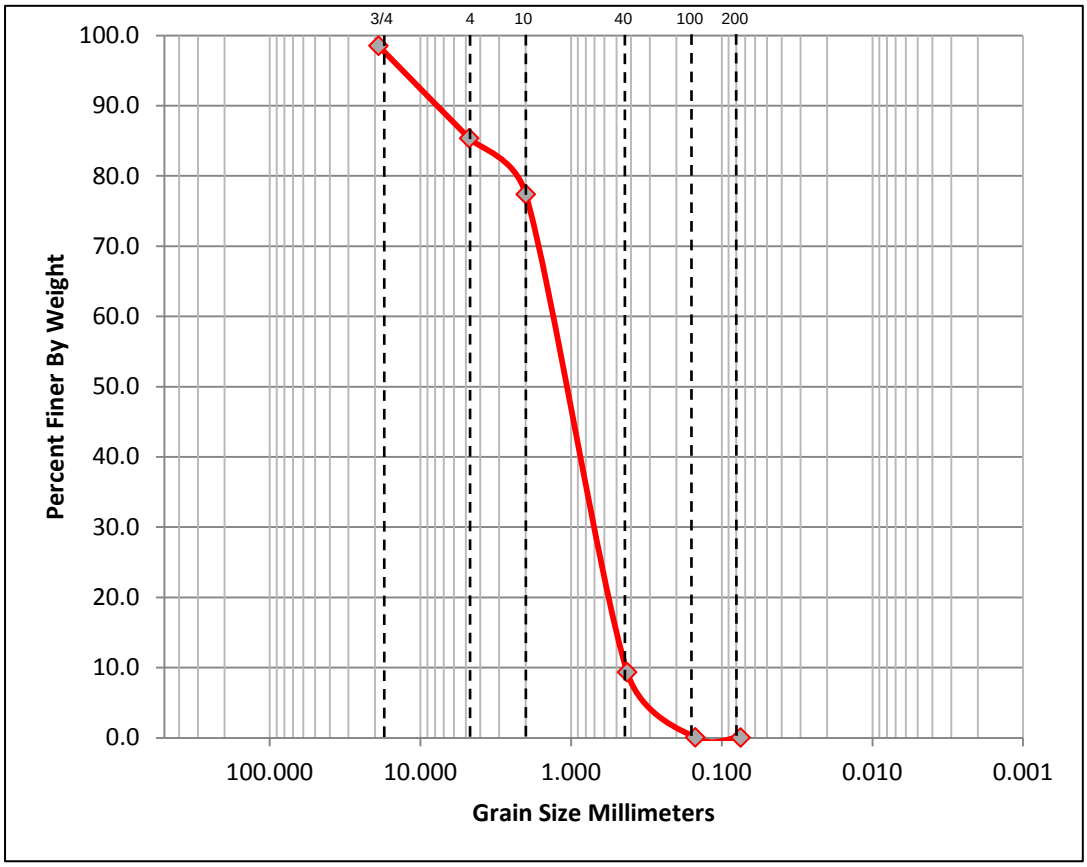
Sample Notes: SP - Poorly graded, grey/brown, sub-angular sand with a small amount of gravel (max size = 2 in). 41.147425N, 73.130798W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T1-S3

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	1.5	13.2	8.0	68.0	9.3	0.1	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.4399	0.5557	0.9029	1.3659	1.5974	4.6230	2.57	3.63

Original Sample Weight (g)			1169.4	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.2	560.3	17.1	1.5	1.5	98.5
#4	4.750	489.3	643.3	154.0	13.2	14.6	85.4
#10	2.000	463.5	556.8	93.3	8.0	22.6	77.4
#40	0.425	354.8	1150.4	795.6	68.0	90.6	9.4
#100	0.150	328.7	437.2	108.5	9.3	99.9	0.1
#200	0.075	313.6	313.9	0.3	0.0	99.9	0.1

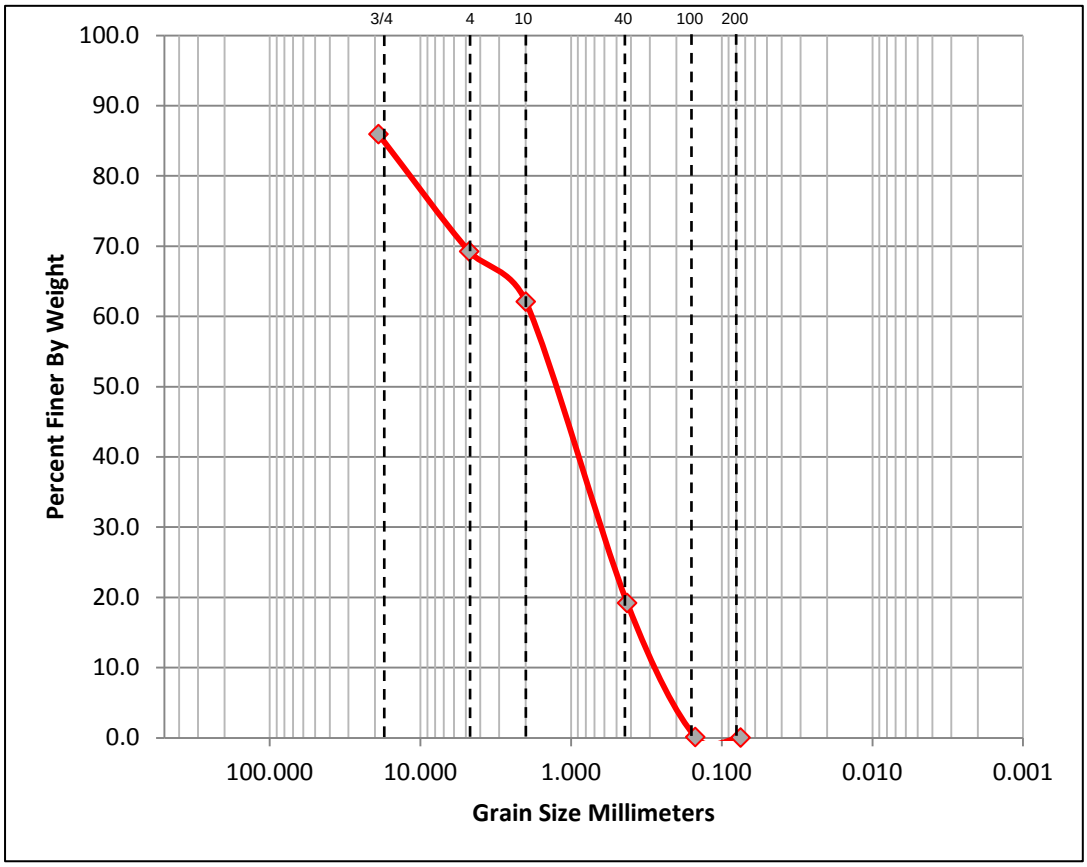
Sample Notes: SP: Poorly graded, tan/grey, sub-angular sand with some gravel. The gravel is sub-rounded to sub-angular (max size = 1.75 in) 41.147360N, 73.130802W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T2-S4

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	14.0	16.7	7.1	42.9	19.2	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2923	0.3644	0.8213	1.5555	1.9226	18.1863	2.92	6.58

Original Sample Weight (g)			889.9	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.1	668.1	125.0	14.0	14.0	86.0
#4	4.750	494.1	642.7	148.6	16.7	30.7	69.3
#10	2.000	470.4	534.0	63.6	7.1	37.9	62.1
#40	0.425	354.2	736.0	381.8	42.9	80.8	19.2
#100	0.150	326.5	496.3	169.8	19.1	99.9	0.1
#200	0.075	316.6	317.3	0.7	0.1	100.0	0.0

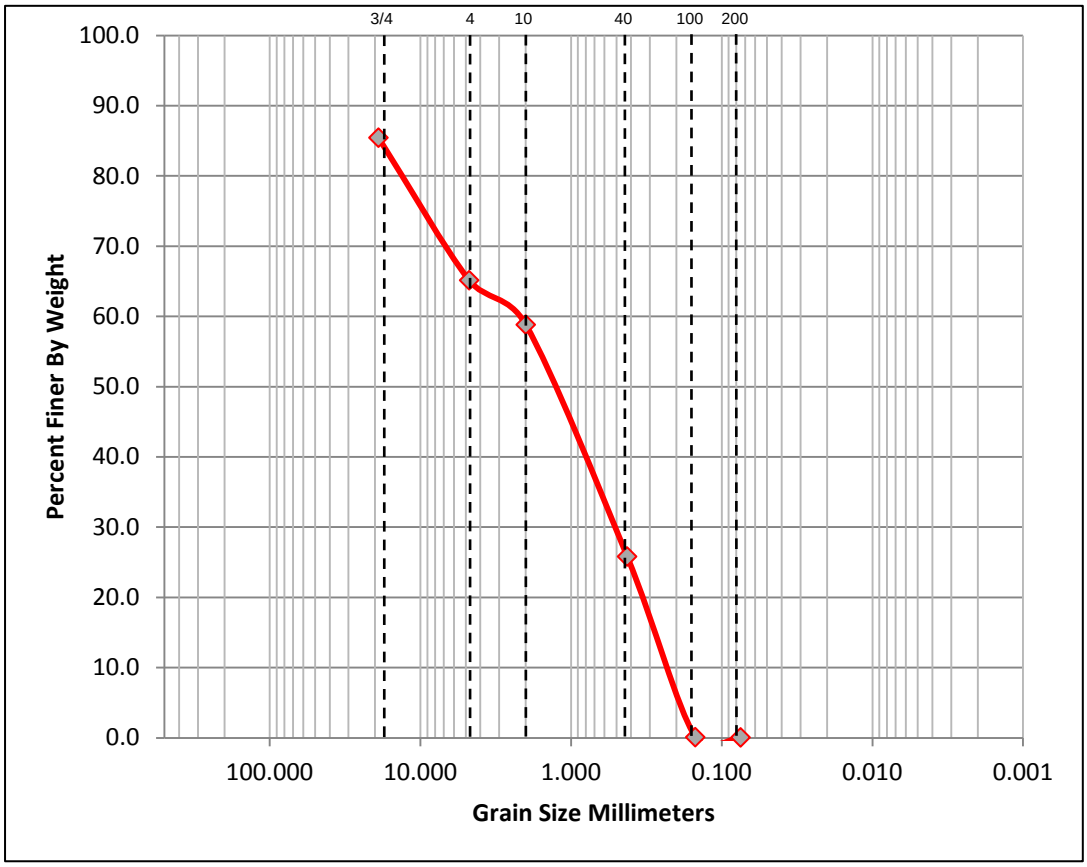
Sample Notes: SW: Well graded, tan/grey, sub-angular sand with gravel. The gravel is flat and rounded (max size = 2 in.) 41° 08' 52.80" N 73° 08' 0.69" W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T2-S5

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	14.6	20.3	6.3	33.0	25.8	0.1	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2559	0.3093	0.6246	1.5789	2.5113	18.6861	1.94	9.82

Original Sample Weight (g)			1192.2	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.2	716.7	173.5	14.6	14.6	85.4
#4	4.750	494.1	736.1	242.0	20.3	34.9	65.1
#10	2.000	470.4	545.8	75.4	6.3	41.2	58.8
#40	0.425	353.2	746.7	393.5	33.0	74.2	25.8
#100	0.150	325.6	632.2	306.6	25.7	99.9	0.1
#200	0.075	316.5	316.9	0.4	0.0	99.9	0.1

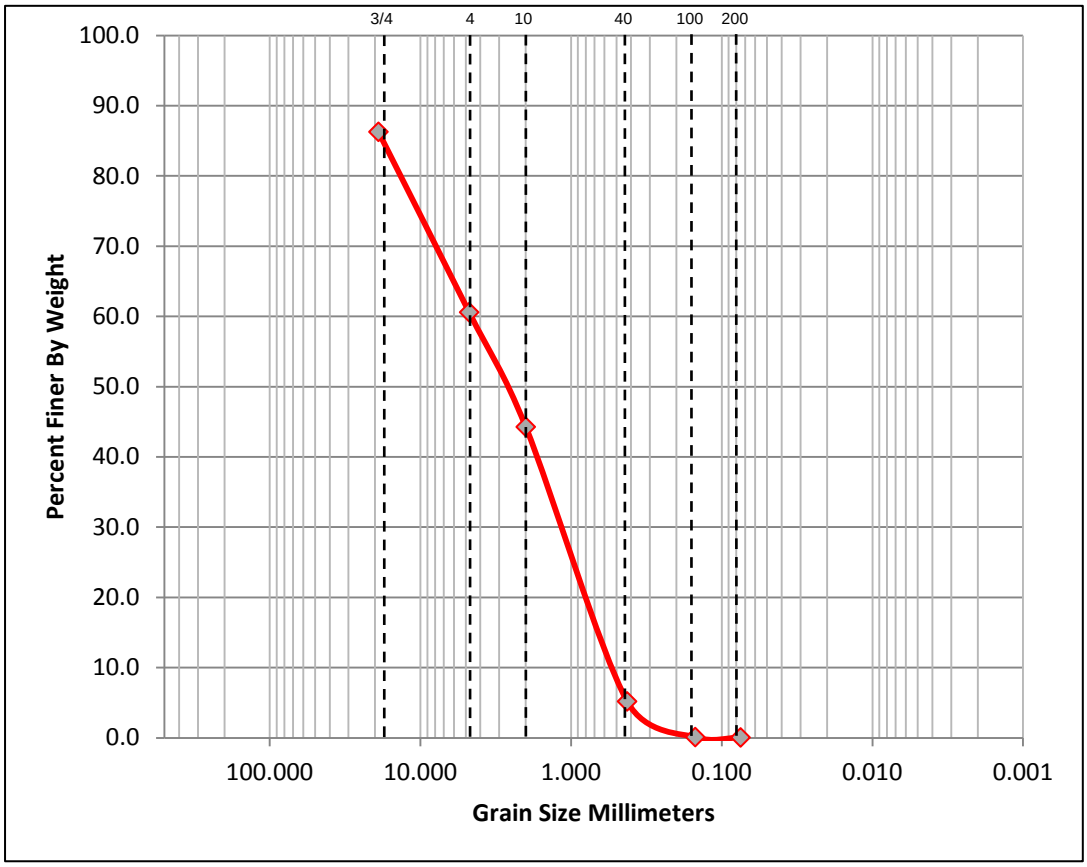
Sample Notes: SW: Well graded, brown/grey, sub-angular sand with gravel. The gravel is sub-angular to sub-rounded (max size = 2.75 in.) 41° 08' 52.62" N 73° 08' 0.83" W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T2-S6

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	13.7	25.7	16.3	39.1	5.1	0.1	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.6188	0.8203	1.4248	2.9648	4.6498	18.2902	0.99	7.51

Original Sample Weight (g)			1150.1	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.2	701.0	157.8	13.7	13.7	86.3
#4	4.750	489.3	784.7	295.4	25.7	39.4	60.6
#10	2.000	463.6	651.3	187.7	16.3	55.7	44.3
#40	0.425	354.8	804.3	449.5	39.1	94.8	5.2
#100	0.150	328.9	387.3	58.4	5.1	99.9	0.1
#200	0.075	313.6	314.2	0.6	0.1	99.9	0.1

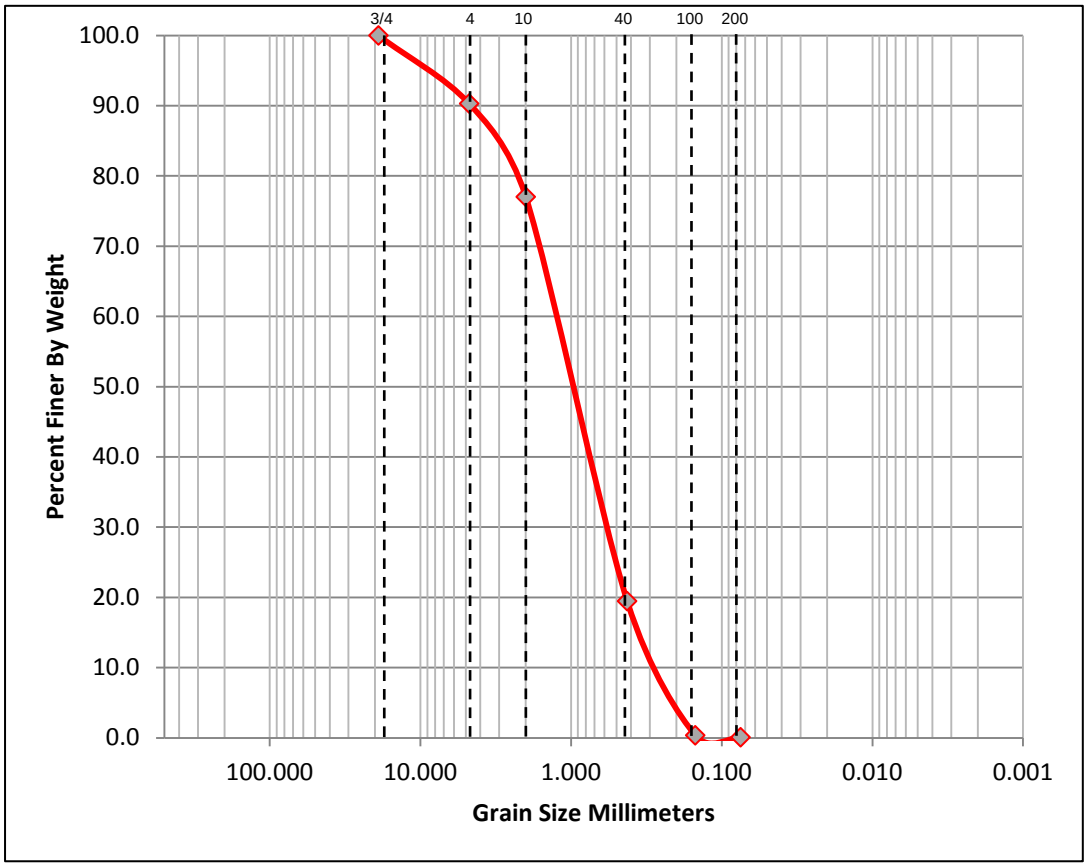
Sample Notes: SW: Well graded, tan/grey, sub-angular sand with gravel. The gravel is sub-angular to sub-rounded (max size = 1.75 in.) 41° 08' 52.34" N 73° 08' 0.97" W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T3-S7

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	0.0	9.7	13.3	57.6	19.4	0.1	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2887	0.3607	0.7131	1.2604	1.5341	3.6515	3.22	5.31

Original Sample Weight (g)			1015.9	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.2	543.2	0.0	0.0	0.0	100.0
#4	4.750	494.0	592.5	98.5	9.7	9.7	90.3
#10	2.000	470.4	605.3	134.9	13.3	23.0	77.0
#40	0.425	352.9	937.6	584.7	57.6	80.5	19.5
#100	0.150	325.5	519.6	194.1	19.1	99.6	0.4
#200	0.075	316.6	319.4	2.8	0.3	99.9	0.1

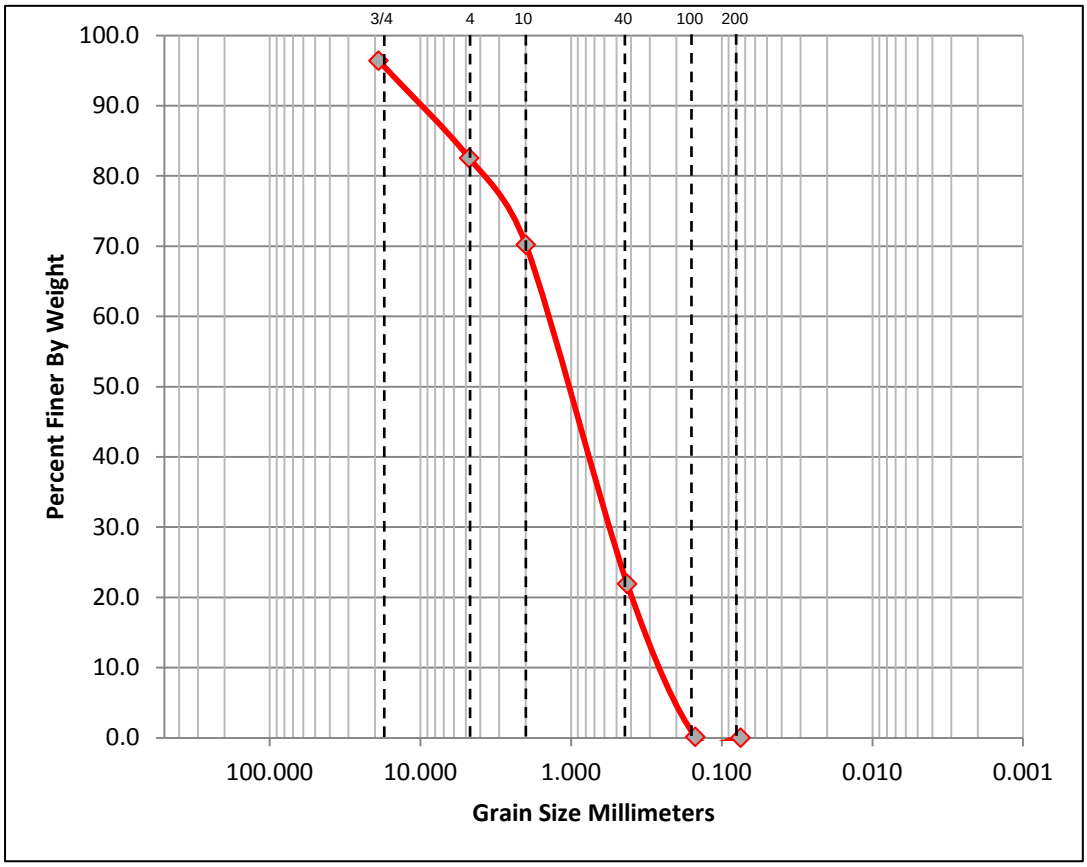
Sample Notes: SP: Poorly graded, tan/grey, sub-angular sand with a small amount of gravel. The gravel is sub-rounded (max size = 1.25 in.) 41° 08' 54.73"N 73° 07' 33.08" W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T3-S8

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	3.6	13.9	12.3	48.3	21.9	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2744	0.3375	0.6883	1.3406	1.6667	7.2705	3.01	6.07

Original Sample Weight (g)			1142.0	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.2	584.2	41.0	3.6	3.6	96.4
#4	4.750	489.3	647.6	158.3	13.9	17.5	82.5
#10	2.000	463.5	604.3	140.8	12.3	29.8	70.2
#40	0.425	353.7	905.2	551.5	48.3	78.1	21.9
#100	0.150	325.5	574.2	248.7	21.8	99.9	0.1
#200	0.075	316.7	318.1	1.4	0.1	100.0	0.0

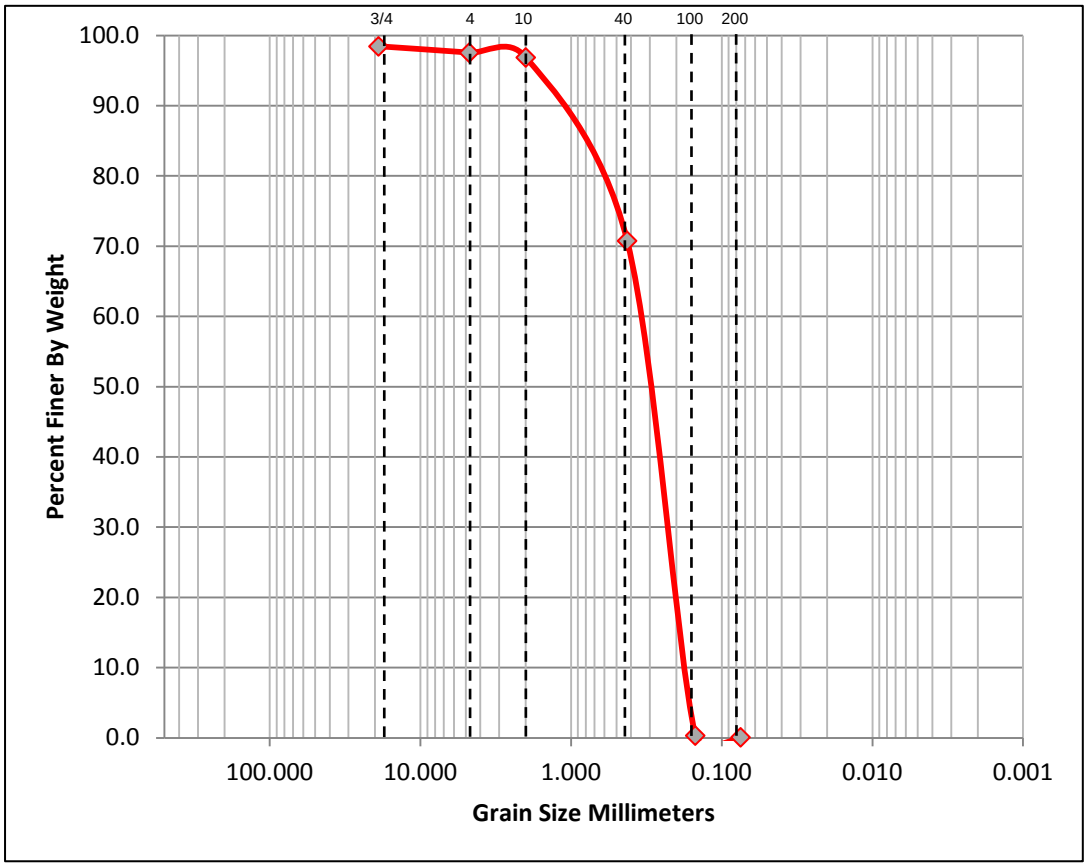
Sample Notes: SW: Well graded, tan/grey, sub-angular sand with gravel. The gravel is sub-angular to sub-rounded (max size = 1.5 in.) 41° 08' 54.50"N 73° 07' 33.04" W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T3-S9

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	1.6	0.9	0.7	26.1	70.7	0.1	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1878	0.2073	0.2659	0.3440	0.3830	1.2846	7.39	2.04

Original Sample Weight (g)			910.8	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.1	557.3	14.2	1.6	1.6	98.4
#4	4.750	494.0	502.2	8.2	0.9	2.5	97.5
#10	2.000	470.4	476.6	6.2	0.7	3.1	96.9
#40	0.425	353.1	590.9	237.8	26.1	29.2	70.8
#100	0.150	325.7	967.2	641.5	70.4	99.7	0.3
#200	0.075	316.5	318.7	2.2	0.2	99.9	0.1

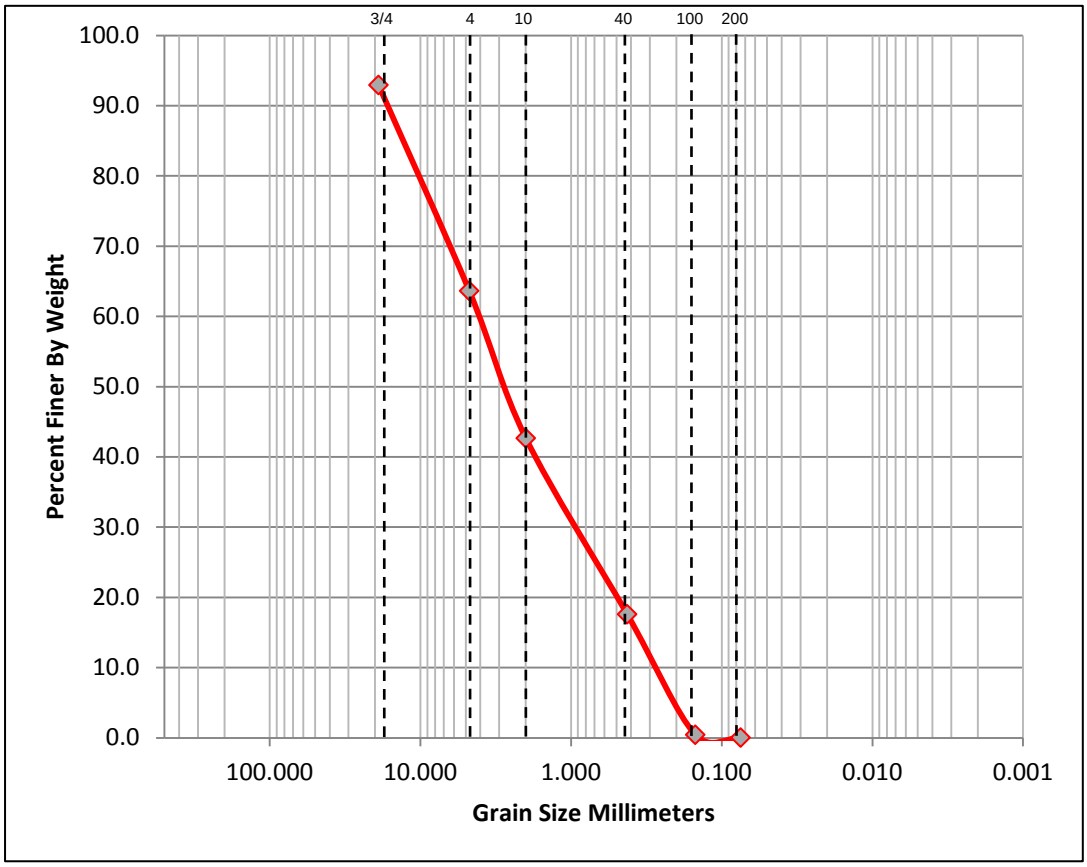
Sample Notes: SP: Poorly graded, light to dark brown, sub-angular sand with a small amount of gravel. The gravel is sub-rounded (max size = 1 in.) 41° 08' 54.18" N 73° 07' 33.00" W

US Army Corps of Engineers®
New England District

Project Name: Point No Point Beach
Project Location: Stratford, CT
Sample ID: T3-S10

Date: 01/13/12

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
ND	7.1	29.3	21.0	25.1	17.6	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.3031	0.3832	1.2039	2.9611	4.2722	15.1349	1.86	14.09

Original Sample Weight (g)			1056.5	Post Wash Weight (g)			-
Sieve	Sieve Size (mm)	Sieve Weight (g)	Shaken Weight (g)	Weight Retained (g)	Percent Retained	Cum. Percent Retained	Percent Finer
3/4	19.000	543.1	617.6	74.5	7.1	7.1	92.9
#4	4.750	494.2	803.8	309.6	29.3	36.4	63.6
#10	2.000	470.4	692.0	221.6	21.0	57.3	42.7
#40	0.425	353.3	618.1	264.8	25.1	82.4	17.6
#100	0.150	325.7	507.0	181.3	17.2	99.6	0.4
#200	0.075	316.6	320.8	4.2	0.4	100.0	0.0

Sample Notes: SW: Well graded, tan/grey, sub-angular sand with gravel. The gravel is sub-angular to sub-rounded (max size = 1.5 in.) 41° 08' 53.86" N 73° 07' 33.00" W