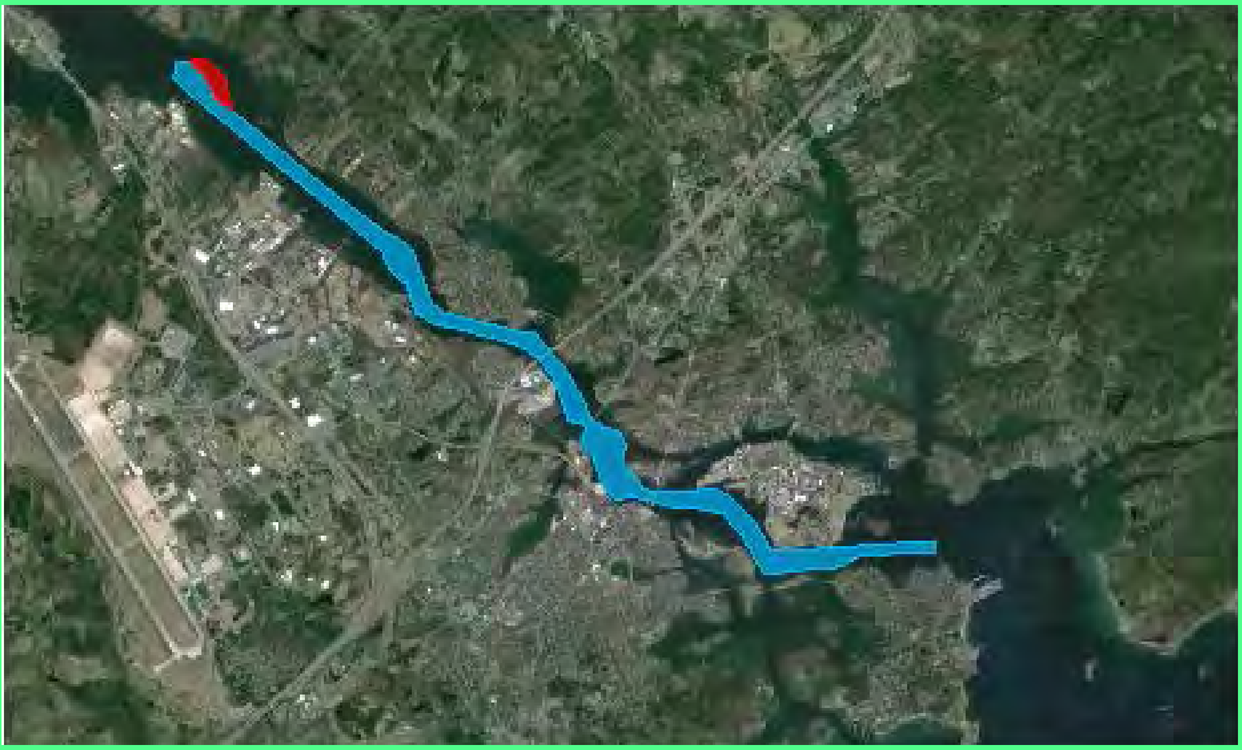
Final Feasibility Report and
Final Environmental Assessment and FONSI
for Navigation Improvement Project

Portsmouth Harbor and Piscataqua River

New Hampshire & Maine



US ARMY CORPS
OF ENGINEERS
New England District

NH PEASE DEVELOPMENT
AUTHORITY – DIVISION OF
PORTS AND HARBORS

July 2014

Portsmouth Harbor & Piscataqua River
New Hampshire and Maine
Navigation Improvement Project

Addendum to Final Feasibility Report

Background and Purpose of this Addendum

The Final Feasibility Report and Final Environmental Assessment (FR/EA) for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project was published on 10 July 2014. The Corps Civil Works Review Board met on 21 August 2014 and approved release of the proposed Chef of Engineer's Report accompanied by the Final FR/EA for State and Agency Review. The State and Agency Review period was 23 October to 24 November 2014. The Chief of Engineers Report is scheduled for signature in February 2015.

The July 2014 Final Feasibility Report included project costs and benefits developed at Federal Fiscal Year 2014 price levels and interest rates, the year in which the report was published. The final report also presented escalated cost estimates for anticipated Fiscal Year 2015 price levels for inclusion in the proposed Chief of Engineers Report. However, Fiscal Year 2015 interest rates were not available at that time. This addendum was prepared to provide updated Fiscal Year 2015 benefit cost computations to provide consistency between project information in the Final Feasibility Report and the final Chief of Engineers Report.

Portsmouth Harbor is located at the mouth of the Piscataqua River which forms a portion of the state boundary between Maine and New Hampshire. The recommend plan to improve the existing Federal navigation project at Portsmouth Harbor and the Piscataqua River consists of widening the upper-most turning basin at the head of the project from its present width of 800 feet to a width of 1200 feet. The existing project depth of -35 feet at mean lower low water (MLLW) would be retained. The existing width of the upper turning basin is too narrow for efficient and safe handling of existing and future commerce. The upper turning basin serves the terminals situated in the upper channel reaches of the Piscataqua River above the Interstate 95 Bridge. The recommended plan includes dredging and rock removal with a base plan for ocean placement of the material.

The study was directed by Section 436 of the Water Resources Development Act of 2000 (P.L. 106-541) which states: Section 216 of the Flood Control Act of 1970 also provides the Corps general authority to review completed civil works projects. The State of New Hampshire, Pease Development Authority, Division of Ports and Harbors (New Hampshire Port Authority) is the non-Federal sponsor for the feasibility study and improvement project.

Additional information and further details of the recommended plan can be found in the Executive Summary of the July 2014 Feasibility Report.

Update of Project Benefit-Cost Information

The Federal Fiscal Year (FY) 2014 interest rate for water resources project evaluation was 3-½ percent, and was the rate used in the benefit-cost evaluation for the July 2014 Final Feasibility Report. The Federal FY 2015 interest rate used for the Chief of Engineers Report is 3-3/8 percent. Price levels and interest rates impact project costs, annualized project costs, and benefit-cost computations. The Federal Office of Management and Budget also evaluates proposed projects using a 7 percent interest rate. The tables below show the project cost, benefit-cost evaluation, and cost-sharing information using price levels and interest rates for both fiscal years for comparison. Table A-1 shows the first cost of design and construction of the navigation improvements at FY14 prices levels and as escalated to FY15 levels.

TABLE A-1
First Cost of Improvement of the Recommended Plan
1200-Foot Wide Turning Basin - Federal Base Plan for Ocean Disposal

	FY14 (October 2013) Price Level*	FY15 (October 2014) Price Level**
General Navigation Feature Improvements	$15,309,000	$15,588,000
Contingencies	$3,234,000	$3,293,000
Planning, Engineering and Design	$997,000	$1,033,000
Construction Management	$827,000	$857,000
Lands, Easements, ROWs	None	None
Total First Cost	$20,367,000	$20,774,000

* From Feasibility Report - Table 10 (Page 43), and Executive Summary Table ES-1.
** From Feasibility Report – Executive Summary Table ES-1 and Chiefs Report. Note: The numbers used in the Chief of Engineers Report are rounded to the nearest $10,000.

Cost sharing of the recommended plan is based on sharing the costs of the Federal base plan between the Federal government and the non-Federal Sponsor. The estimated project first cost for the Federal base plan is $20,367,000 (FY 2014 price level). That cost escalated to the programmed budget year (Fiscal Year 2015) is $20,774,000. Costs escalated to the assumed fully funded mid-point of construction in FY 2016) would be $21,295,000.

Design and Construction of the project is cost-shared in accordance with the requirements of the Water Resources Development Act of 1986, §101(a), as amended. As the depth of the improved turning basin will be -35 feet MLLW (greater than -20 feet, but not greater than -45 feet) the required non-Federal cost share will be 25 percent of the cost of design and construction paid during each of those project phases, plus an additional 10 percent of the cost of design and construction payable after completion of construction (WRDA86 §101(a)(2). The July 2014 Feasibility Report presents project cost-sharing information for both the FY 2015 escalated price levels included in the Chief of Engineers Report, and the FY 2016 fully funded project costs projected for the earliest year during which construction may occur, subject to project authorization, appropriation of funds by Congress, and provision of cost-share funds by the Sponsor.

TABLE A-2
Cost-Sharing for the Recommended Plan
1200-Foot Wide Turning Basin - Federal Base Plan for Ocean Disposal

	FY15 (October 2014) Price Level*	FY16 Fully Funded Price Level**
Project First Cost	$20,774,000	$21,295,000
Federal Up-Front Share (75%)	$15,580,500	$15,971,000
PED Phase	$774,800	$794,000
Construction Phase	$14,805,800	$15,177,000
Non-Federal Share During Design & Construction (25%)	$5,193,500	$5,324,000
PED Phase	$258,300	$265,000
Construction Phase	$4,935,300	$5,059,000
Non-Federal Post-Construction Additional Share (10%)	$2,077,400	$2,130,000

* From Feasibility Report – Executive Summary Table ES-1 and the Chief of Engineers Report.
Note: The numbers used in the Chief of Engineers Report are rounded to the nearest $10,000.
** From Feasibility Report - Table 19/Page 72 and Executive Summary Table ES-1.

Benefit-cost evaluation of navigation improvement projects is based on a 50-year period of analysis suing the interest rate established for the current fiscal year. For FY 2014 that rate was 3-1/2 percent as used in the July 2014 Feasibility Report, and 3-3/8 percent for FY 2015 as presented in the Chief of Engineers Report. Project benefits were developed at FY 2014 price levels, did not include any commodity growth projections, and are therefore unaffected by the change in fiscal year interest rates. Project costs used for benefit-cost analysis include a computation for interest during the period of construction and will change with the changed interest rate. Amortization of project first costs over the 50-year period will also change. The two sets of computations are shown in the table below.

The annualized cost of the Recommended Plan is estimated at $1,076,700 at the FY2014 interest rate of 3-1/2 percent, or $1,057,100 at the FY2015 interest rate of 3-3/8 percent. As the present terminal facilities are adequate for existing and prospective commerce, and the project does not involve deepening, there are no local service facility costs associated with the project. With expected average annual net benefits of $2,208,800 at the FY2014 interest rate of 3-1/2 percent, or $2,248,800 at the FY2015 interest rate of 3-3/8 percent, the benefit/cost ratio for the recommended plan is about 3.1 to 1 using either interest rate.

TABLE A-3
Annual Costs and Benefits of the Recommended Plan
50-Year Project Life

	FY 2014 (October 2013) 3-1/2% Interest*	FY 2015 (October 2014) 3-3/8% Interest**
Investment Cost with IDC (5 months)	$20,478,000	$20,474,000
Interest and Amortization	$873,000	$853,400
Increased Annual Maintenance Dredging	$203,700	$203,700
Total Annual Cost	$1,076,700	$1,057,100
Annual Benefit	$3,285,500	$3,285,500
Benefit/Cost Ratio	3.05	3.11
Net Annual Benefit	$2,208,800	$2,228,400

* From Feasibility Report - Table 14/Page 48, Table 17/Page70, and Exec Summary Table ES-1.
** From Feasibility Report – Executive Summary Table ES-1 and the Chief of Engineers Report.
Note: The numbers used in the Chief of Engineers Report are rounded to the nearest $10,000.

Annual Costs of Federal Base Plan – 7% Interest Rate[+]
Using FY14 and FY15 Investment Costs

	FY 2014	FY 2015
Total Annual Cost	$1,637,200	$1,636,900
Benefit/Cost Ratio	2.01	2.01
Net Annual Benefit	$1,648,300	$1,648,600

[+] From Feasibility Report – Executive Summary Table ES-1.

Specific references to July 2014 Feasibility Report information that would be changed by the conversion to the Fiscal Year 2015 interest rate of 3-3/8 percent are itemized in the following errata sheet.

Errata Sheet – Portsmouth Harbor and Piscataqua River Final Feasibility Report

Executive Summary

The executive summary text (pages ES-3 and ES-6) and Table ES-1 (page ES-4) have been edited to provide project cost and benefit-cost analysis information for both the Fiscal Year 2014 and 2015 price levels and interest rates. Errata notations are provided on the changed pages.

Main Report

Page 44 – The first paragraph and Table 11 use the FY2014 3-1/2 percent interest rate. In FY2015 this rate changed to 3-3/8%. In Table 11 the IDC cost, total project cost, amortization cost, total annual cost, including that for the 7% analysis would all change under the new interest rate as shown in the addendum tables for the recommended plan.

Page 45 – Section 5.1, 3rd paragraph cites the FY 2014 3-1/2% interest rate, which is changed in FY 2015 to 3-3/8 percent.

Page 48 – Section 5.2, 1st paragraph and Table 14 cite and use the FY 2014 3-1/2% interest rate, which is changed in FY 2015 to 3-3/8 percent. Table 14 provides annual costs, annual net benefits and benefit-cost ratios using the FY 2014 3-1/2 percent interest rate which has been changed for the recommended plan as shown in the addendum tables.

Page 69 – Section 6.2, 1st Paragraph cites the FY 2014 3-1/2% interest rate, which is changed in FY 2015 to 3-3/8 percent.

Page 70 – Table 17 and the paragraph below the table (part of Section 6.2) present project investment cost, annual costs, and annual net benefits and benefit-cost ratios for the recommended plan using the FY 2014 3-1/2 percent interest rate which has been changed as shown in the Addendum Table A-3.

Page 71 and 72 – There is no superseded information on these pages and Tables 18 and 19. These are the sources for the benefit-cost and cost-sharing information included in the Addendum.

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN NY 11252-6700

1 July 2014

CENAD-PD-CS

MEMORANDUM FOR Commander, Headquarters, US Army Corps of Engineers, (CECW-NAD/Ms. Shuman), 441 G Street, NW, Washington, DC 20314

SUBJECT: Portsmouth Harbor & Piscataqua River Navigation Improvement Project, New Hampshire and Maine

I hereby submit the Portsmouth Harbor & Piscataqua River Navigation Improvement Project Final Feasibility Report and Environmental Assessment and supporting documentation (enclosed). Further, I concur with the findings and recommendations of the New England District Commander, COL Charles P. Samaris. In addition, I confirm that the report complies with all applicable policy and laws in place at the time of its completion.

Encl
as

KENT D. SAVRE
Brigadier General, USA
Commanding

CF: CENAE-DE

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-EP-PN 19 June 2014

MEMORANDUM FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers, ATTN: CENAD-PD-CID-P (Attn: Mr. Paul Sabalis), Fort Hamilton Military Community, 301 General Lee Avenue, Brooklyn, NY 11252-6700

SUBJECT: Portsmouth Harbor and Piscataqua River, NH & ME, Navigation Improvement Project, Final Feasibility Report and Final Environmental Assessment/FONSI, CWRB Submittal Package, PWI #013654

REFERENCE: Appendix H, Amendment #1, ER 1105-2-100, Policy Compliance Review and Approval of Decision Documents, dated 20 November 2007, Planning Bulletin No. PB-2013-03-Re-issue dated 14 March 2014, Civil Works Review Board Expectations and Guidance Memo dated 2 May 2014, and Policy Review Comments Memos from CECW-NAD and CENAD-PD dated 14 May and 20 May 2014, respectively.

1. In accordance with the referenced guidance, and vertical team conferences with Division and HQUSACE staff, the New England District is submitting copies of the subject Final Feasibility Report, Final Environmental Assessment/FONSI, and associated documents for endorsement and transmittal to HQUSACE in preparation for the Civil Works Review Board for this project scheduled for 21 August 2014.

2. The final report submittal package to NAD and HQUSACE includes the items on the attached list, with numbers of copies in accordance with direction from the NAD RIT.

3. As has been discussed on the weekly vertical team conference calls, State CZM consistency concurrence has been received from New Hampshire, but Maine's CZM concurrence is still pending. Maine expects to have completed their review process and issued their concurrence by the end of June.

4. The project is scheduled for presentation to the Civil Works Review Board at its 21 August 2014 meeting. If further information is needed, please contact NAE Planning Branch Chief, Mr. John Kennelly at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871.

Encl

CHARLES P. SAMARIS
COL, EN
Commanding

CF:
Joseph Vietri, NAD
Naomi Fraenkel, NAD
Michael Keegan, NAE PPM

Portsmouth Harbor and Piscataqua River
Navigation Improvement Project
Final Feasibility Report and Final Environmental Assessment
Submittal Package
19 June 2014

Tab #	**Item Description**	**Copies Provided to NAD**	**Copies Provided to HQ**	**Binder #**
	Division Commander's Letter (provided by NAD)		2	
	District Engineer's Transmittal Letter	1	2	1 & 2
1	Final Feasibility Report & EA **(and 9 CD's)** FONSI (See after EA) M-CACES Estimate & Risk Analysis (See Appendix E) Real Estate Activities (See Appendix H - RE Plan) Public Review Documentation (See Appendix A)	1 with 6 CDs	9 with 9 CDs	1
2	Report Summary (& Word file)	1	9	1 & 2
3	Report Synopsis (& Word file)	1	9	1 & 2
4	Study Issue Checklist	1	9	1 & 2
5	Report Mailing List (& Word file)	1	2	2
6	Value Engineering Statement	1	2	2
7	Sponsor's Letter of Support	1	2	2
8	Sponsor's Self-Certification of Financial Capability	1	2	2
9	Draft Proposed Chief of Engineers Report (& Word file)	1	2	2
10	Risk Register	1	2	2
11	Decision Log	1	2	2
12	Project Briefing Map (Placemat) 9 Extra Unbound Provided	1	2	2
13	Project Fact Sheet	1	2	2
14	CWRB Web Abstract (with Word file)	1	2	2
15	Draft ASA(CW)/OMB Briefing Slides (& PPT File)	1	2	2
	Review Documentation			
16	Economic Model Certification	1	2	2
17	District Quality Control Cert & Report on Final Report	1	2	2
18	Certification of Legal Review on Final Report	1	2	2
19	Policy Compliance Memorandum (with Word file)	1	2	2
20	ATR Report and Certification on Final Report	1	2	2
21	Cost Certification (NWW)	1	2	2
22	IEPR Review Documentation (Exclusion Memo)	1	2	2
23	IPR and TSP Memorandums for Record	1	2	2
24	Review Plan for PED (submitted to Division only)	1	2	2

Deviations from Appendix H

Instead of Project Risk Management Plan – a Risk Register is provided

Portsmouth Harbor and Piscataqua River
New Hampshire & Maine
Navigation Improvement Project

Final Feasibility Report
& Final Environmental Assessment
Including
Finding of No Significant Impact

July 2014

Portsmouth Harbor & Piscataqua River
New Hampshire and Maine
Navigation Improvement Project

Executive Summary

The purpose of the study is determine whether navigation improvements to the existing Federal navigation project at Portsmouth Harbor and Piscataqua River are warranted and in the Federal interest. The existing width of the upper turning basin is too narrow for efficient and safe handling of existing and future commerce. This report presents the results of studies concerning the feasibility of providing a wider turning basin to serve the terminals situated in the upper channel reaches of the Piscataqua River. The report consists of this executive summary, a final Feasibility Report, a final Environmental Assessment (EA) and supporting appendices.

This study of Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, was directed by Section 436 of the Water Resources Development Act of 2000 (P.L. 106-541) which states:

> *"The Secretary shall conduct a study to determine the feasibility of modifying the project for navigation, Portsmouth Harbor and Piscataqua River, Maine and New Hampshire, authorized by section 101 of the River and Harbor Act of 1962 (76 Stat. 1173) and modified by section 202(a) of the Water Resources Development Act of 1986 (100 Stat. 4095), to increase the authorized width of turning basins in the Piscataqua River to 1,000 feet."*

Section 216 of the Flood Control Act of 1970 also provides the Corps general authority to review completed civil works projects.

> *"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to the significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest".*

The study area is located within the 1st Congressional District of New Hampshire and the 1st Congressional District of Maine. In addition, sites considered for nearshore placement of dredged material for beach nourishment are located in the 6th Congressional District of Massachusetts.

The State of New Hampshire, Pease Development Authority, Division of Ports and Harbors (New Hampshire Port Authority) is the non-Federal sponsor for the feasibility study and improvement project.

The Piscataqua River forms a portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the river, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine.

The existing Federal Navigation Project for Portsmouth Harbor and Piscataqua River consists of a 6.2 mile long navigation channel that is 35-feet deep at mean lower low water (MLLW), a minimum of 400 feet wide, and extends from deep water at the river's mouth at New Castle, New Hampshire/Kittery, Maine to the head of deep-draft navigation at Newington, New Hampshire/Eliot, Maine. The project also includes widening in the entrance reach, and at several bends and bridge approaches by removal of ledges at; Henderson Point, Gangway Rock, Badgers Island, the U.S. Route 1 Bypass Bridge (Sarah Long Bridge), and Boiling Rock. Revised channel widths in these areas vary from 500 to 1,000 feet between the two vertical lift bridges. There are two turning basins, a 950-foot wide 35-foot deep basin upstream of Boiling Rock (river mile 5.1) and an 800-foot wide, 35-foot deep basin at the head of the project. The deep draft project features, as modified in 1986 to widen the lower river reaches, was completed in 1992. The project also includes a stone breakwater connecting Goat Island and Great Island (New Castle) constructed in 1880, and shallow-draft back channels connecting the harbor with Little Harbor and Sagamore Creek, completed in 1971.

Portsmouth Harbor is the only deep draft harbor located in the state of New Hampshire. The navigation project is ice-free year round, supports a wide variety of commercial and recreational activities along the Piscataqua River, with commercial terminals located primarily on the south bank of the river in Portsmouth and Newington, New Hampshire. A U.S. Naval Shipyard primarily engaged in servicing submarines is located in Kittery in the lower harbor. Commodities received at the port include petroleum and petroleum products, and bulk and specialty cargos. Principal shipments received at the two upper terminals include road salt, cement, gypsum, kerosene, liquid asphalt, fuel oil and liquid propane gas.

Alternative improvement plans analyzed and compared during the feasibility study included no action, widening the existing turning basin from 800 feet to widths of 1020, 1120 or 1200 feet, and relocating the turning basin to either an upstream or downstream location. The recommended plan of improvement for navigation identified in the report is widening the existing turning basin to 1200 feet at the authorized depth of -35 feet mean lower low water. Approximately 728,100 cubic yards of mostly sand and gravel (glacial till), and about 25,300 cubic yards of rock would be removed to widen the existing turning basin to 1200 feet.

Development of the recommended plan was based on identification of the plan with the highest net annual benefits which is the National Economic Development (NED) plan, in this case widening the existing turning basin to a width of 1200 feet. The NED Plan includes the Federal Base Plan for ocean placement of the dredged material and rock at the Isles of Shoals North site (IOS-N), identified by the Corps and US EPA as a likely selectable site, and is the plan selected for implementation. The costs and benefits of the recommended plan are shown in Table ES-1, using both the Fiscal Year (FY) 2014 interest rate of 3-½ percent, and the FY2015 interest rate of 3-3/8 percent.

The existing project has only required maintenance dredging at one recurring shoal since its initial construction was completed in 1966. The upper turning basin proposed for widening has never required maintenance. The recommended improvement will not change the existing maintenance of the project. An estimate of one percent of the construction cost was included for future maintenance in the annual costs for benefit-cost purposes.

Four coastal communities; Wells, Maine and Salisbury, Newburyport and Newbury, Massachusetts, have expressed a desire to acquire and beneficially use the sandy dredged material. These municipalities have expressed a willingness to fund the additional cost over and above the Federal Base Plan cost, to transport the material to more distant sites for placement in nearshore bars along eroding beaches in those communities. The report presents estimates of the additional costs allocated to placement at these alternative beneficial use sites.

Although beneficial uses for rock were discussed with the States and municipalities, no firm plans were developed and the current plan includes placement of the rock at the IOS-N site. Coordination will continue with State and local officials during the project's design phase. The Town of Kittery, Maine, is pursuing design and regulatory approval for construction of a stone berm to act as a wave break for their small craft anchorage at Pepperell Cove at the mouth of Portsmouth Harbor. Should the Town successfully complete its efforts and is willing to provide funds to cover any excess cost for placement of the material at this site over the cost of the Base Plan, then the rock from the turning basin expansion could be made available to the Town.

The Recommended Plan is supported by the non-Federal Sponsor, the New Hampshire Pease Development Authority. The plan accomplishes the objectives of reducing safety hazards and grounding damages, decreasing turning costs, and reducing waterborne transportation costs for carriers and shippers utilizing the two upper Piscataqua River terminals identified as beneficiaries of the project.

Errata: December 2014 to add FY2015 interest rate reference in first paragraph.

TABLE ES-1 **Costs and Benefits of the Recommended Plan** **1200-Foot Wide Turning Basin**		
First Cost of Improvement – Federal Base Plan – October 2013 Price Level		
General Navigation Feature Improvements		$15,309,000
Contingencies		$3,234,000
Planning, Engineering and Design		$997,000
Construction Management		$827,000
Lands, Easements, ROWs		None
Total First Cost		$20,367,000
Annual Costs of Federal Base Plan – 50-Year Project Life		
	FY 2014 (October 2013) 3-1/2% Interest	FY 2015 (October 2014) 3-3/8% Interest
Investment Cost with IDC (5 months)	$20,478,000	$20,474,000
Interest and Amortization	$873,000	$853,400
Increased Annual Maintenance Dredging	$203,700	$203,700
Total Annual Cost	$1,076,700	$1,057,100
Annual Benefit	$3,285,500	$3,285,500
Benefit/Cost Ratio	3.05	3.11
Net Annual Benefit	$2,208,800	$2,228,400
Annual Costs of Federal Base Plan – 7% Interest Rate		
Total Annual Cost	$1,637,200	$1,636,900
Benefit/Cost Ratio	2.01	2.01
Net Annual Benefit	$1,648,300	$1,648,600

Errata: December 2014 to add FY2015 interest rate computation to Table ES-1

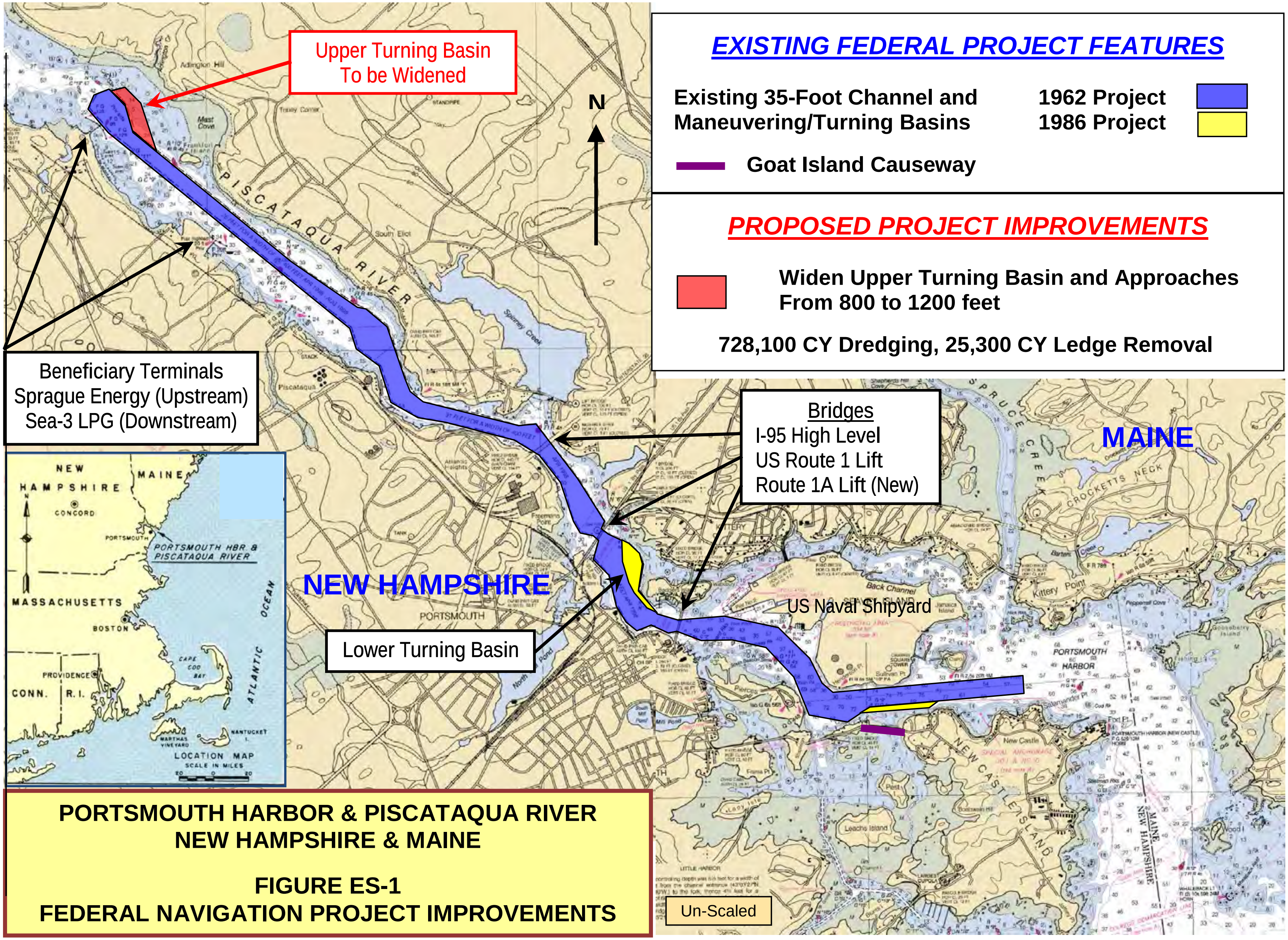
TABLE ES-1 (Continued) Costs and Benefits of the Recommended Plan 1200-Foot Wide Turning Basin	
Federal Base Plan – October 2014 (FY 2015) Budget Year Level Cost	
General Navigation Feature Improvements	$15,588,000
Contingencies	$3,293,000
Planning, Engineering and Design	$1,033,000
Construction Management	$857,000
Lands, Easements, ROWs	None
Total Program/Budget Year (FY2015) Cost	$20,774,000
Federal Base Plan – October 2014 (FY 2015) Budget Year Level Cost	
Federal Up-Front Share (75%)	$15,580,500
PED Phase	$774,800
Construction Phase	$14,805,800
Non-Federal Share During Design and Construction (25%)	$5,193,500
PED Phase	$258,300
Construction Phase	$4,935,300
Non-Federal Post-Construction Additional Share (10%)	$2,077,400
Federal Base Plan – Fully Funded Cost (February 2016)	
General Navigation Feature Improvements	$15,962,000
Contingencies	$3,371,000
Planning, Engineering and Design	$1,059,000
Construction Management	$902,000
Lands, Easements, ROWs	None
Total Fully Funded Cost	$21,295,000
Cost Sharing for GNF – Fully Funded Cost	
Federal Up-Front Share (75%)	$15,971,000
PED Phase	$794,000
Construction Phase	$15,177,000
Non-Federal Share During Construction (25%)	$5,324,000
PED Phase	$265,000
Construction Phase	$5,059,000
Non-Federal Post-Construction Additional Share (10%)	$2,130,000

Cost sharing of the recommended plan is based on sharing the costs of the Federal base plan between the Federal government and the non-Federal Sponsor. The estimated project first cost for the Federal base plan is \$20,367,000 (October 2013 price level). That cost escalated to the programmed budget year (Fiscal Year 2015) is \$20,774,000. Costs escalated to the assumed fully funded mid-point of construction of February 2016) would be \$21,295,000. The Federal share would be 75 percent and the non-Federal sponsor's share would be 25 percent. The non-Federal sponsor would also be responsible for an additional contribution equal to 10 percent of the project cost after construction to be paid over a period not to exceed 30 years.

The expected annual economic benefit of the proposed navigation improvements is about \$3,285,500, based on a 50-year project economic life beginning with a base year of FY 2016. The annualized cost of the recommended plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction and contingencies, and is estimated at \$1,076,700 at the FY2014 interest rate of 3-1/2 percent, or \$1,057,100 at the FY2015 interest rate of 3-3/8 percent. As the present terminal facilities are adequate for existing and prospective commerce, and the project does not involve deepening, there are no local service facility costs associated with the project. With expected average annual net benefits of \$2,208,800 at the FY2014 interest rate of 3-1/2 percent, or \$2,248,800 at the FY2015 interest rate of 3-3/8 percent, the benefit/cost ratio for the recommended plan is about 3.1 to 1 using either interest rate.

The recommendations contained in this Final Feasibility Report and Final Environmental Assessment reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, New Hampshire Pease Development Authority, Division of Ports and Harbors and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

Errata: December 2014 to add FY2015 interest rate and benefit-cost computation



EXISTING FEDERAL PROJECT FEATURES

Existing 35-Foot Channel and Maneuvering/Turning Basins	1962 Project	🟦
	1986 Project	🟨
▬	Goat Island Causeway	

PROPOSED PROJECT IMPROVEMENTS

🟥 Widen Upper Turning Basin and Approaches From 800 to 1200 feet

728,100 CY Dredging, 25,300 CY Ledge Removal

PORTSMOUTH HARBOR & PISCATAQUA RIVER
NEW HAMPSHIRE & MAINE

FIGURE ES-1
FEDERAL NAVIGATION PROJECT IMPROVEMENTS

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT PROJECT

FEASIBILITY REPORT

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Acronyms Used in this Document

Acronym	Meaning
ATR	Agency Technical Review
CADS	Cape Arundel Disposal Site
CWRB	Civil Works Review Board
CY	Cubic Yards
DEP	Department of Environmental Protection (NH or MA)
DMR	Maine Department of Marine Resources
DOD	Department of Defense
DRED	NH Department of Resources and Economic Development
DWT	Dead Weight Tons (Ship's Displacement)
EFH	Essential Fisheries Habitat
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FNP	Federal Navigation Project
GNF	General Navigation Features (Federal Project Features)
IEPR	Independent External Peer Review
IOS-H	Isles of Shoals Historic Disposal Site
IOS-N	Isles of Shoals North Ocean Placement Site
MBDS	Massachusetts Bay Disposal Site
ME DEP	Maine Department of Environmental Protection
MGS	Maine Geological Survey
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
MPRSA	Marine Protection Research and Sanctuaries Act
NED	National Economic Development
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
O&M	Operations and Maintenance
OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
OSE	Other Social Effects
PDA	Pease Development Authority
PDS	Portland Disposal Site
SBIT	Saco Bay Implementation Team
TPCS	Total Project Cost Summary
TSP	Tentatively Selected Plan
VE	Value Engineering
USACE	U. S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USF&WS	U.S. Fish and Wildlife Service (Also FWS, USFWS)
USGS	U.S. Geological Survey
WHG	Woods Hole Group
WRDA	Water Resources Development Act

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NAVIGATION IMPROVEMENT PROJECT
FEASIBILITY REPORT

1.0 INTRODUCTION

1.1 Study Authority

This study of Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, was directed by Section 436 of the Water Resources Development Act of 2000 (P.L. 106-541) which states:

> *"The Secretary shall conduct a study to determine the feasibility of modifying the project for navigation, Portsmouth Harbor and Piscataqua River, Maine and New Hampshire, authorized by section 101 of the River and Harbor Act of 1962 (76 Stat. 1173) and modified by section 202(a) of the Water Resources Development Act of 1986 (100 Stat. 4095), to increase the authorized width of turning basins in the Piscataqua River to 1,000 feet."*

The study was initiated at the request of the State of New Hampshire, Pease Development Authority, Division of Ports and Harbors, the study sponsor, using funds from the Fiscal Year 2004 Energy and Water Development Appropriations Bill.

Section 216 of the Flood Control Act of 1970 also provides the Corps general authority to review completed civil works projects.

> *"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to the significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest".*

The study area is located within the 1st Congressional District of New Hampshire and the 1st Congressional District of Maine. In addition, some sites considered for nearshore placement of dredged material for beach nourishment are located in the 6th Congressional District of Massachusetts.

1.2 Purpose and Scope

The study purpose is to evaluate the feasibility of modifying the existing Portsmouth Harbor and Piscataqua River Federal navigation project to provide a wider turning basin for vessels that off load their cargos at the upper two terminals on the Piscataqua River. The existing width of 800 feet is too narrow for efficient and safe handling of existing and future commerce. An additional purpose was to establish the level of support, willingness and capability of the non-Federal sponsor to participate in recommended improvements.

1.3 Study Area

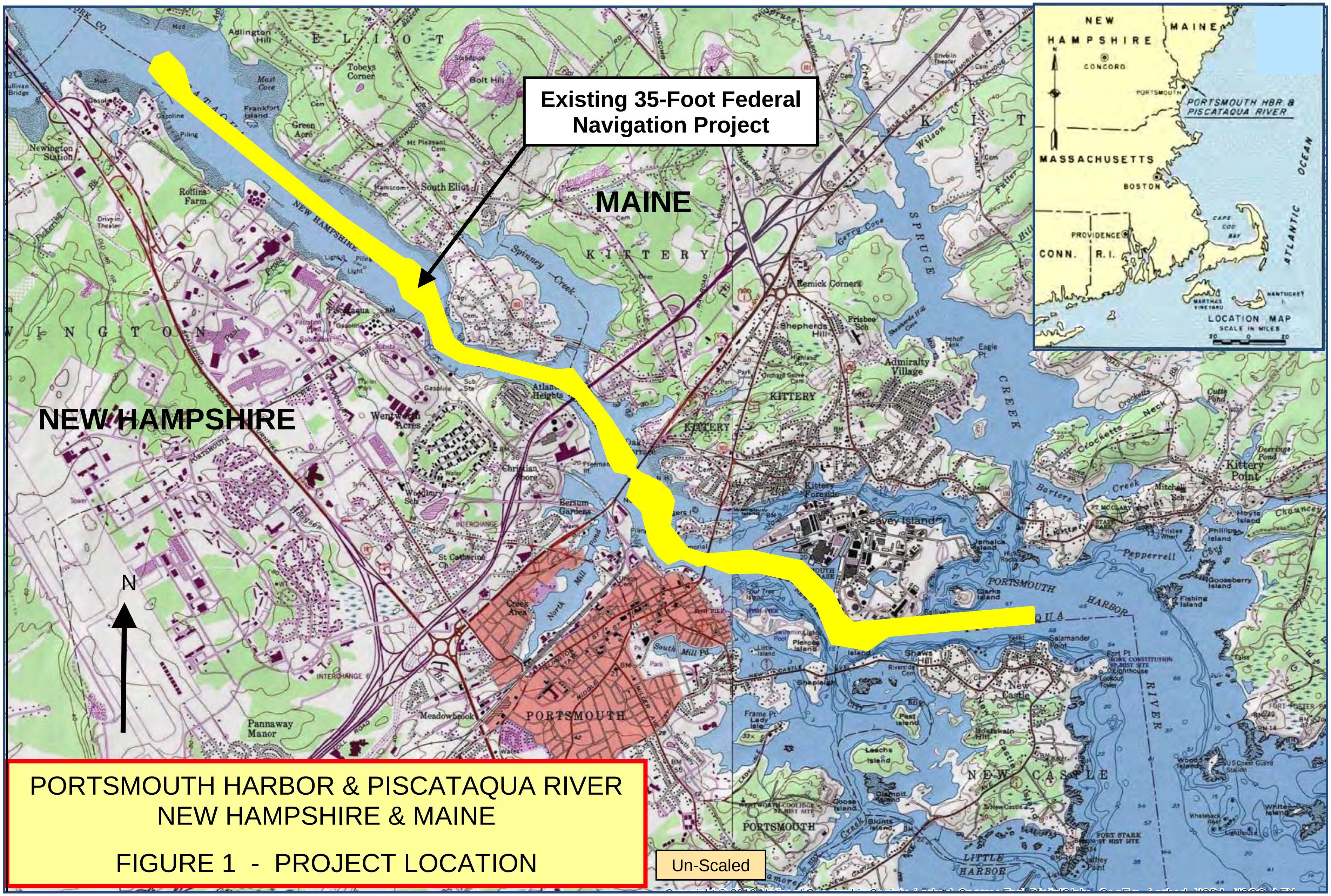
The Piscataqua River, which has a drainage area of about 1495 square miles, forms a portion of the interstate boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the river as shown in Figure 1, is situated about 45 miles northeast of Boston, Massachusetts and 37 miles southwest of Portland, Maine. The existing Federal navigation project includes a 35-foot deep channel, 400-feet wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to just north of Sprague Energy's River Road terminal in Newington, New Hampshire (river mile 8.8).

The focus of this feasibility study is providing improved deep-draft navigation conditions in the upper channel reaches of the Piscataqua River above the bridges. The project reaches below this area were widened under improvements authorized in 1986 and completed in 1992. The existing turning basin serving the upper river reaches is located at the upstream end of the Federal channel near Newington, New Hampshire and Eliot, Maine. This turning basin is 800-feet wide and 35-feet deep at mean lower low water. Two active terminals, Sea-3/Sprague Avery Lane and Sprague River Road utilize the turning basin. A third terminal, owned by the Department of Defense (DOD), for supplying fuel to the former Pease Air Force Base, is currently not in use.

1.4 Existing Federal Navigation Project

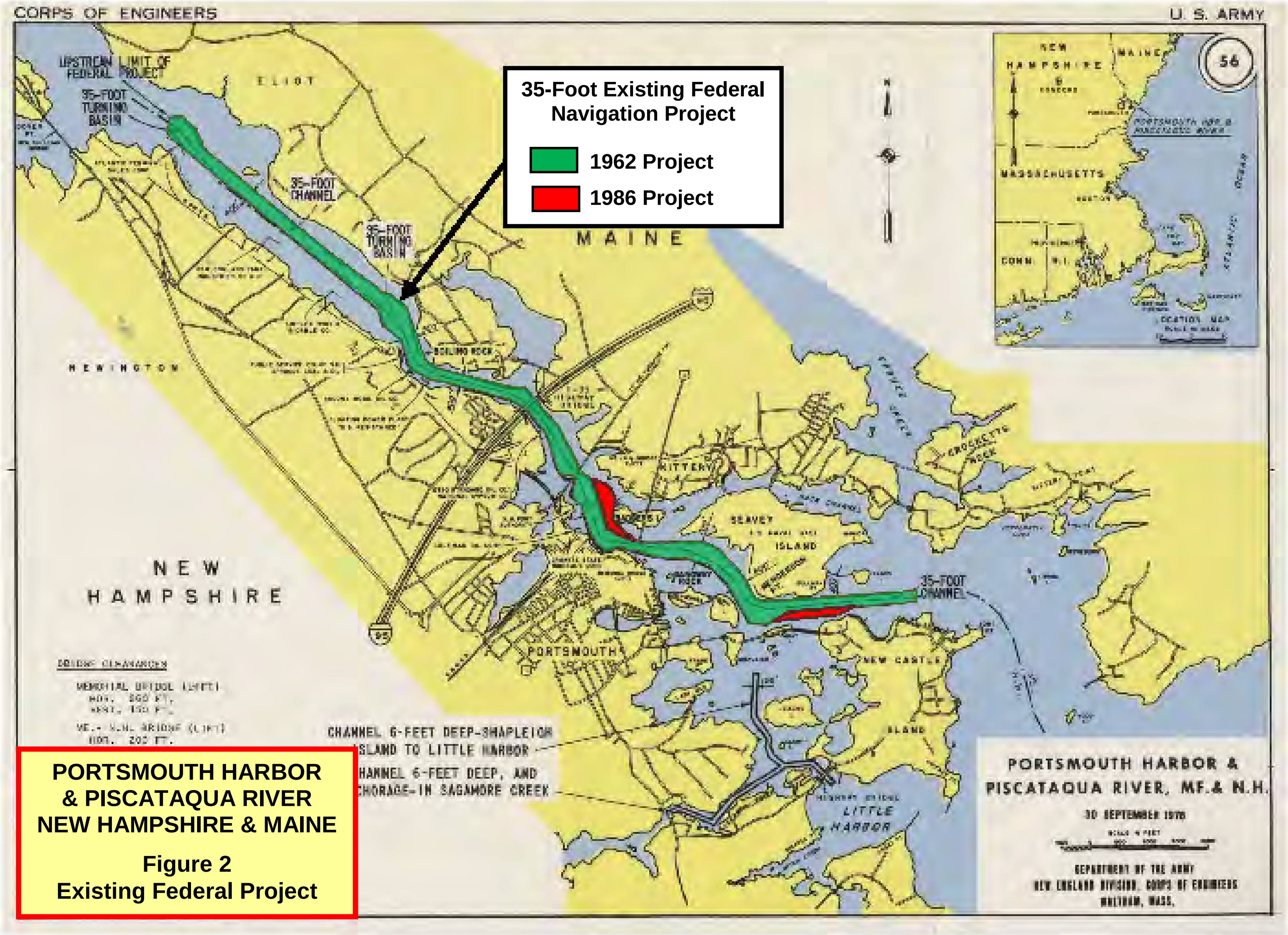
As previously stated, the Portsmouth Harbor and Piscataqua River Federal navigation project consists of a 6.2 mile long navigation channel that is 35-feet deep at mean lower low water (MLLW), generally 400 feet wide, and extends from deep water in Portsmouth, New Hampshire to the head of navigation in Newington, New Hampshire. The project, shown in Figure 2, also includes widening at several bends by removal of ledge at; Henderson Point, Gangway Rock, Badgers Island, the U.S. Route 1 Bypass Bridge (Sarah Long Bridge), and Boiling Rock. Revised channel widths in these areas vary from 500 to 1,000 feet between the two vertical lift bridges. There are two turning basins, a 950-foot wide 35-foot deep basin upstream of Boiling Rock (river mile 5.1) and an 800-foot wide, 35-foot deep basin at the head of the project.

The project also includes the 6-foot deep Back Channels project located about one mile south of the outer end of the main ship channel. This channel extends 0.4 mile from the head of Little Harbor at 100 feet wide, through the Route 1B drawbridge to deep water at the junction of two 75-foot wide branch channels. One branch channel extends 0.7 mile to deep water between Shapleigh and Goat Islands to connect through a fixed bridge with Portsmouth Harbor, and the other extends 0.9 miles up Sagamore Creek to a 3 acre anchorage area along the upper end of the channel near the Route 1A Bridge in Rye, New Hampshire.



PORTSMOUTH HARBOR & PISCATAQUA RIVER
NEW HAMPSHIRE & MAINE

FIGURE 1 - PROJECT LOCATION



PORTSMOUTH HARBOR
& PISCATAQUA RIVER
NEW HAMPSHIRE & MAINE

Figure 2
Existing Federal Project

1.4.1 Construction History of the Navigation Project

Federal involvement in navigation improvements at Portsmouth Harbor and along the Piscataqua River began in 1879 with initiation of construction of a breakwater between Goat Island and Great Island, which now serves as a causeway carrying Route 1B to connect Great Island (Town of New Castle) to the mainland. This work was followed by removal of ledge at Badgers Island and Gangway Rock between 1881 and 1891. In 1956, additional ledge was removed to a depth of 35 feet at Boiling Rock, Gangway Rock and the southwest point of Badgers Island to remove channel restriction and improve navigation in these areas.

The next improvements were authorized by the River and Harbor Act of 1962, and were constructed between 1964 and 1966. These improvements deepened and widened the natural and previously improved areas of the channel to provide a depth of -35 feet MLW with a minimum width of 400 feet, extending about 6.2 miles from deep water north of New Castle Island to a turning basin located below the entrance to Great Bay. Also included was widening the channel to various widths in bends and bridge approaches, and construction of turning basins upstream from Boiling Rock and at the head of navigation. This project was designed to accommodate bulk carriers of about 35,000 dead weight tons (DWT) with a draft of 35 feet transiting with tidal assistance.

The Water Resources Development Act of 1986 made additional modifications consisting of widening the channel to the south along the Goat Island Causeway to 550 feet, to the north along Badgers Island by an additional 100 feet, and providing additional 600 to 1000-foot wide emergency maneuvering area between Badgers Island and the Route 1 (Sarah M. Long) bridge. These improvements were constructed in 1989 to 1992 and were designed to permit bulk carriers in the 40,000 to 45,000 DWT class to access terminals below Interstate 95. The upstream reaches of the project were also investigated leading up to the 1986 modifications, specifically widening of the upper turning basin. At that time however initial investigations indicated that widening of the upper turning basin would encounter substantial ledge carrying a high cost for removal. Improvements to the upper basin were determined to be not economically justified at that time as a result.

Bulk carriers in the 45,000 DWT class are now calling on terminals upstream of I-95. These shifts to larger vessels upstream led to the request to re-examine turning basin improvements for the upper project area. A complete listing of project authorizations and work history is included in Appendix B.

1.4.2 Navigation Uses of the Federal Navigation Project

Portsmouth Harbor is the only deep draft harbor located in the state of New Hampshire. The navigation project supports a wide variety of commercial and recreational activities along the Piscataqua River. Commercial terminals are located primarily on the south bank of the river in Portsmouth and Newington, New Hampshire. The U.S. Naval Shipyard is situated on Seavey's Island along the north bank of the river in Kittery, Maine, and mainly supports the Atlantic submarine fleet.

The fleet currently calling on the upper Piscataqua River in Portsmouth Harbor ranges is length from 420 feet to 747 feet, with most vessels in the 20,000 to 50,000 DWT range. There are currently 78 vessel visits a year with many shipments originating in the Mediterranean, Northern Europe and the Caribbean.

1.5 Feasibility Study Process

The Corps planning and evaluation for water resource projects is based on the "Economic and Environmental Principles & Guidelines (P&G) for Water and Related Land Resources Implementation Studies" approved in 1983. The P&G was implemented under the authority of the Water Resources Planning Act of 1965. In accordance with the P&G the Federal objective of a water resource project is to contribute to the national economic development consistent with protecting the nation's environment. The P&G are the drivers for the Corps planning process. The Corps regulation that describes the process is the Planning Guidance Notebook; Engineering Regulation 1105-2-100 dated April 22, 2000 and subsequent revisions.

The Corps planning process follows a six step iterative process as described in the Planning Guidance Notebook and includes the following steps:

1. Specification of water and related land resources, problems, and opportunities
2. Inventory, forecast, and analysis of existing and future conditions
3. Formulation of alternative plans
4. Evaluation of the effects of the alternative plans
5. Comparison of alternative plans
6. Selection of a recommended plan

The process considers the four criteria of completeness, effectiveness, efficiency, and acceptability in the screening of alternative plans. Completeness is the extent to which the plan accounts for all necessary investment or actions. For example plans that rely on activity by others to be successful may not be complete if the activity to be completed by others is unlikely to occur. Effectiveness is the degree to which an alternative plan contributes to the attainment of the planning objective. An efficient plan is the extent to which an alternative plan is most cost-effective means of attaining the objective. Acceptability measures the workability of a plan and compatibility with existing laws, regulations, and public policy.

During the feasibility study alternatives are formulated and evaluated to determine which alternative reasonably maximizes the net economic benefit consistent with protection of the environment. The economic benefits calculated for this study are National Economic Development (NED) benefits. NED benefits are contributions to national economic development that increase the value of the national output of goods and services. For deep-draft navigation projects, the most common type of NED benefit is transportation cost savings, typically waterborne transportation cost savings. The NED benefits are estimated by comparing the transportation costs without the project to the transportation costs with the project. Any decrease in total transportation costs resulting from the project equal the benefits of the project. The project costs are then subtracted from the benefits to determine the net benefits. The alternative that maximizes the net benefits, consistent with protection of the environment is the Corps identified NED plan.

Projects may deviate from the NED plan if requested by the non-Federal sponsor and approved by Assistant Secretary of the Army for Civil Works. For example a non-Federal sponsor may not be able to afford or otherwise support the NED Plan. Plans requested by the non-Federal sponsor that deviate from the NED plan are identified as the Locally Preferred Plan (LPP).

The Corps feasibility study process also contains an Environmental Assessment. The Environmental Assessment (EA) is prepared in compliance with the requirements of National Environmental Policy Act (NEPA). NEPA requirements are outlined in the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508) and the U.S. Army Corps of Engineers Regulation 200-2-2, “Procedures for Implementing NEPA". The EA is designed to serve as a concise public document that briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact; and to aid the Corps of Engineers in compliance with the NEPA, when an environmental impact statement is not necessary. The EA includes a brief discussion of the need for the project, the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.

1.6 Environmental Operating Principles

The Corps has reaffirmed its commitment to the environment in a set of "Environmental Operating Principles". These principles foster unity of purpose on environmental issues and reflect a positive tone and direction for dialogue on environmental matters. By implementing these principles within the framework of Corps regulations, the Corps continues its efforts to evaluate the effects of its projects on the environment and to seek better ways of achieving environmentally sustainable solutions in partnership with stakeholders.

The seven “Environmental Operating Principles” are as follows:

1. Foster sustainability as a way of life throughout the organization.
2. Proactively consider environmental consequences of all Corps activities and act accordingly.
3. Create mutually supporting economic and environmentally sustainable solutions.

4. Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.
5. Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
6. Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
7. Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

1.7 USACE Campaign Plan

The U.S. Army Corps of Engineers (Corps) Campaign Plan guides Corps policy decisions on how we organize, train, and equip our personnel; how we plan, prioritize, and allocate resources; and how we respond to emerging requirements and challenges. Implementation of the goals and objectives from this Campaign Plan will lead to actual change in the Corps organization moving the Corps from "good to great."

The Corps strategic plan effort towards improvement began in August 2006 with the "12 Actions for Change" and has evolved to four goals and associated objectives. Although the effort originally developed with a focus on missions that seek to manage risk associated with flooding and storm damage, the Campaign Plan Goals and Objectives are applied to all aspects of the Corps service to the nation including its navigation mission. USACE Campaign Plan Goals and Objectives are derived, in part, from the Commander's Intent, the Army Campaign Plan, and Office of Management and Budget guidance. The two goals and associated objectives related to the feasibility study are:

Goal 2: Deliver enduring and essential water resource solutions through collaboration with partners and stakeholders.

> **Objective 2a:** Deliver integrated, sustainable, water resources solutions.
> **Objective 2b:** Implement collaborative approaches to effectively solve water resource problems.
>
> Addressing Objective 2a and 2b. The study considers the harbor as a physical and economic system with general navigation features, local service facilities, port facilities, and shippers and consideration of the environmental. The recommended plan will consider the likelihood and potential for gain in economic benefits related to the project improvements. The public is involved through the NEPA review process.

Goal 4: Build and cultivate a competent, disciplined, and resilient team equipped to deliver high quality solutions.

Objective 4b: Communicate strategically and transparently.

Addressing Objective 4b. The study provides opportunities for agency technical review and involvement of the Corps established Center of Expertise, and technical and policy expertise available though the vertical chain of command at the New England District, North Atlantic Division, and Corps Headquarters, Washington D.C., Office of Water Project Review.

2.0 PLANNING SETTING AND PROBLEM IDENTIFICATION

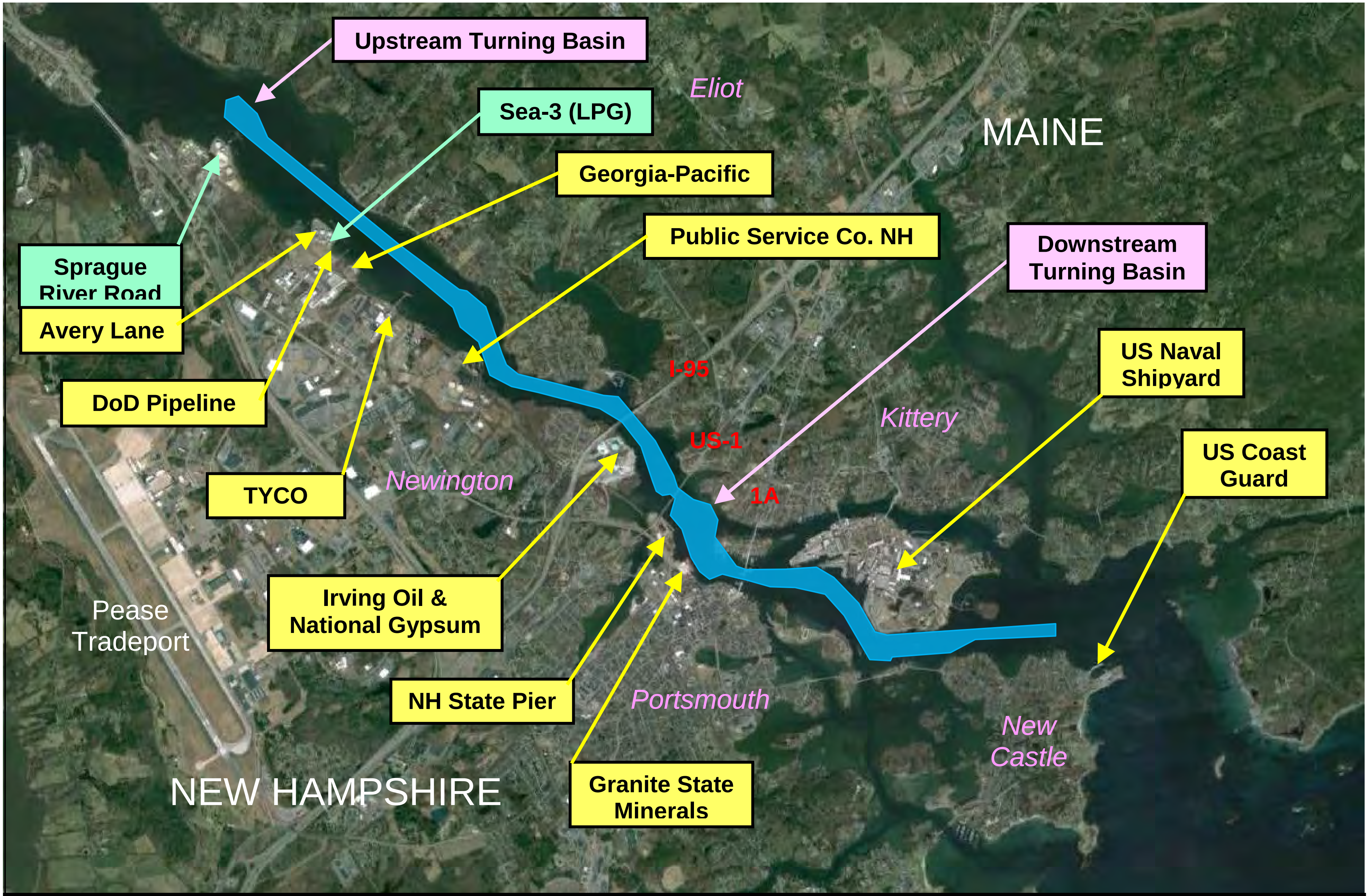
2.1 General Setting and Navigation Problems

The Portsmouth Harbor and Piscataqua River Federal Navigation Project is located along the lower reaches of the Piscataqua River estuary and extend from river mile 2.6 to river mile 8.8. The Harbor is New Hampshire's only deep water port. It is also ice-free, year round which allows navigation throughout the year. The Piscataqua River extends for about 13 miles and forms a portion of the border between New Hampshire and Maine. Communities bordering deep draft reaches of the river include Newcastle, Portsmouth and Newington in New Hampshire and Kittery and Eliot in Maine.

There are seven major terminals along the Piscataqua River on the New Hampshire side of the River in Portsmouth and Newington. Table 1 is a listing of these terminals, in order from downstream to upstream, and the major cargos that are handled at each one. The Market Street Terminal, owned and operated by the New Hampshire Pease Development Authority (PDA), Division of Ports and Harbors, is the only public access, general cargo terminal on the river. The locations of the port's terminals are shown in Figure 3.

TABLE 1
Marine Terminals along the Piscataqua River

Terminal	Cargos Handled
Granite State Minerals	Road Salt
New Hampshire State Pier (Market Street Terminal)	Bulk cargo (scrap metal, road salt, gypsum), and general, project and container cargo
National Gypsum /Irving Oil	Gypsum and fossil fuels (kerosene and oil)
Public Service of New Hampshire	Fossil fuels (coal and oil)
Tyco Wire and Cable	Specialty cargo (cable)
Sprague Avery Lane/Sea-3 Newington	Liquid asphalt, oil and propane
Sprague River Road	Bulk cargo (road salt, cement, gypsum), liquid cargo (tallow) and fossil fuels (kerosene)



PORTSMOUTH HARBOR & PISCTAQUA RIVER

FIGURE 3 – DEEP DRAFT TERMINALS

🟩 Beneficiary Terminals

🟨 Other Terminals

As shown in the table below, Portsmouth Harbor terminals ship and receive a variety of commodities. The types of commodities have remained relatively unchanged with petroleum fuels and construction materials predominating. Growth from 2010 to 2011 was about 2.8%. In 2011 these goods were carried in 121 vessels, of which half (61) had arrival drafts greater than the 32 feet that can be carried at all tides with 10 percent underkeel clearance in the 35-foot channel.

TABLE 2
Commodities Shipped – Thousands of Tons

Commodity	**2010**	**2011**
Coal	313	309
Liquid Petroleum Fuels	1200	1,183
LPG	316	198
Asphalt	57	26
Gypsum	491	529
Scrap Metal and Slag	131	214
Salt and Minerals	446	555
All Other Commodities	9	33
Total All Commodities	2,964	3,047

Currents along the Piscataqua River are among the highest of commercial harbors in the northeast United States with currents reaching speeds of up to 5 knots. In addition to these currents, the principle factors that limit the size of ships that can safely navigate the harbor are the alignment and size of the bridge opening at the Sarah Long Bridge, and the undersized turning basin at the head of navigation. The alignment of the span at the Sarah Long Bridge is being addressed with the replacement of the bridge. Construction of a new bridge is scheduled to begin in late 2014. With completion of this new bridge, the undersized turning basin at the upstream end of the navigation project will remain as the major factor limiting the size of ships that can safely use the two upper terminals on the Piscataqua River. Fast currents will continue to be addressed by limiting ship transits and turns to slack or near slack water periods.

2.2 Topography and Geology

2.2.1 Physiography

The project area is in the New England physiographic province of southeastern Maine and New Hampshire. The Piscataqua River estuary is located in the Seaboard Lowland section. The Seaboard Lowland section rises uniformly from sea level to an elevation of about 300 to 400 feet with occasional hills rising above this elevation. Relief is generally low with rivers flowing southeasterly to the Atlantic Ocean.

2.2.2 Marine Geology and Geophysics

Bedrock beneath the Piscataqua River consists of the Elliot Formation (SOe – Generally thin-bedded gray calcareous and ankeritic quartz-biotite-chlorite phyllite and metasiltstone; and dark gray biotite-chlorite-muscovite phyllite). The Elliot Formation strikes northeast and dips steeply southeast (70 degrees). Compositional layering in the metamorphic rock of the Elliot Formation has been documented in the area of the General Sullivan Fault. A diabase dike outcrops on the south bank of the Piscataqua River and strikes northeast with a near vertical dip.

A seismic reflection survey was conducted as part of a Marine Geophysical Investigation (See Attachment to Appendix F), but, as reported in the final report, it was unable to differentiate between acoustic basement composed of bedrock and acoustic basement composed of glacial till. To characterize material in the area of the proposed turning basin widening, a total of 8 borings and three probes were advanced in this area. Soil samples were taken at 5 foot intervals while advancing the borings and the probes were conducted to determine depth to bedrock. During conduct of the borings, bedrock was encountered at elevation -30 feet mean lower low water (MLLW) at boring B-6. The rock core recovered from this boring appears to be gray phyllite. No other borings, all of which were advanced to at least -40 feet MLLW, encountered bedrock. Geophysics, boring, and probe results were used to estimate the depth and extent of bedrock in the study area.

2.3 Soils and Sediment Characterization

Along the Piscataqua River, surficial geologic material consists of marine regressive deposits generally composed of sand, gravel and silt, and drumlinoid deposits of surficial materials that strike northwest-southeast.

To characterize soils in the area of potential turning basin widening, ten representative samples of the soils that were collected when the borings were advanced were tested for grain size. These results, which are summarized in Table 3, are shown in Appendix F.

As analysis of soils at boring B-5 showed a high percentage of silt, additional analysis of surface sediments in this area were conducted to complete the Suitability Determination for disposal of dredged material. Bottom grab samples were collected in a 75 foot grid pattern around the location of boring B-5. A total of 22 grab samples were attempted. Samples could not be obtained at six of these locations after 5 attempts. This was attributed to hard rocky bottom conditions. Table 4 shows the results of grain size analysis of these samples. All of these samples, except for two, had a very low percentage of silt. Based on this analysis, the material was found suitable for ocean disposal.

TABLE 3
Grain Size Analysis of Boring Soil Samples

Boring Number and Sample Identification	% cobble	% gravel	% sand	% silt & clay
B-1 (J-5)	-	1.5	89.9	8.6
B-2 (J-3)	-	1.0	90.4	8.6
B-4 (J-3)	-	1.7	83.8	14.5
B-5 (J-1)	-	0.0	5.7	94.3
B-5 (J-3)	-	13.4	45.1	41.5
B-7 (J-1)	-	0.03	89.1	10.6
B-7 (J-2)	-	2.5	84.2	13.3
B-7 (J-3)	-	16.2	76.5	7.3
B-8 (J-1)	-	13.5	76.5	10.0
B-8 (J-2)	-	19.4	74.9	5.7

TABLE 4
Grain Size Analysis of Surface Grab Samples

Sample Number	Depth of Water	% gravel	% sand	% silt & clay
1	20	No sample		
2	18.5	No sample		
3	17.7	78.0	20.7	1.3
4	10	No sample		
5	19	45.9	53.3	0.8
6	19	1.1	67.6	31.3
7	17.4	14.1	76.9	8.7
8	18.9	No sample		
9	20.1	57.0	42.1	0.9
10	15.7	41.0	58.1	0.9
11	16.4	-	92.9	7.1
12	18.5	67.0	31.0	2.0
13	16.3	No sample		
14	14.6	11.8	85.4	2.8
15	16.6	82.1	16.9	1.0
16	17.9	0.8	90.2	9.0
17	12.5	5.7	83.4	10.9
18	15	36.7	61.5	1.7
19	7	60.9	33.5	5.6
20	10	No sample		
21	6.4	3.1	78.4	18.5
22	8	5.5	87.0	7.5

2.4 Water Resources

2.4.1 Piscataqua River

The Piscataqua River is a 13 mile long tidal estuary formed by the confluence of the Cocheco and Salmon Falls Rivers. The watershed covers an area of about 1,495 square miles and includes the additional watersheds of the Great Works River and fiver rivers that flow into Great Bay. The rivers that enter Great Bay include the Bellamy, Oyster, Lamprey, Squamscott, and Winnicut. Great Bay is a large tidally dominated estuary that occupies over 6,000 acres (more than 9 square miles). The lower river forms one of the finest harbors in the Northeast despite having currents rated among the highest in North America.

2.4.2 Marine Water Quality

The water quality in the Piscataqua River is generally good as New Hampshire and Maine have an agreement to maintain acceptable water quality in the river by regulating their effluent discharges into the river. The river is designated by the state of New Hampshire as a Class B stream segment and by the state of Maine as a Class SB. New Hampshire Class B waters are acceptable for bathing and other recreational purposes. Maine Class SB waters are suitable for water contact recreation, fishing, shellfish harvesting and propagation, and are valuable fish and wildlife habitat.

2.5 Estuarine Biology

New Hampshire’s estuaries are composed of a variety of habitats. They serve as nursery areas for commercially important fish and shellfish species as well as sustaining runs of numerous anadromous and diadromous species. The primary producers include a diverse community of benthic organisms, seaweeds and eelgrass.

2.6 Estuarine Vegetation

The majority of the salt marsh in the Great Bay Estuary can be found in the lower portions of the Piscataqua River near Portsmouth Harbor and Little Harbor. A salt marsh fringe is located along the edges of Mast Cove, which is located along the Maine side of the river near the turning basin. Seaweeds mapped in Mast Cove are iris moss, tufted red weed and knotted wrack.

Eelgrass is an essential habitat for the Great Bay Estuary because it is the basis of an estuarine food chain that supports many of the recreationally, commercially and ecologically important species in the estuary and beyond. Despite its ecological importance, there has been a continuing loss of eelgrass biomass in the estuary, and virtually all of the eelgrass in Little Bay and the Piscataqua River has died. Despite the slight increase of eelgrass distribution in the Great Bay Estuary in 2008, there was continued loss of percent cover and biomass in Great Bay and in Portsmouth Harbor in 2007-2008. In 2008, eelgrass was found only in the Great Bay itself and in Portsmouth Harbor. Overall, the estuary has lost 66% of its eelgrass biomass since 1996.

A lack of eelgrass sighted in the proposed turning basin project area was confirmed by staff from the U.S. Army Corps of Engineers (USACE), New England District. Dr. Fred Short of the University of New Hampshire accompanied the staff of USACE during this site visit. An underwater camera was towed along several transects within the proposed expansion of the turning basin to locate eelgrass on October 14, 2008. The results of the field trip indicated that no eelgrass exists in the proposed navigation improvement area, only seaweed.

Another eelgrass survey was conducted when it was reported by Dr. Short at a NH Dredged Material Task Force Meeting on October 21, 2009 that eelgrass had returned to the proposed project area. Another video survey was successfully carried out on November 5, 2009 by USACE personnel in the vicinity of the proposed project area. Depths in the area surveyed ranged from five to 24 feet at the time of survey (intertidal to 19 feet adjusted to MLLW). Again, no eelgrass was observed in the survey area. The bottom type consisted of sand with cobble, gravel and shell, with several areas of dense kelp beds. A record of the field trip, video survey log, and screen captures from each of the video survey stations can be found in Appendix L.

2.7 Benthic Invertebrates

Benthic invertebrates include epibenthos such as motile bottom dwelling taxa (e.g. snails, crabs and lobsters) and sessile taxa that attach to hard substrates (e.g. oysters, barnacles) as well as infaunal benthos that burrow in the sediments. Environmental conditions that are important in influencing invertebrate occurrence include water depth, substratum, temperature, and salinity. Substratum type is also a major determinant of species composition.

Community composition is determined to a great extent by sediment grain size. Although species dominance can vary spatially and temporally, generally speaking the dominant taxa in the Great Bay Estuary are the polychaetes, the amphipod, and the bivalves. Abundance, number of taxa and species diversity generally increase with decreasing distance from the open coast, indicating that fewer species are tolerant of the seasonal temperature extremes and daily tidal salinity changes.

To determine the potential impact to the benthic community from the proposed project, six benthic samples were collected with a Van Veen (1/25 m^2) grab from the proposed turning basin on September 11, 2007 and passed through a 0.5 mm sieve. A visual inspection of the grab samples determined that the substrate is composed of coarse sand and gravel. Amphipod species comprised three of the four dominant species making up 79% of the total individuals in the area. The results of the benthic survey are typical of coarse grained benthic community in that the Amphipod species typically make slender tubes for shelter. The fourth species was an unidentified Oligochaete.

2.8 Shellfish

The Great Bay Estuary supports populations of eastern oyster, flat oysters, softshell clams, blue mussels, razor clams, and sea scallops. A benthic survey conducted at the proposed turning basin widening site resulted in the collection of softshell clams at two of the six stations sampled and blue mussels at all six stations sampled.

Other common or important crustaceans in the estuary system are American lobster, horseshoe crabs, green crabs, and rock crab. The river is fished by local lobstermen and lobster concentrations are highest near the mouth of the estuary.

2.9 Finfish

The Great Bay Estuary supports 52 species of resident and migratory fish (Nelson, 1981). Estuarine species include year round residents such as tomcod, mummichogs and silversides; seasonal migrants such as bluefish and striped bass; and anadromous fish such as the river herrings, shad and lampreys. Fishways constructed on the Cocheco, Exeter, Oyster, Winnicut and Lamprey Rivers in the Great Bay Estuary have enabled populations of several anadromous species to rebound. However, some species such as the Atlantic salmon, and the common and shortnose sturgeons (for which there is no reliable historic record of occurrence) and shad have not successfully been reestablished, despite stocking efforts for Atlantic salmon and shad. Commercially and recreationally important species include, smelt, winter flounder, smooth flounder, and striped bass.

This area also serves as habitat for a number of diadromous fishes species, including blueback herring, alewife, American shad, rainbow smelt, striped bass, and American eel. These species are present in the Piscataqua River and in the vicinity of the Portsmouth Harbor during spawning migrations.

Smelt, followed by alewives and blueback herring, were the most abundant anadromous fish captured during the Newington Generating Station Study. Smelt enter Great Bay estuary in late fall and winter and move up and down river channels with the tides. In spring, after ice-out, spawning occurs in the tributaries. Adults then return to more saline water and eventually leave the estuary.

Alewives move into the bay and freshwater tributaries to spawn from late April or early May through June; blueback spawn at or just above tidewater during this period. Striped bass are in the estuary from late June through September.

2.10 Wildlife Resources

Although Portsmouth Harbor is surrounded by a combination of industrial, commercial, and recreational land uses, area wetlands provide habitats for reptiles, amphibians and mammals. Harbor seals can be found throughout the Great Bay Estuary, but they and the harbor porpoises are more frequent in the lower portions of the estuary. Harbor seals can be found from November through April, with most sightings during March and April. They were sighted most often in Little Bay, with infrequent sightings in Great Bay and the Piscataqua River.

Whales have been observed outside Portsmouth Harbor, in the Gulf of Maine, during their migration. Most common species include humpback whales, right whales, finback whales, and minke whales.

Great Bay is part of the Atlantic flyway and an important migratory stopover as well as wintering area for many waterfowl and wading birds. As a result, there are both substantial seasonal and year round populations of waterfowl throughout the Great Bay area. Common species include cormorants, Canada geese, bald eagles, sea gulls, terns, ducks, herons, snowy egrets, common loons and a large variety of perching birds.

2.11 Threatened and Endangered Species

Based on correspondence from the National Marine Fisheries Service (letters dated September 2, 2011, November 15, 2013, and February 3, 2014) the following Federally listed threatened or endangered species may occur in the project area: for fish species, the endangered shortnose sturgeon and Atlantic salmon, and the threatened Gulf of Maine (GOM) Distinct Population Segment (DPS) of Atlantic sturgeon; for sea turtles, the endangered leatherback, Kemp’s ridley and green, and the threatened loggerhead; listed whale species include the endangered North Atlantic right whale, humpback whale, fin whale, and sei whale.

2.12 Essential Fish Habitat

The 1996 amendments to the Magnusson-Stevens Fishery Conservation Management Act strengthen the ability of the National Marine Fisheries Service and the New England Fishery Management Council to protect and conserve the habitat of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. This habitat is termed "essential fish habitat", and is broadly defined to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Managed species listed for the 10' x 10' square of latitude and longitude which includes Piscataqua River are: Atlantic salmon, Atlantic cod, haddock, pollock, whiting, red hake, white hake, winter flounder, yellowtail flounder, windowpane flounder, American plaice, Atlantic halibut, Atlantic sea scallop, Atlantic sea herring, bluefish, Atlantic mackerel, and bluefin tuna. See Appendix P for a list of the EFH managed species and their life history.

2.13 Special Reserves/Places

New Hampshire coastline is supported by several Federal, State, and local initiatives to protect and enhance its coastal and estuarine environment. The Great Bay, located upstream of the project area, was designated in 1989 as a National Estuarine Research Reserve. The National Estuarine Research Reserve System is a network of 27 areas representing different biogeographic regions of the United States that are protected for long-term research, water-quality monitoring, education and coastal stewardship. The reserve system is a partnership program between the National Oceanic and Atmospheric Administration and the coastal states. NOAA provides funding, national guidance and technical assistance. Each reserve is managed on a daily basis by a lead State agency or university, with input from local partners. In the case of Great Bay, it is managed by the New Hampshire Department of Fish and Game.

The Pisqataqua River is also a component of the Piscataqua Region Estuaries Partnership (PREP), a U.S. Environmental Protection Agency National Estuary Program. The National Estuary Program is a joint local/State/Federal program established under the Clean Water Act with the goal of protecting and enhancing nationally significant estuarine resources.

2.14 Air Quality

Ambient air quality is protected by Federal and State regulations. The U.S. Environmental Protection Agency (EPA) has developed National Ambient Air Quality Standards (NAAQS) for certain air pollutants, with the NAAQS setting concentration limits that determine the attainment status for each criteria pollutant. The six criteria air pollutants are carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide.
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As the area of proposed dredging in the Piscataqua River in Maine and New Hampshire, and areas of potential disposal of material off of Wells Beach in Maine, and off the beaches located in Salisbury, Newburyport, and Newbury, Massachusetts are in attainment for 2008 Ground-level Ozone Standards, 2006 24-Hour Particulate Matter Standards, 2010 Nitrogen Dioxide Standards, 2010 Sulfur Dioxide Standards, and 2008 Lead Standards, no General Conformity Analysis is required.

2.15 Cultural Resources

As one of the major estuaries on the New England coast, the Piscataqua River provided a reliable source of aquatic resources for both aboriginal inhabitants and early settlers. With increased settlement, the economy shifted toward long distance shipping, and the river became one of the most important ports in New England. The majority of this early activity occurred at or below the city of Portsmouth which is downriver from the study area. Commercial activity in the upper portion of the estuary occurred primarily during the later part of the last century. Archaeological studies in the study area, presented in Appendix I, indicate that no prehistoric or historic resources are located in the project areas.

2.16 Socioeconomics

Population and other statistics for the five communities adjacent to the Federal navigation project are shown on Table 5. Major sources of employment include professional, scientific and management services, educational and health care services, transportation and warehousing, service occupations, and manufacturing.

TABLE 5
Community Statistics

Community	Population *	Median Household Income **	Unemployment Rate**
Portsmouth, NH	21,233	$64,459	4.8
Newington, NH	753	$81,458	0.5
New Castle, NH	968	$103,462	4.7
Kittery, ME	9,490	$47,571	4.3
Eliot, ME	6,204	$76,620	4.5

* U.S. Census Bureau 2010
** U.S. Census Bureau, 2007-2011 American Community Survey

Population Trends

	2010 Census	2012 Estimate	2013 Estimate
State of New Hampshire – Population	1,316,469	1,321,617	1,323,459
% Change Since 2010		0.4 %	0.5 %
Rockingham County - Population	295,223	297,820	NA
% Change Since 2010		0.7 %	
City of Portsmouth - Population	21,233	21,379	NA
% Change Since 2010		0.9 %	

Source: US Census Bureau

3.0 PLAN FORMULATION

3.1 Summary of Navigation Inefficiencies and Safety Problem

Vessels utilizing the upper turning basin off-load their cargo at the two active terminals in the upper reach of the deep draft project. A third terminal and berth in the area that is owned by the U.S. Department of Defense is currently not in use. Fuel lines from the government terminal lead to the former Pease Air Force Base. Although Sprague owns both active terminals, they share the upstream terminal (River Road) with other users and share the downstream terminal (Avery Lane) under an easement granted to Sea-3. Sea-3 has also made capital improvements to this terminal and their easement, and an associated dock agreement, allows them road and pipeline access to off-load at the terminal. Sea-3 is an importer of liquefied natural gas (LPG) that is temporarily stored at their tank farm landward on the terminal.

Currently, terminal operators and harbor pilots report that the existing width of the turning basin is inadequate for existing and future vessel traffic. To compensate for the inadequate width, larger vessels are turned near low slack water, when the currents are the lowest, and only during daylight hours. In addition, vessels are turned using three tugs vs. the two that would normally be required. Even with these precautions, there have been five groundings in the last 30 years. The most costly incident occurred in 1985 when the vessel grounding caused damage to the propeller, propeller shaft and stern tube. Vessel damage, towing charges, penalties and vessel service loss were estimated to be $8,000,000 at that time. The loss in today's prices is estimated at $15,600,000. Another incident resulted in an estimated $250,000 in damage to the bulbous bow of the ship. No damage was reported for the other three groundings. Without widening the turning basin, the commercial potential of the upper portion of the navigation channel will not be realized as shippers have no incentive to use larger ships as the potential for damage would exceed the reduction in transportation cost. The possibility of groundings and continued inefficient turning operations for existing vessel traffic will also persist.

Waterborne Commerce Statistics report about 121 vessel arrivals and departures from Portsmouth Harbor in 2011, of which about half were vessels drawing greater than the 32 feet that can be carried through the 35-foot channel at all tidal stages given a 10% (3-foot) underkeel clearance requirement. Of the total number of calls, about 78 ships call on the terminals in the upper river reaches that rely on the upper turning basin for access. The breakdown of these calls by vessel length is shown below.

TABLE 6
Upriver Vessel Calls by Vessel Length Class
For Existing Condition with 800-Foot Basin Width

Vessel Length (LOA)	Number of Vessels – 2011 Data		
	Domestic	Foreign	Total
<=500 Feet	28	22	50
501-599 Feet	0	9	9
600-699 Feet	0	12	12
700-800 Feet	0	7	7
Total Ships	28	50	78

3.2 Problems and Opportunities

3.2.1 Problems

As stated previously, the current 800-foot wide turning basin is inadequate for existing and future vessel traffic. Due to this restriction, ships are turned during high or low water slack periods when currents are the lowest, and only during daylight hours. In addition, due to inadequate bank clearance, three rather than two tugs are used to keep the vessel in position during the turn. Even with these precautions, there have been accidental groundings at the turning basin. These restrictions increase the cost of turning vessels and impose a limit on the size of vessels that can use the upper reaches of the project.

Specifics regarding how vessels are turned are shown below:

- All turns take approximately 10 minutes.
- For a turn at low slack, they start the maneuver 30 minutes before low slack (30 minutes of ebb remaining). Currents at this time are about 1 knot.
- For a turn at high slack, they start the maneuver 50 minutes before high slack (50 minutes of flood remaining). Currents at this time are 1-1.5 knots.
- For a portion of each maneuvering time the current continues to act on the vessel and its assisting tugs
- The remainder of the transit, either inbound or outbound, must also be accomplished during a specified period to avoid problems in the remaining channel reaches, channel bends, and the two drawspan openings.

3.2.2 Opportunities

Opportunities are positive conditions that may result from management measures. There is an opportunity to improve efficiency and safety for deep draft commercial cargo carriers using the upper project reaches by implementing a variety of management measures. Providing a wider turning basin would increase the safety and efficiency of turning ships and reduce the potential for grounding damage. A wider turning basin would also encourage shippers to use larger vessels thereby reducing transportation costs.

3.4 Planning Objectives

The Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the Nation’s environment, pursuant to national environmental statutes, applicable executive orders and other Federal planning requirements. In support of the National Objective, it is within both the Federal and Corps interest to participate in studies to improve commercial navigation. The objective for this study of Portsmouth Harbor is to develop the most cost effective plan to improve navigation related issues consistent with the Federal objectives. Since the upper turning basin is inefficient considering the size of vessels that use or could use the terminals in this section of navigation channel, the primary goal of the study is to provide a wider turning basin to accommodate these vessels.

Specific planning objectives for the 50-year period of analysis beginning in 2016 are:

1. Decrease the inefficiencies associated with navigation in the upper project reaches, including turning vessels at the upper turning basin, during the period of analysis.
2. Reduce safety hazards and grounding damages for vessels using the upper project reaches, including those caused by the current inadequate turning basin width, during the period of analysis.
3. Decrease transportation costs to enable shippers to use larger vessels in the upper project reaches during the period of analysis.

3.5 Planning Constraints

Planning constraints are restrictions that limit the planning process and the available scope of solutions to the identified problems, or that limit consideration of opportunities. Alternative plans should be formulated in a manner that meets the planning objectives while avoiding the planning constraints. Planning constraints may be physical (bridges, landmasses, utilities), institutional (legal or legislative), economic, environmental, or cultural resources. The following constraint was considered during the plan formulation and evaluation process.

- The focus of the improvement project is to provide an appropriately sized turning basin to accommodate vessels that use, and are projected to use, the commercial cargo terminals on the upper deep draft reach of the Piscataqua River.

- The Portsmouth Pilots have identified the maximum size vessel that could access the upper river reaches as being no more than 800 feet in length. This restriction is due to the width and alignment of the navigation openings two of the downstream bridges, the channel width, and the bends in the channel in those bridge approaches. While the downstream-most bridge (Route 1A) was recently replaced (2013), and the middle bridge (Route 1) is scheduled for replacement in 2015-16, significant changes in navigation alignment were not made and are not planned. Further, as the channel through the lower reaches is largely rock-bound, the cost of downstream modifications to the channel and its bends through extensive drilling and blasting, and further changes to the bridges to permit vessels larger than 800 feet in length to access the river, would be extraordinarily high. Therefore, analysis of vessel usage of the upper reaches beyond the 800-foot maximum identified by the pilots was not carried into detailed planning.

3.6 Measures to Improve Shipping Efficiency and Safety

A range of management measures were initially identified and considered as the basis for formulating alternative plans to provide safe and efficient turning of vessels at the upstream limit of the Federal navigation project.

Three highway bridges cross the deep-draft channel, of which one is a combined highway/railway bridge. The uppermost is the Interstate 95 Bridge, a high-level crossing with piers located along each shore, poses no restriction on current or projected navigation. The middle bridge is the US Route 1 Sarah Long Bridge. Design for replacement of this combined highway/railway bridge is nearing completion and its replacement is scheduled to be completed in 2016. Replacement of the downstream-most bridge, the Route 1A Memorial Bridge, was completed in July 2013. The replacement of the two lift spans will improve the ability of the waterway to safely carry large bulk cargo vessels of up to 800 feet in length.

The very specific needs of improving the efficiency and safety of vessels utilizing the upstream terminals limits the range of alternatives that can be considered. Non-structural measures such as reducing the size of vessels visiting these terminals would not be acceptable to terminal operators as their ultimate goal is to increase vessel size to reduce transportation costs. The current trend toward larger vessels has increased the average length of vessels visiting these terminals. In addition, as severe tidal currents limit navigation maneuvers to slack or near slack periods, there were no opportunities to more effectively use the tide or adjust operating conditions to address the issue of turning basin width. Accordingly, no viable non-structural measures were identified for this investigation.

Structural navigation improvement measures focused on meeting all planning objectives by providing an effective and efficient turning basin near the head of navigation along the Piscataqua River. Plan formulation included consideration of measures to provide an adequately sized turning basin and options for disposal or beneficial use of dredged material.

3.7 Subsurface Investigations

To assess the feasibility of widening the existing turning basin, subsurface investigation were conducted to characterize the material that would be excavated. In September 2007, eight test borings and 3 probes were taken in the area of proposed widening. A plan showing the location of these explorations is included in Appendix F, Geotechnical Investigations.

Investigations included a geophysical survey of the area of potential turning basin widening. The geophysical study included a side scan sonar survey to identify course materials and man-made items on the bottom, a magnetic intensity survey to identify ferrous items on or below the bottom, and a sub-bottom profile survey to identify the presence of coarse glacial till and bedrock. Results of this work are presented in a report entitled, “Marine Geophysical

Investigations Navigation Channel Improvement Project Piscataqua River Portsmouth, New Hampshire" dated 17 September 2008, that is included as an attachment in Appendix F.

Data collected from borings, probes and sub-bottom profiling was used to assess dredging practicability. Analysis showed that the material is primarily coarse sand and gravel, with two areas of bedrock generally deeper than -30 feet MLLW. The glacial till is very dense and is expected to contain cobbles and some boulders. Based on the nature of the material to be dredged, a barge mounted mechanical dredging plant would be required for improvement dredging at the site.

3.8 Navigation Features

Based on EM 1110-2-1613, Chapter 9, Section 9-2.c.(1), a turning radius of 1.5 times the length of the design vessel being considered was used to size the turning diameter. This factor is based on current velocities greater than 0.5 but less than 1.5 knots. The selection of the turning radius factor of 1.5 considered the Portsmouth Pilots input and currents at the time ships are turned during windows limited to slack tide periods. Due to the limited nature of the improvements under consideration and the slack tide limitation on vessel turning, a ship simulation study was not conducted during the feasibility study.

Based on the size of ships that currently use the two upstream terminals and the design vessel for the navigation project, three turning basin widths were developed for evaluation. Since the majority (about 90 percent) of ships that use these terminals are less than 680 feet in length, a basin width of 1,020 feet was the smallest to be evaluated. The next basin width analyzed was 1,120 feet which is based on a 747 foot long vessel. This basin width would be able to handle about 99 percent of the vessel trips made over the last 5 years. The widest basin width to be evaluated is 1,200 feet, which is based on the design vessel length of 800 feet. Considering the channel configuration, width and depth, the harbor pilots consider this to be the maximum sized vessel that could navigate the river and reach the upper turning basin and terminals, and the replaced draw spans will improve the safety of transiting vessels of that size.

3.9 Dredged Material Disposal Suitability Determination

The suitability of dredged material for ocean disposal was evaluated based on testing of ten representative samples from the September 2007 borings and supplemental testing of 16 surface samples in collected in June 2009. Suitability determinations for both rounds of testing are included in Appendix K. Material was found to be suitable for disposal at a Section 103 ocean disposal site without further testing, or as sub-tidal nearshore feeder bar placement for eroding beaches in nearby communities.

3.10 Dredged Material Management Measures

3.10.1 Upland Disposal

There are several options for upland disposal of dredged material. In 2005, the Corps completed a study that indentified approximately 100 potential upland disposal sites for dredged material from Federal navigation projects in New Hampshire. All sites were within a 15 mile haul distance from one of the eight Federal navigation projects located in the State. Although property owners were not contacted, this study demonstrated that it was likely that upland sites were available depending on the nature of the material to be dredged. As initial testing of the dredged material indicates that it would be acceptable as construction fill, the cost to dispose of the material at one of the closest sites in Newington was developed. This cost included unloading the scow at the State terminal on Market Street, trucking it to the site, and grading the material at the disposal site. As the cost per cubic yard for upland disposal exceeded $30.00, which is about twice the cost of ocean disposal, this measure was eliminated from further consideration.

3.10.2 Ocean Placement

There are three regional dredged material placement sites that could be used for dredged material, all of which are subject to Section 103 of the Marine Protection, Research, and Sanctuaries Act, also known as the Ocean Dumping Act. Two are located off the coast of Maine, the Portland Disposal Site (PDS), located directly east of Cape Elizabeth, and the Cape Arundel Disposal Site (CADS), located just southeast of Kennebunkport, Maine The other site, the Massachusetts Bay Disposal Site (MBDS), located 20 miles east of Boston Harbor, Massachusetts.

The PDS was designated by the U.S. Environmental Protection Agency (EPA) as a dredged material disposal site on October 16, 1987 However, the material from the turning basin was not tested for suitability for disposal at the PDS because it is located about 58 miles by sea from the dredging site. This distance is too far to be considered a practicable disposal location; therefore this site was dropped from further consideration.

The CADS site was considered for disposal when the Expedited Reconnaissance Report was completed in August 2004. However future use of this site was affected by a 1992 amendment to the Marine Protection Research and Sanctuaries Act (MPRSA - the Ocean Dumping Act). That amendment established a time limit on the availability of Corps selected sites for disposal activity in waters seaward of the territorial sea baseline. The provision allowed a selected site to be used for two non-consecutive five-year periods; beginning with the first disposal activity after the effective date of the provision, which was October 31st, 1992. The second five-year period began with the first disposal act commencing after completion of the first five-year period. Use of the dredged material disposal site, however, could be extended for long-term use if the site was designated by EPA. Thus, the Corps can select disposal sites only for short-term limited use; whereas, Congress authorized EPA to undertake long-term site designations subject to ongoing monitoring requirements to ensure that the sites remain environmentally sound. However, no funding was provided to support the EPA studies needed to designate the CADS as a long-term dredged material disposal site. As a result, CADS no longer remained available for dredged material disposal after January 2010. As of the time the internal drafts of this report were prepared, this situation resulted in this site being eliminated from further consideration.

The Consolidated Appropriations Act for Fiscal Year 2014 (PL 113-76, January 17, 2014) contained language as cited below that re-opened the Cape Arundel Disposal Site for a limited period with certain conditions.

> *Section 113. The Cape Arundel Disposal Site in the State of Maine selected by the Department of the Army as an alternative dredged material disposal site under section 103(b) of the Marine Protection Research and Sanctuaries Act of 1972, shall remain open for 5 years after enactment of this Act, until the remaining disposal capacity of the site has been utilized, or until completion of an Environmental Impact Statement to support final designation of an Ocean Dredged Material Disposal Site for southern Maine under section 102(c) of the Marine Protection Research and Sanctuaries Act of 1972, whichever first occurs, provided that the site conditions remain suitable for such purpose and that the site may not be used for disposal of more than 80,000 cubic yards from any single dredging project.*

With the per-project limitation of 80,000 the site would be of only limited use for the Portsmouth Harbor project. It may be possible that the rock volume to be removed from any turning basin expansion could be accommodated under these restrictions, but the ordinary material dredging volumes would far exceed that limit under even the smallest incremental alternatives.

The MBDS was officially designated by the U.S. Environmental Protection Agency (EPA) as a dredged material disposal site on 1993. However, the material from the turning basin was not tested for suitability for disposal at the MBDS because it is located about 58 miles by sea from the dredging site. This distance is too far to be considered a practicable disposal location; therefore this site was dropped from further consideration.

Inasmuch as the distance to available ocean disposal sites eliminates them as acceptable disposal sites due to cost, the feasibility of re-opening the historically used Isle of Shoals (IOS-H) disposal site located just east of the Isle of Shoals in State waters was considered. However, based on coordination with resource agencies (primarily NMFS), it was determined that since this site is a prime area for various marine species and is today an important fishing ground, NMFS would not consider the IOS-H site as a disposal site. Since designating a new ocean disposal site within a reasonable haul distance from the proposed project would result in significant cost saving to the project a meeting was held with NMFS and EPA representatives following Corps/EPA investigations of potential ocean placement sites in the

Portsmouth vicinity. EPA had encouraged locating any new ocean placement site outside State waters and entirely within Federal waters. Based on those investigations, a potential candidate site was located north and seaward of the Isles of Shoals, which was assessed as being less biologically productive and had little evidence of recent fisheries activity.

The investigation of an alternative ocean placement site determined that an area with the appropriate characteristics is located about five (5) miles northeast of the IOS-H disposal site. This site, designated as Isles of Shoals North (IOS-N), has a depth of about 300 feet and is a relatively flat plain nearly surrounded by higher elevations. Figure 4 shows the location of the previously used IOS-H site, and the IOS-N site. Data was then collected from this site to determine if it would be "likely selectable" under the MPRSA criteria for dredged material disposal site selection. Side-scan sonar data was collected in July 2010 by the U.S. EPA OSV "BOLD" for both the existing IOS site and the IOS-N site during July 2010. Benthic and grain size data was collected separately by the Corps from the IOS-N site in November 2010.

The side-scan data show that the substrate at the IOS-N site is smooth, uniform and composed of fine-grained material, while the IOS-H site contains ridges and other deposits of hard material (rock, ledge and/or boulders). The side-scan data also indicated that fish trawl marks noted at the IOS-N site during the survey are historic (oxidized), indicating that the site is not actively fished. Only a few trap lines were evident at IOS-N site, whereas the IOS-H site was being actively fished for lobster, with numerous trap lines visible. The benthic report for IOS-N summarizes the site as "the study area is physically homogeneous and inhabited by a limited benthic invertebrate community. Richness, at the species and higher taxonomic levels, and density are low relative to both more inshore and more offshore habitats." Grain size data confirmed that the site is fine-grained as seven of the nine samples contained more than 95% fines and the remaining two samples contained more than 79% fines. Data collected during this analysis is included in Appendix M.

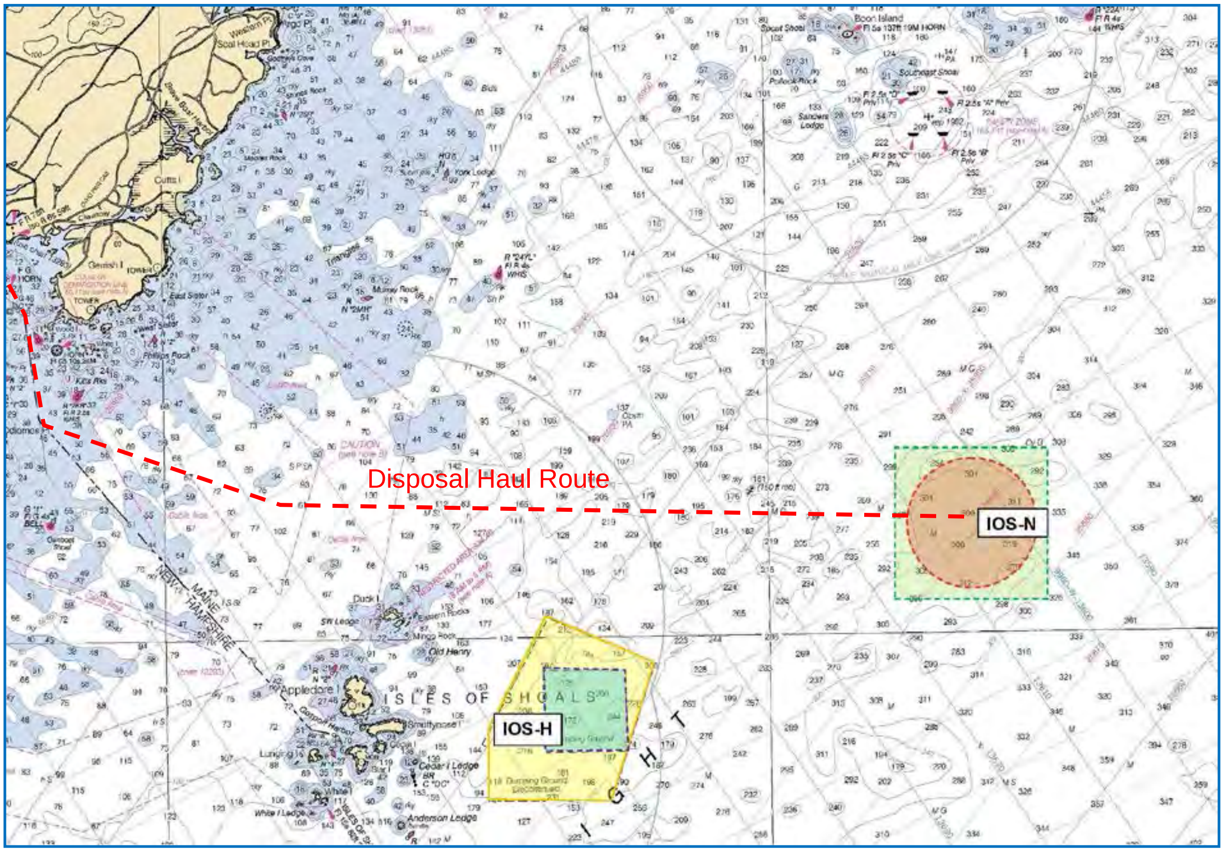

Figure 4. Isle of Shoals Ocean Placement Sites

As these results indicate that IOS-N is “likely selectable” under MPRSA criteria for one-time use for placement of dredged material from the turning basin widening, letters were forwarded to EPA and NMFS requesting their concurrence. By letter dated 7 September 2011, EPA concurred “that this site is “likely selectable” for one-time use for placement of dredged material from the Piscataqua River FNP turning basin.” NMFS determined that the proposed alternative site “(IOS-N) may be a more favorable selection for minimizing impacts to living marine resources than the historic IOS-H site”, but that additional consultation would be required under the Magnuson-Stevens Fisheries Conservation Management Act (MSA), and the Endangered Species Act (ESA) should a site selection be made. By letter of February 3, 2014 NMFS determined that use of the IOS-N site was not likely to affect listed species. Based on these responses, and cost estimates showing that use of the IOS-N site results in the lowest project costs, this site was identified as the Federal base plan.

3.10.3 Beneficial Use, Beach Nourishment

One of the most common forms of beneficial use is beach nourishment by placing suitable sandy dredged materials on beaches or at nearshore areas where wave action will slowly move the material onshore. Review of the material proposed to be dredged shows that it is predominantly sand with some gravel. The material is coarser than the sand on the beaches needing nourishment making direct placement potentially unacceptable. Another factor to consider is that the material to be dredged is compact and must be mechanically dredged. Direct placement on beaches needing fill would therefore require double handling of the material making this option cost prohibitive. However, nearshore placement is much more cost effective as the material does not need to be re-handled and has been approved for ocean disposal. Wave action on the nearshore placement would also sort the dredged material resulting in finer materials being washed ashore. Therefore, beach nourishment by way of nearshore placement was retained as a suitable disposal alternative.

As beneficial use of dredged material is viewed favorably by State and Federal agencies, coordination was initiated to identify candidate beaches in New Hampshire and Maine. The preliminary criterion for this search was that these beaches be located within the same haul distance as the most likely Federal base plan (disposal at IOS-N), a distance of 20 miles. For beaches further than 20 miles, the non-Federal entity requesting the sand would be required to fund the difference in cost between the Federal base plan and transporting sand to their location. The closest beach needing sand is Wallis Sands Beach in Rye, New Hampshire. This beach is managed by the New Hampshire Department of Resources and Economic Development (DRED). Dredged material from Little Harbor, situated between New Castle and Rye, has been placed off shore from the beach. DRED was contacted regarding current needs, but were concerned because material previously placed nearshore may have migrated south resulting in the blockage of a coastal inlet.

To determine beach nourishment needs in Maine, the Maine Geological Survey (MGS) was contacted. This State agency monitors numerous beaches along the coast and has identified those with erosion problems. Using our initial criterion, MGS identified Long Sands Beach in York Maine as a prime candidate. Erosion has been a long term problem and the beach is within 20 miles of the dredging site. Since this beach appeared to be a good candidate for beneficial use, the Maine Department of Environmental Protection (DEP), and Department of Marine Resources (DMR) were contacted. DMR’s primary concern was that the disposal site not be located in an area where the bottom is rocky or has boulders and cobbles. These areas are considered prime lobster habitat. The potential for impacts to submerged aquatic vegetation, primarily eelgrass, was also considered. Based on these concerns, a site at the northern end on the beach was selected for further study. To determine site suitability and potential impacts to the benthic community, five sediment grab samples were collected in the nearshore placement area. Grain size analysis of these samples determined that all samples were fine sands. The benthic community analysis determined that the number of species identified is typical for a small benthic survey of a sandy nearshore environment on the Maine coast.

As studies at Long Sands Beach progressed, the Maine Lobstermen’s Association and the town of York were contacted to determine if there was local interest in receiving sand and to gather information. A meeting was held 5 January 2010 in York, Maine, with town officials the Corps and State agencies (MGS, DEP and DMR). Based on a local news report, roughly 50 people also attended the meeting. The background of the study and why Long Sands was selected as a potential candidate for nearshore placement were explained, and the meeting was opened for questions and comments. There was definite vocal opposition to the plan. Those present were concerned about the characteristics of the sand. Although testing is not required based on the grain size analysis and the high velocity environment of the Piscataqua River, and ocean disposal had been approved based on coordination with resource agencies, the public was concerned whether the material was clean enough for disposal. There was also concern regarding impacts to surfing opportunities and the color of the sand, brown rather than the white sand found on their beach. The dispersal of disposed sediments over hard bottom areas was a potential issue as well. Although the reasoning behind selecting this area was based on the history of landward migration and lowering of the beach, those present didn't seem to see the need for potential beach quality sand at their beach. Subsequent discussions with the Chairman of the York Board of Selectmen on February 16, 2010 determined that based on this opposition, the Town was not in a position to support nearshore placement in York.

Opposition to nearshore placement in York and similar concerns expressed regarding placement off shore from Wallis Sands Beach and at other beaches in New Hampshire, resulted in a reanalysis of nearshore placement options. Initially, sites within a 20 mile haul distance were considered because there would be no local cost share as cost to deliver sand to these sites would be the same or less expensive than the base plan. If sand was transported further than this, the community receiving the sand would have to pay the difference in cost between the base plan and the cost to bring it to their location. Since this cost would be relatively minor when compared with the cost of receiving sand by other means, a new search was initiated to identify other potential sites. To gauge the level of interest in receiving the dredged material a meeting was held on May 21, 2010 in Portsmouth, New Hampshire. Representatives from three states, Maine, New Hampshire and Massachusetts, were invited along with representatives from communities with documented beach erosion problems. Approximately 25 people from the three-state region attended the meeting. Table 7 provides an update of the estimated additional cost to receive this material.

The town of Wells, Maine and the Commonwealth of Massachusetts expressed an interest in receiving dredged material for beach nourishment. The Massachusetts sites included the Merrimack River Inlet/Plum Island area and Winthrop. Dredged material has previously been deposited along the coasts of Wells and Plum Island.

TABLE 7
PORTSMOUTH HARBOR - TURNING BASIN WIDENING STUDY
Cost Comparison of Sand Placement Alternatives

Placement Site	Haul Distance (Miles)	Cost/CY	Cost Increase Above Federal Base Plan
Open Water Placement			
Wallis Sands Beach, North Rye, NH - Nearshore	14	No Local Interest	
Isles of Shoals North – Ocean Placement – Base Plan	20	$19.75	NA
Long Sands Beach, York, ME - Nearshore		No Local Interest	
Salisbury Beach MA - Nearshore	24	NA	$2.60
Plum Island Beaches in Newbury & Newburyport, MA - Nearshore	26	NA	$2.69
Wells Beach, Wells, ME - Nearshore	32	NA	$2.81
Camp Ellis Beach, Saco, ME – On Beach	52	NA	$10.00
Winthrop Beach, Winthrop, MA – Nearshore	58	NA	$11.70
Portland Disposal Site, Maine – Ocean Placement	58	NA	$11.70
Upland Placement			
Gosling Road, Newington, NH – 220,000 CY Only		NA	$13.80

Note: Costs are comparison of Base Plan costs with alternative placement plans costs based on total project first cost for design and construction in FY2014 price levels and distributed by CY.

Additional coordination concerning interest in receiving dredged material was also conducted in July 2012. Letters were sent to each State and to the following communities: Rye in New Hampshire; Wells, Ogunquit and Kittery in Maine; and Salisbury, Newburyport, Newbury and Winthrop in Massachusetts. The communities of Wells, Maine, and Salisbury, Newburyport and Newbury, Massachusetts responded that they would be interested in receiving dredged material and would be willing to fund the incremental amount above the Federal base plan. The New Hampshire Department of Recreation and Economic Development (DRED) reversed its prior determination and indicated that it may want sand for placement of several area beaches, but first wanted to see chemical testing of the dredged sand. DRED was advised of how to conduct its own testing, but no further communication was received.

Discussions between State representatives determined that the dredged material would be distributed on a 50/50 basis between Maine and Massachusetts should all of the interested parties ultimately secure the necessary permits and approvals prior to completion of the project's Design Phase. In addition, based on a Merrimack River Beach Alliance agreement between the communities of Salisbury, Newburyport and Newbury, the Massachusetts, 25 percent of the Massachusetts material would go to Salisbury, with the remainder going to Plum Island (Newburyport and Newbury).

4.0 ALTERNATIVES

4.1 Future Without Project Condition

The future without project condition, or the no-action alternative, is the condition expected to occur in the project area in the future should no-action be taken by the Federal government to provide a wider turning basin at the upstream limit of navigation on the Piscataqua River. The future without-project condition is compared to the with-project condition to identify project benefits and environmental effects of the alternatives. The economic base year of the analysis is 2016 and a 50 year period of analysis is used.

Changes in the fleet utilizing Portsmouth Harbor resulted in previous project improvements and modifications. Improvements authorized in 1962 and completed in 1966, which included extending the channel to its current limits, widening the channel at several locations, and constructing of turning basins upstream from Boiling Rock and at the head of navigation, were designed to permit the use of vessels of 35,000 DWT (deadweight tonnage) with a draft of 35 feet. As the fleet changed and more ships in the 40,000 – 45,000 DWT class used the harbor, several sections of the channel were widened to allow safe navigation of the channel. These improvements were authorized in 1986 and completed in 1992. These improvements resulted in further changes in the fleet and more frequent use of larger vessels in the upstream reach of the project. Between 2008 and 2012, an average of 12 vessels with a deadweight tonnage of 45,000 or greater visited the upper two terminals annually. These changes to larger vessels lead to the need for upstream turning basin improvements.

In the future without project condition it is assumed that the two beneficiary terminals at the upstream end of the navigation channel will continue to operate and that cargo volumes will be similar to current levels (See Table 2 and Appendix C - Economics). Total annual transportations costs for the existing condition for cargo shipped by the existing upper harbor fleet are as follows (in $1000s). As the commodities shipped are primarily petroleum fuels and items like asphalt and gypsum which are tied to roadway and housing construction, these number are expected to grow at a low rate similar to the rate of population growth, with variation according to the severity of any given winter.

At Sea Cost	In Port Cost	Tidal Delay Cost	Total Cost
$5,470.7	$928.1	$0.1	$6,398.9

Sprague Energy owns both the Sprague River Road terminal, which it operates, and the Avery Lane Terminal. Sea-3 has an easement to access and operate the Avery Lane Terminal for its propane pipeline which connects its gas tanks on Sea-3 property with the dock. That easement was originally granted to Sea-3’s predecessor, Dorchester Enterprises, and grants a right of way to the terminal as well as over the terminal itself. That easement itself does not have a stated termination date but is instead tied to the terms and conditions of a Dock Agreement which memorializes the two companies (Sprague and Sea-3) shared responsibilities for dock maintenance and operation. The Dock Agreement's termination date is 2079, beyond the 50-year project life, but may be terminated sooner upon the expiration of the useful life of the dock or if any occurrence or event requires a capital improvement of $500,000.00 or more. However, Sea-3 has an Option to Purchase the dock if either of those events come to pass. Sea-3's Option to Purchase is also triggered by Sprague attempting to sell or lease the dock to another entity or if 51% of the Sprague's stock is transferred. The grantee in the easement (Sea-3) has an ownership interest in the property to the extent the Dock Agreement remains in effect.

The future without a navigation improvement project assumes that the existing channel and turning basin would be maintained at the authorized dimensions (i.e. depth of -35 feet MLLW, channel width of 400 feet and turning basin width of 800 feet). The upper portion of the Federal project was originally completed in 1966 and there has been no need for maintenance dredging in the upper reaches adjacent to these terminals. No changes in maintenance requirements are expected without the project. Based on condition surveys obtained in 2007, only a small amount of shoaling (less than 100 cubic yards in areas shallower than -35 feet MLLW) has accumulated in the turning basin. This minimal amount of shoaling does not impact vessel operations in this area. Maintenance dredging of the Simplex Shoal area, situated about 3,000 feet downstream, is conducted fairly regularly. The last maintenance dredging in this area was completed in early 2013.

Without an improvement project, inefficient turning operations and safety hazards would continue. Shippers would also continue to be limited in the size of vessel they can use to call on the port, leaving them unable to achieve the economies of scale of larger vessels. Many shippers, particularly of bulk commodities, prefer to use larger vessels that have lower overall costs per ton, particularly for trips over long distances (from South America or Europe). Without a project, the degree to which commodities can be shipped on the most cost-effective vessels would be limited by the undersized turning basin width. In the future without project condition it is likely that natural resources in the study area will continue to be present as described in the existing conditions section of this report.

4.2 Alternative Plans

Navigation improvement measures and dredged material disposal measures discussed above were combined to form alternative plans. All alternatives, except the no-action alternative, include a wider turning basin at the upstream end of the Federal navigation channel. Dredged material disposal options include nearshore placement for beach nourishment and ocean disposal.

4.3 Development of Alternatives

Development of alternatives was an iterative process. The first item evaluated was the feasibility of widening the existing turning basin, or relocating the turning basin to an adjacent area where it would be able to serve the two upper terminals. Bathymetric surveys of the area were obtained and alternative turning basins were laid out using the maximum turning basin width of 1,200 feet. Alternative 1 consists of widening the existing turning basin, Alternative 2 is a southeast relocation, and Alternative 3 is an upstream relocation. Figure 5 shows the location of the existing turning basin and the two alternative turning basin locations.

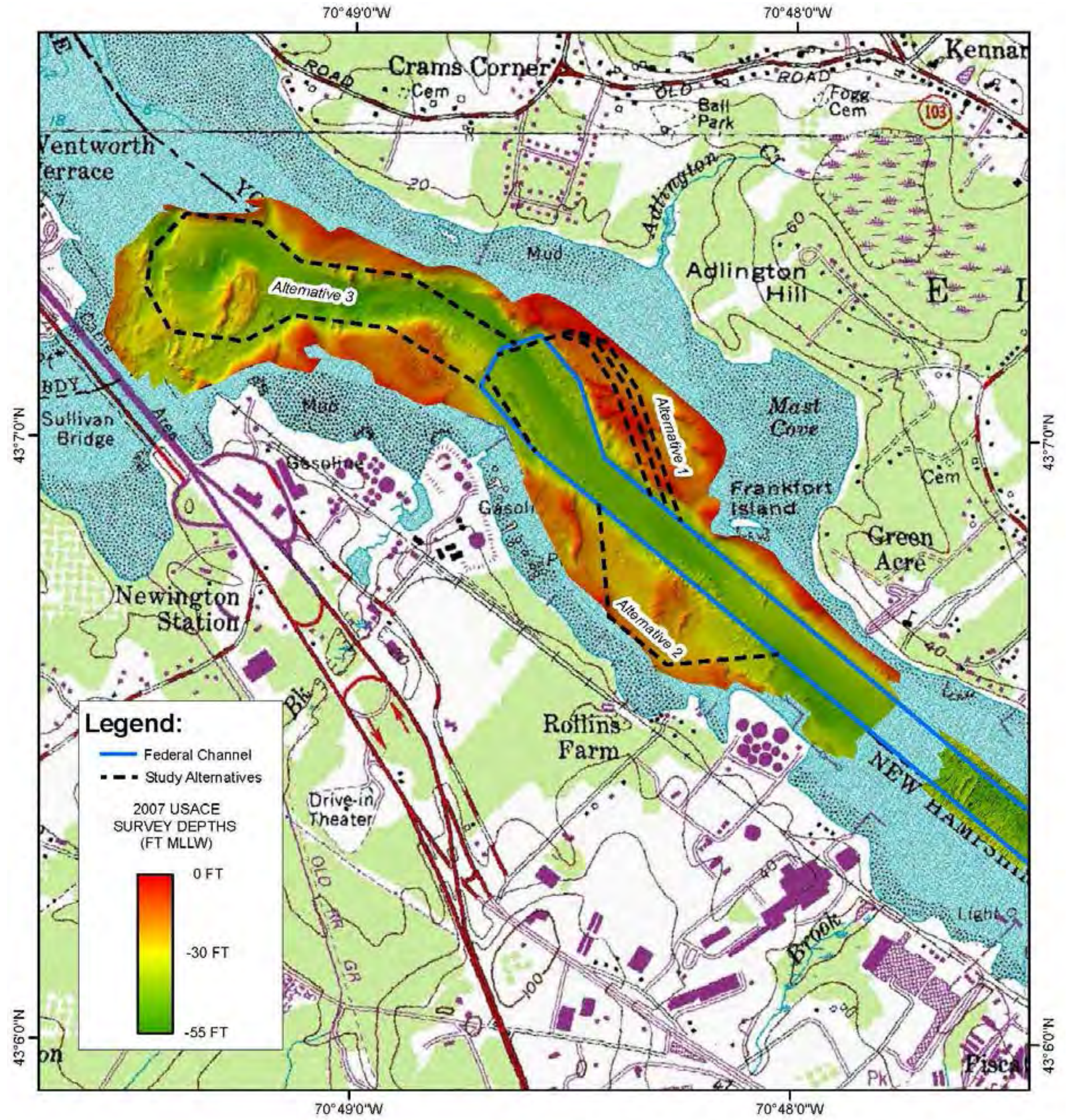

Figure 5. Turning Basin Alternatives

4.4 Description and Evaluation of Alternatives

No Action: Continued Maintenance of the Existing Turning Basin Width

Under this alternative the existing project dimensions would be maintained by maintenance dredging when required. Vessels would be limited in size to lengths no greater than those presently calling on the upper river terminals. At least three tugs would be required for turning maneuvers. The risk of vessel grounding would remain and vessels would continue to be limited to slack-water movement in times that would facilitate transit in daylight hours.

Alternative 1: Widen Existing Turning Basin

Widening the existing turning basin to allow efficient and safe turning of ships was selected for further study. It is currently 800 feet wide and widening it would cause the least disruption in the area. Widening the existing turning basin to a maximum width of 1200 feet would result in the smallest dredging footprint of the alternatives considered. There are no critical environmental or cultural resources present in the proposed expansion area, and the extent of bedrock is limited. It is also favored by the Portsmouth pilots as the Sprague River Road Terminal, which handles about two thirds of the river traffic in this section of the river, is adjacent to the turning basin. This allows the pilots to turn the ship off the terminal taking advantage of the short slack tide windows to turn the ship. Potential widening widths, discussed in Section 3.8, Navigation Improvements, will be evaluated in detail to select the most cost effective plan.

Alternative 2: Relocate Turning Basin to Southeast

Relocating the turning basin southeasterly to a point between the Sprague and Sea-3 terminals was considered. This area, located on the New Hampshire side of the channel, would be easily accessible from both terminals. Evaluation of a 1200-foot wide turning basin, which would encompass the 400-foot wide channel, would require the excavation of over 640,000 cubic yards of material. However, based on past borings along the river, bedrock is extensive and located at shallow depths in this area. As drilling, blasting and removing this rock to an elevation of -39 feet MLLW would be extremely expensive, the alternative was not recommended for further study.

Alternative 3: Relocate Turning Basin to Upstream Location

This alternative would cause a major revision of how ships from the Sprague River Road and Sprague Avery Lane/Sea-3 terminal are turned. The turning basin would be located about 3400 feet further upstream and would require extension of the main ship channel. The Portsmouth Pilots evaluated this upstream turning basin and based on their comments and the additional reasons listed below, this upstream site was not recommended for further study or consideration.

- The additional distance to reach the turning basin upstream would mean the pilots would have less time and flexibility to turn the ships during slack tides.

- The new turning basin would be located where the currents exit Great Bay into Piscataqua River. These additional currents would increase the amount of time the pilots would need to maneuver the ships to counter these currents; thereby lessening their already short slack tide window for turning large vessels in the river. Additional tugs may be needed for these maneuvers.
- Significant small craft traffic between the bay and the river would interfere with the use of the area as a turning basin for large ships. The Hilton State Park at Dover Point in New Hampshire has a large boat ramp located adjacent to the proposed upstream turning basin. This State park experiences a significant amount of recreational usage, further contributing to the small craft congestion in this area, and a potential safety hazard.
- Multiple turns in the proposed extension of the navigation channel to take full advantage of naturally deep water would not be possible due to the river currents and the large size of the ships using the river. Therefore, some removal of the submerged banks in the river would be necessary. This along with the presence of a large ledge in the center of the proposed upstream turning basin site would contribute to a higher upstream turning basin development cost than just expanding the existing turning basin.
- The upstream turning basin site also contains a plotted shipwreck that may be a cultural resource of concern. This would require additional study and documentation to determine compliance with applicable laws and regulations.

4.5 Results of Initial Alternative Screening

Evaluation of the alternatives presented in the previous section resulted in the selection of Alternative 1, Widen the Existing Turning Basin, as the only viable alternative. To determine the most cost effective basin width, three basin widths were evaluated. These basin widths were developed based on classes of ships that currently use the upper terminals, and the largest vessel that could safely navigate the Piscataqua River and access the upper terminals

TABLE 8
Alternatives Recommended for Further Study Based on Initial Screening

Alternative	Description
No Action	Continued Maintenance of Existing Project Dimensions
1A	Widen Existing Upper Turning Basin to 1020 feet
1B	Widen Existing Upper Turning Basin to 1120 feet
1C	Widen Existing Upper Turning Basin to 1200 feet

The turning basin widening plans will be evaluated based on dredged material placement at the IOS-N site which is considered to be the Federal base plan. Costs for placement at the four alternative nearshore disposal sites that were developed during plan formulation were used to determine non-Federal cost requirements for the additional haul distance. One site is located in Wells, Maine and the other three are situated in Salisbury, Newburyport and Newbury, Massachusetts.

The plans were formulated in consideration of the Corps formulation criteria of completeness, effectiveness, efficiency and acceptability. The three plans are similar and meet these criteria as described below.

Completeness. The plans are complete as they include all necessary investments to widen the existing turning basin.

Effectiveness. The plans are effective as they all contribute to varying degrees to the planning objectives to decrease transportation costs, and reduce safety hazards and inefficiencies associated with turning vessels at the existing turning basin.

Efficiency. The plans are cost-effective means of attaining these objectives. Initial screening considered various dredge material disposal measures including upland disposal and open water disposal at nearshore placement sites or at a disposal site northeast of the Isle of Shoals. Open water disposal is less expensive then upland disposal.

Acceptability. The alternative plans are workable from a construction point of view and can be implemented in compliance with existing laws regulations, and public policy.

4.6 Quantity Estimates for Alternative Plans

Dredge quantities were developed for each turning basin width and include quantities for both ordinary material (sand and gravel) and bedrock. The design depth of the expanded turning basin would remain at the design depth of -35 feet Mean Lower Low Water (MLLW). In areas of bedrock, the required depth is increased two feet to -37 feet MLLW. In addition, overdepth allowances for dredging is two feet is all areas. A minor amount of maintenance dredging would be required to restore the turning basin to its authorized depth of -35 feet MLLW. Although this material would be dredged at the same time as the improvements, quantities shown in Table 8 do not include this maintenance quantity of 7,800 cubic yards (CY) including overdepth. Quantities for the No Action alternative are not shown on Table 9 as long term maintenance has not been required along this section of river.

The assumed bedrock surface that was used to develop quantity estimates for rock removal was based on boring and probe results, and a seismic study conducted at the site. Of the 8 borings and 3 probes that were taken, bedrock was encountered at only one location at a depth less than the dredging depth of -37 feet MLLW (boring B-6 at a depth of about -30 feet MLLW). The acoustic basement reflector identified during the seismic study in this area coincides with this depth indicating that the acoustic basement is the surface of bedrock in this area. Acoustic basement and probe results were somewhat inconsistent in other areas indicating that the acoustic basement could be either bedrock or glacial till. As boring and probe coverage was somewhat limited, the acoustic basement was assumed to be the top of bedrock in areas where geologic features indicate the potential for the presence of bedrock. Accordingly, the rock excavation quantities presented in the report are considered conservative, as material now counted as bedrock could be hard glacial till common to New England. Additional subsurface investigations will be conducted during detailed design to better define the surface of bedrock.

TABLE 9
Dredging Quantity Estimates for Alternative Plans

1020-Foot Wide Turning Basin	Dredging Quantity (CY)	
	Ordinary Material	Rock
Cut to -35 Feet MLLW	340,500	8,900
Overdepth Allowance – 2 Feet	44,400	6,100
Additional Overdepth in Rock – 2 Feet		7,500
Total Improvement Quantities	384,900	22,500
1120-Foot Wide Turning Basin	Dredging Quantity (CY)	
	Ordinary Material	Rock
Cut to -35 Feet MLLW	519,800	8,900
Overdepth Allowance – 2 Feet	53,900	6,200
Additional Overdepth in Rock – 2 Feet		7,800
Total Improvement Quantities	573,700	22,900
1200-Foot Wide Turning Basin	Dredging Quantity (CY)	
	Ordinary Material	Rock
Cut to -35 Feet MLLW	661,300	9,200
Overdepth Allowance in Ordinary Material or Additional Required in Rock – 2 Feet	66,800	6,800
Additional Overdepth in Rock – 2 Feet		9,300
Total Improvement Quantities	728,100	25,300

4.7 Cost Estimates of Alternative Plans

Cost estimates for the alternative plans were developed for each plan for the base plan (disposal of all material at the new IOS-North site). Cost estimates include dredging and disposal costs, planning, engineering and design, and construction supervision and administration. Costs are presented in Table 10 below. Cost estimates are at the October 2013 price level. Costs for the No Action alternative are not shown in Table 10 as maintenance dredging of this section of the Piscataqua River has not been required since the project was completed in 1966. No Action project costs are therefore estimated to be $0 relative to the existing maintained project. Costs were also developed and included in Table 8 for an alternative non-Federally funded “beneficial use” plan that would place the dredged sandy material in nearshore areas off beaches in Maine and Massachusetts where local communities have expressed a desire to receive that material and pay for the additional transportation cost for hauling that material a longer distance.

Construction Costs. Construction cost estimates were developed using the Corps of Engineers Dredge Estimating Program (CEDEP) for dredging of ordinary material and blasted rock. Costs for drilling and blasting the bedrock were developed using a separate estimating program. CEDEP estimates include costs for mobilization and demobilization, construction plant (dredge, scows, tugs), cost of fuel, labor, insurance, materials, overhead, bond and profit. CEDEP inputs include consideration of the type of material to be dredged, efficiency of dredging operation, and haul distance. The drilling and blasting program includes costs for mobilization and demobilization, and all other costs associated drilling and blasting the rock.

Planning, Engineering and Design (PED) Phase Costs. Cost estimates include design phase project management, planning and engineering, additional agency coordination, preparation of plans and specifications, costs for reviews, and pre-construction contracting activities. Costs for preparing a site selection document for use of the IOS-N ocean placement site were also included in the PED phase estimate, to be needed in the event that the non-Federally funded nearshore beneficial use alternatives ultimately are no pursued. .

Construction Management Costs (Including Supervision and Administration and Engineering During Construction). Cost estimates include project management, contract administration, construction supervision and inspection, engineering during construction (EDC) and pre-dredge and after-dredge surveys and monitoring.

Real Estate Costs. No real estate interests are required for the Federal project. The area to be dredged and the open water placement areas required for construction are below the ordinary high watermark of the navigable watercourse. Therefore, navigational servitude applies and would be invoked for the project. Any berth access for survey, work boats and tugs could reportedly be provided at the New Hampshire State Pier by the New Hampshire Pease Development Authority, Division of Ports and Harbors, the project Sponsor. As these berths and piers are reportedly subject to navigation servitude, no credit would be due the sponsor for use. Alternatively any contractor bidding the project could make their own private arrangements for access via any of the many private piers in Portsmouth Harbor. Opportunities for access would be left to the discretion of the contractor(s) when preparing their bids.

Interest During Construction. The estimated cost of the project is increased for interest during construction (IDC) to account for the lost opportunity cost of construction funds over the period of construction, yielding the total investment cost. IDC is included for economic analysis purposes only and is not included in total project costs for budgeting or cost-sharing purposes. IDC was calculated based on the Office of Budget and Management (OMB) rate for Federal water projects for FY14 of 3-1/2 percent.

Aids to Navigation. No new aids to navigation are planned for the alternatives. There are five markers in the area, G “9” (Fl G 4s), R “10” (Fl R 4s), and G “11” (Fl G 2.5s) mark the Federal channel downstream from the turning basin, and R “12” (N), and G “13” (C) mark the natural channel upstream from the Federal project. The navigation aids are maintained by the United States Coast Guard (USCG).

TABLE 10
Cost Estimates for Alternative Plans

Alternative 1A – 1020-Foot Wide Turning Bain

With Ocean Placement at the Isles of Shoals North Site

	Work Time Months	Cubic Yards	Unit Cost	Cost
Mobilization/Demobilization				
Dredging Plant – Ordinary Material			Lump Sum	$608,000
Drill and Blast Plant			LS	567,000
Dredging Plant – Rock Removal			LS	16,000
Total Mob/Demob				$1,191,000
Dredging and Disposal Ordinary Material	1.7	384,900	$14.86	$5,720,000
Drill and Blast Ledge Rock	1.1	22,500	$92.57	2,083,000
Dredge Blasted Rock	0.2	22,500	$32.80	738,000
Subtotal Contract Cost				$9,732,000
Contingencies		21.12%		2,056,000
Subtotal with Contingency				$11,788,000
Planning, Engineering and Design				957,000
Construction Management				729,000
Total First Cost		407,400		$13,474,000

With Nearshore Bar Placement of Sand at Wells Beach and Merrimack River Beaches

	Work Time Months	Cubic Yards	Unit Cost	Cost
Mobilization/Demobilization				
Dredging Plant – Ordinary Material			Lump Sum	$720,000
Drill and Blast Plant			LS	567,000
Dredging Plant – Rock Removal			LS	16,000
Total Mob/Demob				$1,303,000
Dredging and Disposal Ordinary Material				
50% Nearshore Placement at Wells Beach	0.9	192,500	$17.45	$3,359,000
37.5% Placement at Plum Island Beaches	0.6	144,400	$16.81	2,427,000
12.5% Placement at Salisbury Beach	0.2	48,000	$16.17	776,000
Drill and Blast Ledge Rock	1.1	22,500	$92.57	2,083,000
Dredge Blasted Rock	0.2	22,500	$32.80	738,000
Subtotal Contract Cost				$10,686,000
Contingencies		21.12%		2,257,000
Subtotal with Contingency				$12,943,000
Planning, Engineering and Design				964,000
Construction Management				729,000
Total First Cost		407,400		$14,636,000

TABLE 10 (Continued)
Cost Estimates for Alternative Plans

Alternative 1A – 1120-Foot Wide Turning Bain

With Ocean Placement at the Isles of Shoals North Site

	Work Time Months	Cubic Yards	Unit Cost	Cost
Mobilization/Demobilization				
Dredging Plant – Ordinary Material			Lump Sum	$608,000
Drill and Blast Plant			LS	567,000
Dredging Plant – Rock Removal			LS	16,000
Total Mob/Demob				$1,191,000
Dredging and Disposal Ordinary Material	2.6	573,700	$14.81	$8,496,000
Drill and Blast Ledge Rock	1.1	22,900	$93.28	2,136,000
Dredge Blasted Rock	0.2	22,900	$34.12	781,000
Subtotal Contract Cost				$12,604,000
Contingencies		21.12%		2,662,000
Subtotal with Contingency				$15,266,000
Planning, Engineering and Design				976,000
Construction Management				778,000
Total First Cost		596,600		$17,090,000
With Nearshore Bar Placement of Sand at Wells Beach and Merrimack River Beaches				
Mobilization/Demobilization				
Dredging Plant – Ordinary Material			Lump Sum	$720,000
Drill and Blast Plant			LS	567,000
Dredging Plant – Rock Removal			LS	16,000
Total Mob/Demob				$1,303,000
Dredging and Disposal Ordinary Material				
50% Nearshore Placement at Wells Beach	1.3	286,900	$17.44	$5,004,000
37.5% Placement at Plum Island Beaches	1.0	215,100	$16.78	3,609,000
12.5% Placement at Salisbury Beach	0.3	71,700	$16.35	1,172,000
Drill and Blast Ledge Rock	1.1	22,900	$93.28	2,136,000
Dredge Blasted Rock	0.2	22,900	$34.12	781,000
Subtotal Contract Cost				$14,005,000
Contingencies		21.12%		2,958,000
Subtotal with Contingency				$16,963,000
Planning, Engineering and Design				986,000
Construction Management				778,000
Total First Cost		596,600		$18,727,000

TABLE 10 (Continued)
Cost Estimates for Alternative Plans

Alternative 1A – 1200-Foot Wide Turning Bain

With Ocean Placement at the Isles of Shoals North Site

	Work Time Months	Cubic Yards	Unit Cost	Cost
Mobilization/Demobilization				
Dredging Plant – Ordinary Material			Lump Sum	$608,000
Drill and Blast Plant			LS	567,000
Dredging Plant – Rock Removal			LS	16,000
Total Mob/Demob				$1,191,000
Dredging and Disposal Ordinary Material	3.2	728,100	$14.84	$10,808,000
Drill and Blast Ledge Rock	1.3	25,300	$96.52	2,442,000
Dredge Blasted Rock	0.2	25,300	$34.31	868,000
Subtotal Contract Cost				$15,309,000
Contingencies		21.12%		3,234,000
Subtotal with Contingency				$18,543,000
Planning, Engineering and Design				997,000
Construction Management				827,000
Total First Cost		753,400		$20,367,000

With Nearshore Bar Placement of Sand at Wells Beach and Merrimack River Beaches

	Work Time Months	Cubic Yards	Unit Cost	Cost
Mobilization/Demobilization				
Dredging Plant – Ordinary Material			Lump Sum	$720,000
Drill and Blast Plant			LS	567,000
Dredging Plant – Rock Removal			LS	16,000
Total Mob/Demob				$1,303,000
Dredging and Disposal Ordinary Material		728,100	$0.06	$41,000
50% Nearshore Placement at Wells Beach	1.6	364,100	$17.36	6,321,000
37.5% Placement at Plum Island Beaches	1.2	273,100	$16.64	4,544,000
12.5% Placement at Salisbury Beach	0.4	90,900	$16.11	1,464,000
Drill and Blast Ledge Rock	1.3	25,300	$96.52	2,442,000
Dredge Blasted Rock	0.2	25,300	$34.31	868,000
Subtotal Contract Cost				$16,983,000
Contingencies		21.12%		3,554,000
Subtotal with Contingency				$20,537,000
Planning, Engineering and Design				997,000
Construction Management				827,000
Total First Cost		753,400		$22,361,000

4.8 Annual Cost of Alternative Plans

The first cost and annual costs of each alternative with disposal at the IOS-N site (Federal base plan) are shown in the Table 11. The costs of the alternatives were prepared at October 2013 price levels. Annual costs consist of amortization of the project first cost and any increase in annual maintenance of the project attributed to the improvement. Amortizing the first costs used the 50-year period of analysis for navigation improvements and the Fiscal Year 2014 interest rate of 3-1/2%. The Office of Management and Budget conducts its own review of water resource projects using an interest rate of 7%, and those numbers are also provided below.

Maintenance dredging of the section of river where the turning basin is located has not been required since the project was completed in 1965. Maintenance of this area is currently not considered necessary on its own as the controlling depth over most of the basin is greater than the authorized depth of -35 feet. Currently there is less than 100 cubic yards of material shallower than the design depth of -35 feet, and a total of about 2,100 cubic yards shallower than the current allowable overdepth elevation of -37 feet. The lack of shoaling in the basin and vicinity has made sedimentation studies unnecessary, thereby providing no basis for estimating future shoaling rates. A reasonable estimate of future annual maintenance dredging costs was determined to be one percent of project first costs.

TABLE 11
Annual Cost of Alternative Plans
With Placement at IOS-N Site (Federal Base Plan)

Project Investment Costs	**Turning Basin Width Alternatives**		
	1020 Feet	**1120 Feet**	**1200 Feet**
Total Project First Cost	$13,474,000	$17,020,000	$20,367,000
Interest During Construction	$39,000	$70,000	$111,000
Total Project Cost	$13,513,000	$17,090,000	$20,478,000
Annual Costs – at 3-1/2% Rate			
Amortization of Project Costs	$576,100	$728,500	$873,000
Increased Annual Maintenance Dredging	$134,700	$170,200	$203,700
Total Annual Cost	$710,800	$898,700	$1,076,700
Annual Costs – at 7% Rate			
Amortization of Project Costs	$945,900	$1,196,300	$1,433,500
Increased Annual Maintenance Dredging	$134,700	$170,200	$203,700
Total Annual Cost	$1,080,600	$1,366,500	$1,637,200

5.0 EVALUATION AND COMPARISON OF ALTERNATIVE PLANS

5.1 Economic Analysis

This economic analysis was conducted in accordance with current Corps of Engineers guidance for deep draft navigation projects. The purpose of the economic analysis is to determine the potential benefit a plan would have on the national economy. The Corps uses the National Economic Development (NED) account to analyze the economic benefits of a project. NED benefits are contributions to national economic development that increase the value of the national output of goods and services. For deep-draft navigation projects, the most common type of NED benefit is waterborne transportation cost savings. The NED benefits are estimated by comparing the transportation costs without the project to the transportation costs with the project. Any decrease in total transportation costs resulting from the project equal the benefits of the project. This study also evaluated reduction on damages as a result of grounding when turning, and the efficiencies achieved when fewer tugs are required to assist in the turn.

The economic analysis conducted for the Portsmouth Harbor turning basin study is based on detailed waterborne commerce statistics data from the Corps of Engineers Waterborne Commerce Statistics Center, as well as on information provided by the New Hampshire Pease Development Authority, Division of Ports and Harbors, the operators and users of the two terminals at the upstream end of the Federal channel, and the Portsmouth Harbor Pilots.

Benefits and project costs are compared in annual terms, and are converted to average annual equivalents using the FY 2014 Federal interest rate for water resources projects of 3-1/2 percent. The base year of the analysis is 2016 and a 50 year period of analysis (2016-2066) is used. Both the without and with project conditions are forecast over the period of analysis. A detailed explanation of the economic analysis and results including data, assumptions and methodology is provided in the Appendix C, Economic Assessment. Findings of the economics analysis are briefly summarized below. Hourly vessel operating costs as developed by the Army Corps of Engineers, Institute for Water Resources, in Economic Guidance Memorandum #11-05, Deep-Draft Vessel Operating Costs FY 2011, were used in the economic analysis.

5.1.1 Benefits Analysis

In the future without-project condition it is assumed that the two terminals at the upstream end of the navigation channel will continue to operate and that cargo volumes will be similar to current levels (See Appendix C - Economics). The future without a navigation improvement project also assumes that the existing channel and turning basin would be maintained at the authorized dimensions (depth of -35 feet MLLW, channel width of 400 feet and turning basin width of 800 feet). The upper portion of the Federal project was completed in 1966 and maintenance dredging the only area where shoaling occurs regularly, the Simplex Shoal located about 3,000 feet downstream, is conducted approximately every ten years. The last maintenance dredging in this area was completed in early 2013. Based on condition surveys obtained in 2007, only a small amount of shoaling (less than 100 cubic yards shallower than -35 feet MLLW, and less than 2.100 CY shallower than -37 feet MLLW) has accumulated in the turning basin and its channel approaches above Frankfort Island. This minimal amount of shoaling does not impact vessel operations in this area.

Three types of benefits were evaluated for this study. The first type is a reduction in the transportation costs that are associated with the economies of scale of using larger vessels and less time in port. The second type is is a reduction in damages as a result of grounding while turning, and the third type would be the efficiency achieved in the turning operation as a result of utilizing fewer tugs to assist in the turn.

In the with-project condition, widening the turning basin will allow shippers to shift to larger, more cost-effective vessels, thereby achieving the lower cost per ton of larger vessels. The degree to which shippers would use larger vessels was determined based on interviews with Sea-3 and users of the Sprague terminal. Widening the turning basin from 800 feet to the proposed widths of 1020, 1120 and 1200 feet would encourage shippers to schedule relatively more of the larger ships. Transportation costs, expressed in at sea, in port and tidal delay, were developed for each widening scenario. In these with project conditions, it is projected that average size of vessels will increase based on the new width. Widening the turning basin to 1200 feet allows a new class of vessel to call on the two terminals that use this basin for turning.

The reduction in transportation cost between the without project condition and the with-project condition is a project benefit. Savings were put on a per ton basis to allow for calculation of tonnage growth, but no growth was assumed in the calculation. The annual economic benefits to widening the turning basin equal the difference in waterborne transportation cost between the without project condition and the with-project condition for each turning basin width analyzed.

In the without project condition the probability of grounding is about 0.00446 (5 groundings divided by 1120 trips for vessels greater than 500 feet in length) based on 28 years of record. In the with-project condition the probability of grounding is expected to be reduced by at least 75 percent.

In the without project condition, three tugs are required to turn vessels in the upper turning basin. In the with-project condition the number of tugs can be reduced to two for all turning basin widths evaluated. The reduction in tugs costs improves the efficiency of the turn and is a project benefit.

Table 12 shows the upper river fleet distribution for the various alternative basin widths including the no action plan. Table 13 shows transportation cost savings, grounding damage reductions, reduction in turning costs and total expected annual benefits for each improvement width.

TABLE 12
Vessel Size Distribution for Alternative Plans

Vessel Length	**Alternative Turning Basin Widths**											
	800 Feet No Action Plan			**1020 Feet**			**1120 Feet**			**1200 Feet**		
	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
<=500	28	22	50	28	22	50	28	22	50	28	22	50
501-599	0	9	9	0	0	0	0	0	0	0	0	0
600-699	0	12	12	0	14	14	0	0	0	0	0	0
700-800	0	7	7	0	5	5	0	17	17	0	15	15
Total	28	50	78	28	41	69	28	39	67	28	37	65

TABLE 13
Annual Benefits to Turning Basin Widening

Turning Basin Width	Expected Annual Benefits			
	Transportation Cost Savings	Grounding Damage Reduction	Reduction in Turning Costs	TOTAL
1020 Feet	$2,089,800	$307,900	$74,000	$2,471,700
1120 Feet	$2,277,500	$314,900	$82,000	$2,674,400
1200 Feet	$2,873,600	$321,900	$90,000	$3,285,500

5.2 Determination of NED Plan

The National Economic Development (NED) plan is that plan which reasonably maximizes net annual benefits. The net annual benefits of an improvement plan are equal its annual benefits minus its annual costs. The annual benefits, annual costs, benefit to cost ratio (BCR), and annual net benefits for each alternative were evaluated and compared using outputs calculated at the FY2014 3-1/2% interest rate. The results are shown in Table 14. Benefit-cost calculations using the 7% OMB interest rate are also shown.

TABLE 14
Benefit-Cost Summary

Benefit-Cost Analysis at 3-1/2% Rate	**Turning Basin Width**		
	1020 Feet	**1120 Feet**	**1200 Feet**
Annual Benefits	$2,471,700	$2,674,400	$3,285,500
Annual Costs	$710,800	$898,700	$1,076,700
Annual Net Benefits	$1,760,900	$1,775,700	$2,208,800
Benefit-Cost Ratio (BCR)	3.48	2.98	3.05
Benefit-Cost Analysis at 7% Rate	**Turning Basin Width**		
	1020 Feet	**1120 Feet**	**1200 Feet**
Annual Benefits	$2,471,700	$2,674,400	$3,285,500
Annual Costs	$1,080,600	$1,366,500	$1,637,200
Annual Net Benefits	$1,391,100	$1,307,900	$1,648,300
Benefit-Cost Ratio (BCR)	2.29	1.96	2.01

The 1200-foot wide turning basin plan is the NED plan as net annual benefits are maximized at this width. Annual net benefits for the 1020 and 1120-foot width plans are nearly identical, with the 1200-foot width plan providing more than 25 percent more annual net benefits than either of these plans. The 1200-foot width plan is the best plan from an economic standpoint as it provides nearly $500,000 more in net annual benefits.

5.3 Development of Costs for the Beneficial Use Plan

The previous section indentified the NED plan based on the Federal base plan disposal site which is IOS-N. As four communities, Wells, Maine, and Salisbury, Newburyport and Newbury, Massachusetts, have expressed an interest in having dredged material placed in nearshore areas to nourish nearby beaches, the difference in cost between this Federal base plan and nearshore placement at these sites was determined. The distances from the turning basin to these sites vary which will result in differences in costs to haul the dredged material to these locations. Table 15 shows the total difference in costs between the Federal base plan and nearshore placement at the four sites. As the Newburyport and Newbury sites are off the Plum Island shoreline they were combined for this analysis. In both the Federal base plan and beneficial use plan, rock will be disposed of at the IOS-N site.

TABLE 15
Comparison of Project Costs - Federal Base Plan and Nearshore Placement

Project Costs	**1200-Foot Turning Basin Width**	
	Federal Base Plan	**Nearshore Placement**
Mobilization/Demobilization		
Dredging	$1,191,000	$1,303,000
Ordinary Material (728,100 CY)		$41,000
100% to IOS-North	$10,808,000	
50% Nearshore Placement at Wells Beach		$6,321,000
37.5% Nearshore Placement at Plum Island		$4,544,000
12.5% Placement at Salisbury Beach		$1,464,000
Rock – Drilling & Blasting and Removal	$3,310,000	$3,310,000
Subtotal	$15,309,000	$16,983,000
Contingencies	$3,234,000	$3,554,000
Subtotal	$18,543,000	$20,537,000
Planning, Engineering and Design (PED)	$997,000	$997,000
Construction Management	$827,000	$827,000
Total Project First Cost	$20,367,000	$22,361,000
Interest During Construction	$111,000	$122,000
Total Project Investment Cost	$20,478,000	$22,483,000
Difference in Total Project First Cost	$1,994,000	

As shown in Table 16, the total difference in Total Project First Cost between the Federal base plan and nearshore placement is $1,994,000. This difference in total costs was distributed to the four communities requesting placement in nearshore areas based on the difference in the distance to these alternative placement sites and the percentage of material going to each site. Table 16 shows the cost apportionment plus other specifics regarding costs for nearshore placement by community. Whether any or all of the identified receiving communities ultimately receive sand from the project will depend on their ability to secure necessary permits and approvals and provide the difference in cost for that placement over the cost of the Federal base plan for ocean placement. These costs were developed using the proportional costs for nearshore placement from Table 10 applied to the difference in total project first cost from Table 15. This ensures that both sand volumes placed and haul distance to each site are both factored into the distribution. Ultimately it will be up to the two states and the four communities to determine their participation and the final distribution of sand between the receiving beaches.

TABLE 16
Non-Federal Costs for Nearshore Placement by Community

Beach Placement Site	Distance to Site	Cubic Yards Placed	Cost Apportionment	Approximate Cost Per CY
Wells, Maine	31	364,100	$1,022,000	$2.81
Salisbury, Mass.	26	90,900	$237,000	$2.61
Newburyport, MA	28	36,400	$98,000	$2.69
Newbury, Mass.	28	236,700	$637,000	$2.69
TOTAL		728,100	$1,994,000	

5.4 Regional Economic Development and Other Social Effects Benefits

The widened turning basin would also have positive regional economic effects (RED benefits). The transportation costs savings of the NED benefit analysis would be seen in lower costs of bringing products to manufacturers and consumers in New Hampshire and Maine. LPG costs with the widening project could be somewhat lower as compared to the without project condition. Lower costs of transporting products such as gypsum to manufacturing businesses could make these businesses more efficient and more cost-competitive relative to businesses in other regions. This could increase local business activity which in turn could increase employment.

Although no growth in use of these terminals was projected, widening the turning basin could promote increased use of these upstream terminals by importers and exporters. This could result in increased employment in the region and at the harbor itself, as increased shipments require additional dock workers, truckers, and other workers. These types of positive effects would be RED benefits to turning basin widening.

In the Other Social Effects (OSE) category, the most significant benefit from channel widening would be the improved safety and efficiency of turning vessels at this basin. Costs associated with turning vessels would be reduced, and safety, particularly for LPG tankers would be improved. This would help ensure reliable and efficient deliveries of LPG and other products and raw materials to the region. Increased turning basin width would allow shipments to be brought on larger, more cost-effective vessels. The improved safety and efficiency of critical energy shipments would improve the energy security of the region.

Placement of dredged material in nearshore areas to nourish nearby beaches in four communities, one in Maine and three in Massachusetts, will have a beneficial effect on local economies. As all communities have substantial tourist industries that rely heavily on healthy beaches, wider stable beaches should attract additional visitors as well as protect structures situated along the shoreline.

5.5 Environmental Impacts

Information on environmental impacts of dredging and impacts of disposal or beneficial use of dredged material is presented in the following sections.

5.5.1 Dredging Impacts

Dredging of about 730,000 cubic yards of coarse sand and gravel from the turning basin in the Piscataqua River would be performed by a mechanical dredge. The potential impacts of dredging on water quality and biological resources in the area are addressed below.

Water Quality: The area of the proposed improvement is classified by the state of New Hampshire as Class B and by Maine as Class SB. New Hampshire Class B Waters are designated by the State as being acceptable for bathing and other recreational uses. Maine Class SB waters are suitable for water contact recreation, fishing, shellfish harvesting and propagation, and are valuable fish and wildlife habitat. The area of proposed improvement is a high-energy environment with strong tidal currents sometimes exceeding 5 knots. The majority of the material to be dredged (i.e "parent material") consists of coarse sand and gravel. Sand and gravel are not known for being a carrier of contaminants; therefore no release contaminants into the water column during dredging operations are expected. Excavation (and the loading of attendant scows) of the parent material from the Piscataqua River will likely suspend some sediment into the water column; however, given the nature of the material to be dredged, any increases in turbidity should be short term. The strong currents of the Piscataqua River may carry the turbidity plume beyond the immediate vicinity of the dredging area, but because of the minor amount (and nature) of material likely to be suspended, the impact of any turbidity plume should be minimal. There should be no degradation of Class B or Class SB waters as a result of the dredging operations.

Effects on Marine Organisms: Potential impacts of dredging to marine organisms is restricted to physical effects, as dredging operations are not likely to have any effect on water column chemistry. Some benthic organisms inhabiting the dredging area would be destroyed during the dredging process. The benthic invertebrates inhabiting the channel area are mostly opportunistic species with life history characteristics adapted to frequent disturbances. Dredging to widen the turning basin is therefore not likely to alter benthic community structure. Recolonization following dredging should take place within a few months. Any temporary loss of fish foraging area would be extremely localized and short-lived.

There are no significant shellfish resources in the dredging area. Softshell clams along the intertidal banks of the Piscataqua River would not be threatened by dredging operations as any increases in turbidity levels would be short-lived and extremely localized. More motile forms (e.g. lobsters and crabs) would avoid the work area and should not be seriously affected by dredging. Turbidity generated by the dredging may drive lobsters away from the area for a short time. Adult lobsters and crabs in the area would survive short-term increases in turbidity. Lobster larvae are likely to be abundant from May through July. Softshell clams spawn in the area from June through August. Restricting the dredging and disposal operations to the November through March window will also minimize impacts to lobsters and shellfish.

Dredging can be conducted without significant impacts to anadromous fisheries. The timing of the dredging operation avoids spring runs of anadromous fish (alewife, April - June; American shad, May - June; blueback herring, May - June; smelts, April - June) and the fall salmonid runs (October - November). Striped bass spawn in the estuary in June and early July. Restricting dredging and disposal to between November and March would avoid any impacts to striped bass spawning. Overall, the impacts to finfish are expected to be minimal. Turbidity impacts would be extremely short-lived and localized, and fish should be able to avoid the work area.

Any marine mammals that could be in this portion of the river would also avoid the area of activity and not be affected.

Impacts of Blasting: The Approximate 25,300 cubic yards of rock may require blasting to remove it from the expanded turning basin. Potential aquatic impacts associated with blasting include noise, thermal energy release, increased turbidity, damage to structures, and effects on aquatic life, all of which are expected to be minor and temporary in nature due to the precautions to minimize the shock wave. These impacts would be generated as a result of vibrations, explosion-induced surface water waves, or air overpressure.

Any impacts to aquatic populations would be localized and temporary, with the most pronounced effect on aquatic species in the immediate vicinity. The effect of blasting on hard-bodied invertebrates would tend to be small except in the immediate vicinity of the blast. Damage to hard-bodied invertebrates near the blast site might include cracked or broken shells and carapaces. Soft-bodied invertebrates in the immediate vicinity would be killed, while populations of those in outlying areas would sustain less damage. Long term impacts are not expected.

The extent of damage to fish populations depends primarily on the proximity to the blast and the presence or absence of a swim bladder. Fish with swim bladders (e.g., Atlantic herring) will be unable to adjust to the abrupt change in pressure propagated by the blast. If they are within a zone of influence, fish with swim bladders may be injured or killed. Fish without swim bladders (e.g., winter flounder) are less likely to be injured, and would likely sustain injuries only if they are in the immediate vicinity of the blast. Blasting may displace resident fishes, although this impact is expected to be temporary. Blasting impacts will be avoided or minimized by the methods discussed below:

- Use of a fish detecting and startle system to avoid blasting when fish are present or transiting through the area, including placing the fish startle system on a separate boat;
- Require the use of sonar and the presence of a fisheries and marine mammal observer;
- Prohibiting blasting during the passage of schools of fish, or in the presence of marine mammals, unless human safety was a concern;
- Using inserted delays of a fraction of a second per blast drill hole, and;
- Placing material on top of the borehole (stemming) to deaden the shock wave reaching the water column.

5.5.2 Impacts of Disposal

Disposal impacts have been evaluated for both the Federal Base Plan disposal at the Isles of Shoals North ocean placement site, and for the alternative nearshore placement sites to be pursued by local communities.

Water Quality: The material from the expanded turning basin is a glacial till composed of coarse grained material (sand and gravel) and rock, and so has had little in the way of anthropogenic influences that would include contaminants. Dredged material released from a barge would descend through the water column as a dense fluid-like mass and a small percentage may be lost to the water column. Because the dredged material is coarse grained almost all of the material would be expected to settle rapidly resulting in limited turbidity of short duration, whether it is deposited at the ocean placement site or as a feeder berm for the nearby alternative nearshore beach placement sites.

Sediment Quality: The sediments to be dredged consist of glacial till composed of clean, coarse sand and gravel that is considered to be free of contaminants due to the nature of the deposit, lack of fined grained material, and its removal from any known sources of contamination. The material at the IOS-N site is primarily fine grained. Placement of dredged material and rock at the IOS-N site would change the sediment characteristics at that site where the existing bottom material ranges from fine grained to sand and gravel, making the site more physically diverse.

Placement at the alternative nearshore sites would not significantly change the present character of those sites. The dredged sediments are clean, coarse sand and gravel that is considered to be free of contaminants. The grain size distribution of shoal material is generally compatible with the sediments at the nearshore areas, except for the Wells nearshore placement site which has finer grained material. However, the coarser grained material should assist in providing a stable beach system for a longer period of time.

Sediment Movement: Dredged material and rock placed at the IOS-N site is not expected to move from the area. The depths at the IOS-N (about 300 feet) and the generally fine grained nature of the bottom materials indicate that this site is not subject to storm generated waves and currents. In comparison, monitoring of similar deep water disposal sites such as the MBDS under the Disposal Area Monitoring System (DAMOS), have not shown significant movement of dredged material away from the disposal mounds.

At the alternative nearshore sites low mounds of dredged material are created when placed in a nearshore environment for the purposes of beach nourishment. This type of placement is considered a “feeder berm”, allowing beach nourishment to occur naturally by migration of sand to these nearshore areas. Since tidal currents and wave action would redistribute the material over the course of several seasons or years, no long-term changes in bathymetry would occur. The average height of material would be several feet above the seafloor and placed at the 12-foot MLLW contour and seaward in the nearshore placement sites to maximize movement of the material towards shore. Approximately 364,100 cy of dredged material would be disposed in waters off the coast of Wells, Maine, with the remaining 364,000 cy divided between the three Massachusetts communities as follows: Salisbury – 90,900 cy, Newburyport – 36,400 cy, and Newbury – 236,700 cy. Material would be placed to provide the greatest amount of material to be carried by currents and longshore transport onto the nearby beaches for nourishment.

Effects on Marine Organisms and Wildlife: At the IOS-N ocean placement site the primary impacts of dredge material disposal on aquatic resources can result from increased turbidity and direct burial in the immediate vicinity of the disposal site. Turbidity impacts would be minimal, short lived and localized and not likely to significantly impact the biota due to the coarse grained nature of the material being disposed. The temporary mounds formed by the disposal of material will result in the burial of any individuals (shellfish and benthos) directly in the disposal footprint at the placement area. Some mobile species would likely have the ability to move away from the area during disposal operations. Disposal mounds would begin recolonization after construction is completed.

At the alternative nearshore placement sites the major physical effects of disposal on aquatic populations are turbidity and direct burial. Unlike at the ocean placement site, material placed in the nearshore sites is expected to move within the littoral system and onto the beach. Gradual erosion at the disposal site could result in minor periodic turbidity increases in the immediate area. The temporary mounds formed by the discharge may bury or injure individuals in the placement area. Mobile species would most likely avoid the area. Any lobsters inhabiting the area would move or be buried during placement events. Once placement operations begin and the area is disrupted, lobsters would likely move from the area. Material has been previously disposed at the Wells, Salisbury, Newburyport, and Newbury nearshore disposal sites.

Limiting work from mid-October to mid-April would minimize impacts to lobsters and spawning benthic organisms at the nearshore disposal sites. In addition, the proponent communities or state agencies would provide prior notice to local commercial fisherman allowing for any commercially harvestable shellfish resources (i.e. surf clams) to be removed from any of the nearshore placement sites prior to placement. Once placement operations have been completed it can be expected that shellfish and benthic organisms will recolonize these areas in a short period of time.

5.5.3 Threatened and Endangered Species

Federally Listed Species: While listed whales and sea turtles occur seasonally off the coast of New Hampshire, the occurrence of any of these species in Portsmouth Harbor is extremely unlikely (NMFS letter dated March 27, 2008). Since the bulk of the dredging and disposal activities are planned to occur during the late fall and winter months (November – March), it is unlikely that listed sea turtles species would be in the area during the construction activities. Therefore, the proposed dredging and disposal operations are not expected to adversely affect listed species of sea turtles. Listed whales would not be expected to occur at shallow nearshore placement sites or along the transit routes to these sites (NMFS letters dated November 15, 2013 and February 3, 2014). Whales could be present at the IOS-N site. The contractor will be required to contact the Right Whale Advisory prior to transit, and a threatened and endangered species monitor will be present for transport of material to the IOS-N site to avoid potential ship strikes. Vessels will not be allowed to travel greater than 10 knots.

As stated in NMFS' letter dated September 2, 2011, seaward migrating juvenile Gulf of Maine (GOM) DPS Atlantic salmon (listed as Federally endangered) have been recorded by acoustic telemetry moving southward toward the vicinity of the proposed Isles of Shoals

Disposal area (IOS-N). Atlantic salmon have been detected in the vicinity of GoMOOS Buoy E01, however they have not been detected in the Buoy closest to the IOS-N, B01 since its deployment in 2005 (which is located approximately 10 miles south from E01). Therefore it is unlikely that this species would be in the vicinity of the Isles of Shoals disposal area during the time of disposal operations. In addition, once out-migrating Atlantic salmon smolts have transitioned to saltwater, growth is rapid, and the post-smolts have been reported to move close to the surface in small schools and loose aggregations (Dutil, J. D., and J. M. Coutu. 1988 and early marine life of Atlantic salmon, *Salmo salar*, post-smolts in the northern Gulf of St. Lawrence (Fishery Bulletin 86: 197-212)). Therefore, given the fact that this species has not been detected in the area of the disposal area, as well its migratory behavior being close to the surface where it could avoid any vessel in the area, it is unlikely that the disposal of dredged material at the Isle of Shoals will adversely affect the Gulf of Maine DPS of Atlantic salmon.

The proposed dredging and blasting activities at the Piscataqua River turning basin are planned to be conducted during the late fall/early winter and late winter/early spring, during the months of mid-October through mid-April. Shortnose sturgeons are not known to spawn in the Piscataqua River, so there would no impacts on early life stages in the dredged area. Information provided by the NMFS in their 2011 letter indicated that shortnose sturgeon were detected in the Piscataqua River during the spring and fall. Therefore it is not likely that shortnose sturgeon will be in the proposed dredging and blasting area during the bulk of the dredging and blasting activities. In addition, based upon the information noted above concerning overwintering, it is not likely that the actual dredging area would be an overwintering site for shortnose sturgeon. Also, due to the time of year that the construction will occur, it does not appear that shortnose sturgeon would be foraging in that area during the time of construction. However it is possible that shortnose sturgeon migrating to and from the Great Bay estuary during the early spring and late fall could encounter the construction activities and be affected by them. However, given the fact that shortnose sturgeon are less likely to be in the dredging area during the time of active dredging and the lower risk of contact with a mechanical dredge, the likelihood of a lethal interaction between a sturgeon and the dredge in the Piscataqua River during the active time of dredging would appear to be low.

As noted in NMFS' November 15, 2013 letter, shortnose sturgeons that were detected in the Piscataqua River were believed to be migrating between the Kennebec and Merrimack Rivers. Since all of these near shore disposal areas as well as the Isle of Shoals Disposal Area are located between the Kennebec River and the Merrimack River, any shortnose sturgeon migrating between these two areas could potentially be affected by the disposal activities at these sites. Effects of the disposal of the coarse grained sand and gravel dredged from the Piscataqua River include the direct burial of benthic organisms at the disposal site, as well as the burial or direct contact of any fish species that may be foraging along the bottom with the material as it descends through the water column. Therefore any shortnose sturgeon in the immediate path of the descending dredge plume could be directly affected by the material as it descends from the scow. Also if these sites were used for foraging, then food items could be buried.

Studies conducted on sub-adult white sturgeon in the lower Columbia River in Washington at dredged material disposal areas have shown that "the rates of movement, depths used, and diel movement patterns of the white sturgeon showed little change over all periods" (i.e. of disposal activities) "suggesting that natural behaviors were not altered during and immediately after hopper dredge disposal operations" (Parsley et al. 2011). It is assumed that shortnose sturgeon would similarly be un-affected, being a similar species. In addition, most of the migratory activity of shortnose sturgeon appears to be during the spring and fall, and since most of the dredging activity is planned to occur during November through March, the likelihood of sturgeon being in these areas at the time of dredging is reduced.

Rock removed from the site is planned to be disposed at the Isle of Shoals North disposal area. As noted in the letter from NMFS above, although acoustic receivers (GoMOOS buoy E01) in the vicinity of the Isle of Shoals have detected tagged Atlantic salmon and Atlantic sturgeon, no shortnose sturgeon were detected in the receiver closest to the Isle of Shoals disposal area (GoMOOS Buoy B01). Although the letter mentions that migrating shortnose sturgeon could be in the area of the proposed disposal site, the closest buoy to that site has not detected any shortnose sturgeon or Atlantic salmon. In addition, since shortnose sturgeon have been detected migrating between river systems in the spring and fall, it is not likely that they will be in the vicinity of the disposal areas during the bulk of the construction period between mid-October through mid-April. Therefore based upon the time of year of the shortnose sturgeon migrations reducing the likelihood of their being the any of the disposal areas during the time of disposal, and the fact that shortnose sturgeon were not detected at the Isles of Shoals buoy, as well as the information that shows other sturgeon species to be unaffected by disposal material, it would appear that the disposal of the Piscataqua River dredged material at the proposed near shore and Isles of Shoals disposal sites would not be likely to adversely affect shortnose sturgeon.

Like shortnose sturgeon, the available information on the presence of Atlantic sturgeon in the Piscataqua River is extremely limited and is based only on the detection of Atlantic sturgeon by acoustic receivers in Great Bay. An Atlantic sturgeon tagged and released in the Merrimack River was detected by telemetry receivers in the Great Bay as recently as June 2012. The best available information indicates that suitable habitat for Atlantic sturgeon spawning and rearing does not occur in the lower Piscataqua River because of relatively high salinities. If suitable forage was present, it would be expected that occasional subadult Atlantic sturgeon could be present in the River while foraging between the spring and fall. Because of the lack of spawning and rearing habitat, the action area should only be considered a migratory corridor for both sturgeon species; but, since Atlantic sturgeon do not overwinter in their natal streams they may occur in the action area regardless of season or time of year.

As noted in NMFS's November 15, 2013 letter, Atlantic sturgeon are not believed to spawn in the Piscataqua River, and due to the lack of spawning and rearing habitat, the action area should only be considered a migratory corridor for both sturgeon species. However the letter also notes that due to the fact that Atlantic sturgeons do not overwinter in their natal streams, they may occur in the action area regardless of season or time of year. As noted in the information presented above, Atlantic sturgeon overwintering areas include nearshore areas off the Atlantic coast from the Gulf of Maine south to Cape Lookout North Carolina. Also in the Hudson River, overwintering areas include deep holes. In addition, Adult sturgeon are generally found in areas of little or no current throughout much of their lives, specifically when they are living in the lower parts of rivers, in estuaries or in the ocean.

Since the dredging area of the Piscataqua River is located in an area of high velocity currents, it would not likely be an overwintering area for Atlantic sturgeon. In addition, based upon the above information, it would appear that most of the overwintering areas for adults and late juvenile Atlantic sturgeon would be in nearshore areas off the coast. Since the dredging will occur from mid-October through mid-April, during the times that Atlantic sturgeon would already be at these overwintering areas, it is not likely that an overwintering Atlantic sturgeon would be in the area of active dredging. However, since Atlantic sturgeon migrations occur during the spring and fall, it is possible that during the late fall or early spring that Atlantic sturgeon moving through the area to or from the Great Bay Estuary could be affected by the dredging activities.

NMFS's letter also notes that if suitable forage was present in the dredging area of the Piscataqua River, then occasional sub-adult Atlantic sturgeon could be present in the area while foraging between the spring and fall. Since Atlantic sturgeon juveniles are known to feed on a variety of freshwater, estuarine and marine organisms, it is likely that these food items would be present in either Great Bay, or the tidal flats in the vicinity of the proposed dredging area. However, as noted in that letter, this would be likely between the spring and the fall. In addition, the most recent Atlantic sturgeon detection from Great Bay occurred during June of 2012. Since most of the dredging will occur in the late fall through the early spring, the chances of an Atlantic sturgeon being in the area and being affected by the dredging operations would be assumed to be minimal. However, it is possible that a late fall or early spring migrant through the river could come in contact with the dredging activities.

NMFS's November 15, 2013 letter notes that the use of explosives has the potential to result in injury or mortality of fish. Shortnose and Atlantic sturgeon within 500 feet of a detonation resulting in peak pressures of 120 psi and average pressure of 70 psi, would be exposed to noise and pressure levels that could cause adverse effects (see Moser 1999; Teleki and Chamberlain 1978; and Wiley *et al.* 1981). Based on studies completed by Moser (1999), peak pressure levels at, or below, 75.6 psi, and peak impulse levels at or below 18.4 psi-msec, will cause no injury or mortality to species of sturgeon, including Atlantic and shortnose sturgeon. The letter recommended that the project be designed to observe the above mentioned thresholds, and suggested that the following mitigation techniques be used to facilitate the reduction of sound pressure:

1. Stemming and decking of individual charges;
2. Staggered detonation of charges in a sequential blasting circuit; and
3. Blasting during periods of slack tide and within a confined bubble curtain.

These, plus the following actions to minimize potential blasting impacts to marine mammals and fish (i.e. shortnose sturgeon), will be employed to the maximum practicable extent during construction of the project.

- Use of a fish detecting and startle system to avoid blasting when fish are present or transiting through the area, including placing the fish startle system on a separate boat;
- Require the use of sonar and the presence of a fisheries and marine mammal observer;
- Prohibiting blasting during the passage of schools of fish, or in the presence of marine mammals, unless human safety was a concern;
- Using inserted delays of a fraction of a second per blast drill hole, and;
- Placing material on top of the borehole (stemming) to deaden the shock wave reaching the water column.

Blasting safety radii for marine mammals, sea turtles and Atlantic sturgeon were calculated for the Boston Harbor Deep Draft Dredging project. These calculations were based upon peak pressure levels of less than 23 psi, which would avoid level B harassment of turtles and marine mammals, and would be more than protective of Atlantic and shortnose sturgeon (which as noted above is 75.6 psi). Using Coles equation (1948) modified for confined blasting (Hempen et al, 2007) safety radii were calculated based upon the total weight of the charges for blast. These same equations will be used to calculate safety radii for the Piscataqua River blasting. Since they are based upon the lower peak pressure of 23 psi which protects sea turtles and marine mammals, it is expected that they would be more than protective of shortnose sturgeon (See letter to John Bullard, NOAA Fisheries from ACOE dated November 7, 2012 for further discussion, and also NMFS response of February 3, 2014).

Based on these calculations and analysis of effects on listed species and the low probability of whales, sea turtles and Atlantic and sturgeon occurring in the project area during the time of active blasting, we believe that the blasting in the Piscataqua River would not likely adversely affect listed species, particularly sturgeon.

No impacts to the Federally listed Piping Plover or the proposed listing of the Red Knot is expected. Piping plover nest on beaches and they forage in intertidal areas, away from the proposed nearshore placement sites.

State Listed Species

Maine: As the State listed species for the State of Maine are the same as the Federally listed species, any potential impacts described above for the Federal species would be relevant to Maine's State listed species.

New Hampshire: The New Hampshire Natural Heritage Bureau provided a list of State-listed species in the project vicinity in a memo dated 4 December 2014. The Prolific Yellow-Flowered Knotweed (State Listed as Endangered) and the Henslow's Sparrow (not listed but last observed in 1983) are not in the immediate project area, and do not inhabit the types of area (subtidal) in which the project is located. Neither species is Federally listed.

Massachusetts: The proposed nearshore placement of about 365,000 cubic yards of dredged material in the vicinity of Newbury, Newburyport and Salisbury will occur within the foraging habitat of the Least Tern and Common Tern, and is in close proximity to breeding habitat for Piping Plover. Both tern species are State-listed as "Special Concern" and the Piping Plover is State-listed as "Threatened". The Piping Plover is also Federally protected as "Threatened" pursuant to the U.S. Endangered Species Act (ESA, 50 CFR 17.11).

Based on the information provided, the Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife does not anticipate impacts to State-listed species associated with the nearshore placement of about 365,000 cy of dredged material (email dated October 2, 2013).

5.5.4 Essential Fish Habitat

Dredge Area

The only EFH managed species listed for the Great Bay and the Piscataqua River are: transiting Atlantic salmon (juveniles, adults), Atlantic cod (eggs, larvae), haddock (eggs, larvae), pollock (eggs, larvae, juveniles), red hake (juveniles, adults), white hake (eggs, juveniles, adults), winter flounder (eggs, larvae, juveniles, adults, spawning adults), yellowtail flounder (eggs, larvae), windowpane flounder (eggs, larvae, juveniles, adults, spawning adults), Atlantic halibut (eggs, larvae, juveniles, adults, spawning adults), Atlantic sea scallop (juveniles, adults), Atlantic sea herring (larvae, juveniles), bluefish (juveniles, adults), and Atlantic mackerel (eggs, larvae, juveniles).

Short-term and temporary impacts to EFH species from dredging and blasting are expected based on the following reasons. The Piscataqua River is very wide, with swift currents. The reach of river where dredging to expand the turning basin would occur is over 2,000 feet in width. As the material to be dredged is composed of mostly sand and gravel, the majority of the material is expected to settle within a 1,000 feet of the dredging. Dredging activities are not expected to impede the passage of fish migrating up and down the Piscataqua River due to the substantial width of the river and the coarse material being removed from the turning basin. Some entrainment of eggs and larvae could occur from dredging. This is likely to affect spawning winter flounder, windowpane flounder and Atlantic halibut. Ongoing dredging activities may deter these species from spawning in locations in and adjacent to these activities. However, the amount of entrainment should be minimal as dredging would occur in a limited area. Restricting the dredging operations to between September through April will further minimize any impacts to fisheries.

Blasting activities may kill or injury finfish species with air bladders closest to the blast more severely. Demersal species such as flounder would not be expected to be as impacted as greatly from the shock wave from blasting. Mitigation techniques to reduce these blasting impacts were discussed above.

The benthic community in the Piscataqua River is dominated by opportunistic species that are capable of rapid recolonization. Long-term impact to the benthic community is not expected as recolonization would be expected to begin when dredging has been completed. No significant and long-term impact to these EFH species is expected from deepening the turning basin.

Isles of Shoals-North Site (Federal Base Plan)

EFH managed species listed for the IOS-N site based on depth and substrate type are: Atlantic cod (eggs), pollock (eggs, larvae, juveniles, adults), whiting (eggs, larvae, juveniles, adults), red hake (eggs, larvae), white hake (eggs, larvae, juveniles, adults), redfish (larvae, juveniles, adults), winter flounder (juveniles), American plaice (larvae, juveniles, adults), ocean pout (adults), Atlantic halibut (eggs, larvae, spawning adults), Atlantic sea scallop (eggs, larvae, juveniles), Atlantic sea herring (juveniles, adults), monkfish (eggs, larvae, juveniles, adults), bluefish (juveniles, adults), long-finned squid (juveniles, adults), short-finned squid (juveniles, adults), Atlantic butterfish (eggs, larvae, juveniles, adults), Atlantic mackerel (larvae, juveniles, adults), summer flounder (adults), scup (juveniles, adults), ocean quahog (juveniles, adults), spiny dogfish (juveniles, adults), bluefin tuna (juveniles, adults).

Eggs and larvae of these species are mostly found in the surface and pelagic waters of the placement site. Any eggs and larvae at the placement site would be entrained in the dredged material as it is released from the scow and destroyed. Eggs and larvae on the bottom of the sea floor would also be destroyed from burial during placement. Disposal during the cooler months of the year could impact Atlantic cod eggs, pollock eggs and larvae, American plaice eggs and larvae, Atlantic halibut eggs and larvae, monkfish eggs and larvae, and Atlantic mackerel larvae. It is possible that juveniles and adults would be able to escape impacts from placement. Also, the temporary and limited impact of disposal on these species is not expected to have a significant impact.

The material proposed for placement is composed of coarse-grained material. The current bathymetry and sediment type is homogenous and fine-grained. Disposal mounds of coarser grained material and rock could provide a benefit to EFH species by providing some physical diversity to the site which may attract additional EFH species.

Nearshore Placement Site – Wells

Managed species for the Wells nearshore disposal site are: Atlantic cod (adult), whiting (adult), white hake (juvenile, adult), winter flounder (eggs, larvae, juveniles, adults, spawning adults), yellowtail flounder (larvae, adults), windowpane flounder (eggs, larvae, juveniles, adults, spawning adult), American plaice (juveniles, adults), Atlantic halibut (eggs, larvae, juveniles, adults), Atlantic sea scallop (eggs, larvae, juveniles, adults), Atlantic sea herring (larvae, juveniles, adults), bluefish (juveniles, adults), and bluefin tuna (adults).

The only managed species listed above which would be expected to inhabit the Wells nearshore placement site based on the available depths and marine conditions at the placement area as well as the seawater (> 25 ppt) include: white hake (juveniles and adults), winter flounder (juveniles, adults, and spawning adults), windowpane flounder (eggs, larvae, juveniles, adults, and spawning adults), Atlantic halibut (eggs, larvae, and spawning adults), and bluefish (juveniles and adults). The potential impact to these species is discussed in the following paragraphs.

White Hake: The nearshore placement sites are at their lower limit of their preferred depth; consequently the number of individuals at the placement location would be expected to be small. Any potential impacts from nearshore placement would not be expected to be large or meaningful. The time of year restrictions would not generally coincide with the presence of white hake in the project area. Considering the overall project area in comparison to the Gulf of Maine, potential impacts to this EFH species from interim dredging within Wells Harbor would be considered irrelevant.

Winter Flounder: The material to be disposed is coarse grained sand and gravel so turbidity impacts would again be expected to be minimal and of a short duration. Winter flounder spawning, eggs and larvae could be minimally affected as placement could occur during a portion of the spawning period. Any adult fish in nearshore placement site would be expected to move away from the disruption. Benthic resources would be expected to recolonize the area quickly. Fish could swim to other areas to avoid the disturbance and for foraging while the area recolonizes.

Windowpane Flounder: The coarse nature of the sediment would further minimize turbidity impacts at the nearshore placement sites. Therefore, impacts from turbidity are expected to the localized and temporary. The nearshore placement would occur sometime between mid-October through mid-April. This would further avoid or minimize potential adverse impacts to windowpane flounder. Peak observations of windowpane flounder eggs and larvae are

May and October in the middle Atlantic and July through August on Georges Bank. If adults are in the project area, they would be expected to move away from areas of disturbance. Benthic resources would be expected to recolonize the area quickly. Fish could swim to other areas with better forage species while the area recovers.

Atlantic Halibut: Atlantic halibut would not be expected to be found in large numbers in the project area as they are generally located in deeper marine areas. Spawning occurs between late fall and early spring, with peaks in November and December. Spawning could coincide with the placement at the nearshore placement site. This potential temporary impact from placement would be considered insignificant as the project area is not generally associated with this species and nearshore placement will only have a temporary and localized turbidity impact.

Bluefish: Bluefish juveniles and adults are found in pelagic waters generally from June through October. It is unlikely that large numbers of bluefish would be found off of Wells Beach. If present, these fish would be expected to avoid the nearshore placement activities. The temporary and limited impact from nearshore placement is not expected to have any significant impact on the bluefish population in the Gulf of Maine.

Nearshore Placement Sites – Salisbury, Newburyport, and Newbury

Managed species for the Salisbury, Newburyport and Newbury nearshore disposal areas are Atlantic cod (eggs, larvae), pollock (juveniles), red hake (eggs, larvae, juveniles), winter flounder (eggs, larvae, juveniles, adults), windowpane flounder (eggs, juveniles, adults), Atlantic sea scallop (eggs, larvae), Atlantic mackerel (eggs, juveniles, adults), surf clam (juveniles, adults), and bluefin tuna (juveniles, adults).

Atlantic Cod: Some entrainment of eggs and larvae could occur from disposal at the nearshore disposal sites. However, the area of disposal is small compared to the remaining area of Massachusetts Bay.

Pollock: The coarse nature of the material would minimize turbidity impacts to this species. Juveniles would be expected to move from the area of disturbance. Any potential impacts would be expected to be minimal and short-term.

Red Hake: Some entrainment of eggs and larvae could occur from disposal at the nearshore disposal sites. However, the area of disposal is small compared to the remaining area of Massachusetts Bay. Juveniles would be expected to move from the area of disturbance.

White Hake: The nearshore disposal site is at their lower limit of their preferred depth; consequently the number of individuals at the disposal location would be expected to be small. Any potential impacts from nearshore disposal would not be expected to be large or meaningful. The time of year restrictions would not generally coincide with the presence of white hake in the project area. Considering the overall project area in comparison to the Gulf of Maine, potential impacts to this EFH species from interim dredging within Wells Harbor would be considered irrelevant.

Winter Flounder: Disposal of the material is sandy so turbidity impacts would be expected to be minimal. Winter flounder spawning, eggs and larvae could be minimally affected as disposal could occur during some of the spawning period. Any adult fish in nearshore disposal site would be expected to move away from the disruption. Benthic resources would be expected to recolonize the area quickly. Fish could swim to other areas with better forage species while the area recovers.

Windowpane Flounder: The coarse nature of the sediment would minimize turbidity impacts at the nearshore disposal sites. Therefore, impacts from turbidity are expected to the localized and temporary. The nearshore disposal would occur sometime between mid-October through mid-April. This would further avoid or minimize potential adverse impacts to windowpane flounder. Peak observations of windowpane flounder eggs and larvae are May and October in the middle Atlantic and July through August on Georges Bank. If adults are in the project area, they would be expected to move away from areas of disturbance. Benthic resources would be expected to recolonize the area quickly. Fish could swim to other areas with better forage species while the area recovers.

Atlantic Sea Scallop: Atlantic sea scallop eggs and larvae could be buried at the site from disposal. However, the nearshore disposal would occur sometime between September through April avoiding the peak occurrences. Impacts are expected to be minimal and temporary.

Atlantic Mackerel: Atlantic mackerel would not be expected to be found in large numbers in the project area as they are generally located in pelagic waters. Some entrainment could occur during disposal, but this would not be considered significant as the project area is small compared to the Massachusetts Bay. Nearshore disposal will only have a temporary and localized turbidity impact.

Surf Clams: All of the Massachusetts nearshore disposal sites contained juvenile surf clams. Some of these clams may be able to ascend burial by thin layers of dredged material disposal. The coarse nature of the sediment would further minimize turbidity impacts at the nearshore disposal site. Therefore, impacts from turbidity are expected to the localized and temporary. The dredging project would occur sometime between mid-October through mid-April. This would further avoid or minimize potential adverse impacts to surf clams. Commercial fishermen may be allowed to remove any clams prior to burial.

Bluefish: Bluefish juveniles and adults are found in pelagic waters generally from June through October. It is unlikely that large numbers of bluefish would be found off during the window of disposal. If present, these fish would be expected to avoid the nearshore disposal activities. The temporary and limited impact from nearshore disposal is not expected to have any significant impact on bluefish population in the Gulf of Maine.

5.6 Cultural Resources

A marine archaeological survey of the proposed project area was completed in 2008 (Robinson and Gardner, 2008). The survey consisted of archival research and field investigation using differential GPS, side-scan sonar, a marine magnetometer, and sub-bottom profiler to acquire 100 percent coverage within the project area along a series of parallel surveyed track lines spaced 50 feet apart.

Systematic, multidisciplinary archival research, remote sensing archaeological field survey, and geotechnical data analysis of the Piscataqua River navigation improvement project area documented no targets with potential to be National Register–eligible post-contact archaeological deposits and no areas of buried paleosols with archaeological sensitivity for potentially containing pre-contact period archaeological deposits. Based on the results of this study, no additional archaeological investigations within the project area are recommended.

No historic properties will be affected during the proposed placement of dredged material at the nearshore areas. These areas are in a highly active environment within the littoral zone. It is anticipated that sand placed at these locations will eventually wash landward to nourish the adjacent beaches. Any historic properties within these areas would have already been damaged or destroyed due to water and wave action.

This proposed project was coordinated with the Maine State Historic Preservation Officer (SHPO), the New Hampshire SHPO, the Massachusetts SHPO, the Massachusetts Board of Underwater Archaeological Resources, the Penobscot Nation Tribal Historic Preservation Officer (THPO), the Wampanoag Tribe of Gay Head (Aquinnah) THPO, and the Passamaquoddy THPO. The MA SHPO concurred on November 12, 2013 with the determination that the proposed navigation improvement project will have no effect on historic properties in Massachusetts. The remaining agencies and tribes are expected to concur with the determination that the proposed navigation improvement project will have no effect on historic properties. The Passamaquoddy Tribe, in their letter of 15 May 2014 stated that the "proposed project will not have any impact on cultural and historical concerns of the Passamaquoddy Tribe".

5.7 Plan Selection

Identification of the recommended plan was based on the results of Corps planning guidance that specifies that the plan that reasonably maximizes net economic benefits consistent with protecting the Nation's environment is the selected plan. In this case, widening the existing turning basin to a width of 1200 feet and disposing of dredged material at the IOS-N ocean disposal site was the NED plan and is the Federal base plan that would be recommended for implementation. However, as four coastal communities have indicated that they desire that the dredged material be placed in nearshore areas to nourish nearby beaches, and are willing to fund the cost differential between the NED plan and nearshore placement. The environmental impacts discussion summarized in this report and additional information provided in the attached EA demonstrates that these alternative placement options can likely be implemented in a manner that is consistent with protecting the Nations environment. Neither the Government nor the non-Federal sponsor is a party to these beneficial use options, which therefore are not locally preferred plans. The local communities would need to secure all necessary permits and approvals and fully fund any additional costs in order for these options to be considered further during PED.

6.0 DESCRIPTION OF THE RECOMMENDED PLAN

6.1 Plan Components

6.1.1 General Navigation Features

The navigation improvement project at the Portsmouth Harbor and Piscataqua River Federal navigation project would widen the upper turning basin from a width of 800 feet to a width of 1200 feet at the authorized depth of -35 feet MLLW (see Figure 6). Realignment of the basin limits, in part to allow for a wider non-Federal berth for larger ships at the upper terminal, would result in eliminating two small wedge shaped sections of the existing turning basin. One would provide for a 125-foot wide berth at the Sprague Terminal, and the other to straighten the upstream boundary of the widened turning basin.

Approximately 728,100 cubic yards of sand and gravel, and about 25,300 cubic yards of rock would be removed. Under the Federal Base Plan for disposal the material (sand and gravel and rock) would be placed at the Isles of Shoals North ocean placement site. The EPA in their letter of September 7, 2011 concluded that this site was likely selectable based on physical and ecological surveys conducted by the Corps and EPA. A site selection document would need to be prepared and processed during the design phase to allow placement at this site.

Consideration of beneficial use alternatives for both the sandy material and the rock have been ongoing throughout the study and would continue during design. Under current proposals by non-Federal interests other than the project Sponsor, the sand and gravel would be disposed of at four nearshore sites off of beaches in the communities of Wells, Maine, and Salisbury, Newburyport and Newbury, Massachusetts. The location of these sites in relation to the project site is shown on Figure 7. The haul distances from the improvement area to these nearshore placement sites is 31 miles for Wells, 26 miles for Salisbury, and 28 miles for Newburyport and Newbury.

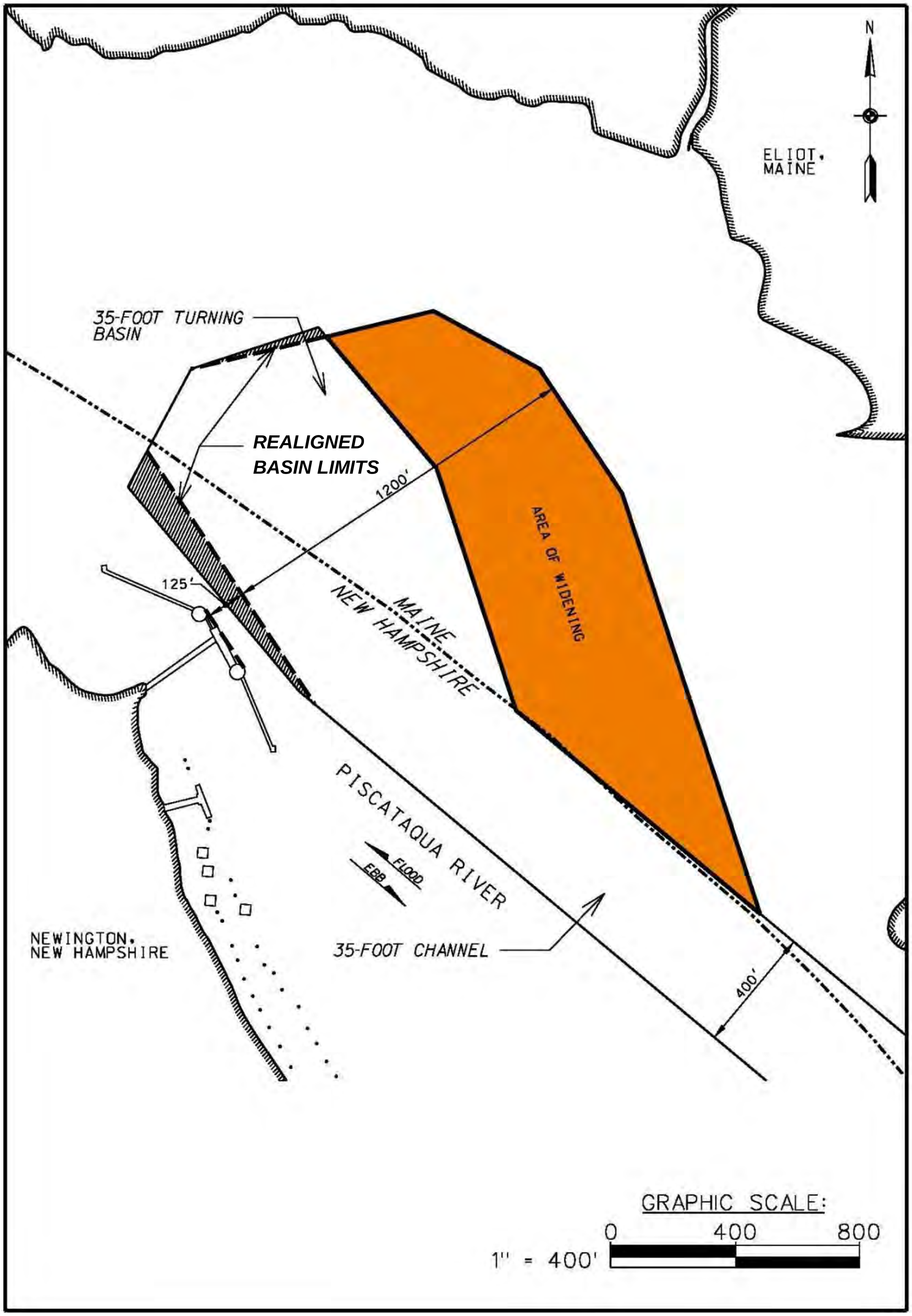

Figure 6. Recommended Turning Basin Widening Plan

The rock to be removed is a phyllite that will most likely require blasting. Although beneficial uses for this rock were discussed, no firm plans were developed and the current plan includes disposal at the IOS-N disposal site. However, during detailed design, coordination will continue and it is likely that a beneficial use will be identified. The recommended improvement project accomplishes the objectives of decreasing transportation costs, reducing safety hazards and grounding losses, and decreasing inefficiencies associated with turning vessels at the upper turning basin.

Neither the Government nor the Non-Federal Sponsor are parties to any of the alternative beneficial uses proposed for the sand and rock removed for the project. The responsibility for all costs associated with these alternative placement options including regulatory approvals and the full difference in cost above the Federal Base Plan rests solely with the communities and or State agencies proposing such uses.

6.1.2 Design and Construction Considerations

A mechanical dredge (bucket or clamshell) would be used to remove sand and gravel and rock. A drill barge would be utilized to drill then rock for subsequent blasting. It is anticipated that all sands and gravels would be excavated prior to rock removal. The dredges would remove the material from the bottom and place the material in split-hull scows for transport to the nearshore placement sites. Due to the fast currents on the river, scow transit would be limited during the ebb tide. This would require the positioning of at least one extra scow at the dredge site. The contractor is also expected to employ smaller harbor tugs to help position the equipment, work boat for crew and supply transfer, and a survey boat. It is anticipated that the dredging and blasting operation would take about 5 months to complete. No scow overflow would be allowed to minimize any turbidity impacts.

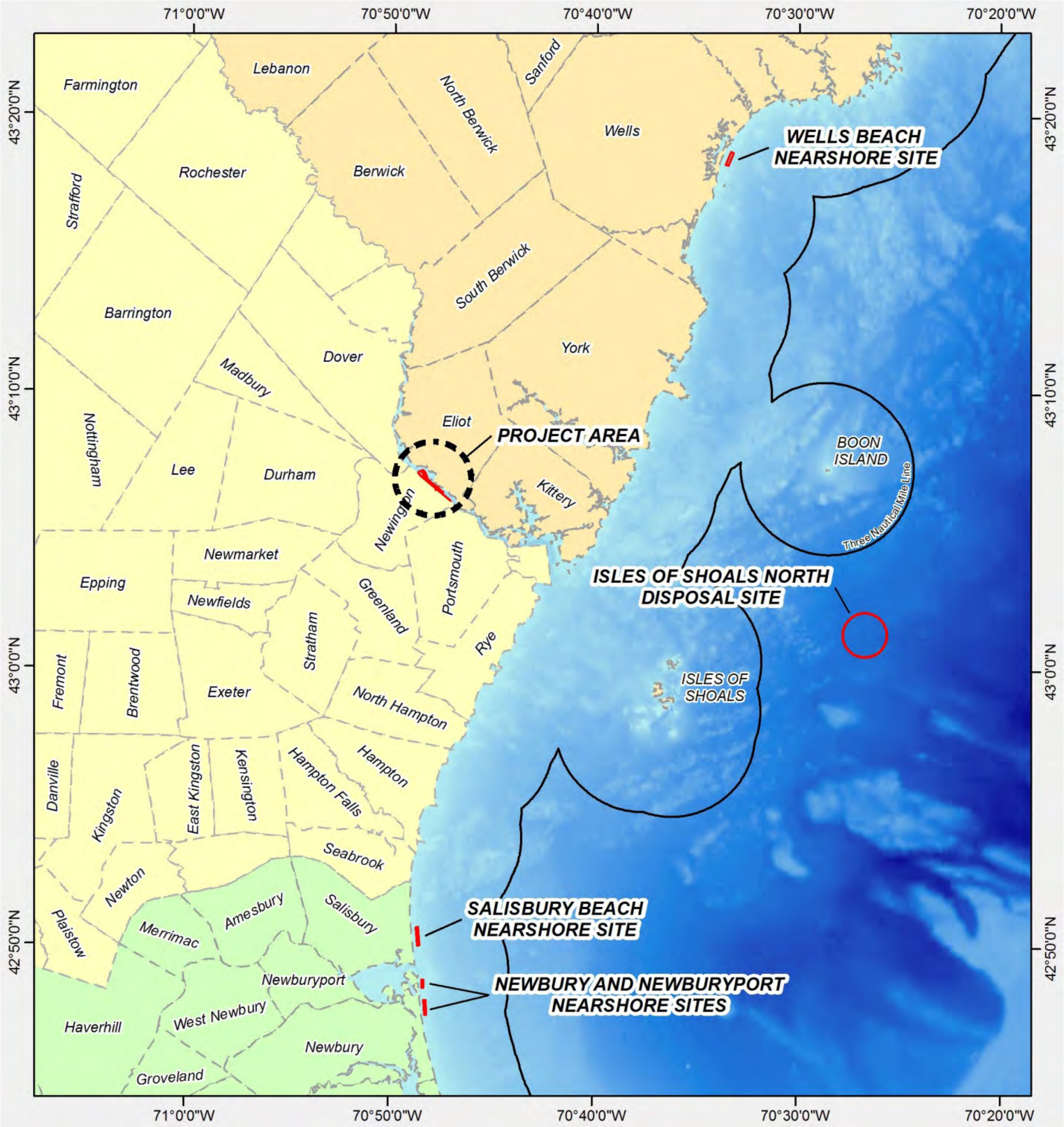

Figure 7. Nearshore Placement Sites and Location of IOS-N

6.2 Economics of the Federal Base Plan

This section summarizes the economics of the Recommended Plan (the Federal Base Plan) which includes all Federally cost shared costs. Costs of the alternative non-Federally funded beneficial use plans for nearshore placement include additional disposal costs due to the longer distance to the disposal site. Those costs will be presented in the next section. Costs and benefits are compared at a common point in time, in this case at October 2013 (1st Quarter FY 2014) price levels.

TABLE 17
1200-Foot Basin - Federal Base Plan - Project Cost and Benefits

First Cost of Improvement	GNF Improvements	$15,309,000
	Contingency	$3,234,000
	Subtotal	$18,545,000
	Planning, Engineering and Design	$997,000
	Construction Management	$827,000
	Lands, Easements, ROWs	None
	New Aids to Navigation	None
Project Cost	Total	$20,367,000
	Investment Cost with IDC (5 months)	$20,478,000
Annual Cost/Benefit	Interest and Amortization (3-1/2%)	$873,000
	Increased Annual Maintenance Dredging	$203,700
	Total Annual Cost	$1,076,700
	Annual Benefit	$3,285,500
	Benefit/Cost Ratio	3.05
	Net Annual Benefit	$2,208,800

Cost and benefits were analyzed at the October 2013 price level used in the study, a 50-year period of analysis, and 3-1/2 percent discount rate

The expected average annual benefits in transportation costs savings, grounding damages avoided, and reduction in turning costs (at 3-1/2% interest rate) for the Federal base plan are estimated at $3,285,500. The economic cost of the recommended plan consists of several project cost components and includes all of the opportunity costs expressed in average annual equivalent terms. The economic costs include: expenditure for project design, construction, related construction management and administration costs, interest during construction, and a risk based contingency established for the project. The annualized economic cost for the Federal base plan (at 3-1/2 interest rate) is $1,076,700. With expected average annual benefits of $3,285,500 the benefit to cost ratio for the Federal base plan is 3.1 to 1 (See Table 17). The annual net benefits are $2,208,800.

6.3 Project Cost Breakdown

a. Project First Cost (Program Year).
This section presents project costs at the price level estimated for the report recommendation. That price level is typically the first quarter of the Fiscal Year in which the Chief of Engineers

Report on the project is signed and forwarded to Congress, in this case FY 2015. Total project cost and Federal/non-Federal cost sharing amounts are expressed at this price level. The cost for the general navigation features (GNF) of the improvement project include the construction contract costs, cost of pre-construction planning, engineering and design, construction management, and contingency. There are no lands, easements, rights-of-way and relocations required for project implementation. A risk based contingency was estimated for the project using the abbreviated cost schedule risk analysis procedures developed by the Corps of Engineers, Center of Cost Expertise. The cost schedule risk analysis, the MII cost estimate (based on dredging costs developed with the Corps of Engineers Dredge Estimating Program), and the "Total Project Cost Summary" spreadsheet (TPCS) for the Recommended Plan (the Federal Base Plan) are included in Appendix E.

For the purpose of calculating the first cost (program year), the estimated cost of the improvement project $20,367,000 (October 2013 price level) is brought to the effective price level date of October 2014 for the Federal budget year 2015 providing a project first cost of $20,774,000 (See Table 18 and TPCS in Appendix E).

TABLE 18
Escalation of Federal Base Plan GNF Project Costs to Budget Year

GNF contract costs	$15,588,000
Lands, Easements, ROWs	None
Planning, Engineering and Design	$1,033,000
Construction Management	$857,000
Contingency	$3,293,000
Total	$20,774,000

Note: October 2013 price levels brought to effective price level date of October 2014, Federal budget year FY 2015.

b. Fully-Funded Project Cost. The fully funded project cost is developed to provide the Government and the non-Federal Sponsor with an estimate of the project costs that would be incurred during the periods of PED and construction, for the purpose of budgeting for their respective shares of project implementation costs. The fully funded GNF improvement project cost estimate is $21,295,000. This number is based on the GNF improvement project cost (October 2013 price level) escalated to the estimated mid-point of design or construction, as applicable. The calculation is displayed in the TPCS included in the Cost Appendix (E).

Construction is expected to take about six months to complete and assuming a construction start in October 2015, the mid-point of construction used in the TPCS for calculation purposes was February 2016. The fully funded cost estimate would be used in the Project Partnership Agreement to implement the project, in accordance with the cost sharing provisions of Section 101 of WRDA 1986, as amended, the costs for the GNF improvements (widening the turning basin from 800 to 1200 feet) would be shared at the rate of 75 percent by the Government and 25 percent by the non-Federal sponsor (See Table 19) during the period of design and construction.

c. Additional 10 Percent Payment. In addition to the non-Federal sponsor‘s estimated share of the total fully-funded cost of the GNF improvement project, pursuant to Section 101(a)(2) of WRDA 1986, as amended, the non-Federal sponsor must pay an additional 10 percent of the cost of the GNF of the project in cash over a period not to exceed 30 years, with interest.

Table 19
Estimated GNF Improvement Project – Funds Allocation Table

Federal/Non-Federal Cost for General Navigation Features of Improvement Project
Portsmouth Harbor & Piscataqua River, NH and ME
Federal Base Plan for Ocean Placement of Dredged Materials
Fully Funded (FY 2016) Cost Estimate ($000)[1]

GNF Improvement Cost	Total Cost	Non-Federal Cash		Federal Cash	
Year 1 - PED	$1,059	$265	25%	$794	75%
Year 2 - Construction	$20,236	$5,059	25%	$15,177	75%
Total	$21,295	$5,324		$15,971	
Year 2 - Non-Federal cash (Post Construction Payment[2])		$2,130	10%	NA	
Total with Reimbursement		$7,454		NA	

Notes:
1. All costs in this table are based on October 2013 price levels escalated to the assumed mid-point of the period of design or construction, as applicable.
2. Post construction, the non-Federal sponsor must pay an additional 10% of the cost of the general navigation features of the improvement project in cash over a period not to exceed 30 years, with interest. Information provided above assumes full payment of 10% in Year 2.

d. Other Non-Federal Costs for Alternative Sand Placement. The difference in costs between the Recommended Plan (Federal Base Plan) and the plans including use of more distant alternative dredged material placement sites are considered other non-Federal costs. Neither the Government nor the non-Federal Sponsor are parties to these proposed alternatives and will not share in these additional costs. To develop these costs, total costs for these alternative plans were also developed and are presented in the cost appendix. The total cost for this plan, escalated to the February 2016 mid-point of construction is $23,373,000. At this fully funded price level, this results in a cost differential of $2,078,000 that will be shared between the four communities requesting nearshore placement for beach nourishment. Table 20 presents the cost allocation between the four communities.

TABLE 20
Cost Allocation for Nearshore Placement by Community
Escalated to Fully Funded Cost

Beach Placement Site	Distribution by Project First Cost (FY2014 Prices) from Table 16		Distribution of Fully Funded Cost (FY2016) from Table 19	
	Cost Apportionment	Approximate Cost Per CY	Cost Apportionment	Approximate Cost Per CY
Wells, Maine	$1,022,000	$2.81	$1,065,000	$2.93
Salisbury, Mass.	$237,000	$2.61	$247,000	$2.72
Newburyport, MA	$98,000	$2.69	$102,000	$2.80
Newbury, Mass.	$637,000	$2.69	$664,000	$2.81
TOTAL	$1,994,000		$2,078,000	

e. Real Estate Costs. All work will be in areas seaward of mean high water and will entail work by waterborne plant. There will be no lands, easements, rights of way, or dredged material disposal facilities required for the project. There are no utility relocations required for the project.

f. Aids to Navigation. There are no additional costs for aids to navigation as coordination with the US Coast Guard concluded that no new aids are required. Relocating and resetting existing aids to facilitate construction would be required for maintenance dredging even if no improvement dredging was planned.

6.4 Environmental Mitigation

As described in Section 5.5, environmental impacts, and in the EA, the recommended plan would have only temporary environmental impacts. Measures to minimize effects of the proposed action include measures to minimize turbidity and effects of proposed blasting, and seasonal restrictions on dredging. Dredging and disposal would occur between mid-October to mid-April to protect Atlantic and shortnose sturgeon and other natural resources in the Piscataqua River.

6.5 Real Estate and Utilities

A Real Estate Planning Report is provided in Appendix H. No lands, easements, or rights-of way are required for improvement project implementation. No utility relocations are required for project implementation. The area to be dredged and the open water disposal area required for construction are below the ordinary high watermark of the navigable watercourse. Therefore, navigational servitude applies and would be invoked for the project. Any berth access for survey, work boats and tugs could reportedly be provided at the New Hampshire State Pier by the New Hampshire Pease Development Authority, Division of Ports and Harbors, the project Sponsor. As these berths and piers are reportedly subject to navigation servitude, no credit would be due the sponsor for use. Alternatively any contractor bidding the project could make their own private arrangements for access via any of the many private piers in Portsmouth Harbor. Opportunities for access would be left to the discretion of the contractor(s) when preparing their bids.

Contractor mobilization for the large dredging plant required to construct a project of this size (728,100 CY of sand and 25,300 CY of rock to be removed over a six month environmental window) would be towed to the dredging and placement sites by water, including dredge and drill barges, tugs and scows.

Shoreside access and parking for contractor personnel and inspectors would be up to the contractor to determine as part of their bid, similar to waterside access discussed above. The Contractor will make their own arrangements with whatever pier they choose to work out of. That could be the State Pier or another private pier. While more specific opportunities for access may be developed during the project's design phase, the Corps does not dictate that location.

6.6 Operation and Maintenance

The existing Portsmouth Harbor and Piscataqua River project was completed in 1966 and maintenance dredging has only been required at one area of the upper 35-foot channel reaches of the project (the Simplex Shoal area). Dredging has been required approximately every 10 years with dredging volumes varying from 7,900 to 39,100 cubic yards. No maintenance has been required in the existing upper turning basin since its completion in 1966. As of the most recent survey, only about 100 cubic yards of required shoal material and 2,000 cubic yards of allowable overdepth were within the maintenance template for the existing 800-foot by -35-foot MLLW turning basin. The improvement of the existing basin is not expected to significantly increase shoaling or maintenance frequency in this upper portion of the navigation channel although the widened turning basin may experience some additional shoaling. Maintenance of the improved basin would be carried out by the Government, subject to available funds, concurrent with and in the manner followed for the existing project; namely in-river disposal within naturally deep holes in the channel.

Future maintenance of the improved Federal project is expected to be minimal. Hydrographic surveys of the area would be conducted by the Corps Survey Boat about every 10 years to monitor the depths at the project. When maintenance dredging is required to reestablish the authorized channel depth it is anticipated that the in-river disposal site recently used to dispose of sand from the Simplex Shoal area will be used.

6.7 Sea Level Change

The approach was to address the potential impact of sea level rise on a navigation project at the Portsmouth Harbor and Piscataqua River Federal Navigation Project by considering sea level change (SLC) calculated for the area and apply this information qualitatively to assess the risk to future project performance. In general the types of navigation components that may be affected by sea level rise are jetties and breakwaters affected by increase wave heights, infrastructure at the port, clearance under bridge crossings, and shoaling related to changes in inlet configurations. The existing Federal Navigation Project includes a breakwater and three bridge crossings. The entrance to the harbor is naturally deep so changes in shoaling related to inlet configuration changes are not a concern. There is infrastructure at the port, piers and land side terminal facilities and depending on the magnitude of SLC there may be a potential impact to these facilities. There is the potential for SLC to provide a potential benefit to the future depth of water at the navigation project.

Sea Level Change Projection

As described in the Sea Level Change (SLC) EC 1165-2-212, USACE is required to use three projected SLC curves for a project area. These curves are; the historic rate of SLC at the project area, an intermediate SLC curve (modified NRC Curve I), and a high SLC curve (modified NRC Curve III). Formulation of the NRC curves from a defined starting date, and for localized subsidence was also provided in the EC which allows for SLC to be calculated for specific project time frames and for specific geographic areas. This is critical since SLC along the coast varies due to local subsidence, uplift, water body movement, etc. Using Equation 11-1 below, which is equation 3 from the EC, Figure 8 was developed for Portland, ME. Portland, ME was used since it is only 37 miles north along the Maine coast, and has available historic SLC information from NOAA. Figure 9 shows the long term sea level trend for Portland, ME.

Equation (11-1) $E(t2) - E(t1) = 0.0017(t2 - t1) + b(t22 - t12)$ where	
	t1 = is the time between the project's construction date and 1986
	t2 = is the time between a future date at which one wants an estimate for sea-level rise and 1986.
	b = 2.36E-5 for modified NRC Curve I b = 1.005E-4 for modified NRC Curve III
*Equation 11-1 is adjusted to include the historic global mean sea-level change rate	

As can be seen in Figure 7, the historical rate would result in a rise of 0.3 feet (91mm) over 50 years. The level of change increases for the intermediate and higher curves specified for use in the EC. As shown in Figure 7, for the intermediate curve, the increase in sea level after 50 years is 1.5 feet. For the high curve in Figure 7, the increase over 50 years is 2.2 feet.

Sea Level Change Discussion

The historic level of sea level change would result in a change about 0.3 feet over 50 years. The mean range of tide at Portsmouth is about 7.8 feet. The existing facilities have been designed and are operated to deal with this fluctuation. It is very unlikely that the historic level of SLC would impact the use of pier or port facilities. The intermediate and high rates of SLC for this area of coast are 1.5 feet and 2.2 feet, respectively over 50 years and there is some likelihood that this level of sea level rise may require modification of the terminal facilities by private operators and at the State's Market Street Terminal by the non-Federal sponsor at some point in the future, such as increasing pier deck elevations. There is also a potential benefit to the project in the form of the additional depth of water in the channel, basin and berths that an increase in sea level would bring. This additional depth of water may decrease the need for project maintenance dredging. Based on the above analysis, it does appear that the tentatively selected plan (1200 foot wide turning basin) would accommodate the range of SLC scenarios and the risk to project performance is low.

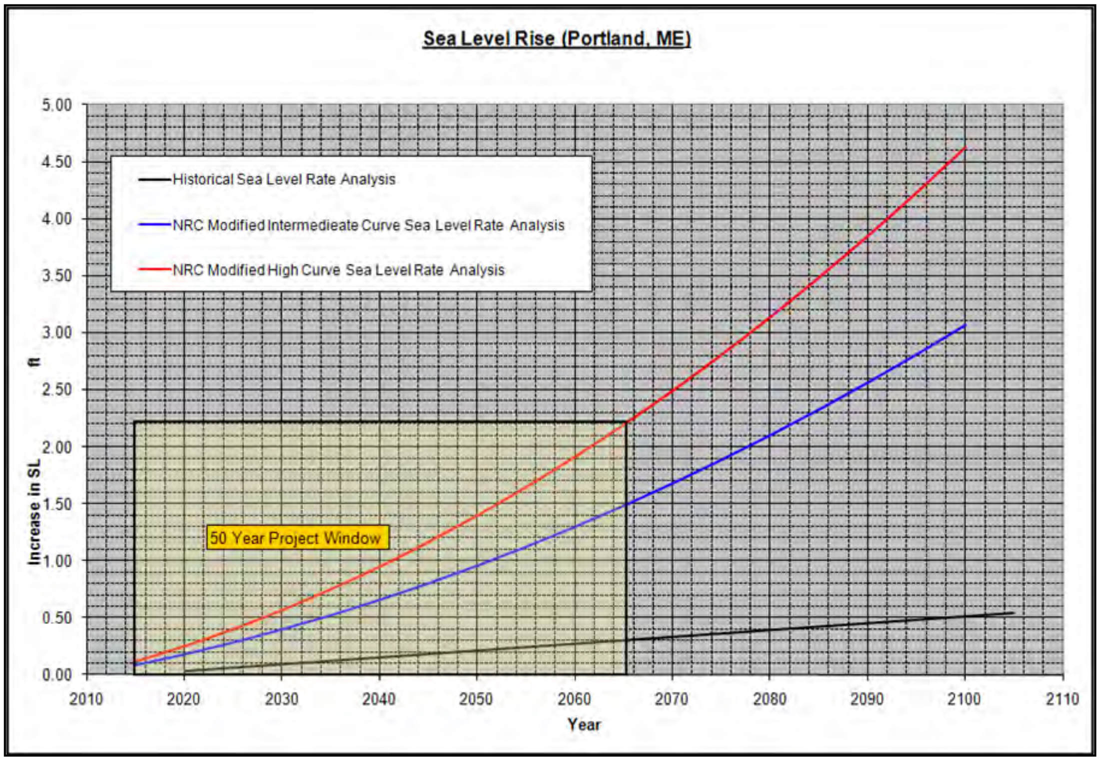

Figure 8. Sea Level Curves Based Upon USACE EC-1165-2-212, Portland, ME

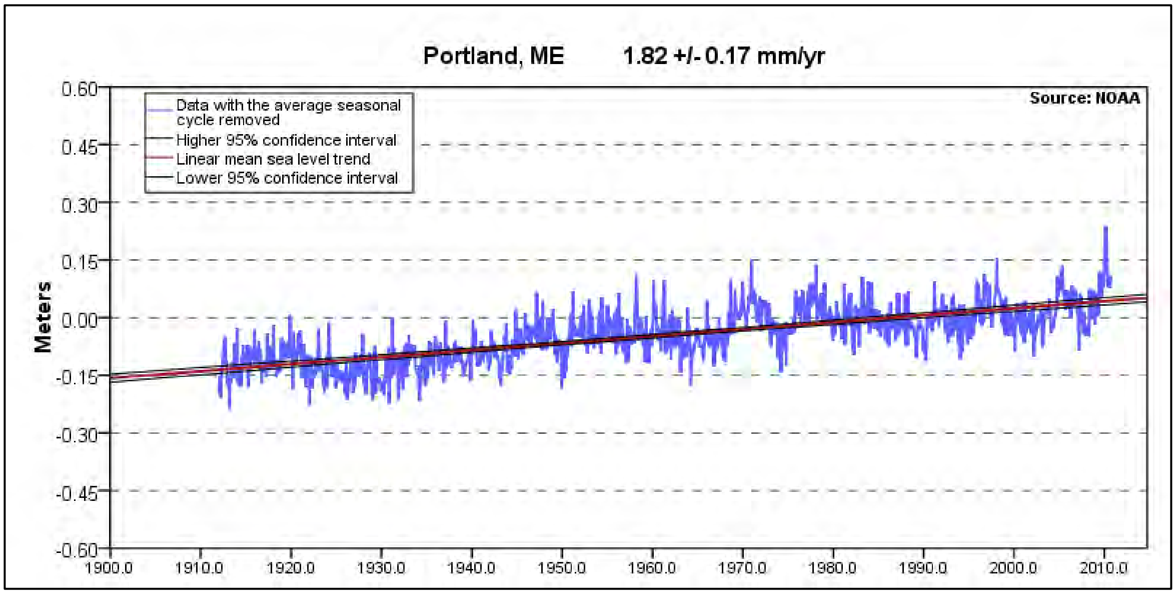

Figure 9. Historical Sea Level Change Trend for Portland, ME – Provided by NOAA.

6.8 Institutional Requirements

In order to implement the navigation improvement project the U.S. Congress would both authorize the project and once authorized provide Federal funds for the navigation improvement project. The New Hampshire Pease Development Authority, Division of Ports and Harbors would seek funding for the non-Federal share of the project costs. Project implementation would require both parties to enter into two Corps Partnership Agreements, one for the design phase and one for the construction phase.

6.9 Status of Legal Review

The draft report and EA was reviewed by Office of Counsel, New England District prior to public release. That office will review and certify the final Feasibility Report and Environmental Assessment prior to their transmittal to the Civil Works Review Board. The District and Division Legal Counsel would also review the Design Agreement and the Project Partnership Agreement for the project and certify their legal sufficiency prior to execution. It is anticipated that the Corps "model" Agreements would be used for design and construction.

6.10 Agency Technical Review Documentation and Value Engineering

Agency Technical Review: A study review plan was approved in January 2008 and updated in December 2012. The study review process was further amended through hybridizing the review process already underway with the Corps new SMART Planning principals to the extent practicable beginning in January 2014. Agency technical review (ATR) was completed for the draft Feasibility Report and Environmental Assessment in January 2014 prior to the

Corps internal tentatively selected plan briefing (TSP) submittal. The Planning Center of Expertise (PCX) for Deep Draft Navigation managed the ATR process. The Corps Cost Engineering Mandatory Directorate of Expertise reviewed the estimates included in the draft report and will further review and certify the recommended project costs prior to submittal of the final report to the Civil Works Review Board. The ATR of the final Feasibility Report and Environmental Assessment was completed and certified by the PCX on 12 June 2014.

Value Engineering Review: Value Engineering review for Portsmouth Harbor Navigation Improvement Project will be conducted during the Design Phase in accordance with ER 1110-2-1150 (see par 13.14). Design Phase investigations, particularly the subsurface exploration program, are expected to provide more refined information on the division between glacial till, rock requiring blasting and rock removable by means other than blasting. Feasibility estimates are conservatively based on all this material being rock requiring blasting. Once the final quantities and distribution of these materials is known, blasting plans, construction sequencing and equipment needs can be better defined. Value Engineering would then be concluded and the resulting recommendations incorporated into the project plan.

The specific legislative language calling for this study, and the work done for the 1986 authorized modifications of the downstream project reaches, focused the current study efforts on a turning basin to service the needs of the upper channel reaches. The locations of the user terminals and the practices of the Harbor Pilots relative to the hydrodynamic conditions in the river narrowed the area in which a turning basin could be reasonably located. Of the three alternative locations identified, navigation difficulties and excessive ledge removal quantities ultimately narrowed the the most practicable choice to expansion of the existing basin. The scale of potential improvements was thus limited by both the intent of the legislation and the conditions of the waterway. As a result the project investment being recommended is scalable to the navigation need and the other restrictions of the waterway. A Value Engineering Screening Checklist is included at the end of the Design Appendix (Appendix D).

6.11 Compliance with NEPA, Key Statutes and Regulations

The following paragraphs summarize the relationship of the navigation improvement project to some of the more pertinent statutes and regulations. The EA includes additional information on project compliance with additional applicable statutes and regulations.

An Environmental Assessment (EA) has been prepared for the proposed project and documents compliance with NEPA and other environmental laws, regulations, and policies. Comments received in response to the public review of the draft Feasibility Report and Environmental Assessment were limited to public agencies and waterway users. A Finding of No Significant Impact has been prepared and included with the final Environmental Assessment.

Water Quality. Section 401 Water Quality Certificate under the Clean Water Act of 1977 (P.L. 95-217), as amended, is not applicable to this navigation project. Section 404(b)(1) of the Clean Water Act requires evaluation of the effects associated with the discharge of material in the waters of the United States. Under the Federal Base Plan the project involves dredging and rock removal with ocean placement of all materials seaward of the territorial sea boundary. Therefore Water Quality Certifications are not required.

Coastal Zone Management. Coastal Zone Management Act of 1982, as amended, 16 U.S.C. 1451 et seq is applicable to the navigation project and is handled by the Maine Coastal Program Office, and the New Hampshire Coastal Program. The Corps has submitted Coastal Zone Management Consistency Determinations for the navigation project to both states and will obtain State concurrence.

Cultural Resources. Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq. effects on historic, architectural and archaeological resources are to be evaluated. A marine geophysical investigation and marine archaeological surveys were completed in the study area. The project has been coordinated with both the New Hampshire and Maine State Historic Preservation Officers, and with the Penobscot, Passamaquoddy and Wampanoag Tribes.

Biological Resources.

Laws include:

- Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.
- Magnuson-Stevens Act, as amended, 16 U.S.C. 1801 et seq.
- Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

A USF&WS Final Coordination Act Report (FCAR) was requested from the USF&WS. Coordination with the National Marine Fisheries Service has determined that the preparation of an Essential Fish Habitat (EFH) Assessment was required and this was included in the EA and has been provided to NMFS for review. The Corps has developed its determination regarding endangered species in the EA and this was provided to NMFS and the USF&WS for their review.

The NMFS provided technical advice and comments under the ESA by letters dated 15 November 2013 and 3 February 2014, and by email of 13 May 2014. The Service concluded that dredging, ocean disposal of sand and rock, and nearshore bar nourishment with the sandy material would be “not likely to affect” listed species under its jurisdiction.

The USF&WS New England Field Office, which covers the States of New Hampshire and Massachusetts by letter of 11 December 2013 concluded that dredging and the alternatives for placement of sandy dredged material nearshore off the Massachusetts Beaches would be "not likely to affect" listed species.

The USF&WS Maine field office by letters dated 4 September 2013 and 14 February 2014 concluded that dredging and ocean placement did not involve any listed species under its jurisdiction. With respect to the non-Federal alternative proposal for nearshore placement of the sandy material off Wells Beach, the Service concluded that while preparation of a biological opinion would not be required, evaluation of this alternative proposal would require additional information concerning the piping plover and red knot (shorebirds). At a meeting between the Corps and Service in Falmouth, Maine on 19 March 2014, the nature of the additional information was discussed, and the Corps provided that information by letter of 2 April 2014.

6.12 Agency Coordination

Federal, State and local agencies and port interests were invited to an initial coordinated site visit in Portsmouth on 13 May 2008. The purpose of the invitation was to inform the agencies of the project and study scope, and to solicit comments, concerns, and information from the appropriate resources. Prior to internal review of the draft report the Corps again solicited Federal and State agency technical inpu through letters dated 4 September 2013. The study has been discussed at the New England District's quarterly dredging task force meetings with local, state and Federal agencies, and at the regular state dredging team meetings for each of the three states. Coordination with agencies assisted in identifying biological resources to include in the draft Environmental Assessment prepared for the study. A summary of public and agency coordination for this study is included in Appendix A. A list of the agencies, municipalities and other interests coordinated with during the study is provided in Table 21. Federal, State and local agencies and port interests were also provided copies of the draft Feasibility Report and Environmental Assessment with issuance of the public notice on 31 March 2014. The comment period closed on 30 April 2014. Copies of all external correspondence including comments received are included in Appendix A.

The Corps submitted its Coastal Zone Management Consistency Determinations to the States of New Hampshire and Maine on 3 April and 8 April 2014, respectively. In response to a request from the Maine Coastal Program, additional information was provided under letter date 13 May 2014. CZM concurrence was received from the State of New Hampshire 2 June 2014, and from the State of Maine 30 June 2014. The Maine concurrence incorporated conditions from a Maine DEP Findings of Fact with which the Corps already concurred.

The U.S. Environmental Protection Agency responded on 18 November 2013 in response to a request for comments under the Clean Water Act, Clean Air Act, and Ocean Dumping Act. The Agency concluded its coordination and applauded efforts to partner in beneficial use opportunities for the sandy material.

TABLE 21
Federal, State and Local Coordination

Federal Agencies	State Agencies	Local Agencies
U.S. Environmental Protection Agency (EPA)	Maine Department of Environmental Protection	Town of Ogunquit, ME
National Marine Fisheries Service	Maine Coastal Program	Town of Eliot, ME
U.S. Fish and Wildlife Service	Maine Department of Marine Resources	Town of Wells, ME
United States Coast Guard	Maine Department of Inland Fisheries and Wildlife	Town of Kittery, ME
United States Naval Shipyard, Portsmouth	New Hampshire Department of Environmental Services	Town of Rye, NH
Academia	New Hampshire Fish and Game Department	Town of Salisbury, MA
University of New Hampshire	New Hampshire Natural Heritage Bureau	City of Newburyport, MA
	New Hampshire Department of Resources and Economic Development	Town of Newbury, MA
	New Hampshire Division of Parks and Recreation	Town of Winthrop, MA
	Massachusetts Dept of Conservation and Recreation	Town of York, ME
	Massachusetts EOEEA - Coastal Zone Management	

6.13 Public Review and Comment

A public notice on the availability of the Draft Feasibility Report and Draft Environmental Assessment was issued on 31 March 2014 and mailed to interested and appropriate elected officials and stakeholders including agencies, organizations, and individuals. The 30-day public review period closed on 30 April 2014. Coastal Zone Management Consistency Determination concurrence was requested from the states of New Hampshire and Maine concurrent with the public review period for the Federal Base Plan action. As disposal under the Base Plan is seaward of the territorial sea, state Water Quality Certification was not required.

6.14 Status of Sponsor Support

The New Hampshire Pease Development Authority (NHPDA), Division of Ports and Harbors (New Hampshire Port Authority) is the non-Federal Sponsor for this navigation improvement project. NHPDA fully supports the proposed improvement project and views the proposed improvement project to be crucial to the Harbor's existing and future operation.

The non-Federal Sponsor understands its responsibilities under the future Project Partnership Agreements required to design and implement the project. The non-Federal Sponsor by letter dated 29 May 2014 stated their concurrence with and support for the recommended plan, their intent to execute the required design and project partnership agreements for the project, and submitted a non-Federal Sponsor's Self-Certification of Financial Capability, signed by the chief financial officer of the non-Federal Sponsor. These documents will be included with the final Feasibility Report submitted to the Corps Division and Headquarters vertical team for review.

7.0 RECOMMENDATION

As the District Engineer I have considered the environmental, social, and economic effects, the engineering and technical elements, and the comments received from other resource agencies and the public during the Portsmouth Harbor and Piscataqua River Feasibility Study and Environmental Assessment.

Based upon the sum of this information, I am recommending that widening the existing upper turning basin to 1200 feet be authorized, with realignment of the basin as included in the recommended plan, and with such modifications as in the discretion of the Chief of Engineers may be advisable, as it reasonably maximizes net benefits and is consistent with protecting the Nation's environment.

This recommendation is subject to the non-Federal sponsor agreeing to comply with all applicable Federal laws and policies, including that the non-Federal sponsor must agree with the following requirements prior to project implementation.

a. Provide 10 percent of the total cost of construction of the GNFs attributable to dredging to a depth not in excess of 20 feet; plus 25 percent of the total cost of construction of the GNFs attributable to dredging to a depth in excess of 20 feet but not in excess of 45 feet as further specified below:

(1) Provide the required non-Federal share of design costs allocated by the Government to commercial navigation in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

(2) Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs allocated by the Government to commercial navigation;

(3) Provide, during construction, any additional funds necessary to make its total contribution for commercial navigation equal to 10 percent of the total cost of construction of the GNFs attributable to dredging to a depth not in excess of 20 feet; plus 25 percent of the total cost of construction of the GNFs attributable to dredging to a depth in excess of 20 feet but not in excess of 45 feet; plus 50 percent of the total cost of construction of the GNFs attributable to dredging to a depth in excess of 45 feet.

b. Provide all lands, easements, and rights-of way (LER), including those necessary for the borrowing of material and the disposal of dredged or excavated material, and perform or assure the performance of all relocations, including utility relocations, all as determined by the Federal Government to be necessary for the construction or operation and maintenance of the GNFs;

c. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the GNFs, an additional amount equal to 10 percent of the total cost of construction of the GNFs less the amount of credit afforded by the Government for the value of the LER and relocations, including utility relocations, provided by the Sponsor for the GNFs. If the amount of credit afforded by the Government for the value of LER, and relocations, including utility relocations, provided by the Sponsor equals or exceeds 10 percent of the total cost of construction of the GNFs, the Sponsor shall not be required to make any contribution under this paragraph, nor shall it be entitled to any refund for the value of LER and relocations, including utility relocations, in excess of 10 percent of the total cost of construction of the GNFs;

d. Provide, operate, and maintain, at no cost to the Government, the local service facilities in a manner compatible with the project’s authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

e. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating and maintaining the GNFs;

f. Hold and save the United States free from all damages arising from the construction or operation and maintenance of the project, any betterments, and the local service facilities, except for damages due to the fault or negligence of the United States or its contractors;

g. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence are required, to the extent and in such detail as will properly reflect total cost of the project, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and local governments at 32 CFR, Section 33.20;

i. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601–9675, that may exist in, on, or under LER that the Federal government determines to be necessary for the construction or operation and maintenance of the GNFs. However, for lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude, only the Government shall perform such investigations unless the Federal Government provides the Sponsor with prior specific written direction, in which case the Sponsor shall perform such investigations in accordance with such written direction;

j. Assume complete financial responsibility, as between the Federal Government and the Sponsor, for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under LER that the Federal Government determines to be necessary for the construction or operation and maintenance of the project;

k. To the maximum extent practicable, perform its obligations in a manner that will not cause liability to arise under CERCLA;

l. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, (42 U.S.C. 1962d-5b) and Section 101(e) of the WRDA 86, Public Law 99-662, as amended, (33 U.S.C. 2211(e)) which provide that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the Sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

m. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. 4601-4655) and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way necessary for construction, operation, and maintenance of the project including those necessary for relocations, the borrowing of material, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;

n. Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c);

o. Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project; and

p. Not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the Sponsor's obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that such funds are authorized to be used to carry out the project.

The recommendations contained herein reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, the State of New Hampshire, Pease Development Authority, Division of Ports and Harbors, and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

10 July 14
Date

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

PORTSMOUTH HARBOR AND PISCATAQUA RIVER NAVIGATION IMPROVEMENT PROJECT NEW HAMPSHIRE AND MAINE

FINAL
ENVIRONMENTAL ASSESSMENT
&
FINDING OF NO SIGNIFICANT IMPACT (FONSI)

Evaluation Branch
U.S. Army Corps of Engineers, New England District
Concord, MA

July 2014

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FINAL ENVIRONMENTAL ASSESSMENT

FINDING OF NO SIGNIFICANT IMPACT

FINAL ENVIRONMENTAL ASSESSMENT

I. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New England District, has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) of 1969 as part of the planning and development of navigation improvement alternatives for Portsmouth Harbor/Piscataqua River. The NEPA process is intended to promote better decisions based on an understanding of environmental consequences, and to take actions that protect, restore, and enhance the environment. Other environmental considerations applicable to the placement of dredged material include the requirements of the Clean Water Act Section 401 and Section 404 (b)(1) Evaluation, and/or the Marine Protection, Research, and Sanctuaries Act as well as other applicable environmental laws and regulations.

The Piscataqua River forms the lower boundary between the States of Maine and New Hampshire. Portsmouth Harbor is located at the mouth of the Piscataqua River. This navigation improvement study focuses on improvements to the upper reaches of the Federal navigation project for the benefit of deep-draft commercial traffic calling on terminals located above the Portsmouth Harbor bridges; an area not previously covered by the 1986 project modifications (discussed below). Specifically, this project addresses the inadequacy of the existing 800-foot wide, 35-foot deep mean lower low water (MLLW) turning basin located at the head/upstream limit of the 35-foot deep Federal navigation channel. Two deep-draft terminals that are located on the New Hampshire shore, and rely on the upper turning basin, are the Sprague Energy River Road Terminal, and a joint use terminal, the Sprague Energy/Sea-3 Avery Lane Terminal. A third terminal, owned by the U.S. Department of Defense (DOD) and originally constructed as a fuel terminal for the former Pease Air Force base, is currently inactive.

II. EXISTING AUTHORIZED PROJECT AND STUDY AUTHORITY

The original Federal navigation project in Portsmouth Harbor and Piscataqua River was authorized in 1879 and modified by the River and Harbor Act of 1890, 1954, and 1962, by the Chief of Engineers in December 1965 under the Continuing Authority of Section 107 of the 1960 River and Harbor Act, as amended, and by the Water Resources Development Act of 1986. The existing Federal navigation project provides for a 35-foot deep MLLW, 400-foot wide navigation channel extending from deep water in Portsmouth Harbor (river mile 2.6) to a point about 1,700 feet upstream of the Sprague Energy wharf in Newington, NH (river mile 8.8). A 950-foot wide turning basin located above Boiling Rock (river mile 6.5), an 800-foot wide turning basin located at the upstream limit of the project, and a stone breakwater between Goat Island and Great Island (New Castle), comprise the remaining navigation features of the project. Both turning basins are 35 feet deep MLLW. The 1986 modifications, completed in 1992, widened the lower channel reaches opposite Seavey Island and expanded the area between the two vertical lift bridges to allow larger ships to access the river reaches and terminals located downstream of the bridges. See Figure EA-1.

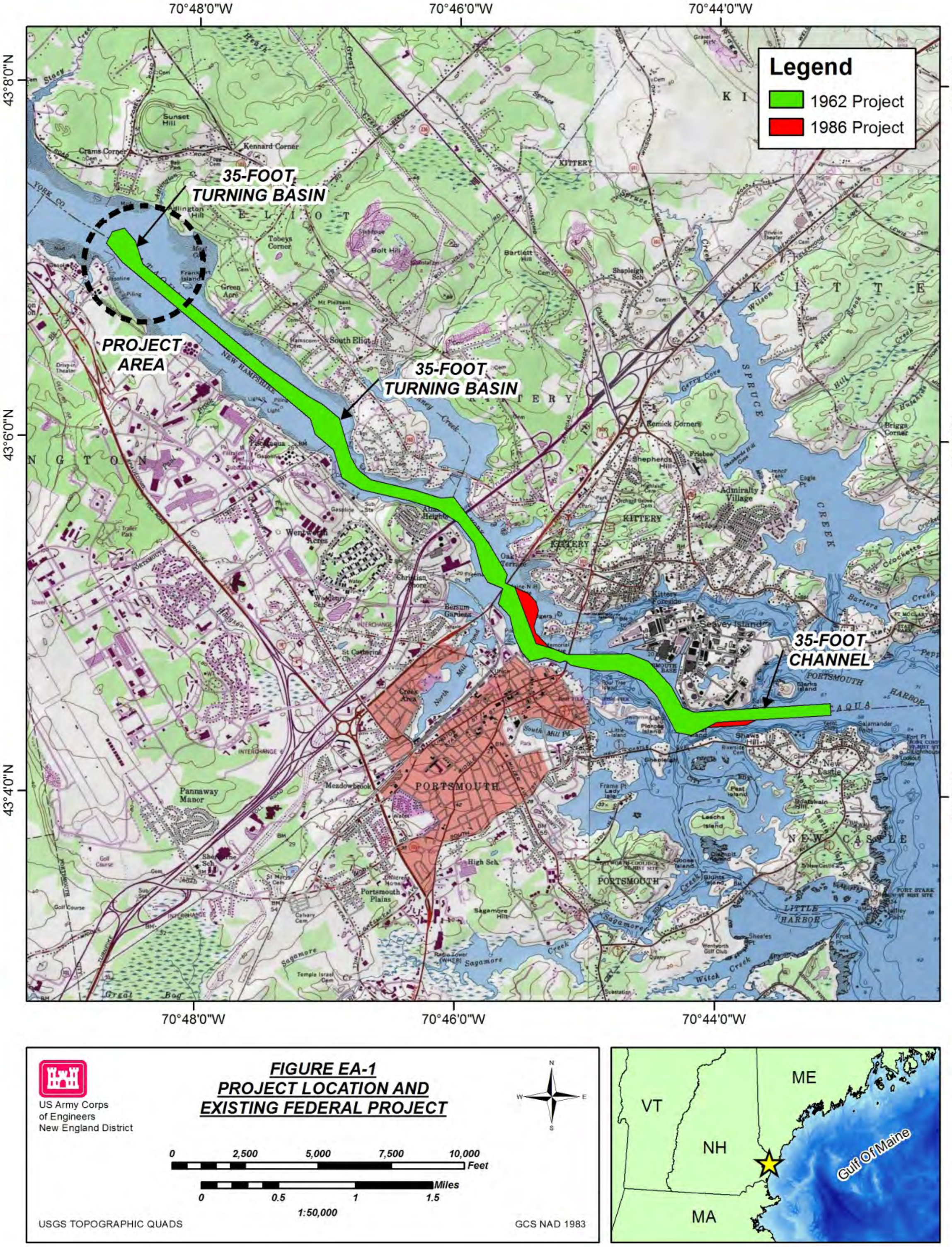

FIGURE EA-1
PROJECT LOCATION AND EXISTING FEDERAL PROJECT

Other completed Federal navigation projects for Portsmouth Harbor and the Piscataqua River include the shallow draft Portsmouth Back Channels connecting the harbor with Little Harbor and Sagamore Creek authorized in 1965, and a project to remove obstructions from the river bed above Great Bay up to Berwick authorized in 1832, an area now called the Salmon Falls River.

This study of Portsmouth Harbor and Piscataqua River was directed by Section 436 of the WRDA of 2000 in the following language:

> *"The Secretary shall conduct a study to determine the feasibility of modifying the project for navigation, Portsmouth Harbor and Piscataqua River, Maine and New Hampshire, authorized by Section 101 of the River and Harbor Act of 1962 (76 Stat. 1173) and modified by Section 202(a) of the Water Resources Development Act of 1986 (100 Stat. 4095), to increase the authorized width of turning basins in the Piscataqua River to 1,000 feet."*

Section 216 of the Flood Control Act of 1970 also provides the USACE general authority to review completed civil works projects.

> *"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to the significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest."*

This study was initiated at the request of the non-Federal sponsor; the State of New Hampshire, Pease Development Authority, Division of Ports and Harbors. Funds to initiate the study were added to the Fiscal Year 2004 Energy and Water Development Appropriations Bill. The reconnaissance report was approved by the USACE, North Atlantic Division on October 21, 2004.

III. PURPOSE AND NEED FOR THE PROJECT

The Piscataqua River is known for its strong tidal currents and tight turns that make navigation through this area difficult. Vessels use the upper turning basin to access the commercial terminals on the New Hampshire side of the river above the I-95 Bridge. The existing width of the upper turning basin is too narrow for efficient and safe turning and maneuvering of the larger vessels calling on two of those terminals, which constrains existing and future commerce.

Current USACE navigation design policy dictates that a turning basin should be equal to 1.5 times the length of the largest ship (design ship) utilizing the turning basin. Currently, vessels that utilize the two upper berths can be divided into two categories; those less than 680 feet in length, and those more than 680 feet long up to a maximum of 747 feet long. This means that the turning basin should have a minimum width of 1,020 feet or 1,120 feet, respectively, to safely turn these vessels. Instead, ships unloading at the two upper berths have a turning basin which is only 800 feet wide. Terminal operators also plan to bring in ships up to 800 feet long. The two downstream drawspans (Routes 1 and 1A) are being rebuilt to handle ships of that size, and the lower river channel was modified in 1986 to handle such vessels in the reaches below the bridges.

As a result of the narrow upper turning basin, ships calling on the upper river terminals have been damaged from groundings. To compensate for the narrow turning basin, the harbor pilots will only turn ships when currents are slower during the high slack or low slack tidal periods, and during daylight hours. Turning during these times within the tidal cycle also coincide with the best time to transit the river based on the current speeds.

These conditions put a severe constraint on the available time to transit the river and unload goods. Additional costs associated with these delays include the cost to remain at the berth until the tide is right, and the cost of additional tugs to turn and maneuver the ships up and down the river. Also, shippers may use shorter ships to unload goods so that they can use the current turning basin. This means there is an additional cost for extra ships to transport the same amount of goods.

The purpose of this study is to identify the Federal navigation improvement plan for Portsmouth Harbor and the Piscataqua River which is economically justified based on maximizing national economic development, is environmentally acceptable based on minimizing environmental impacts, and which considers regional economic development and other social effects. The study also assesses the non-Federal Sponsor’s interest and capability to participate in sharing the construction costs of the project.

IV. ALTERNATIVES

In addition to the navigation improvement alternatives, a no action alternative is discussed so that a comparison to the various navigation improvement alternatives can be made. Various dredging methods and placement alternatives are also considered. Placement alternatives include open water placement, nearshore placement, upland placement and riverine placement.

A. No Action Alternative

With the no action alternative, the turning basin would not be expanded at the upstream end of the Federal navigation channel. Vessels and pilots would continue to operate as usual, and would continue to experience unsafe and inefficient navigation and transfer of goods, as described in the preceding section. This could create a situation where the ships may experience damage from groundings. As a large percentage of the commerce in Portsmouth Harbor is liquid petroleum (fuel oils, LPG, and asphalt), serious environmental damage could occur in the estuary with a hull breach from a major grounding. However, with the no action alternative, the temporary and/or potential environmental impacts from dredging and disposal, as discussed below, to marine organisms, essential fish habitat species, water quality, air quality, threatened and endangered species, and permanent alteration of the river bottom that result from the navigation improvement dredging would not occur.

However, maintenance dredging of approximately 2,100 cy of material could potentially be removed from the turning basin and its approaches to bring the current turning basin and its approaches to their authorized 35-foot MLLW depth. The material is expected to be composed of clean sandy material. Up to about 1.4 acres could be disturbed during dredging. Temporary impacts to benthos and finfish would occur while the area recovers. Impacts to marine resources and water quality are expected to be minimal due to the coarse grained material, the limited quantity of material, and the short amount of time for the material to be removed.

B. Alternative Dredging Methods

Typical dredging methods and plants include a hydraulic dredge, a hopper dredge, and a mechanical dredge. The dredging method selected for a particular project is determined by the placement site selected for disposal and the type of material to be dredged. A hydraulic pipeline dredge was eliminated from further consideration in part because hydraulic dredges are extremely inefficient in areas that consist of hard packed glacial deposits such as this, and due to the lack of a nearby suitable upland or alongshore placement site (see below). A hopper dredge was also eliminated from further consideration because they are best suited for removal of loose material and the majority of material to be dredged is hard packed glacial sands and gravels.

A mechanical dredge excavates the sediments with a bucket-type apparatus and deposits them into a scow for transport to a placement site. Dredged material may be released through an opening in the bottom of the scow into open water or transported for offloading to an upland placement site. Based on conditions at the placement site, only a mechanical dredge in combination with scows for transport of material would be suitable for work in the Piscataqua River. Given the semi-consolidated nature of the sandy, gravelly glacial till to be removed, a large heavy toothed bucket, either crane mounted or excavator would be required.

Bedrock is expected to be encountered during the deepening of the turning basin. Blasting may be required if a sharp-toothed mechanical dredge cannot remove the rock. If blasting is required, a mechanical dredge would then remove the rock material and deposit the material into a scow.

C. Navigation Improvement Alternatives

The development of the turning basin alternatives was an iterative process. The first alternative evaluated was the feasibility of widening the existing turning basin, or relocating the turning basin to an adjacent area where it would be able to serve the two upper terminals. Bathymetric surveys of the area were obtained and alternative turning basins were laid out using the maximum turning basin width of 1,200 feet. Alternative 1 consists of widening the existing turning basin, Alternative 2 is a southeast relocation, and Alternative 3 is an upstream relocation. Figure EA-2 shows the location of the existing and the two optional turning basin locations.

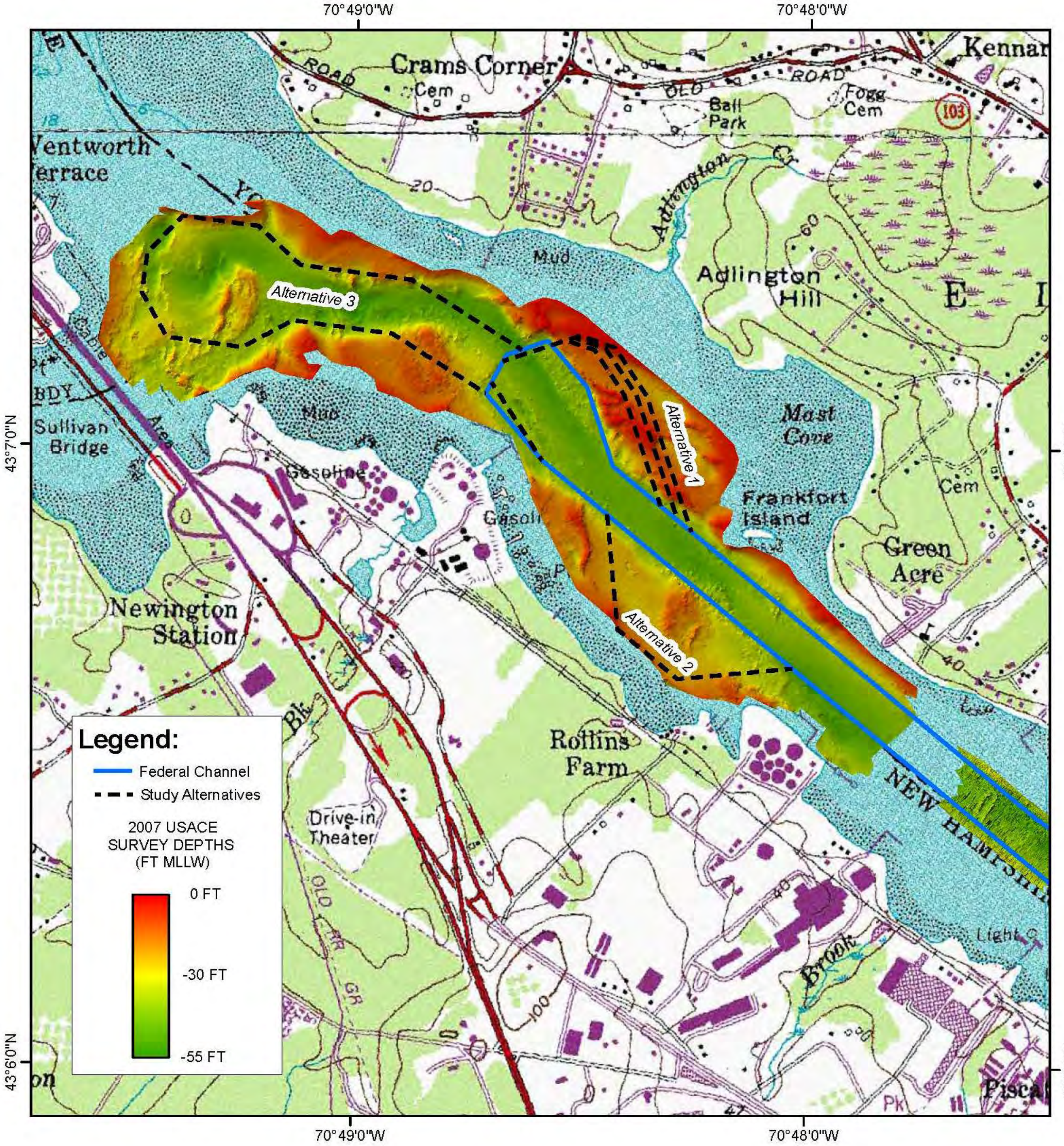

FIGURE EA-2. Location of the Turning Basin Alternatives

1. Widening the Existing Turning Basin

Widening the existing 800 foot wide turning basin to allow for the efficient and safe turning of ships was selected for further study. The three expansion alternatives proposed for the existing turning basin include:

- the two design alternatives discussed above in the purpose and need section;
    - the 1,020 wide alternative to accommodate ships less than 680 feet long,
    - and the 1,120 wide alternative for those ships more than 680 feet long up to a maximum of 747 feet long; as well as
- a third design alternative of a 1,200 wide turning basin based on an 800-foot long ship. An 800-foot long ship is the largest ship that can safely navigate the river and access the upper terminals.

All of the dredging and rock removal required for each of the alternative turning basin widths would occur in State of Maine waters. Table EA-1 below compares the various proposed turning basin alternatives.

TABLE EA-1. COMPARISON OF EXISTING TURNING BASIN ALTERNATIVES

Alternatives	Dredged Material (cy)	Rock (cy)	Acres
1,020 feet wide	384,900	22,500	11.3
1,120 feet wide	573,700	22,900	16.2
1,200 feet wide	728,100	25,300	20.4

The 1,200-foot wide turning basin alternative was selected as the most cost effective plan. Compared to relocating the turning basin, the impacts to the sub-bottom habitat would be less and the amount of bedrock to be removed would be smaller if the turning basin was widened to 1,200 feet instead. In addition, there are no critical environmental or cultural resources present. Enlarging the existing turning basin is also favored by the Portsmouth Pilots over relocating the turning basin. The Sprague River Road Terminal, which handles about two thirds of the river traffic in this section of the river, is located adjacent to the existing turning basin. This means that the pilots can turn a ship next to the terminal. The advantage of this alternative is that the pilots can take full advantage of the short amount of time available during slack tide to turn the ship around.

2. Relocate the Turning Basin to the Southeast

Relocating the turning basin southeasterly to a point between the Sprague River Road and Sea-3 terminals was also considered. This area, located on the New Hampshire side of the Piscataqua River, would be easily accessible from both terminals. Evaluation of a turning basin 1,200 feet wide and 35-deep MLLW, which would encompass the 400-foot wide navigation channel, would require the excavation of over 640,000 cubic yards of material. However, based on past borings in this area, bedrock is extensive and located at shallow depths. A far greater amount of rock would need to be removed from this site compared to the other two turning basin alternatives evaluated. As drilling, blasting and removing this rock to an elevation of -39 feet MLLW (-35 feet plus 2 feet of additional required removal in hard material, plus 2 feet of allowable overdepth) would be extremely expensive, this alternative was not recommended for further study.

3. Relocate the Turning Basin to an Upstream Location

This alternative would require a major revision in how the Portsmouth Pilots maneuver and turn ships arriving or departing from the Sprague River Road and Sprague Avery Lane/Sea-3 terminals. A turning basin at this site would be located about 3,400 feet upstream of the existing turning basin and would require extension of the main ship channel to provide access. A new turning basin at this upstream site was dismissed from further consideration based on comments from the Portsmouth Pilots and for the additional reasons as listed below.

- The additional distance to reach the turning basin upstream would mean the pilots would have less time and flexibility to turn the ships during slack tides.
- The new turning basin would be located where the currents exit Great Bay into Piscataqua River. These additional currents would increase the amount of time the pilots would need to maneuver the ships to counter these currents; thereby lessening their already short slack tide window for turning large vessels in the river.
- Significant small craft traffic between the bay and the river would interfere with the use of the area as a turning basin for large ships. The Hilton State Park at Dover Point in New Hampshire has a large boat ramp located adjacent to the proposed upstream turning basin. This State park experiences a significant amount of recreational usage, further contributing to the small craft congestion in this area, and a potential safety hazard.
- Multiple turns in the proposed extension of the navigation channel to take full advantage of naturally deep water would not be possible due to the river currents and the large size of the ships using the river. Therefore, some removal of the submerged banks in the river would be necessary. This along with the presence of a large ledge in the center of the proposed upstream turning basin site would contribute to a higher upstream turning basin development cost than just expanding the existing turning basin.
- The upstream turning basin site also contains a plotted shipwreck that may be a cultural resource of concern. This would require additional study and documentation to determine compliance with applicable laws and regulations.

Based on these concerns, the upstream turning basin alternative was not recommended for further consideration.

D. Alternative Placement Options

Placement of dredged material can occur in open water, at an upland site, or in the river. The following section gives a description of the proposed placement alternatives assessed for dredged material. Rock placement is considered after the discussion of soft dredged material placement.

1. *Upland Placement*

The suitability of an upland site located at the end of Gosling Road in Newington, NH that is currently owned by Public Service of New Hampshire (a Northeast Utilities Company), and was previously owned by the Fuel Storage Corporation in Newington, NH, was investigated. This land is still undeveloped and does not appear to have significant natural resources.

A New Hampshire comprehensive upland dredged material placement study was completed by the USACE for the State of New Hampshire in 2005. This study identified three suitable offloading and dewatering sites in New Hampshire near the project area. In addition, several upland placement sites were also identified. However, none of the property owners were contacted for their interest in leasing or selling land for placing dredged materials during the study. The next phase of the upland placement study would have been to short-list the sites based on property owner’s interest, proximity to dredging sites, the cost of land, and verification of compliance with zoning. In addition, the upland sites were based on accommodating approximately 24,000 cy of dredged maintenance material from Piscataqua River/Portsmouth Harbor. This project would produce over 700,000 cy of material, possibly exceeding the capacity of and eliminating most if not all of the available sites listed in the study for placement of dredged material. The follow-on phases of the upland site study were never funded.

Any upland placement would significantly increase the cost of the project. Although the dredged material is used by the property owner, the Government is not compensated. With bucket and scow operations the material would need to be handled multiple times; once during the dredging, again when the material is being offloaded from the scow. In addition, a containment facility would have to be built to dewater the dredged material, which would add to the overall project cost. Further rehandling after dewatering would be required to transport the material to the final upland site, offload the material at that site, and distribute the material within that site.

Currently there are no identified viable upland placement sites available for use for dredged material. Upland placement increases the cost of the project because the material needs to be handled and transported multiple times. Since a practicable upland site could not be identified for dredged material placement, the upland placement alternative was removed from further consideration.

2. *Riverine Placement*

Two in-river placement sites have been used for previous placement of dredged material removed during maintenance dredging in the Simplex Shoal Reach of the existing navigation channel. The first in-river placement area is about 7,500 feet seaward of the turning basin in a section of the river where depths exceed 50 feet MLLW. This placement area was used for the last three maintenance dredging projects: in 1991 when 20,100 cy of sand and gravel were removed from the channel, in 2000 when 7,900 cy of material was removed, and in 2013 when 14,323 cy of material was removed. This placement area would likely be proposed for the next maintenance dredging cycles of the Simplex Shoal area located just downstream of the turning basin.

The second placement area is located about 10,500 feet downstream from the turning basin and just upstream from the I-95 Bridge. Water depths at the second placement site range from 53 to 58 feet MLLW. This placement area was used in the 1984 maintenance dredging operation when 43,100 cubic yards of sand and gravel were removed from the channel.

Survey data indicates that depths at the riverine placement sites have changed very little over the past fifteen years. Sediment characteristics at the two riverine placement sites are similar. Grain size analysis indicates that material to be dredged from the channel is compatible with material in these two sites. In November 2010, additional sediment grab samples were taken from the proposed dredge and placement area for the proposed maintenance dredging project (Simplex Shoal). Grain size curves from the dredging site and the proposed placement site show that the dredged material from the Simplex Shoal is sand and gravel which is consistent with that collected in 1999. Only gravel was collected from the placement area. As the material from the proposed expansion of the turning basin is also composed of sand and gravel, this indicates that material dredged from expansion of the turning basin and the placement site would be compatible.

However, the amount of material to be dredged from the expanded turning basin exceeds the capacity of the deep areas along the Piscataqua River. In addition, placement of large volumes of material along this high velocity river would create channel instability in areas where it was placed and most likely create navigation hazards. Therefore, riverine placement was eliminated from further consideration.

3. Ocean Placement (MPRSA)

Several ocean placement sites, subject to the regulations of Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), are located near the project area. They include the Isles of Shoals (IOS) placement site, the Cape Arundel Disposal Site (CADS), the Portland Disposal Site (PDS), and the Massachusetts Bay Disposal Site (MBDS). The closest previously used ocean placement site to the project area is the Isles of Shoals. See Figure EA-3.

The CADS is a regional disposal site located approximately 23 nautical miles northeast from Portsmouth Harbor. This site was closed for disposal on January 10, 2010 under the 1992 amendments to the MPRSA which limited future use of non-EPA-designated ocean sites. A disposal site designation study to keep the site open under MPRSA was never funded. Congress in the Fiscal Year 2014 Consolidated Appropriations Act re-opened the CADS for a period of five years, but limited its use to project placing no more than 80,000 cubic yards of material. This site is therefore not available for use by this navigation improvement project unless no more than 80,000 cubic yards of rock or other materials were placed there.

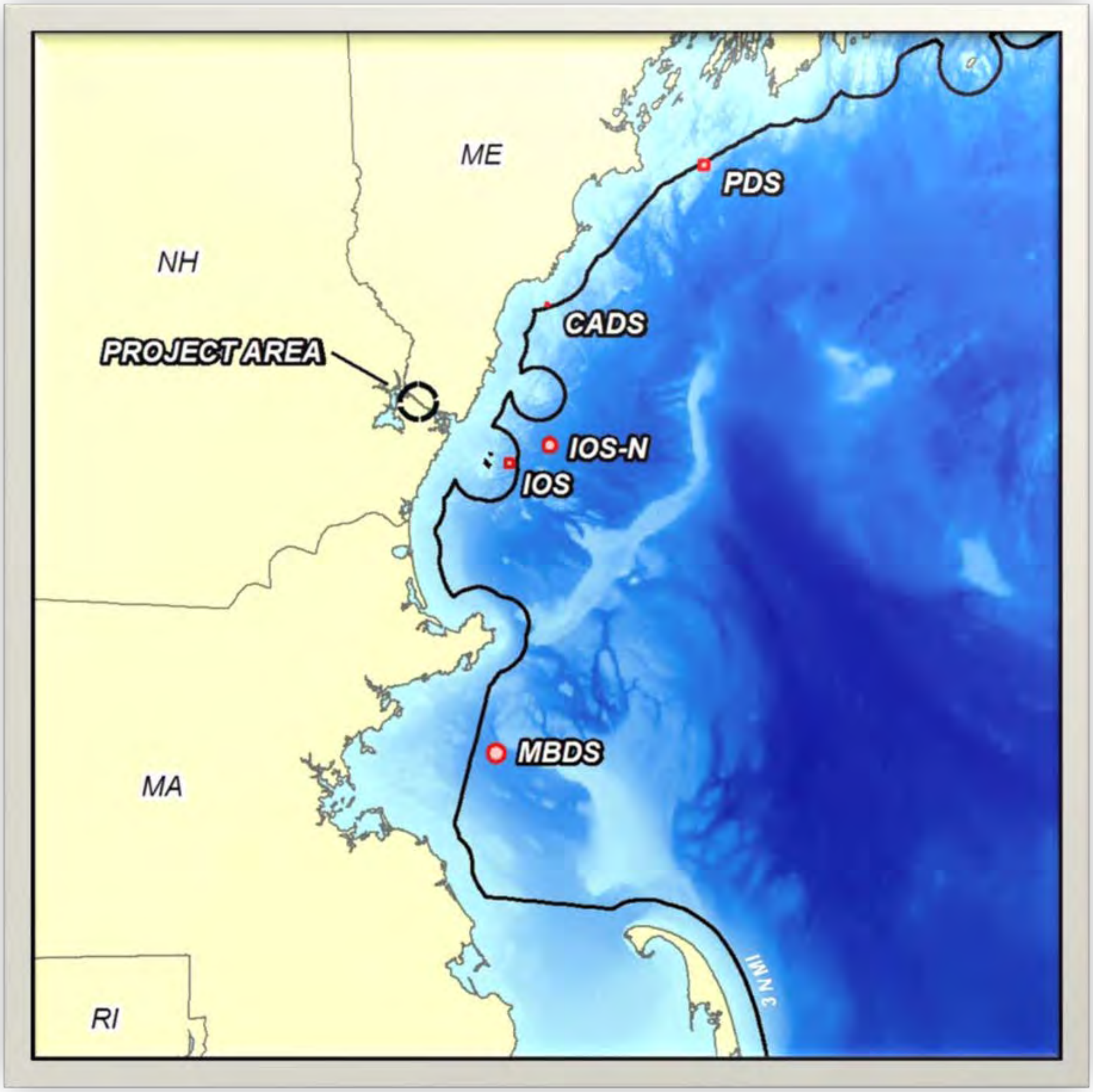

FIGURE EA-3. Approximate Location of Alternative Ocean Dredged Material Disposal Sites

About 51 miles north of the mouth of Portsmouth Harbor, and approximately seven nautical miles east of Cape Elizabeth, Maine, is the PDS. This disposal site is a U.S. EPA designated dredged material disposal site and could receive material from the Piscataqua River. The MBDS is also a U.S. EPA designated dredged material disposal site and is located 44 nautical miles south-southeast of the mouth of Portsmouth Harbor. The dredged material proposed to be dredged from this project consists of clean sand and gravel. Placement at the PDS, or the MBDS would have minimal impacts on water quality and the local habitat at these ocean sites. However, the distance to the PDS or the MBDS makes disposal at these sites undesirable. Also, disposal of material at these sites would preclude taking advantage of potential beneficial use opportunities as discussed in the next two sections below.

The IOS placement site is an open water disposal area that has been used in the past for disposal of dredged material from Portsmouth Harbor. The disposal site is centered in open water about three nautical miles east of a cluster of islands called the Isles of Shoals. The waters surrounding the Isles of Shoals are clear, deep, and relatively pollution free. They support a rich abundance of aquatic life and commercially and recreationally important finfish and shellfish. In 1964-1965, 64,000 cy of dredged material was disposed at this location from improvement dredging of the Portsmouth Harbor. This site was last used in June 1971 when 39,160 cubic yards (cy) of dredged material were removed from the project area using a Government hopper dredge.

A meeting between staff from the USACE, the National Marine Fisheries Service (NMFS) and the Environmental Protection Agency (EPA) was held on April 14, 2010 to discuss the feasibility of disposal at the IOS disposal site. Concern was expressed by the agencies that the IOS site likely provides valuable fisheries habitat based on conversations with local fishermen. It was concluded that additional studies would be needed to fully assess the potential impacts from disposal of dredged material in this area.

Since it was determined that the previously used IOS site may not be suitable for dredged material disposal due to fisheries concerns, adjacent areas were evaluated to identify their suitability as potential locations for disposal of dredged material. Another proposed ocean disposal site, selected for one-time use, would be needed to establish the Federal base plan as a baseline for comparison of costs for disposal. Once this Federal base plan was established, the additional cost to transport and dispose of the material at sites located at a further distance than or more costly than the base plan would be the responsibility of the local or State partner(s).

Further evaluations for another proposed ocean disposal site identified the Isles of Shoals-North (IOS-N) site as a potential site for placement of suitable material dredged from the Piscataqua River upper turning basin and a potential Federal base plan; if additional studies determined the site could be selected or designated for that use. This site is located seaward of the three nautical mile limit of the territorial sea in Federal waters, just northeast of the Isles of Shoals. See Figure EA-3. This site was identified because it is located in deep Federal waters ranging in depths between approximately 250 and 310 feet. Additional benthic and substrate studies were performed to assess the suitability of this site and determine if this site could satisfy the five general (40 CFR 228.5) and 11 specific (40 CFR 228.6) regulatory criteria for site designation under MPRSA as discussed in Section VI (Affected Environment). Subsequent correspondence from EPA dated September 7, 2011 stated that based on these additional analysis, EPA concurred that the IOS-N site is “likely selectable” as an alternative site for the Piscataqua River Navigation Improvement Project on a “one-time use” basis.

4. Nearshore/Open Water Placement (Clean Water Act)

Material disposed for fill (i.e. beach nourishment, intertidal clam flat creation, etc.) within the three mile limit of the Territorial Seas is subject to Section 404 (b) (1) Guidelines of the Clean Water Act. The USACE seeks opportunities to use dredged material in a beneficial manner whenever practicable. Disposal of dredged material for beach nourishment at appropriate nearshore disposal sites was investigated. The New Hampshire Division of Parks and Recreation identified the beach at Wallis Sands State Park and Hampton Beach as two beaches that need sand. At a meeting held on September 15, 2009, staff from the State of New Hampshire indicated that they would prefer the material to be disposed at the north end of both disposal sites to maximize the use of the material for beneficial reuse as longshore drift is to the south. The Wallis Sands Beach nearshore site has not received dredged material from the Piscataqua River but material dredged from the Federal navigation channel in Little Harbor has been placed at the site. About 5,400 cubic yards was placed in 1994, and approximately 40,000 cubic yards was placed in 2001. Most renourishment of Hampton beach has consisted of direct placement on the beach, but in 1987 about 23,000 cubic yards of material dredged from the entrance channel at Hampton Harbor was placed at a nearshore site off the north end of Hampton Beach. Nearshore placement would be suitable for disposal of material from the Piscataqua River, since the material is clean sand and gravel. Disposal of the dredged material at the nearshore site would keep the material within the littoral zone. However, even if both New Hampshire beaches were nourished, they could not accommodate all of the material that would be removed from Portsmouth Harbor. At most, between 50,000 and 100,000 cubic yards could “fit” at each nearshore disposal site.

Although the local sponsor for this project is the New Hampshire Pease Development Authority, Division of Ports and Harbor, all of the material would be removed from Maine waters, except some of the maintenance material. In addition, since the large amount of material to be dredged from the turning basin could not be accommodated at the two beaches identified by the State of New Hampshire, inquires were made to find additional suitable nearshore disposal sites.

In October 2009, a suitable nearshore disposal site, located within a reasonable distance from Portsmouth Harbor (about 10 miles), was identified by the staff from the Maine Geological Survey (MGS). This nearshore site was located off of Long Sands Beach in York, Maine, which based on MGS studies, has a history of landward migration and lowering in response to sea level rise and storm events. Based on the site selection by the MGS, and favorable coordination with Maine’s Department of Environmental Protection (DEP) and Department of Marine Resources

(DMR), grab samples were collected on November 5, 2009 to determine the benthic community structure and grain size at the site. See the benthic and grain size results in Appendix O. Based on the grain size and benthic community results, it was determined that material dredged from the Portsmouth Harbor and Piscataqua River Navigation Improvement Project would be suitable for disposal at the Long Sands Beach nearshore disposal site.

A meeting was scheduled with the local lobstermen on January 5, 2010 in York, Maine and the USACE and State of Maine staff to obtain any comments, questions, or concerns they may have regarding disposal off of Long Sands Beach. Publicity concerning this coordination meeting resulted in a much larger group of attendees than expected (about 60 attended). USACE and State of Maine representatives (primarily MGS, although DEP and DMR representatives were also present) explained that the long term history of landward migration and lowering of the beach indicated that this was a good candidate for nearshore placement of sandy material. The area of proposed dredging, which consists of parent materials adjacent to the channel rather than sediments in the channel, was explained. However, as the material was coming from the Piscataqua River, the public was concerned about the chemical characteristics of the sand, and whether or not the material was suitably “clean” for disposal. The criteria and testing that was done to determine the material was suitable for open ocean disposal were explained, but many desired additional testing. Sand color, white vs. light brown, and potential impacts to surfing opportunities were also discussed. Fishermen were also concerned about dispersal of material over hard bottom areas. In summary, all who spoke at the meeting were opposed to placing material off of Long Sands Beach in nearshore waters from the proposed expanded turning basin.

As no local officials spoke at the meeting, the Chairman of the York Board of Selectmen was contacted on February 16, 2010 to determine the town’s position regarding nearshore placement of dredged material. Based on concerns expressed at the meeting and the general public opinion, the Chairman stated that the Town has no interest in receiving sand from the turning basin widening project. Publicity following the York meeting also resulted in the Selectmen of Rye, New Hampshire stating that their town also had no interest in having the sandy dredged material deposited off their shore.

The lack of nearby nearshore placement sites for beach nourishment purposes prompted a new search for other practicable placement alternatives, preferably in nearshore areas for beneficial use. A meeting was held May 21, 2010 in Portsmouth, NH to determine who from the three States (Maine, New Hampshire, and Massachusetts) would be interested in receiving the dredged material. Table EA-2 displays an updated cost comparison between the Federal base plan (placement at Isles of Shoals-North) and the other alternative nearshore, ocean, and upland placement sites.

The Town of Wells, Maine, located approximately 32 miles from the turning basin, and the State of Massachusetts expressed an interest in receiving dredged material for the purposes of beach nourishment. Sites considered for nearshore placement in Massachusetts included Salisbury and

Plum Island (26 miles from Portsmouth Harbor) and Winthrop Beach near Boston Harbor (58 miles from Portsmouth Harbor). In addition to the meeting noted above, letters were also sent in July 2012 to the States of Maine, New Hampshire, and Massachusetts, as well as the following local communities to determine their interest in receiving dredged material for nearshore placement from the proposed project. The local communities in Maine included Wells, Ogunquit, and Kittery; in New Hampshire Rye; and in Massachusetts Salisbury, Newbury, Newburyport, and Winthrop. The communities of Wells, Maine, and Salisbury, Newbury and Newburyport in Massachusetts responded that they would be interested in receiving this material and would also be willing to fund the incremental cost above the Federal base plan.

TABLE EA-2. ALTERNATIVE DREDGED MATERIAL PLACEMENT COST COMPARISONS

Disposal Site	Haul Distance From Turning Basin (Miles)	Base Plan Cost/Cubic Yard	Cost Increase Above Base Plan
Aquatic Disposal			
Wallis Sands/N. Rye, NH - Nearshore	14	No Local Interest	
Isles Of Shoals-N – Ocean: Base Plan	**20**	**$19.75**	**N/A**
Long Sands, York, ME – Nearshore	20	No Local Interest	
Salisbury, MA – Nearshore	24		$2.60
Newburyport, MA – Nearshore	25		$2.69
Newbury, MA - Nearshore	26		$2.69
Wells, ME – Nearshore	32		$2.81
Camp Ellis, ME – Nearshore	52		$10.00
Winthrop, MA – Nearshore	58		$11.70
Portland, ME Disposal Site - Ocean	58		$11.70
Upland Disposal			
Newington, NH – Gosling Road			$13.80

Note: Cost above base plan are Fiscal Year 2014 price level costs (total first costs) for project implementation design and construction.

5. Rock Placement Alternatives

Rock could be disposed at an upland site, disposed at a nearshore site to create rock reef, used for coastal armoring, or disposed at an open water disposal site. Discussions with State and Federal resource agencies indicated that the rock could be used for upland projects. Discussions with the New Hampshire and Maine Departments of Transportation indicated an interest in the rock for their road projects. The rock could be offloaded at a shoreside location along the Piscataqua River for transport to a suitable upland storage site. Additional discussions with the States of Maine and New Hampshire regarding real estate needs would be needed if these States are still interested in the rock for upland uses.

The Town of Kittery, Maine has expressed an interest in receiving the rock generated by the project for construction of a wave berm at the entrance to Pepperell Cove, located near the mouth of Portsmouth Harbor. The Town is presently pursuing design and permitting of that proposed plan. As with the non-Federal proposals for nearshore placement of the sandy material, any alternative placement or use of the rock requires the non-Federal proponent to secure all necessary approvals for that placement and provide any costs above the Base Plan.

Alternative locations for rock disposal are the IOS-N site and CADS. If the IOS-N site is used, a MPRSA Section 103 site selection document would need to be prepared and processed by the USACE and U.S. EPA during the project's Design Phase.

V. RECOMMENDED PLAN

The Recommended Plan would widen the existing 800-wide turning basin located at the upstream end of the Piscataqua River Federal navigation channel to 1,200 feet and to a depth of -35-feet MLLW plus two feet of overdepth. Approximately 728,100 cy of coarse grained sandy and gravelly material, and approximately 25,300 cy of rock would be removed. All material would be removed by a mechanical dredge and take about six months to complete. About four to five months would be needed to remove the dredged material and one to two months to blast and remove the rock.

Based on data collected as part of the disposal site evaluation, the IOS-N ocean disposal site was selected for this project as the Federal base plan for dredged material placement. However, the following towns have expressed an interest in the material and have agreed to pay the difference in cost between the transport of dredged material to the IOS-N and the alternative locations to which they have expressed an interest. These alternatives include the nearshore placement sites located off the beaches of Wells, Maine, and Newbury, Newburyport, and Salisbury, Massachusetts. These four nearshore placement locations would act as feeder berms for adjacent eroding beaches. Approximately 364,100 cy of dredged material would be placed nearshore in waters off the coast of Wells, Maine, with the remaining 364,000 cy divided between the three Massachusetts communities. Division of the material among the Massachusetts communities would be as follows: Salisbury – 90,900 cy, Newburyport – 36,400 cy, and Newbury – 236,700 cy. The final amounts will be determined during the Design Phase. In addition, the local communities would be responsible for obtaining any necessary approvals prior to construction and funding any costs above the Federal Base Plan.

The rock would be removed and taken to the IOS-N, the CADS, or an alternative location determined during the Design Phase. The bedrock would be removed to a design depth of 35-feet MLLW, plus two feet additional required removal in hard material for safe clearance, plus two feet of allowable overdepth for a total of -39-feet MLLW. If real estate investigations are completed and interest is still viable, then the rock could be used for upland projects by the States of Maine and/or New Hampshire. Other beneficial uses include placement of the rock at a suitable nearshore area as a rock reef for lobster and fish habitat once appropriate studies have been conducted. This alternative would be explored further during the Design Phase of the project. In addition, Section X (Mitigation) discusses methods to avoid or minimize impacts to biological resources from blasting. See Figure EA-4 for a location of the four nearshore placement sites and the IOS-N.

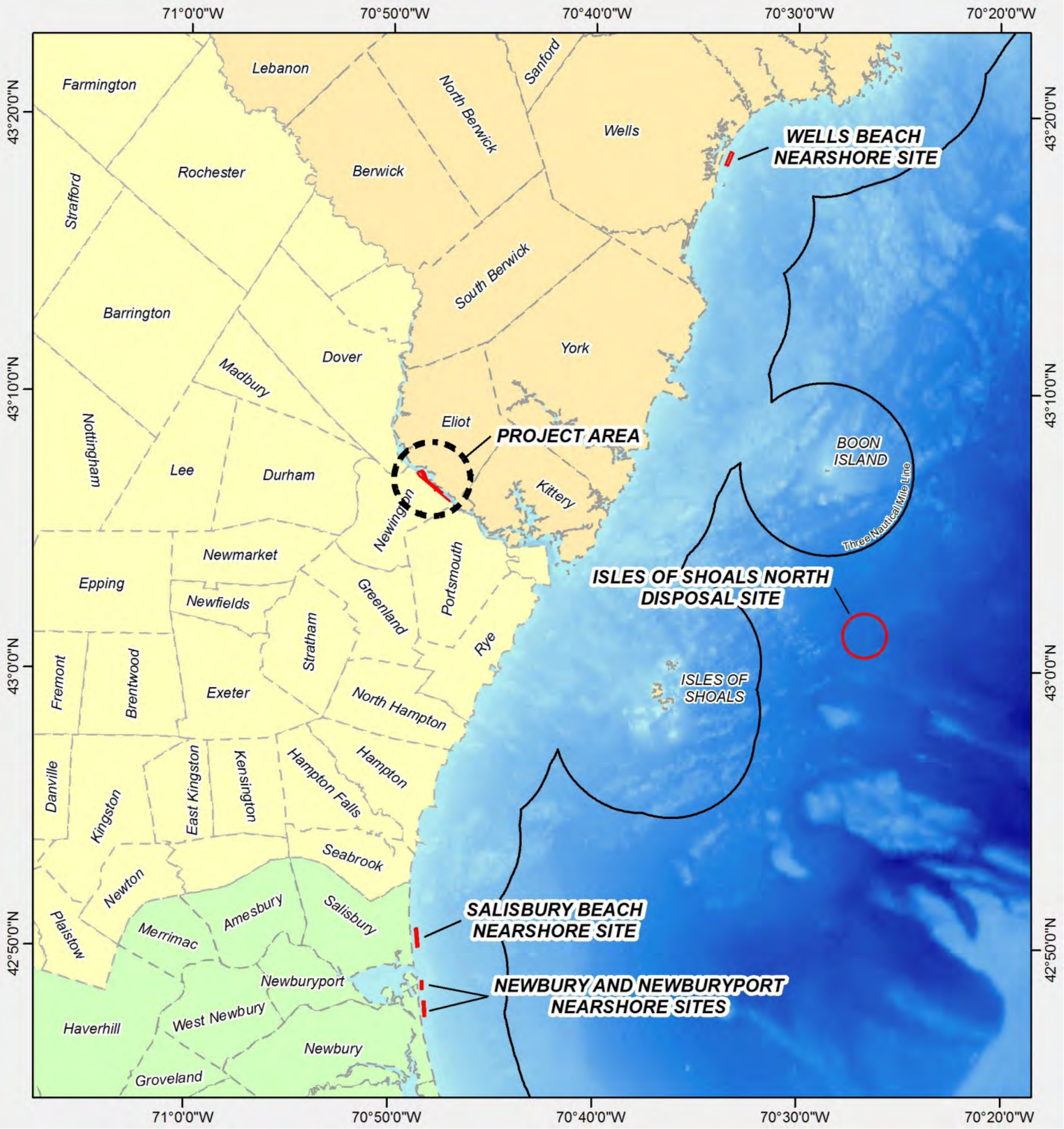

FIGURE EA-4. Location of the Proposed Nearshore Placement Sites and the Isles of Shoals-North Site

Also, approximately 2,100 cy of maintenance material could potentially be removed from within the existing turning basin limits and its approaches to bring the current turning basin and its approaches to their authorized 35-foot MLLW depth, if that material meets the suitability requirements for aquatic disposal. Testing for suitability for placement in these nearshore areas, CADS or IOS-N would occur in the next project phase (Design Phase). All other maintenance material removed from the river over the past several decades since the 35-foot deepening of the navigation channel was composed of clean sandy material. Approximately 0.1 acres would be disturbed to bring the area down to -35 feet MLLW, and another 1.3 acres to include overdepth dredging to -37 feet MLLW.

Based on the biological resources in the project areas, the material would be removed between the months of mid-October through mid-April to protect biological resources. Prior to placement at the Massachusetts nearshore placement sites, commercial shellfishermen would be notified to remove any surf clams (*Spisula solidissima*) located at these sites.

VI. AFFECTED ENVIRONMENT

A. General

The Piscataqua River is a long tidal river formed by the confluence of the Cocheco and Salmon Falls Rivers. It is also a component of the Great Bay Estuary. Land use along the river's shoreline consists of a mixture of commercial and industrial port facilities, and residential areas. Portsmouth Harbor located near the mouth of the river serves as a major commercial port. This port handles almost all of New Hampshire's petroleum products and large shipments of fish and shellfish. The river is also an important recreational resource and the site of a major U.S. naval facility near the mouth of the river, the Portsmouth Naval Shipyard located on Seavey's Island in Kittery, Maine.

B. Hydrology and Water Quality

<u>Dredge Area</u>: The following information, and the references, on the project area hydrology and water quality are taken from the New Hampshire Estuaries Project produced by Jones (2000). The Great Bay Estuary is a tidally dominated embayment located on the southern New Hampshire and Maine border. The estuary extends inland from the mouth of the Piscataqua River between Kittery, Maine, and New Castle, New Hampshire through Little Bay to Great Bay proper, a total distance of about 15 miles. The junction of Little Bay and the Piscataqua River occurs at Dover Point. Little Bay turns sharply west at Cedar and Fox Points near the mouth of the Oyster River and ends at Furber Strait near Adams Point. Great Bay begins immediately inland or "upstream" of Furber Strait. Tidal waters from the Atlantic Ocean enter the Great Bay Estuary in Portsmouth Harbor and flood the three major areas of the Piscataqua River, the Little Bay and Great Bay.

The estuary derives its freshwater inflow from seven major rivers, the Lamprey, Oyster, Cocheco, Salmon Falls, Squamscott, Bellamy and Winnicut Rivers. River flow varies seasonally, with the greatest volumes occurring as a result of spring runoff. However, the tidal component in the estuary dominates over freshwater influence throughout most of the year. Freshwater input typically represents only two percent or less of the tidal prism volume (Reichard and Celikkol, 1978; Brown and Arellano, 1979 *cited in* Jones, 2000). Estimates of flow for all rivers suggest that the average combined freshwater inflow is greater than 1,000 cubic feet per second. Approximately 50 percent of the average annual precipitation (42 inches) in the Great Bay Estuary drainage basin enters the estuary as stream flow (NHWSPCC, 1975 *cited in* Jones, 2000).

The average tidal range for Portsmouth Harbor is 9.4 feet. The average mean spring tidal range is 9.7 feet and the average mean tide level is 4.2 feet. The mean tidal range decreases to 6.6 feet where the Piscataqua River meets the Cocheco and Salmon Falls Rivers. The phase of the tide lags significantly moving up the Great Bay Estuary from the ocean and the slack tides can be as much as 2.5 hours later in the Squamscott River than at the mouth of the estuary. The large tidal range during spring tides results in exposure of extensive mudflats along the fringing areas of the Piscataqua River, Little Bay and the tributaries as well as large expanses of exposed tidal flats in the central part of Great Bay.

The Piscataqua River is one of the fastest flowing tidal waterways among commercial ports in the northeastern United States. The average current velocity at full strength in the lower Portsmouth Harbor varies from about 2.6 to 4.0 knots. Strong tidal currents and mixing throughout the estuary limit vertical stratification during most of the year. Partial stratification may occur during periods of intense freshwater runoff, particularly at the upper tidal reaches of rivers entering the estuary (Jones, 2000). A horizontal gradient of decreasing salinity exists from the mouth of the harbor to the tidal reaches of the tributaries and the upper portions of Great Bay. The range of this salinity gradient (0-30 ppt) depends on tidal cycle, season and rainfall conditions (Jones, 2000).

New Hampshire and Maine have an agreement to maintain acceptable water quality in the Piscataqua River by regulating their effluent discharges into the river. The river is designated by the State of New Hampshire as a Class B stream segment and by the State of Maine as a Class SB. New Hampshire Class B waters are acceptable for bathing and other recreational purposes. Maine Class SB waters are suitable for water contact recreation, fishing, shellfish harvesting and propagation, and are valuable fish and wildlife habitat.

Isles of Shoals-North (IOS-N): Site specific information on the hydrology and tidal currents is not available for the IOS-N disposal site, but would be expected to be affected by the surrounding Gulf of Maine environment. The site would be tidally flushed and have good water quality. The affect of storms on the bottom sediments within the site would be expected to be minimal as the site is located in a deep area (approximately 300 feet deep). This is evident by the nearly uniform layer of fine sediments throughout the area (see next section).

Nearshore Placement Sites: Figure EA-4 shows the location of the four proposed nearshore placement sites: Wells, Salisbury, Newburyport, and Newbury. All of these sites are located in water with depths of -3 and -27 feet MLLW. The Wells nearshore placement site ranges in depth from -9 to -24 feet MLLW, the Salisbury nearshore placement site ranges in depth from -9 to -27 feet MLLW, the Newburyport nearshore placement site ranges in depth from -3 to -18 feet MLLW, and the Newbury nearshore placement site ranges in depth from -5 to -26 feet MLLW. These sites are subject to currents and wave climate typically found in nearshore environments and were selected to provide indirect beach nourishment for adjacent beach areas.

C. Sediments

Dredge Area: Tidal currents cause considerable fluctuations of water clarity, temperature, salinity and current speeds, and have a major impact on bottom substrata. Shallow areas of the estuary are also greatly affected by wind-wave conditions which can influence grain size distributions and sediment transport throughout the estuary. Waves re-suspend sediments, increasing turbidity levels well above levels attributed to tidal currents alone (Anderson, 1972 *cited in* Jones, 2000).

To determine the grain size of the material to be removed from the proposed project and to determine if the material is suitable for open water disposal, borings were collected in the fall of 2007 from the proposed expanded turning basin. Except for sample B5, all the samples were comprised of predominately sand and gravel (see Table EA-3, Figure EA-5). Additional grab samples were obtained in June 2009 from the proposed turning basin to determine the extent of the silt area near boring sample B5. Only one sample out of 16 (number 6) contained more than 20% silt (see Table EA-4, Figure EA-6). Based on this additional information and the swift currents running through the project area, it was determined that the material from the proposed turning basin met the exclusionary criteria of the Clean Water Act and is deemed suitable for open water placement (see Appendix A for the suitability determination).

TABLE EA-3. GRAIN SIZE FOR SELECTED PISCATAQUA RIVER BORING SAMPLES - SEPTEMBER AND NOVEMBER 2007 -

Station No. (Depth)	% Gravel	% Sand	% Silt and Clay
B-1 (20.0-22.0 feet)	1.5	89.9	8.6
B-2 (10.0-12.0 feet)	1.0	90.4	8.6
B-4 (15.0-17.0 feet)	1.7	83.8	14.5
B-5 (0-2.0 feet)	—	5.7	94.3
B-5 (10.0-11.8 feet)	13.4	45.1	41.5
B-7 (0-2.0 feet)	0.3	89.1	10.6
B-7 (5.0-7.0 feet)	2.5	84.2	13.3
B-7 (10.0-12.0 feet)	16.2	76.5	7.3
B-8 (0-2.0 feet)	13.5	76.5	10.0
B-8 (5.0-7.0 feet)	19.4	74.9	5.7

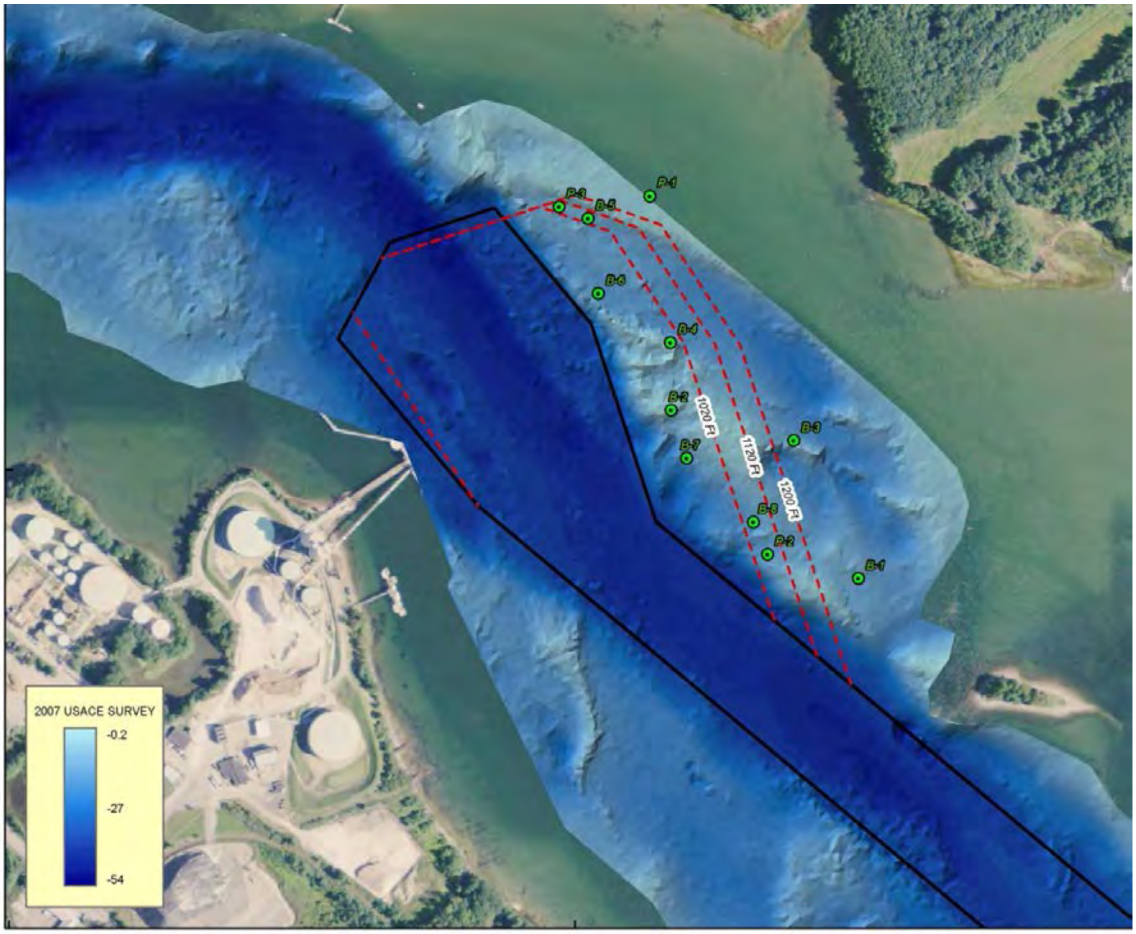

FIGURE EA-5. Location of Borings Collected from the Proposed Expanded Turning Basin in 2007

TABLE EA-4. GRAIN SIZE FOR PISCATAQUA RIVER GRAB SAMPLES – JUNE 2009 -			
Station Number	**% Gravel**	**% Sand**	**% Silt and Clay**
1	--- Sample Not Attainable ---		
2	--- Sample Not Attainable ---		
3	78.0	20.7	1.3
4	--- Sample Not Attainable ---		
5	45.9	53.3	0.8
6	1.1	67.6	31.3
7	14.4	76.9	8.7
8	--- Sample Not Attainable ---		
9	57.0	42.1	0.9
10	41.0	58.1	0.9
11	—	92.9	7.1
12	67.0	31.0	2.0
13	--- Sample Not Attainable ---		
14	11.8	85.4	2.8
15	82.1	16.9	1.0
16	0.8	90.2	9.0
17	5.7	83.4	10.9
18	36.8	61.5	1.7
19	60.9	33.5	5.6
20	Sample Not Attainable ---		
21	3.1	78.4	18.5
22	5.5	87.0	7.5

FIGURE EA-6. Location of Grabs Collected from the Proposed Expanded Turning Basin in 2009

IOS-N: With the exception of Station B, all the grain size data collected from the Isles of Shoals-North disposal site was found to be nearly uniform in composition. These samples contained at least 90% fines, with most samples containing more than 95% fines (silt and clay). See Table EA-5 for the grain size results and Figure EA-7 for the sample locations. Grain size curves can be found in Appendix M. Based on the testing data results, material at this placement site was shown to be much finer than the material to be removed from the proposed expanded turning basin.

TABLE EA-5. GRAIN SIZE FOR ISLES OF SHOALS-NORTH - NOVEMBER 2010 -

Station	Depth (ft)	% Sand	% Silt & Clay
A	319	2.1	97.9
B	314	20.2	79.8
C	315	2.4	97.6
D	318	3.4	96.6
E	316	3.7	96.3
F	321	2.4	97.6
G	317	3.9	96.1
H	328	7.3	92.7
I	313	2.1	97.9

Nearshore Placement Sites: Grain size was collected from the proposed nearshore placement sites to determine grain size compatibility with the material from the dredge area. Material collected in July 2013 from the Wells, Salisbury, Newburyport, and Newbury nearshore placement sites were found to be nearly uniform in sediment composition and contained approximately 90% or more of medium and fine-grained sand (see Table EA-6 below). The Wells site is the only nearshore site that contained over 98% fine sand. None of the nearshore placement sites contained fine grained material. The material collected from the proposed turning basin is more variable in composition than the nearshore placement sites; it contains some fines (10% or less silt and clay) and gravel. See Appendix N for additional information on the nearshore placement sites.

D. Estuarine Biology

New Hampshire's estuaries are composed of a variety of habitats. They serve as nursery areas for commercially important fish and shellfish species as well as sustaining runs of numerous anadromous species. The primary producers include a diverse community of benthic organisms, seaweeds and eelgrass.

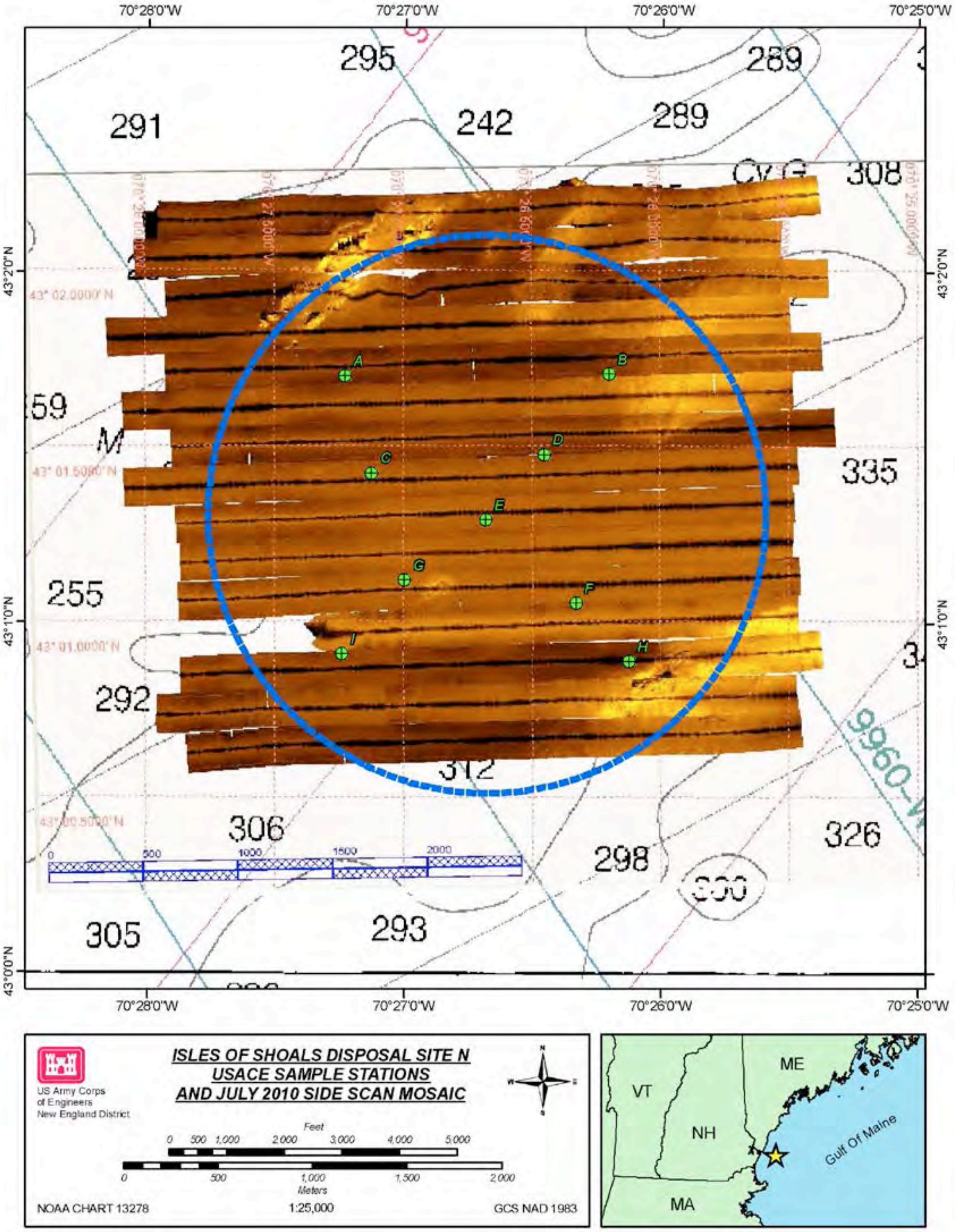

FIGURE EA-7. Sample Locations at the Isles of Shoals-N Dredged Material Disposal Site

TABLE EA-6. GRAIN SIZE RESULTS FOR THE NEARSHORE PLACEMENT SITES - JULY 2013 -					
Station Number	**% Fine Gravel**	**% Sand**			**% Fines**
		Coarse	**Medium**	**Fine**	
Wells-A	0.0	0.1	1.0	98.9	0.0
Wells-B	0.2	0.4	1.4	98.1	0.0
Wells-C	0.1	0.0	0.6	99.3	0.0
Wells-D	0.0	0.1	1.2	98.7	0.0
Wells-E	0.5	0.2	0.5	98.8	0.0
Salisbury-A	0.0	0.1	73.2	26.7	0.0
Salisbury-B	0.0	0.0	2.7	97.3	0.0
Salisbury-C	0.0	0.0	74.9	25.0	0.0
Salisbury-D	0.0	0.1	83.1	16.8	0.0
Salisbury-E	0.0	0.0	1.4	98.5	0.0
Newburyport-A	1.6	8.6	85.4	4.4	0.0
Newburyport-B	0.0	0.9	98.1	1.0	0.0
Newburyport-C	0.2	3.2	85.9	10.7	0.0
Newburyport-D	5.1	4.3	36.2	54.5	0.0
Newburyport-E	0.8	2.2	74.1	22.9	0.0
Newbury-A	0.0	0.1	49.1	50.8	0.0
Newbury-B	0.3	0.7	87.2	11.9	0.0
Newbury-C	0.0	0.0	66.0	34.0	0.0
Newbury-D	0.1	0.2	57.2	42.6	0.0
Newbury-E	0.0	0.2	96.5	3.2	0.0

1. *Estuarine Vegetation*

General: The majority of the salt marsh in the Great Bay Estuary can be found in the lower portions of the Piscataqua River (near Portsmouth Harbor and Little Harbor), the Squamscott River, and in Great Bay (Jones, 2000). A salt marsh fringe is located along the edges of Mast Cove, which is located along the Maine side of the river where the proposed turning basin is proposed.

Seaweeds mapped in Mast Cove are Iris moss *(Chondrus crispus)*, tufted red weed *(Macrocarpus stellatus)* knotted wrack *(Ascophyllum nodosum)* (Jones, 2000).

Eelgrass (*Zostera marina*) is an essential species for the Great Bay Estuary because it is the basis of an estuarine food chain that supports many of the recreationally, commercially and ecologically important species in the estuary and beyond (Short, 2009). Despite its ecological importance, there has been a continuing loss of eelgrass biomass in the estuary. Eelgrass is primarily found in Great Bay, with limited distribution in Portsmouth Harbor and Little Bay

(Short, 2013). Eelgrass distribution continued its long-term trend of decline in the Great Bay Estuary in 2012, with a 37% loss since 1996 (Short, 2013).

Dredge Area: No eelgrass was observed during an eelgrass video survey conducted in the proposed turning basin on October 14, 2008 by staff from the USACE, New England District, and a University of New Hampshire (UNH) eelgrass scientist. This survey included the use of underwater video using a towed camera along several transects within the proposed expansion area of the turning basin. The results of the survey determined that no eelgrass exists in the proposed navigation improvement area.

A second eelgrass survey was conducted in the project area on November 5, 2009 to document the presence/absence of eelgrass in the project area when it was reported by a UNH eelgrass scientist at a NH Dredged Material Task Force Meeting on October 21, 2009 that eelgrass had returned to the proposed project area. Depths in the survey area ranged from five to 24 feet (intertidal to 19 feet adjusted to MLLW). The results of this survey confirmed that no eelgrass was present in the project area. The bottom type consisted of sand with cobble, gravel and shell, with several areas of dense kelp beds. A record of the field survey along with supporting, video survey log, and screen captures from each of the video survey stations can be found in Appendix L.

It has been reported that a new patchy 1.6 acres eelgrass bed representing an expansion of the seedlings planted in 2011 off of Adlington Creek exists on the Maine side of the river (Short, 2013). No eelgrass would be expected in the navigation channel due to the depths.

IOS-N: Given the oceanic conditions and associated water depths no salt marsh or submerged aquatic vegetation (eelgrass) exists at the site.

Nearshore Placement Sites: All proposed nearshore placement sites, Wells, Salisbury, Newburyport, and Newbury, were surveyed for eelgrass in July and August of 2013 using hydroacoustic survey transect data which was processed using the SAVEWS Jr. (Submersed Aquatic Vegetation Early Warning System) software package developed by the US Army Engineer Research and Development Center (ERDC) and a video survey. This data was compared with video transect footage to validate the SAVEWS Jr. output and delineate areas of SAV coverage. Appendix N contains additional details on the survey methods and results.

Based on this survey, no eelgrass was observed within any portion of the proposed nearshore placement sites. Any vegetation detected by SAVEWS was found to be either clumps of drift algae or green fleece (*Codium fragile*).

2. Benthic Invertebrates

General: Benthic invertebrates include epibenthos such as motile bottom dwelling taxa (e.g. snails, crabs and lobsters) and sessile taxa that attach to hard substrates (e.g. oysters, barnacles) as well as infaunal benthos that burrow in the sediments. Environmental conditions that are important in influencing invertebrate occurrence include water depth, substratum, temperature, and salinity. Of these, tidal regulated depth creates a division between intertidal and subtidal populations. Substratum type is also a major determinant of species composition.

Infaunal benthic populations can provide information that is integral to determining the ecological condition of estuaries (Jones, 2000). They are important regulators of the deposition and resuspension of bottom sediments and the exchange of constituents between bottom sediments and overlying water. Because of their burrowing and feeding habits, benthic animals affect the geochemical profiles of sediments and pore waters, particularly in higher salinity habitats with fine grained sediments. Jones (2000) reviewed the data bases on infaunal macrobenthos in the Great Bay Estuary compiled over the past years and found the following results. The data indicate that species richness and dominant species are essentially unchanged over twenty plus years (1972-1995). Biomass and the number of individuals can change dramatically throughout the year, with peaks in both numbers and total biomass occurring in spring and fall. Low summer populations were attributed to predation. Data also found that community composition is determined to a great extent by sediment grain size. Although species dominance can vary spatially and temporally, generally speaking the dominant taxa in the Great Bay Estuary are the polychaetes *Streblospio benedicti*, *Heteromastus filiformis*, *Scolopos sp.*, *Pygospio elegans*, *Aricidea catherinae*, oligochaetes, the amphipod *Ampelisca abdita/vadorum*, and the bivalves *Gemma gemma* and *Macoma balthica*. Abundance, number of taxa and species diversity generally increase with decreasing distance from the open coast, indicating that fewer species are tolerant of the seasonal temperature extremes and daily tidal salinity changes, which can be as much as 18 ppt, in the upper reaches of Great Bay's tidal tributaries.

Dredge Area: To determine benthic community structure and associated potential impact from the proposed project, six benthic samples were collected from the proposed turning basin using a Van Veen (0.04 m^2) grab on September 11, 2007 and passed through a 0.5 mm sieve. See Figure EA 8 for sample locations. A visual inspection of the sediments collected with the grab samples determined that the substrate is composed of coarse sand and gravel. Amphipod species comprised three of the four dominant species making up 79% of the total individuals in the area. The results of the benthic survey are typical of that found in coarse grained sediments. The fourth species was an unidentified Oligochaete. See Appendix L for benthic results.

IOS-N: Benthic samples were collected at nine stations on November 1, 2010 within the proposed Isles of Shoals-North disposal area. At each station, samples for fauna and sediment analyses were retrieved using a 0.04 m^2 modified Van Veen grab (see Appendix M for details). The result of this benthic survey showed that this site is uniform both physically and biologically. Because of the nearly uniform depth of the site, the stations were located in a very narrow depth range and the sediments have very high fine silt/clay content.

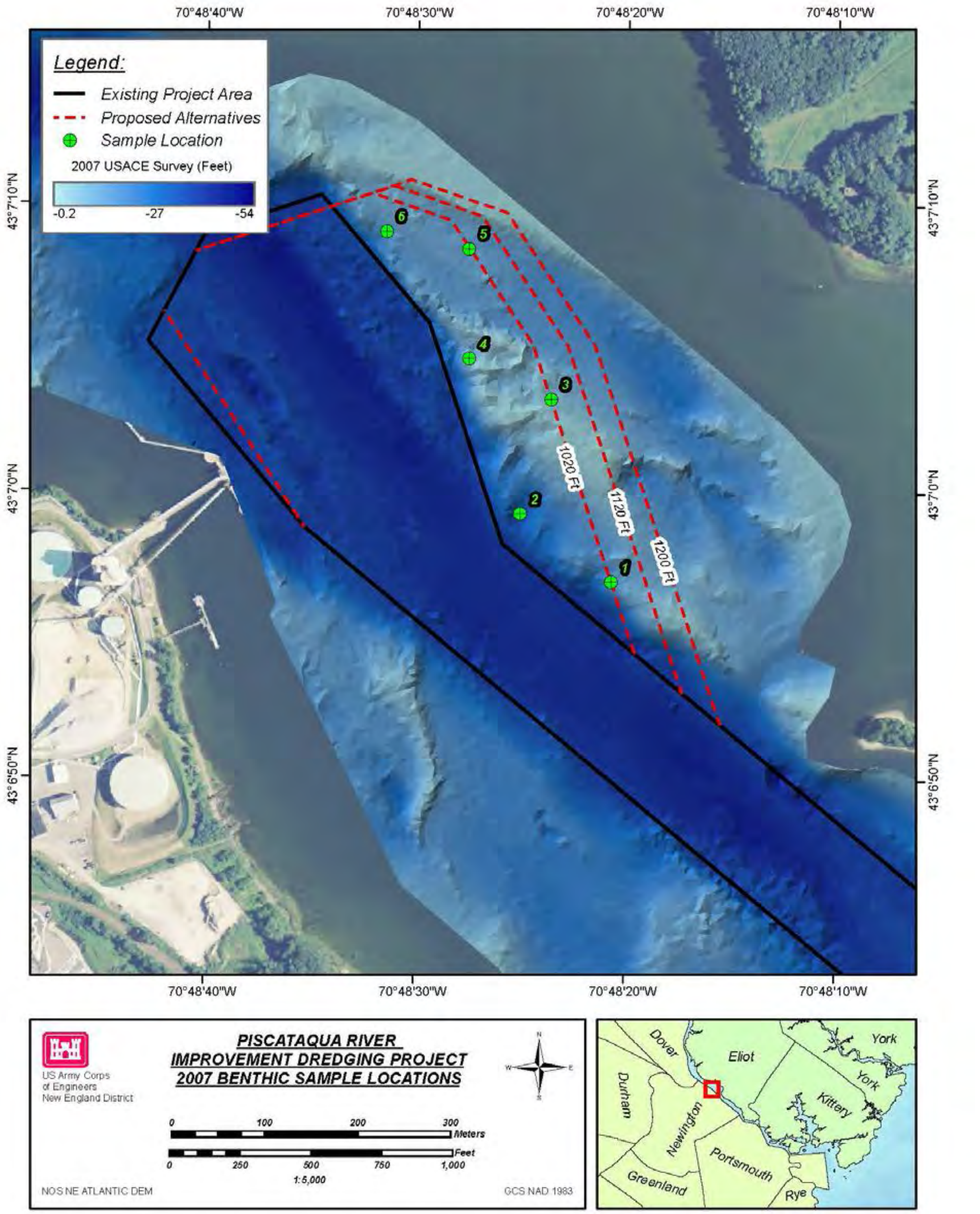

Figure EA-8. Benthic Sample Locations from the Proposed Expanded Turning Basin

The results of the benthic survey indicate that the macroinvertebrate fauna at the IOS-N is limited. The benthic community consists of 40 species representing just four phyla. The assemblage is noteworthy for its lack of oligochaetes, nearly ubiquitous elsewhere, and the absence of echinoderms and colonial species. Polychaetes are the characteristic taxa overwhelmingly dominating the community in terms of numbers of species and individuals. Density is relatively low, while the species richness, diversity and evenness are also at low to modest levels. One species, the polychaete *Paraonis gracilis*, is the numerical dominant at eight of the nine stations.

In summary, the study area is physically homogeneous and inhabited by a limited benthic invertebrate community. Richness, at the species and higher taxonomic levels, and density are low relative to both more inshore and more offshore habitats. Deposit-feeding polychaetes dominate the fauna qualitatively and quantitatively.

<u>Nearshore Placement Site-Wells</u>: Five benthic samples were collected with a Van Veen grab on July 30, 2013. The results of the benthic samples indicated that the benthic community within the nearshore site off Wells Beach was dominated by burrowing amphipods (*Haustorius canadensis*). A wide range of polychaete species were also present. Juvenile razor clams (*Ensis directus*) and commercially important juvenile surf clams (*Spisula solidissima*) were abundant throughout the site. The individuals found at this site represent a sandy nearshore assemblage typical of New England intertidal and shallow subtidal environments (Croker, et al. 1974, Larsen and Doggett, 1990). A complete species list and abundance data from the benthic survey are presented in Table 3 in Appendix N.

<u>Nearshore Placement Site-Salisbury</u>: Five benthic samples were collected with a Van Veen grab on July 31, 2013. The results of the benthic samples indicated that the benthic community within the nearshore site off Salisbury was dominated by burrowing amphipods (*Haustorius canadensis*). A wide range of polychaete species (typically syllids and spionids) were also present. Razor clams (*Ensis directus*) were present in low numbers, while juvenile surf clams (*Spisula solidissima*) were abundant. The individuals found at this site represent a sandy nearshore assemblage typical of New England intertidal and shallow subtidal environments (Croker, et al. 1974, Larsen and Doggett, 1990). A complete species list and abundance data from the benthic survey are presented in Table 5 in Appendix N.

<u>Nearshore Placement Site-Newburyport</u>: Five benthic samples were collected with a Van Veen grab on July 31, 2013. The results of the benthic samples indicated that the benthic community within the nearshore site off Newburyport was dominated by syllid polychaetes (*Brania* sp. and *Exogone dispar*), capitellid polychaetes (*Capitella* sp.), and various species of burrowing amphipods (e.g. *Haustorius canadensis*). Razor clams (*Ensis directus*) and surf clams (*Spisula solidissima*) were also present in low numbers. All clams were juvenile. The individuals found at this site represent a sandy nearshore assemblage typical of New England intertidal and shallow

subtidal environments (Croker, et al. 1974, Larsen and Doggett, 1990). A complete species list and abundance data from the benthic survey are presented in Table 7 in Appendix N.

Nearshore Placement Site-Newbury: Five benthic samples were collected with a Van Veen grab on July 31, 2013. The results of the benthic samples indicated that the benthic community within the nearshore site off of Newbury was dominated by a mix of syllid polychaetes (*Brania* sp. and *Exogone dispar*), capitellid polychaetes (*Capitella* sp.) and oligochaetes. Surf clams (*Spisula solidissima*) were present within the site in low numbers. All surf clams were juvenile. The community found at this site represents a sandy nearshore assemblage typical of New England intertidal and shallow subtidal environments (Croker, et al. 1974, Larsen and Doggett, 1990). A complete species list and abundance data from the benthic survey are presented in Table 9 in Appendix N.

3. Shellfish

The Great Bay Estuary supports populations of eastern oyster *Crassostrea virginica*, European flat oysters *Ostrea edulis*, softshell clams *Mya arenaria*, blue mussels *Mytilus edulis*, razor clams *Ensis directus*, and sea scallops *Placopecten magellanicus* (Jones, 2000). Other common or important crustaceans in the estuary system are American lobster *Homarus americanus*, horseshoe crabs *Limulus polyphemus*, green crabs *Carcinus meanas* and rock crab *Cancer irroratus* (Jones, 2000). Lobsters are fished commercially in all but the upper tidal reaches of the estuaries (Jones, 2000). Adult lobsters undergo a seasonal migration, moving inshore in spring and offshore in fall, though within that time period, they may move about a great deal within estuaries (Dr. S. Jury, pers. comm. *cited in* Jones, 2000). The preferred juvenile settlement substrate is rock-cobble (Wahle and Steneck, 1991 and 1992 *cited in* Jones, 2000).

Dredge Area: During the benthic survey described above in the previous section for the proposed turning basin expansion conducted in September 2007, soft-shell clams were collected at two of the six stations sampled and blue mussels were collected at all six stations sampled. Densities for soft-shell clam ranged from six to eight per sample; the blue mussel density ranged from four to 63 per sample. See Appendix L for shellfish results.

IOS-N: No shellfish of commercial value were recovered from the site during the benthic survey reported above.

Nearshore Placement Site-Wells: As noted above, juvenile razor clams and juvenile surf clams were abundant throughout the site.

Nearshore Placement Site-Salisbury: As noted above, razor clams were present in low numbers, while juvenile surf clams were abundant.

Nearshore Placement Site-Newburyport: As noted above, razor clams and surf clams were present in low numbers. All clams were juvenile.

Nearshore Placement Site-Newbury: As noted above, juvenile surf clams were present within the site in low numbers.

4. Finfish

The Great Bay Estuary supports 52 species of resident and migratory fish (Nelson, 1981) which are listed in Appendix E of Jones, 2000 and in Table EA-7 below. Estuarine species include year round resident such as tomcod, mummichogs, and silversides, seasonal migrants such as bluefish and striped bass, and anadromous fish such as the river herrings, shad and lampreys (Jackson, 1944; Nelson, 1981, 1982; Sale et al., 1992; Jury et al., 1994 *cited in* Jones, 2000). Fishways constructed on the Cocheco (2), Exeter (2), Oyster, and Lamprey Rivers and dam removal on the Winnicut River in the Great Bay Estuary have enabled populations of several anadromous species to rebound. However, some species such as the Atlantic salmon and shad have not successfully been reestablished, despite stocking efforts for Atlantic salmon and shad. Commercially and recreationally important species include, smelt, winter flounder, smooth flounder, and striped bass (Jones, 2000).

As mentioned above, this area also serves as habitat for a number of anadromous fish species, including blueback herring, alewife, American shad, rainbow smelt, striped bass. The catadromous species, American eel is also present. These species are present in the Piscataqua River and in the vicinity of the Portsmouth Harbor during spawning migrations (NMFS letter dated May 27, 2008).

Smelt, followed by alewives and blueback herring, were the most abundant anadromous fish captured during the Newington Generating Station Study (ACOE, 1983). Smelt enter Great Bay estuary in late fall and winter and move up and down river channels with the tides. In spring, after ice-out, spawning occurs in the tributaries. Adults then return to more saline water and eventually leave the estuary.

Alewives move into the bay and freshwater tributaries to spawn from late April or early May through June; blueback spawn at or just above tidewater during this period. Striped bass are in the estuary from late June through September.

New Hampshire estuaries also serve as an important nursery area from many recreationally and commercially important marine species, as well as many forage fish that they feed upon. A juvenile finfish beach seine survey has been conducted on a monthly basis from June to November since 1997 in New Hampshire estuaries (New Hampshire Marine Fisheries, 2007). Species collected in 2007 from the fixed location station closest to the turning basin, and with similar substrate as the turning basin, include alewife, green crab, winter flounder, red hake, Atlantic menhaden, little sculpin (grubby), Atlantic silverside, rainbow smelt, and ninespine stickleback (New Hampshire Marine Fisheries, 2007). Relative abundance indices for this station, calculated as the geometric mean catch per seine haul, were Atlantic silversides with 28% of the catch, followed by green crab and rainbow smelt.

TABLE EA-7. FINFISH SPECIES OF GREAT BAY ESTUARY (Nelson, 1981)

Species	Common Name	Species	Common Name
MARINE		*Menidia menidia*	Atlantic silverside
Acipenser oxyrhynhus	Atlantic sturgeon	*Myoxocephalus aenaeus*	Grubby
Ammodytes americanus	American sand lance	*Fundulus heteroclitus*	Common mummichug
Scopthalmus aquosus	Windowpane	*Fudulus majalis*	Striped mummichog
Alosa aestivalis	Blueback herring	*Microgadus tomcod*	Atlantic tomcod
Alosa pseudoharengus	Alewife	*Apeltes quadracus*	4-spine stickleback
Alosa sapidissima	American shad	*Gasterosteus aculeatus*	3-spine stickleback
Brevoortia tyrannus	Atlantic menhaden	*Pungitius pungitius*	9-spine stickleback
Clupea harengus harengus	Atlantic herring	*Morone americanus*	White perch
Hemitripterus americanus	Sea raven	*Petromyzon marinus*	Sea lamprey
Cyclopterus lumpus	Lumpfish	*Liopsetta putnami*	Smooth flounder
Gadus morhua	Atlantic cod	*Pseudopleuronectes americanus*	Winter flounder
Pollachius virens	Pollock	*Syngnathidae fuscus*	Northern pipefish
Urophycis chuss	Red hake	**FRESHWATER**	
Urophycis tenuis	White hake	*Catastomus commersoni*	White sucker
Tautogolabrus adspersus	Cunner	*Lepomis gibbosus*	Pumpkinseed
Osmerus mordax	Rainbow smelt	*Lepomis macrochirus*	Bluegill
Pholis gunnellus	Rock gunnel	*Micropterus dolomieui*	Smallmouth bass
Pomatomus saltatrix	Bluefish	*Micropterus salmoides*	Largemouth bass
Raja erinacea	Little skate	*Notemigonus crysoleucas*	Golden shiner
Raja ocellata	Winter skate	*Notropis hudsonius*	Spottail shiner
Oncorhynchus kisutch	Coho salmon (i)	*Semotilus corporalis*	Fallfish
Oncorhynchus tshawytscha	Chinook salmon (i)	*Esox niger*	Chain pickerel
Salmo salar	Atlantic salmon	*Ictalurus nebulosus*	Brown bullhead
Centropristis striata	Black sea bass	*Perca flavescens*	Yellow perch
ESTUARINE		*Oncorhynchus mykiss*	Rainbow trout
Anguilla rostrata	American eel	*Salvelinus fontinalis*	Brook trout

(i) Introduced Species, no longer present (New Hampshire Fish and Game Department, 1981)

Since 2000, an inshore trawl survey has been conducted in the spring and fall by the NH Fish and Game Department (NHFG) and the Maine Department of Marine Resources (NHFG, 2013). Silver hake was the dominant species collected during the spring and fall 2012 survey in Region 1 (NH and southern ME) in the 36-55 fathom (216-330 feet) depth stratum. American plaice and alewife were the other two of the top 5 dominant species collected during both the spring and fall surveys. The two other dominant species collected only in the spring were the bristled longbeak and the American lobster. The two other dominant species collected in the fall were the longfin squid and Atlantic herring. Shrimp were not included as a dominant species.

5. Wildlife

Portsmouth Harbor is surrounded by a combination of industrial, commercial, and recreational land uses. Some wetlands do exist and provide habitats for reptiles, amphibians and mammals. Harbor seals *Phoca vitulina* can be found throughout the Great Bay Estuary, but they and the harbor porpoises *Phocoena phocoena* are more frequent in the lower portions of the estuary (Jones, 2000). Harbor seals can be found from November through April, most often during March and April. They were sighted most often in Little Bay, with infrequent sightings in Great Bay and the Piscataqua River (Jones, 2000).

Great Bay is part of the Atlantic flyway and an important migratory stopover as well as wintering area for many waterfowl and wading birds. As a result, there are both substantial seasonal and year round populations of waterfowl throughout the Great Bay area. Common species include cormorants, Canada geese, bald eagles, sea gulls, terns, ducks, herons, snowy egrets, common loons and a large variety of perching birds (Jones, 2000).

E. Threatened and Endangered Species

1. Federally Listed Species

The following Federally listed threatened or endangered species under the jurisdiction of NOAA Fisheries (based on letters received on September 2, 2011 and November 15, 2013), may occur in the project area. For fish species, the endangered shortnose sturgeon (*Acipenser brevirostrum*), and Atlantic salmon (*Salmo salar*), and the threatened Gulf of Maine (GOM) Distinct Population Segment (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*); for sea turtles, the endangered leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*), and green turtle (*Chelonia mydas*), and the threatened loggerhead *(Caretta caretta*); for listed whale species the endangered North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), and sei whale (*Balaenoptera borealis*). The following habitat information for these species is taken from the above mentioned letters.

Shortnose sturgeons occur along the U.S. Atlantic coast. Available information on shortnose sturgeon indicates that they make coastal migrations with the Gulf of Maine (i.e. between the Merrimack and Kennebec Rivers) and make at least occasional short visits to Great Bay. Based on patterns of detections by acoustic receivers in Great Bay, it is thought that shortnose sturgeon visit Great Bay at least during the spring and fall; although there is no known spawning in the Piscataqua River. Habitat within the dredge area appears to be consistent with shortnose sturgeon foraging habitat and given the detection of shortnose sturgeon in Great Bay, NOAA Fisheries believes it is reasonable to expect that at least some individual shortnose sturgeon will be present in Piscataqua River from the spring through the fall and may be engaged in foraging. Migrating shortnose sturgeon may be present in the nearshore areas of the Gulf of Maine. No tagged shortnose sturgeon was detected at a deployed buoy in the vicinity of the potential IOS-N site.

The marine range for Atlantic sturgeon includes all marine waters, plus coastal bays and estuaries from Labrador, Canada to Cape Canaveral, Florida. An Atlantic sturgeon was detected as recently as June 2012 in Great Bay. The best available information indicates that suitable habitat for Atlantic sturgeon spawning and rearing does not occur in the lower Piscataqua River because of relatively high salinities. Occasional subadult Atlantic sturgeon could be present in the Piscataqua River while foraging between spring and fall if suitable forage habitat is present. Because of the lack of spawning and rearing habitat, the dredge area should only be considered a migratory corridor for both sturgeon species. Most detections occurred in the spring (March 2010) with one detection in mid-June 2009. However, Atlantic sturgeons do not overwinter in their natal streams so they may occur in the dredge area regardless of season or time of year.

Tagged Atlantic salmon from Penobscot Bay, Maine were detected heading south prior to heading offshore to northern waters off Greenland. Tagged smolts were detected near a buoy located off of Rockland, Maine.

No tagged shortnose sturgeon or Atlantic salmon have been detected near the buoy deployed in the vicinity of the potential project disposal site IOS-N.

Sea turtles occur in New England waters during the warmer months when water temperatures are above 15^0 C. The sea turtles in these waters are generally small juveniles with the most abundant being the leatherback, loggerhead, green, and Kemp’s ridley. However, Kemp’s ridley are rare in waters north of Massachusetts and only leatherback or loggerhead sea turtles are likely to occur in coastal New Hampshire and Maine waters. Sea turtles move into waters of the Gulf of Maine from their southern wintering grounds in late June/July and most sea turtles move south from these waters by the first week of November. The highest numbers of sea turtles are present in these waters between July and October. Sea turtles generally do not occur in the area where dredging and blasting will occur, and are also not likely to be present at the placement sites or along the transit routes during the environmental window.

Whales occur in the offshore waters of Maine, New Hampshire and Massachusetts. Due to the riverine nature of the dredge area, the shallow depths of the nearshore placement sites and transit routes, no listed whale species are expected to occur in these areas. At the IOS-N site, right whales, as well as occasional humpback whales and fin whales could be present.

The Atlantic Coast population of piping plover, which breeds on sandy beaches along the east coast of North America from Newfoundland to South Carolina, was designated as Federally threatened under the provisions of the Endangered Species Act of 1973 (ESA), as amended on January 10, 1986. Piping plovers are present on New England beaches during the breeding season, generally between March 15 and August 31. These territorial birds nest above the high tide line on sandy ocean beaches on gently sloping fore-dunes, blowout areas behind primary dunes, wash-over areas cut into or between dunes, and the ends of sand spits. Piping plover nests consist of a shallow scrape in the sand, frequently lined with shell fragments and often located near small clumps of vegetation. Females lay four eggs that hatch in about 25 days and surviving chicks learn to fly (fledge) after about 25 to 35 days. The flightless chicks follow their parents to feeding areas, which include the intertidal zone of ocean beaches, ocean wash-over areas, mud flats, sand flats, wrack lines (organic ocean material left by high tide), and the shorelines of coastal ponds, lagoons, and salt marshes.

The red knot was proposed to be listed as a threatened species on September 30, 2013 by the U.S Fish and Wildlife Service (FWS). There is currently no legal obligation to conference on candidate or other species being considered for listing such as the red knot, but the FWS strongly encourages consideration of these species during project planning to avoid potential future project delays.

The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States (Southeast), the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the northbound (spring) and southbound (fall) migrations, red knots use key staging and stopover areas to rest and feed. The coast of Massachusetts is one of the important fall stopovers; however, large and small groups of red knots, sometimes numbering in the thousands, may occur in suitable habitats all along the Atlantic and Gulf coasts during migration. Habitats used by red knots in migration and wintering areas are similar in character, generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In North America, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mud flats, salt marshes, shallow coastal impoundments and lagoons, and peat banks (Federal Register, vol. 78, no. 189). No critical habitat for red knots is proposed in the project area (U.S. Fish and Wildlife Service letter dated January 24, 2014).

2. State Listed Species

Maine: Marine species that utilize the aquatic habitat off the coast of Maine and are State listed as endangered or threatened are the right whale, humpback whale, finback whale, sperm whale and sei whale, leatherback, Atlantic ridley and loggerhead turtles, as well as shortnose sturgeon. All are listed as endangered except the loggerhead turtle which is listed as threatened (Maine revised statues, Title 12, Part 9, Chapter 631).

The proposed nearshore placement of dredged material off of Wells Beach is in the vicinity of Maine's endangered roseate tern and the breeding habitat of piping plover. The red knot is listed as a species of special concern in Maine. Species of special concern is any species that does not meet the criteria of an endangered or threatened species but is particularly vulnerable, and could easily become, an endangered, threatened, or extirpated species due to restricted distribution, low or declining numbers, specialized habitat needs or limits, or other factors.

New Hampshire: The New Hampshire Natural Heritage Bureau provided a record of State-listed species in the project vicinity in a memo dated December 4, 2014. The prolific yellow-flowered knotweed (State listed as endangered) and the Henslow's Sparrow (not listed but last observed in 1983) are not in the immediate project area, and do not inhabit the type of area (subtidal) in which the proposed project is located. Neither species is Federally listed.

Massachusetts: The proposed nearshore placement of dredged material in the vicinity of Newbury, Newburyport and Salisbury will occur within the foraging habitat of the least tern (*Sternula antillarum*) and common tern (*Sterna hirundo*), and is in close proximity to breeding habitat for piping plover (*Charadrius melodus*). Both tern species are State-listed as "Special Concern" and the piping plover is State-listed as "Threatened". The piping plover is also Federally protected as "Threatened" pursuant to the U.S. Endangered Species Act (ESA, 50 CFR 17.11).

F. Essential Fish Habitat

The 1996 amendments to the Magnusson-Stevens Fishery Conservation Management Act strengthen the ability of the National Marine Fisheries Service and the New England Fishery Management Council to protect and conserve the habitat of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. This habitat is termed "essential fish habitat", and is broadly defined to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

Dredge Area: Managed species listed for the 10' x 10' square of latitude and longitude which includes Piscataqua River are: Atlantic salmon *Salmo salar* (juveniles, adults), Atlantic cod *Gadus morhua* (juveniles, adults), haddock *Melanogrammus aeglefinus* (eggs, larvae), pollock *Pollachius virens* (eggs, larvae, juveniles, adults), whiting *Merluccius bilinearis* (juveniles, adults), red hake *Urophycis chuss* (eggs, larvae, juveniles, adults), white hake *Urophycis tenuis* (eggs, larvae, juveniles, adults), winter flounder *Pleuronectes americanus* (eggs, larvae, juveniles, adults), yellowtail flounder *Pleuronectes ferrugineus* (larvae, adults), windowpane flounder *Scophthalmus aquosus* (eggs, larvae, juveniles, adults), American plaice *Hippoglossoides platessoides* (adults), Atlantic halibut *Hippoglossus hippoglossus* (eggs, larvae, juveniles, adults), Atlantic sea scallop *Placopecten magellanicus* (eggs, larvae, juveniles, adults), Atlantic sea herring *Clupea harengus* (larvae, juveniles, adults), bluefish *Pomatomus saltatrix* (juveniles, adults), Atlantic mackerel *Scomber scombrus* (eggs, larvae, juveniles), and bluefin tuna *Thunnus thynnus* (adults).

IOS-N: Managed species listed for the area that includes the IOS-N are: Atlantic cod (eggs, larvae, juveniles, adults), haddock (juveniles, adults), pollock (eggs, larvae, juveniles), whiting (eggs, larvae, juveniles, adults), red hake (eggs, larvae, juveniles, adults), white hake (eggs, larvae, juveniles, adults), redfish *Sebastes fasciatus* (larvae, juveniles, adults), witch flounder *Glyptocephalus cynoglossus* (juveniles), winter flounder (eggs, larvae, juveniles, adults), yellowtail flounder *Pleuronectes ferruginea* (eggs, larvae, adults), windowpane flounder (eggs, larvae, juveniles, adults), American plaice (juveniles, adults), Atlantic halibut (eggs, larvae, juveniles, adults), Atlantic sea scallop (eggs, larvae, juveniles, adults), Atlantic sea herring (juveniles, adults), monkfish *Lophius americanus* (eggs, larvae, juveniles, adults), scup *Stenotomus chrysops* (juveniles, adults), ocean quahog *Artica islandica* (juveniles, adults), spiny dogfish *Squalus acanthias* (juveniles, adults), and bluefin tuna (adults).

Nearshore Placement Site – Wells: Managed species listed for the Wells Beach nearshore placement area are: Atlantic cod (adult), whiting (adult), white hake (juvenile, adult), winter flounder (eggs, larvae, juveniles, adults, spawning adults), yellowtail flounder (larvae, adults), windowpane flounder (eggs, larvae, juveniles, adults, spawning adult), American plaice (juveniles, adults), Atlantic halibut (eggs, larvae, juveniles, adults), Atlantic sea scallop (eggs, larvae, juveniles, adults), Atlantic sea herring (larvae, juveniles, adults), bluefish (juveniles, adults), and bluefin tuna (adults).

Nearshore Placement Sites – Salisbury, Newburyport, and Newburyport: Managed species listed for the Salisbury, Newburyport and Newbury nearshore placement areas are: Atlantic cod (eggs, larvae), pollock (juveniles), red hake (eggs, larvae, juveniles), winter flounder (eggs, larvae, juveniles, adults), windowpane flounder (eggs, juveniles, adults), Atlantic sea scallop (eggs, larvae), Atlantic mackerel (eggs, juveniles, adults), surf clam *Spisula solidissima* (juveniles, adults), and bluefin tuna *Thunnus thynnus* (juveniles, adults).

See Appendix P for a list of the EFH managed species and their life history.

G. Special Reserves/Places

Although the New Hampshire coastline is short in length, it is supported by several Federal, State, and local initiatives to protect and enhance its coastal and estuarine environment. The Great Bay, located upstream of the project area, was designated in 1989 as a National Estuarine Research Reserve. The National Estuarine Research Reserve System is a network of 27 areas representing different biogeographic regions of the United States that are protected for long-term research, water-quality monitoring, education and coastal stewardship. Established by the Coastal Zone Management Act of 1972, as amended, the reserve system is a partnership program between the National Oceanic and Atmospheric Administration and the coastal states. NOAA provides funding, national guidance and technical assistance. Each reserve is managed on a daily basis by a lead State agency or university, with input from local partners. In the case of Great Bay, it is managed by the New Hampshire Department of Fish and Game.

The Piscataqua River is also a component of the Piscataqua Region Estuaries Partnership (PREP), a U.S. Environmental Protection Agency National Estuary Program. The National Estuary Program is a joint local/State/Federal program established under the Clean Water Act with the goal of protecting and enhancing nationally significant estuarine resources. The PREP strives to:

- Improve the water quality and overall health of the region's estuaries;
- Support regional development patterns that protect water quality, maintain open spaces and important habitat, and preserve estuarine resources;
- Track environmental trends though implementation of a long-term monitoring program to assess indicators of estuarine health, and;
- Develop broad-based popular support for the implementation of the Management Plan by encouraging involvement of the public, local government, and other interested parties in its implementation.

Wells Harbor in Maine is also located adjacent to the Wells Reserve National Estuarine Reserve established in 1986 as well as the Rachael Carson National Wildlife Refuge.

H. Air Quality

Ambient air quality is protected by Federal and State regulations. The U.S. Environmental Protection Agency (EPA) has developed National Ambient Air Quality Standards (NAAQS) for certain air pollutants, with the NAAQS setting concentration limits that determine the attainment status for each criteria pollutant. The six criteria air pollutants are carbon monoxide, lead, nitrogen dioxide, particulate matter (PM_{10} ad $PM_{2.5}$), ozone, and sulfur dioxide.

The U.S. Army Corps of Engineers guidance on air quality compliance is summarized in Appendix C of the Corps Planning Guidance Notebook (ER 1105-2-100, Appendix C, Section C-7). Section 176 (c) of the Clean Air Act (CAA) requires that Federal agencies assure that their activities are in conformance with Federally-approved CAA State Implementation Plans (SIP) for geographic areas designated as non-attainment an maintenance areas under the CAA. The EPA General Conformity Rule to implement Section 176 (c) if found in 40 CFR Part 93.

Clean Air Act compliance, specifically with EPA's General Conformity Rule, requires that all Federal agencies, including the Department of the Army, to review new actions and decide whether the actions would worsen an existing NAAQS violation, cause a new NAAQS violation, delay the SOP attainment schedule of the NAAQS, or otherwise contradict the State's SIP.

I. Cultural Resources

The current inventory of known pre-contact site documents a lengthy sequence of Native American settlement in coastal Maine. The region has been home to human populations for more than 10,500 years. The archaeological record of this area suggests a history that is dynamic and complex which is strongly linked to the resource rich ocean and the region's major rivers, including the Piscataqua. The importance of the sea to Maine's Native peoples continued even long after the initial contact period, as Native mariners were quick to adopt European nautical technologies and use sailing vessels for conducting trade and warfare far from their home territories. Far from presenting an obstacle to significant cultural contacts with other regions, the ocean and Maine's coastlines in particular, actually appear to have facilitated inter-regional interaction among Native peoples.

The initial documented European incursions up the Piscataqua were those of Englishmen Martin Pring in 1603 and John Smith in 1614. Before English settlers arrived on the shore of the Piscataqua, there were active fishing communities on the abutting offshore islands. European settlement of Eliot was initiated in the 1630s through a series of land grants stemming from a charter by King James. The area's early settlers established riverfront farms and extracted timber from the interior.

As settlement increased, dams and mills were built at strategic points along the river to harness and control its power. Abundant clay deposits along the river's banks were also utilized for brick-making. Shipbuilding and repair became increasingly important during and after the Revolutionary War, until eclipsed by larger harbors such as Boston and New York.

By the late nineteenth century, tourism began to replace most traditional economic activities in the area, as summer visitors were drawn to the coast for its cool climate, beaches, scenic shores, and relative lack of development.

The Piscataqua River project area and its surrounding environs fit the prevailing predictive model as a productive ecological zone that would have been highly attractive for pre-contact land use from the Archaic Period through the Contact Period. No pre-contact, contact or post-contact sites have been identified within the underwater study area. For stratified archaeological deposits preserved in meaningful contexts to exist within the Piscataqua River study area, intact elements of the paleo-land surface in which they were deposited must be present. Such deposits would need to have survived the post-glacial marine transgression of the Piscataqua River valley and the subsequent disturbances from the river's fluvial processes and/or human activities. Recognizing the erosional effects of the river's extremely strong tidal flow, the Piscataqua River project area is considered to possess a low potential for containing formerly terrestrial archaeological deposits of the pre-contact period. Instead, it would be more probable that pre-contact Native American archaeological deposits present in the study area would be of a maritime nature (e.g., watercraft or fishing weirs) and date to the later pre-contact periods.

The project area was determined to have a moderate archaeological potential for post-contact or historic period archaeological resources. These potential resources could be small vessels and/or the remains of coastal structures.

J. Socioeconomic Resources

Based on the 2010 U.S. Census, the Town of Newington, New Hampshire has a population of 753 people, contained 322 housing units, and had a median household income of $72,500 from

2008 to 2012. From 2008-2012, 6.4% of individuals lived below the poverty level. Over 82 percent of the population is 18 years of age or older and a median age of 47.9 years old. Ninety-six percent of the population is white.

According to the 2010 U.S. Census, the Town of Eliot, Maine has a population of 6,204 people, contains 2,669 housing units, and had a median household income of $75,904 from 2008-2012. From 2008-2012, 5.2% of individuals lived below the poverty level. The median age is 45 years old; over 78 percent of the population is 18 years of age or older. Nearly 97 percent of the population is white.

Both towns are located near the city of Portsmouth, New Hampshire, a major shipping and commercial center, with a population of nearly 21,000 people according to the 2010 U.S. Census. Over 83 percent of the population is 18 years or older and over 91 percent of the population is white. The median household income from 2008-2012 was $65,347 with 7.8% of the population living below the poverty level.

VII. ENVIRONMENTAL CONSEQUENCES

A. Impacts of Dredging

Dredging about 730,000 cubic yards of coarse gravel and sand from the turning basin in the Piscataqua River would be performed by a mechanical dredge. The potential impacts of dredging and disposal on water quality and biological resources in the area are addressed below.

1. Water Quality

Ward (1994) measured the suspended sediment concentrations in the lower estuary (Portsmouth Harbor) and near the mid-estuary (Dover Point) over a number of tidal cycles in July, 1992. The concentrations were low and varied little across the channel and with depth in Portsmouth Harbor. The total suspended sediment concentrations ranged from 1.1 to 3.7 mg/l over a complete tidal cycle at the mouth of the Harbor and from 1.5 to 5.9 mg/l at a cross-section near Seavey Island. Similarly, Shevenell (1974 *cited in* Jones, 2000) found suspended sediment concentrations were generally less than 3 mg/l at a station in the mouth of the Piscataqua River in 1972-1973, except during winter when concentrations exceeded 6 mg/l. According to Shevenell (1974 *cited in* Jones, 2000), the main sources of particulate matter in the coastal shelf waters adjacent to the Piscataqua River were biological productivity, resuspension of bottom sediments and estuarine discharge from the Piscataqua River. Shevenell (1974 *cited in* Jones, 2000) also noted particulate matter concentrations fluctuated seasonally and spatially due to meteorological effects (e.g., storms, high river discharges). Total suspended sediment concentrations were higher in the mid-estuary, ranging from 2.4 to 12.7 mg/l over a tidal cycle at a cross-section at Dover Point in July, 1992 (Ward, 1994). The increase in total suspended sediments in the mid-estuary over the concentrations measured near the mouth reflects the impact of higher suspended sediment inputs from the upper estuary (e.g., Great Bay, upper Piscataqua River, tributaries). The spatial pattern of the total suspended sediment concentrations from the mouth of the estuary in Portsmouth to the upper estuary is reflected in the results of transects run in July, 1992 (Ward, 1994). The concentrations measured at high tide or early ebb tide ranged from 1.3 mg/l at the mouth to 17.7 mg/l at the entrance to the Squamscott River. Concentrations along the same transect run at low tide and during the early flood ranged from 2.4 mg/l to over 50 mg/l at the Squamscott River.

Dredging operations will have no significant long-term impact on turbidity levels or water column chemistry, since the material is clean sand and gravel. The removal of material from the expanded turning basin in the Piscataqua River will resuspend sediments into the water column. This will result in slight localized increases in turbidity during the dredging operation. The amount of turbidity generated during dredging operations depends on the sediment characteristics, ambient currents and the skill of the dredge operators. Given the coarse grained nature of the material to be dredged these increases are expected to be of short duration.

A clam shell dredge typically releases about 1.5 to 3% of the sediment volume in each bucket load, producing suspended solid concentrations on the order of 100 to 900mg/1 in the immediate vicinity of the dredge and declining rapidly with distance from the dredge (Bohlen *et al*. 1979; WES, 1986). A hopper dredge generates similar suspended solid concentrations (250 to 700 mg/1). Although suspended solid concentrations at the cutterhead are usually less than that of the clam shell, barge overflow reintroduces fine sediment to the water column and turbidity impacts are generally less localized. Because of the coarse nature of the sediment (<l% fines) turbidity impacts associated with dredging are not likely to be significant.

The majority of the material from the expanded turning basin consists of coarse sand, and any overflow would therefore settle rapidly. Most of the material would settle out within a couple of hours. The small amount of suspended sediments that would remain in the water column would not exceed natural turbidity levels typical of estuaries (see section V.B.1). The strong currents of the Piscataqua River may carry the turbidity plume beyond the immediate vicinity of the dredging area, but due to the minor amount of material likely to be re-suspended, the impact of any turbidity plume would likely be minimal.

The effects of dredging on the water column chemistry will be minimal (are likely to be minor). The material to be dredged is considered to be uncontaminated because water quality in the area is high and because the shoal area is a relatively high energy sandy environment with a low percentage of fines. Therefore little release of sediment contaminants into the water column is expected. There should be no significant long-term degradation of Class B waters.

2. Eelgrass

Although previous surveys did not reveal the presence of eelgrass in the project area, it has been reported recently that eelgrass was planted in the project area. Additional surveys will be performed during the Design Phase to determine the location of any eelgrass in or adjacent to the project area.

3. *Effects on Marine Organisms*

Potential impacts of dredging on marine organisms is restricted to physical effects, as dredging operations will likely have little, if any, impact on water column chemistry.

Benthic organisms inhabiting the dredging area would likely suffer mortality as a result of the dredging process. Turbidity plumes from dredging may also impact adjacent habitat. The amount of impact would be dependent on the spatial and temporal size of the plume. As the material is generally coarse-grained sand and gravel, a large or substantial turbidity plume is not expected. Dredging is not expected to take longer than approximately six months and will occur during the colder months of the year when biological productivity is low. Recolonization following dredging should take place within weeks to months or one to two years (Guerra-Garcia, et. al., 2003; http://www.ukmarinesac.org.uk/activities/ports/ph5_2_2.htm) depending on time of year. Any temporary loss of fish foraging area would be extremely localized and short-lived.

The only commercial shellfish species that were found in the dredging area were the soft shell clam and the blue mussel. These resource species would be impacted by direct removal of the individuals and their habitat. Softshell clams along the intertidal banks of the Piscataqua River would not be impacted by dredging operations as any increases in turbidity levels would be short-lived and localized. Also, softshell clams spawn in the area during two periods, spring and last summer-fall (Jones, 2000). Blue mussels' peak spawning period is June through August (Jones, 2000). The proposed dredge window would occur outside the shellfish spawning season. The new exposed substrate is expected to be physically similar to the pre-existing substrate; thereby providing the same firm substrate for blue mussel settlement and softshell clam recruitment.

More motile forms (e.g. lobsters and crabs) would be expected to have the ability to avoid the work area resulting in minimal impacts (and should not be seriously affected by dredging). Localized elevations in turbidity generated by the dredging may result in lobsters temporarily vacating the project area for short periods of time. Lobsters begin migrating into the Great Bay Estuary in late spring and well into the estuary in the summer and early fall (Jones, 2000). Lobster larvae are likely to be abundant from May through July. Lobster juveniles may overwinter in the lower Piscataqua River and coastal area of New Hampshire in their preferred habitat of rock-cobble bottom; although they can also be found in shallow subtidal and the deepest areas of the channel areas of the estuary (Jones, 2000). Restricting the dredging operations to the mid-October to mid-April window will minimize impacts to lobsters and shellfish peak spawning periods.

Approximately 9.3 acres of shallow water habitat (depth less than -13 feet MLW) would be impacted with the new proposed project depth of -35 feet MLLW plus overdepth. Shallow water habitats are thought to be important nursery areas for post-larval and juvenile fish and shellfish (Ray, 2005). Dredging will have the direct impact of sediment removal and the deepening of the habitat. This may affect some estuarine fish and shellfish that are dependent on shallow water habitat for predation refuge (Ray, 2005). While some loss of shallow water habitat will occur, other areas along the Piscataqua River and within Great Bay can serve as refuge for these estuarine species. As noted above, benthic recolonization should occur in relatively short periods of time to return the area as a food source for estuarine fish.

Dredging can be conducted without significant impacts to anadromous fisheries. The timing of the dredging operation avoids spring runs of anadromous fish (alewife, April - June; American shad, May - June; blueback herring, May - June; smelts, April – June). Striped bass spawn in the estuary in June and early July. The presence of Atlantic salmon is uncommon in coastal New Hampshire (Jones, 2000). Restricting dredging and disposal to the mid-October to mid-April window would avoid any impacts to these anadromous fish species. Turbidity impacts would be short-lived and localized. Due to the width of the river, fish would be expected to be able to avoid the work area. Overall, no or minimal impacts to finfish are expected.

B. Impacts of Blasting

Approximately 25,000 cy of rock could be removed by blasting in order to achieve the required depths in the expanded turning basin. Potential aquatic impacts associated with blasting include noise, thermal energy release, increased turbidity, all of which are expected to be minor and temporary in nature given the actions to be taken to mitigate impacts for this project. Blasting impacts to resources could be realized from vibrations, explosion-induced surface water waves, or air overpressure. Measures to be taken to minimize blasting impacts to resources in the project area are noted further below in this section.

Any impacts to aquatic populations would be localized and temporary, with the most pronounced effect on aquatic species in the immediate vicinity. The effect of blasting on hard-bodied invertebrates would tend to be less than soft-body invertebrates except in the immediate vicinity of the blast. Damage to hard-bodied invertebrates near the blast site might include cracked or broken shells and carapaces. Soft-bodied invertebrates in the immediate vicinity of the blast would be killed; while populations of invertebrates further from the blast would sustain less damage. Long term impacts are not expected.

The extent of damage to fish populations depends primarily on the proximity to the blast and the presence or absence of a swim bladder. Fish with swim bladders (e.g., Atlantic herring) will be unable to adjust to the abrupt change in pressure propagated by the blast. If they are within a zone of influence, fish with swim bladders may be injured or killed. Fish without swim bladders (e.g., winter flounder) are less likely to be injured, and would likely sustain injuries only if they are in the immediate vicinity of the blast. Blasting may displace resident fishes, although this impact is expected to be only temporary.

Harbor seals may be found throughout the Great Bay Estuary and are common in the lower part of the estuary (Jones, 2000). Seals can be sighted from November through April and most frequently during March and April in Little Bay, with infrequent sightings in Great Bay and the Piscataqua River (Jones, 2000). Harbor porpoises are frequent in the lower portions of the estuary and have been found in Little Bay; as well as a humpback whale that travelled up the Piscataqua River to the mouth of Little Bay in 1995 (Jones, 2000).

Blasting impacts to marine mammals and fish will be avoided or minimized by the following methods:

- No blasting after March 31st,
- Use of a fish detecting and startle system to avoid blasting when fish or marine mammals are present or transiting through the area, including placing the fish startle system on a separate boat;
- Require the use of sonar and the presence of a fisheries and marine mammal observer;
- Prohibiting blasting during the passage of schools of fish, or in the presence of marine mammals, unless human safety was a concern;
- Monitor the blast pressure waves using hydroacoustics;
- Using inserted delays of a fraction of a second per blast drill hole,
- Placing material on top of the borehole (stemming) to deaden the shock wave reaching the water column, and;
- Blasting during periods of slack tide.

In addition, an acoustic monitoring plan to record blast effects will be implemented to monitor sound pressure levels during blasting to confirm the effectiveness of the blast pressure minimization measures. The acoustic monitoring will consist of a series of hydrophones and a digital recorder capable of operating at a minimum of 3,000 samples/second for a minimum of one second, with an adjustable trigger level, and a range of at least30 psi. A minimum of two monitoring sites will be utilized, one upstream and one downstream, with each hydrophone located approximately 1,500 feet from the sound source, assuming the blast pressure will span the entire river. Both stations would be required to simultaneously record the resulting sound pressure level during blasting to verify that blast pressure area calculations are correct, which will also reflect the effectiveness of the above minimization techniques.

C. Impacts of Disposal

1. Water Quality

The material from the expanded turning basin is composed of coarse grained material (sand and gravel) and rock. This area has not been dredged before so the material has little anthropogenic influences (contamination). Dredged material released from a barge would descend through the water column as a dense fluid-like mass. Because the dredged material is coarse grained almost all of the material would be expected to settle rapidly resulting in limited turbidity of short duration.

2. *Sediment Quality*

The sediments to be dredged consist of clean, coarse sand and gravel that is considered to be free of contaminants due to the lack of fined grained material removed from any known sources of contamination. The material at the IOS-N site is primarily fine grained. Placement of dredged material and rock at the IOS-N would change the sediment characteristics at this disposal site where material is disposed from fine grained to sand and gravel, making the site more physically diverse.

Disposal of this material at the nearshore sites would not significantly alter the present character of the nearshore areas under consideration since the nature of the material (grain size distribution) is generally compatible with the sediments in these placement areas. The exception is the Wells nearshore placement site which contains mostly fine sand.

3. *Sediment Movement*

Dredged material and rock placed at the IOS-N site is not expected to move from the area. The depths at the IOS-N (about 300 feet) and the fine grained nature of the material indicate that this site is not subject to storm generated waves and currents. In comparison, monitoring of similar deep water disposal sites such as the MBDS under the Disposal Area Monitoring System (DAMOS), have not shown significant movement of dredged material away from the disposal mound.

Low mounds of dredged material are created when placed in a nearshore environment for the purposes of beach nourishment. This type of placement is considered a “feeder berm” allowing for indirect beach nourishment to occur naturally by migration of sand to these nearshore areas. Tidal currents and wave action would redistribute the material over the course of several seasons or years. The average height of disposal mound would be several feet above the seafloor and placed at the 12-foot MLLW contour and seaward in the nearshore placement sites to maximize movement of the material towards shore. Approximately 364,100 cy of dredged material could be disposed in waters off the coast of Wells, Maine, with the remaining 364,000 cy divided between the three Massachusetts communities as follows: Salisbury – 90,900 cy, Newburyport – 36,400 cy, and Newbury – 236,700 cy. The final amount of material disposed at each site will be dependent on the local communities obtaining the necessary approvals prior to implementation. Material would be placed in a manner to maximize amount of material to be carried by currents and longshore transport to the nearby beaches for nourishment.

4. *Effects on Marine Organisms*

The primary impacts of dredge material disposal on aquatic resources can result from increased turbidities and direct burial in the immediate vicinity of the disposal site. Turbidity impacts would be minimal, short lived and localized and not likely to significantly impact the biota due to the coarse grained nature of the material being disposed. The temporary mounds formed by the disposal of material will result in the burial of any individuals (shellfish and benthos) directly in the disposal footprint at the placement area. Some mobile species would likely have the ability to move away from the area during disposal operations. Any lobsters inhabiting the area could be buried during initial disposal events. However, lobsters would be expected to have moved into deeper waters from the nearshore placement sites during the colder months of the year when construction is scheduled. Given the coarse grained nature of the material, and the gradual erosion rate of the dredged material at the placement site over time, no increased turbidity above ambient conditions is expected. Dredged material from this project would be placed in areas that have been previously used for similar purpose of indirect beach nourishment, and/or are adjacent to or overlap previously used beach nourishment sites at the Wells, Salisbury, and Newburyport/Newbury.

Limiting work from mid-October to mid-April would minimize impacts to lobsters and spawning benthic organisms. In addition, prior notice will be provided to local commercial fisherman allowing for any commercially harvestable shellfish resources (i.e. surf clams) to be removed from any of the nearshore disposal sites prior to disposal events. Once disposal operations have been completed it can be expected that shellfish and benthic organisms will recolonize these areas in a short period of time.

D. Threatened and Endangered Species

1. Federally Listed Species

While Federally listed endangered whales and sea turtles can be found seasonally off the coast of New Hampshire, the occurrence of any of these species in Piscataqua River is extremely unlikely (NMFS letter dated March 27, 2008). Since the bulk of the dredging and disposal activities are planned to occur during the late fall and early spring months (mid-October – mid-April), it is unlikely that listed sea turtles species would be in the project area during the construction activities. Therefore, the proposed dredging and disposal operations are not expected to adversely affect listed species of sea turtles. Federally listed whales would not be expected to occur at shallow nearshore placement sites or along the transit routes to these sites (NMFS letter dated November 15, 2013). Whales could be present at the IOS-N site. The contractor will be required to contact the Right Whale Advisory prior to transit and a threatened and endangered species monitor will be present during transport of material to the IOS-N site from the project area to avoid potential ship strikes. Also, vessels will not be allowed to travel greater than 10 knots to minimize the potential for ship strike.

As stated in NMFS’ letter dated September 2, 2011, seaward migrating juvenile Gulf of Maine (GOM) DPS Atlantic salmon (*Salmo salar*) (listed as Federally endangered) have been recorded by acoustic telemetry moving southward toward the vicinity of the proposed Isles of Shoals Disposal area (IOS-N). Atlantic salmon have also been detected in the vicinity of GoMOOS Buoy E01, however they have not been detected in the vicinity of the monitoring buoy closest to the IOS-N, B01 since its deployment in 2005 (which is located approximately 10 miles south from E01). Therefore it is unlikely that this species would be in the vicinity of the Isles of Shoals disposal area during the time of disposal operations. In addition, once out-migrating

Atlantic salmon smolts have transitioned to saltwater, growth is rapid, and the post-smolts have been reported to move close to the surface in small schools and loose aggregations (Dutil, J. D., and J. M. Coutu. 1988). Therefore, given the fact that this species has not been detected in the area of the disposal, as well its migratory behavior being close to the surface where it could avoid any vessel in the area, it is unlikely that the disposal of dredged material at the Isles of Shoals-N site will adversely affect the Gulf of Maine DPS of Atlantic salmon.

The proposed dredging and blasting activities at the Piscataqua River turning basin are planned to be conducted during the late fall/early winter and late winter/early spring, during the months of mid-October – mid-April. A small number of shortnose and/or Atlantic sturgeons could be potentially exposed to the effects of dredging and blasting between mid-October and early November. Beyond early November, shortnose sturgeon in the action area is extremely unlikely. Given the relatively low probability that either sturgeon species would be present when and where dredging will occur and the low likelihood that any individual sturgeon would be captured in a slow moving dredge bucket, it is extremely unlikely that a sturgeon would be captured, injured, or killed during dredging activities, or that turbidity increases or reduced prey base would be significant (NMFS letter dated February 3, 2014). Due to the proposed mitigation measures to reduce blast impacts to aquatic resources notes in Section VII.b above, any behavioral disturbance is expected to be brief as impacts to the sturgeon species is expected to be of a very short duration (less than seven seconds); pre-disturbance behaviors would be expected to resume quickly (NMFS letter dated February 3, 2014).

Atlantic sturgeons have been detected in the vicinity of the IOS-N site as well as some whale species. However, based on measures to protect whales, the unlikely event that any whales will be at the IOS-N site because of water temperature during disposal, and that vicinity of the IOS-N site is used solely as a migratory route and not a forage site for Atlantic sturgeon, NMFS has determined that the effects from disposal at the IOS-N on Atlantic sturgeon or whales are discountable (NMFS letter dated February 3, 2014).

NMFS also concluded that the effects of nearshore disposal on Atlantic sturgeon and whales would also be insignificant and discountable given the temporary nature of the disturbance to the benthic community at the nearshore placement sites. See NMFS letter dated February 3, 2014 for additional details on NMFS conclusion that the effects of the proposed project will be insignificant and discountable, based on the above mitigation measures.

In an email dated May 13, 2014, NMFS concluded that the placement of dredged material at the nearshore disposal sites located off the coasts of Maine and Massachusetts “may affect, but is not likely to adversely affect listed species or designation of critical habitat under our jurisdiction”.

No impacts to the Federally threatened piping plover, the proposed threatened listing of the red knot, or their critical habitat is expected from dredging or disposal. Piping plover nest on beaches and they forage in intertidal areas, away from the proposed nearshore placement sites.

See New Hampshire USFWS letter dated December 11, 2013. However, the Maine USFWS office in a letter dated February 14, 2014 determined that the project may affect the piping plover and red knot at Wells Beach. The ME USFWS office stated that the USACE would need to make a determination of effects based on a clear project description and evaluation of effects on these species. If resolution of this issue cannot be resolved during the Design Phase of this project, then the material proposed for nearshore placement off of Wells will be placed at the IOS-N or distributed to the other proposed nearshore placement sites in Massachusetts.

2. State Listed Species

Maine: As the State listed species for the State of Maine are the same as the Federally listed species, any potential impacts described above for the Federal species would be relevant to Maine's State listed species.

New Hampshire: No State listed species are known to occur in the project area.

Massachusetts: The proposed nearshore placement of about 365,000 cubic yards (or some other amount to be determined during the Design Phase of the project) of dredged material in the vicinity of Newbury, Newburyport and Salisbury will occur within the foraging habitat of the least tern (*Sternula antillarum*) and common tern (*Sterna hirundo*), and is in close proximity to breeding habitat for piping plover (*Charadrius melodus*). Both tern species are State-listed as "Special Concern" and the piping plover is State-listed as "Threatened". The piping plover is also Federally protected as "Threatened" pursuant to the U.S. Endangered Species Act (ESA, 50 CFR 17.11).

Based on the information provided, the Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife does not anticipate impacts to State-listed species associated with the nearshore placement of about 365,000 cy of dredged material (email dated October 2, 2013).

E. Essential Fish Habitat

Dredge Area: The only EFH managed species listed for the Great Bay and the Piscataqua River are the: transiting Atlantic salmon (juveniles, adults), Atlantic cod (eggs, larvae), haddock (eggs, larvae), pollock (eggs, larvae, juveniles), red hake (juveniles, adults), white hake (eggs, juveniles, adults), winter flounder (eggs, larvae, juveniles, adults, spawning adults), yellowtail flounder (eggs, larvae), windowpane flounder (eggs, larvae, juveniles, adults, spawning adults), Atlantic halibut (eggs, larvae, juveniles, adults, spawning adults), Atlantic sea scallop (juveniles, adults), Atlantic sea herring (larvae, juveniles), bluefish (juveniles, adults), and Atlantic mackerel (eggs, larvae, juveniles).

Short-term and temporary impacts to EFH species from dredging and associated blasting operations are expected. The Piscataqua River is very wide, with swift currents. The reach of river where dredging to expand the turning basin would occur is over 2,000 feet in width. Since the material to be dredged is composed primarily of sand and gravel, the majority of the material is expected to settle less than 1,000 feet from the dredging area based on prior monitoring studies conducted during Boston Harbor and other dredging operations. Monitoring performed while dredging silty material showed that the majority of resuspended material settled within a 1,000 feet from the dredge. This could be considered a conservative indication of the settling distance as it applies to this project since the material that was monitored was fine grained and more likely to be transported farther when compared to the coarse grained material from this project. Dredging activities are not expected to impede the passage of migrating fish within the Piscataqua River due to the substantial width of the river relative to the footprint of the dredging operation and the short duration of any increase in turbidities within the water column given the coarse grained material being removed from the turning basin. No significant impacts (minimal amount of entrainment) of fish eggs or larvae would be expected to occur from dredging due to the time of year dredging operations will occur (mid-October to mid-April), and the small area of impact compared to the remaining estuary. Also, ongoing dredging activities may deter these species from spawning in locations within and adjacent to these activities.

Blasting activities has the potential to kill or injure finfish species with air bladders in close proximity to areas of detonation. Demersal species such as flounder which lack air bladders would not be expected to be as impacted as greatly from the shock wave from blasting. Mitigation techniques to reduce these blasting impacts are discussed above and will be employed during construction of the project.

Long-term impacts to the benthic community is not expected since recolonization by organisms from adjacent areas would be expected to begin shortly after dredging has been completed. No significant and long-term impact to forage habitat for EFH species is expected from deepening the turning basin.

IOS-N: The following remaining EFH managed species listed for the IOS-N that may be found at the disposal site based on depth and substrate type are: Atlantic cod (eggs), pollock (eggs, larvae, juveniles, adults), whiting (eggs, larvae, juveniles, adults), red hake (eggs, larvae), white hake (eggs, larvae, juveniles, adults), redfish (larvae, juveniles, adults), winter flounder (juveniles), American plaice (larvae, juveniles, adults), ocean pout (adults), Atlantic halibut (eggs, larvae, spawning adults), Atlantic sea scallop (eggs, larvae, juveniles), Atlantic sea herring (juveniles, adults), monkfish (eggs, larvae, juveniles, adults), bluefish (juveniles, adults), long-finned squid (juveniles, adults), short-finned squid (juveniles, adults), Atlantic butterfish (eggs, larvae, juveniles, adults), Atlantic mackerel (larvae, juveniles, adults), summer flounder (adults), scup (juveniles, adults), ocean quahog (juveniles, adults), spiny dogfish (juveniles, adults), bluefin tuna (juveniles, adults).

Eggs and larvae of these species can be found in the surface and pelagic waters of the placement site during certain times of the year. Any eggs and larvae within the water column directly in the disposal footprint and on the bottom sediments at the placement site during disposal operations would likely be impacted as the material falls though the water column and settles on the bottom.

Disposal during the cooler months of the year could impact Atlantic cod eggs, pollock eggs and larvae, American plaice eggs and larvae, Atlantic halibut eggs and larvae, monkfish eggs and larvae, and Atlantic mackerel larvae. It is possible that more mobile juveniles and adults would be able to swim away from and avoid impacts from placement. Overall, given the temporary and limited impact of disposal on these species no significant impact to the fisheries resource is expected.

The material proposed for placement is composed of coarse-grained material. The current bathymetry and sediment type is homogenous and fine-grained. Disposal mounds of coarser grained material and rock could provide a benefit to EFH species by providing some physical diversity to the site which may attract additional EFH species.

<u>Nearshore Placement Site – Wells</u>: Managed species for the Wells nearshore placement site are: Atlantic cod (adult), whiting (adult), white hake (juvenile, adult), winter flounder (eggs, larvae, juveniles, adults, spawning adults), yellowtail flounder (larvae, adults), windowpane flounder (eggs, larvae, juveniles, adults, spawning adult), American plaice (juveniles, adults), Atlantic halibut (eggs, larvae, juveniles, adults), Atlantic sea scallop (eggs, larvae, juveniles, adults), bluefish (juveniles, adults), and bluefin tuna (adults).

The only managed species listed above which would be expected to inhabit the Wells nearshore placement site based on the available depths and marine conditions include: white hake (juveniles and adults), winter flounder (juveniles, adults, and spawning adults), windowpane flounder (eggs, larvae, juveniles, adults, and spawning adults), Atlantic halibut (eggs, larvae, and spawning adults), and bluefish (juveniles and adults). The potential impact to these species is discussed below.

White Hake: The nearshore placement sites are at their lower limit of their preferred depth; consequently the number of individuals at the placement location would be expected to be small. Any potential impacts from nearshore placement on this species would not be expected to be significant. Considering the overall project area in comparison to the available habitat of the Gulf of Maine, potential impacts to this EFH species would not be considered insignificant.

Winter Flounder: The material to be disposed is coarse grained sand and gravel so turbidity impacts would be expected to be minimal and of a short duration. Winter flounder spawning, eggs and larvae could be minimally affected as placement could occur during a portion of the spawning period. Any adult fish in nearshore placement site would be expected to move away from the disruption. Benthic resources would be expected to recolonize the area quickly. Fish could swim to other areas to avoid the disturbance and for foraging while the area recolonizes.

Windowpane Flounder: The coarse nature of the sediment would minimize turbidity impacts at the nearshore placement sites. Therefore, impacts from turbidity are expected to the localized and temporary. The nearshore placement would occur sometime between mid-October through mid-April. This would further avoid or minimize potential adverse impacts to windowpane flounder. Peak observations of windowpane flounder eggs and larvae are May and October in the middle Atlantic and July through August on Georges Bank. If adults are in the project area, they would be expected to move away from areas of disturbance. Benthic resources would be expected to recolonize the area quickly. Fish could swim to other areas with better forage species while the area recovers.

Atlantic Halibut: Atlantic halibut would not be expected to be found in large numbers in the project area as they are generally located in deeper marine areas. Spawning occurs between late fall and early spring, with peaks in November and December. Spawning could coincide with the placement at the nearshore placement site. This potential temporary impact from placement would be considered insignificant as the project area is not generally associated with this species and nearshore placement will only have a temporary and localized turbidity impact.

Bluefish: Bluefish juveniles and adults are found in pelagic waters generally from June through October. It is unlikely that large numbers of bluefish would be found off of Wells Beach. If present, these highly mobile fish would be expected to avoid the nearshore placement activities. The temporary and limited impact from nearshore placement is not expected to have any significant impact on the bluefish population in the Gulf of Maine.

Nearshore Placement Sites – Salisbury, Newburyport, and Newbury: Managed species for the Salisbury, Newburyport and Newbury nearshore placement areas are: Atlantic cod (eggs, larvae), pollock (juveniles), red hake (eggs, larvae, juveniles), winter flounder (eggs, larvae, juveniles, adults), windowpane flounder (eggs, juveniles, adults), Atlantic sea scallop (eggs, larvae), Atlantic mackerel (eggs, juveniles, adults), surf clam (juveniles, adults), and bluefin tuna *Thunnus thynnus* (juveniles, adults).

Atlantic cod: Some entrainment of eggs and larvae could occur from placement at the nearshore placement sites. However, the area of placement is small compared to the remaining area of Massachusetts Bay.

Pollock: The coarse nature of the material would minimize turbidity impacts to this species. Juveniles would be expected to move from the area of disturbance. Any potential impacts would be expected to be minimal and short-term.

Red Hake: Some entrainment of eggs and larvae could occur from placement at the nearshore placement sites. However, the area of placement is small compared to the remaining area of Massachusetts Bay. Juveniles would be expected to move from the area of disturbance.

Winter Flounder: Placement of the material is coarse sand and gravel so turbidity impacts would be expected to be minimal. Winter flounder spawning, eggs and larvae could be minimally affected as placement could occur during some of the spawning period, but these nearshore areas would not be considered prime flounder spawning habitat. Any adult fish in nearshore placement site would be expected to move away from the disruption. Benthic resources would be expected to recolonize the area quickly. Fish could swim to other areas with better forage species while the area recovers.

Windowpane Flounder: The coarse nature of the sediment would minimize turbidity impacts at the nearshore placement sites. Therefore, impacts from turbidity are expected to the localized and temporary. The nearshore placement would occur sometime between mid-October through mid-April. This would further avoid or minimize potential adverse impacts to windowpane flounder. Peak observations of windowpane flounder eggs and larvae are May and October in the middle Atlantic and July through August on Georges Bank. If adults are in the project area, they would be expected to move away from areas of disturbance. Benthic resources would be expected to recolonize the area quickly. Fish could swim to other areas with alternative source of forage species while the area recovers.

Atlantic Sea Scallop: Atlantic sea scallop eggs and larvae could be buried at the site from placement. However, the nearshore placement would occur sometime between mid-October through mid-April avoiding the peak spawning occurrences. Impacts are expected to be minimal and temporary.

Atlantic Mackerel: Atlantic mackerel would not be expected to be found in large numbers in the project area as they are generally located in pelagic waters. Some entrainment could occur during placement, but this would not be considered significant as the project area is small compared to the Massachusetts Bay. Nearshore placement will only have a temporary and localized turbidity impact.

Surf Clams: All of the Massachusetts nearshore placement sites contain juvenile surf clams. Some of these clams may be able to ascend burial through the thinner layers of deposited sediments. The coarse nature of the sediment would result in minor elevations of turbidity over a limited timeframe and further minimize turbidity impacts at the nearshore placement sites. The dredging project would occur sometime between mid-October through mid-April. This would further avoid or minimize potential adverse impacts to spawning surf clams. Commercial fishermen may be allowed to remove any clams prior to burial.

Bluefish: Bluefish juveniles and adults are found in pelagic waters generally from June through October. It is unlikely that large numbers of bluefish would be found off during the window of disposal. If present, these fish would be expected to avoid the nearshore placement activities. The temporary and limited impact from nearshore placement is not expected to have any significant impact on bluefish population in the Gulf of Maine.

F. Special Reserves/Places

The proposed navigation improvement project is not expected to have a significant adverse effect on any of the special reserves or places discussed above. The material to be removed consists of coarse-grained material and should not cause a significant degradation in water quality beyond a few hundred feet of the dredge. Some temporary loss of shellfish habitat may occur but affected species will likely re-colonize the area since the exposed substrate would be of similar physical characteristics or hard bottom. Nearshore placement sites will also not have a significant impact on nearby reserve places.

G. Clean Air Act

General Conformity under the Clean Air Act, Section 176 has been evaluated for the action according to the requirements of 40 CFR 93, Subpart B. The General Conformity Rule applies to Federal actions occurring in regions designated as being in non-attainment for the NAAQS or attainment areas subject to maintenance plans (maintenance areas). Threshold (*de minimis*) rates of emissions have been established for Federal actions with the potential to have significant air quality impacts. If the action is located in an area designated as non-attainment and exceeds the *de minimis* levels, a General Conformity Analysis is required. A conformity review must be performed when a Federal action generates air pollutants in a region that has been designated a non-attainment or maintenance area for one or more NAAQS. Non-attainment areas are geographic regions where the air quality fails to meet the NAAQS.

As the dredging in Piscataqua River in Maine/New Hampshire and the placement of material off of Wells Beach in Maine, and off the beaches located in Salisbury, Newburyport, and Newbury, Massachusetts are in attainment for 2008 Ground-level Ozone Standards (Region 1 Final Designations, April 2012), 2006 24-Hour $PM_{2.5}$ Standards (Region 1 Final Designations, October 2009 [to be updated December 2013 for 2012 Standards]), 2010 Nitrogen Dioxide Standards, 2010 Sulfur Dioxide Standards, and 2008 Lead Standards, no General Conformity Analysis is required.
(http://www.epa.gov/airquality/ozonepollution/designations/2008standards/final/region1f.htm),
(http://www.epa.gov/airquality/particlepollution/designations/2006standards/final/region1.htm),
(http://www.epa.gov/no2designations/region/region1.html),
(http://www.epa.gov/airquality/greenbook/snca.html),
(http://www.epa.gov/airquality/lead/designations/2008standards/final/region1f.html)

H. Cultural Resources

A marine archaeological survey of the proposed project area was completed in 2008 (Robinson and Gardner, 2008). The survey consisted of archival research and field investigation using differential GPS, side-scan sonar, a marine magnetometer, and sub-bottom profiler to acquire 100 percent coverage within the project area along a series of parallel surveyed track lines spaced 50 feet apart.

Systematic, multidisciplinary archival research, remote sensing archaeological field survey, and geotechnical data analysis of the Piscataqua River navigation improvement project area documented no targets with potential to be National Register–eligible post-contact archaeological deposits and no areas of buried paleosols with archaeological sensitivity for potentially containing pre-contact period archaeological deposits. Based on the results of this study, no additional archaeological investigations within the project area are recommended.

No historic properties will be affected during the proposed placement of dredged material at the nearshore areas. These areas are in a highly active environment within the littoral zone. It is anticipated that sand placed at these locations will eventually wash landward to nourish the adjacent beaches. Any historic properties within these areas would have already been damaged or destroyed due to water and wave action

This proposed project was coordinated with the Maine State Historic Preservation Officer (SHPO), the New Hampshire SHPO, the Massachusetts SHPO, the Massachusetts Board of Underwater Archaeological Resources, the Penobscot Nation Tribal Historic Preservation Officer (THPO), the Wampanoag Tribe of Gay Head (Aquinnah) THPO, and the Passamaquoddy THPO. The MA SHPO concurred on November 12, 2013 with the determination that the proposed navigation improvement project will have no effect on historic properties in Massachusetts. The ME SHPO concurred on January 3, 2014 that no historic properties in Maine would be affected by the proposed project. The Passamaquoddy Tribe concurred on May 15, 2014 that the proposed project would have no impact on cultural or historical concerns of the tribe. We can assume that the NH SHPO, the Wampanoag Tribe THPO, and the Penobscot THPO concur with the no effect determination stated in the USACE letters sent to these organizations as no responses were received within 30 days on the proposed project from these entities.

I. Environmental Justice and Protection of Children

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” requires Federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of its program, policies, and activities on minority and low-income populations in the U.S., including Native Americans. Executive Order 13045, “Protection of Children from Environmental Health Risks and Safety Risks,” requires Federal agencies to identify and assess environmental health risks and safety risks that may disproportionately affect children.

The population near the proposed turning basin has a higher than average national median household income, and a lower than the U.S. average of minority and low-income populations (U.S. Census Bureau, 2010). In addition, the percentage of the population below 18 years of age is also below the national average (U.S. Census Bureau, 2010).

According the U.S. Census Bureau 2005-2009 American Community Survey, 9,952 people live in the Town of Wells, Maine. Because of its coastal location and stock of seasonal housing units, the population of Wells increases significantly during the summer. When adding the number of seasonal unit occupants to the number of year-round residents, the peak seasonal population of Wells swells to an estimated 33,306. This represents an increase of about 19 percent over the 1994 estimate of 28,000 (The Town of Wells Comprehensive Plan, Appendix A, 2004).

The Town of Wells' 2009 population, like the rest of York County, is predominantly middle aged. The median age is 46 years, which is 10 years higher than the national average. Almost one in five Wells residents in 2000 was over 65 years of age. Alternatively, Wells has a relatively smaller population in the younger age groups than the rest of the county (The Town of Wells Comprehensive Plan, Appendix A, 2004). According to the U.S. Census Bureau, 2005-2009 American Community Survey, 21% of the population is comprised of children under the age of 18.

Minorities make up a very small percentage of the population, less than 1%. Families and individuals below the poverty level are 4.2% and 5.1% respectively, this compares to the national average of 9.9% and 13.5% respectively (U.S. Census Bureau, 2005-2009 American Community Survey).

The Towns of Salisbury, Newburyport and Newbury are all located in Essex County. The 2010 population for Salisbury, Newburyport, and Newbury was 8,283, 17,416, and 6,666 respectively http://www.sec.state.ma.us/census/essex.htm. Almost 88% of the population living in Essex County is white alone (in Newburyport it is 96.4%). This is slightly above the Commonwealth of Massachusetts population (87.7% vs. 83.7%). Hispanic or Latino makes up the largest portion of the minority population. The percentage of persons in Essex County under 18 years old is 22.5%; slightly above the State average of 21.1%. Persons 65 years and over is nearly 15%, comparable to the State average of 14.4%. Persons living below the poverty level is 10.6% http://quickfacts.census.gov/qfd/states/25/25009.html.

The proposed navigation improvement project will deepen and expand an anchorage area to provide safe navigation to the Piscataqua River for deep drafts vessel traffic and dispose of the material off of eroding shorelines to nourish nearby beaches. No significant adverse impacts to children, minority or low income populations are anticipated as a result of this project. Besides increasing navigation efficiency, the proposed project would reduce the likelihood of an adverse environmental and economic impact from grounding. Also, the project area does not have a large minority or low-income population or a number of above the national average of children less than 18 years old that could be affected by the proposed project. In addition, the proposed placement would benefit nearby beaches which can be enjoyed by anyone. Therefore, no potential environmental effects of this project on minorities, low-income or children are expected.

VIII. COORDINATION AND CORRESPONDENCE

Coordination with Federal, State, and local agencies was initiated in a letter dated April 22, 2008. The letter provided a date for a coordinated site visit as well as a request for information and comments on the proposed project. Another letter was sent July 22, 2011 to the U.S. Environmental Protection Agency (EPA) and the National Marine Fisheries Service (NMFS) when the proposed placement of material at nearshore placement sites in Rye, New Hampshire and York, Maine was met with local opposition. This letter requested EPA's and NMFS' concurrence that the IOS-N was “likely selectable” for one time use under the MPRSA. Identification of the IOS-N as “likely selectable” would provide a basis for measuring the difference in haul costs for beneficial use sites. EPA concurred that the IOS-N is “likely selectable” for one time use, while NMFS made a preliminary determination that the IOS-N may be more favorable than the IOS placement site.

After receipt of the above letters, additional letters were sent July 5, 2012 to the States of Maine, New Hampshire, and Massachusetts as well as the following communities to determine which communities were interested in receiving dredged material for beach nourishment: Wells, Ogunquit, and Kittery, Maine; Rye, New Hampshire; Salisbury, Newburyport, Newbury, and Winthrop, Massachusetts.

The communities of Wells, Maine, and Salisbury, Newburyport, and Newbury, Massachusetts expressed an interest in receipt of beach nourishment material from the expanded turning basin. As the initial coordination letters did not include these nourishment placement sites, another round of letters were sent to the applicable Federal and Maine, New Hampshire and Massachusetts State agencies on September 4, 2013 for comment. See Table EA-8 below for a list of organizations contacted during preparation of the draft Environmental Assessment.

TABLE EA-8. LIST OF COORDINATION WITH THE FOLLOWING ORGANIZATIONS

Federal Agencies	State Agencies (cont.)	Local Agencies/Tribes
U.S. Environmental Protection Agency (EPA)	ME State Historic Preservation Officer (SHPO)	Town of Ogunquit, ME
National Marine Fisheries Service (NMFS)	NH Dept. of Environmental Services	Town of Eliot, ME
U.S. Fish and Wildlife Service (USFWS)	NH Fish and Game Dept.	Town of Wells, ME
U.S. Coast Guard (USCG)	NH Natural Heritage Bureau	Town of Kittery, ME
U.S. Navy	NH Dept. of Resources and Economic Dev	Town of Rye, NH
Academia	NH Div of Parks and Recreation	Town of Salisbury, MA
University of New Hampshire	NH SHPO	Town of Newburyport, MA
State Agencies	MA Dept of Conservation and Recreation	Town of Newbury, MA
ME Dept. of Environmental Protection	MA EOEEA- Coastal Zone Management	Town of Winthrop, MA
ME State Planning Office-Coastal Program	MA SHPO	Penobscot Nation
ME Dept. of Marine Resources	MA Board of Underwater Archaeological Resources	Wampanoag Tribe of Gay Head
ME Dept. of Inland Fisheries and Wildlife		Passamaquoddy Tribe

Also, a 30-day public notice was made available on March 31, 2014 to Federal, State, and local agencies, and other interested parties by email, media outlet, and/or postal mail. The public notice informed interested agencies and parties of the availability of the draft Feasibility Report and draft Environmental Assessment for review. Nine letters were received in response to the public notice. Most expressed support for the project. Appendix A-Part 2 contains a copy of the letters received during the public notice period. Construction of the project is not expected to begin before Federal Fiscal Year 2016.

IX. CUMULATIVE IMPACTS

Cumulative impact is defined by NEPA as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The expansion of the current turning basin will allow ships to maneuver more easily. This may have the benefit of potentially avoiding groundings and allow for larger ships. With larger ships, the number of ships transiting the river may decrease.

The effects of the previous, existing and future dredging actions are generally limited to infrequent disturbances of the benthic communities in the dredged areas and disposal areas. None or minimal impacts to EFH species or threatened and endangered species are expected from this dredging event given the time of year restrictions for construction and best management practices. No maintenance dredging has occurred at the turning basin since it was first dredged in 1966. Future maintenance dredging for the turning basin is not expected to be needed for another 40 to 50 years. Maintenance dredging in the Federal navigation channel has generally only occurred downstream at the Simplex Shoal approximately once every five years. The dredged material is clean sand and is disposed in a deep hole in the river. Water quality, air quality, hydrology, and other biological resources are generally not significantly affected by these actions. The direct effects of navigation improvement project are not anticipated to add significant impacts from other actions in the area.

The dredged material removed during improvement dredging of the turning basin in Piscataqua River and disposed at the disposal site will have a temporary impact on water quality and biological resources as a result. Temporary impacts include burial and removal of benthic organisms and slight reduction in habitat for other species such as finfish until the benthic community returns. The placement of clean sandy dredged material at the IOS-N is likely to create a more diverse benthic community which could benefit other species dependent on benthos for food.

No significant adverse cumulative impacts are projected as a result of this project because of: 1) the low frequency of dredging (once every 40-50 years), 2) operation windows are utilized to restrict dredge activities during fish spawning seasons, 3) the use of best management practices are utilized to reduce significant impacts to water quality and biological resources, and 4) sediment is tested to ensure compliance with the Clean Water Act prior to disposal.

No other activities associated with the proposed project are known or anticipated.

X. MITIGATION

Dredging will be scheduled from mid-October through mid-April in order to avoid the spawning periods of the most sensitive resources. Blasting impacts will be avoided or minimized by instituting the following methods and procedures:

- No blasting will occur after March 31st;
- Blast during periods of slack tide;
- Use of a fish detecting and startle system to avoid blasting when fish are present or transiting through the area, including placing the fish startle system on a separate boat;
- Require the use of sonar and the presence of a fisheries and marine mammal observer;
- Prohibiting blasting during the passage of schools of fish, or in the presence of marine mammals, unless human safety was a concern;
- Monitor the blast pressure waves and hydroacoustics;
- Using inserted delays of a fraction of a second per blast drill hole, and;
- Placing material on top of the borehole (stemming) to deaden the shock wave reaching the water column.

The proposed dredging and placement of dredged material at the IOS-N is the least costly environmentally acceptable alternative. However, placement at the nearshore placement sites in Wells, Maine and Salisbury, Newburyport and Newbury, Massachusetts will provide a beneficial use to nearby beaches as a source of sand for indirect beach nourishment. Local sponsors will be required to fund the difference in cost between placement at the IOS-N and the nearshore placement sites, as well as obtain all necessary approvals. No significant adverse long term impacts are anticipated or cumulative impacts from dredging and placement at either the IOS-N or the nearshore placement sites.

Prior to placement at the Massachusetts nearshore placement sites, commercial shellfishermen will be allowed to remove any surf clams.

To protect the right whale and other whale species, the contractor will be required to contact the Right Whale Advisory prior to transit and a threatened and endangered species monitor will be present for transport of material to the IOS-N site to avoid potential ship strikes. Vessels will not be allowed to travel greater than 10 knots.

As mentioned in the Federally preferred project description above, approximately 2,100 cy of maintenance material within the existing turning basin limits and its channel approaches could potentially be removed if it meets the suitability requirement for placement at the ocean or alternative nearshore placement sites. Testing for suitability for placement in these nearshore areas would occur during the Design Phase. All other maintenance material removed from the river over the several decades since the 35-foot deepening has been clean sandy material.

XI. COMPLIANCE WITH ENVIRONMENTAL FEDERAL STATUTES AND EXECUTIVE ORDERS

Federal Statutes

1. *Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 et seq.*

Compliance: Not applicable for sediment and rock disposal at the Isle of Shoals-North (IOS-N) site which is located seaward of the State boundaries. Although the dredged material and rock has been determined to be suitable for nearshore disposal, local communities will need to obtain appropriate approvals from State and Federal agencies for nearshore placement of dredged material. If rock is disposed at the Cape Arundel Disposal Site (CADS), it will also need State approval.

2. *Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 et seq.*

Compliance: The dredged material and rock is suitable for placement at the IOS-N site, and the rock is also suitable for placement at CADS. However, prior to disposal, a site selection document will need to be prepared for disposal at the IOS-N if that site is used.

3. *National Historic Preservation Act of 1966, as amended, 16 U.S.C 470 et seq.*

Compliance: The project was coordinated with the Maine, New Hampshire, and Massachusetts State Historic Preservation Offices, as well as the Wampanoag, Penobscot, and Passamaquoddy Tribal Historic Preservation Officers, in compliance with the National Historic Preservation Act.

4. *Preservation of Historic and Archaeological Data Act of 1974, as amended, 16 U.S.C. 469 et seq. This amends the Reservoir Salvage Act of 1960 (16 U.S.C. 469).*

Compliance: Not applicable: project does not require mitigation of historic or archaeological resources.

5. *Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.*

Compliance: Coordination with the National Marine Fisheries Service (letter dated February 3, 2014 and email dated May 13, 2014) indicated that the effects from the proposed project would be insignificant and discountable and not likely to adversely affect listed species or designated critical habitat. The U.S. Fish and Wildlife Service, New Hampshire office (letter dated December 11, 2013) indicated that no Federally listed endangered and/or threatened species or their critical habitat are known to exist in the project area. The U.S. Fish and Wildlife Service, Maine office in a letter dated May 21, 2014 concurred with our determination that nearshore placement of material off of Wells Beach, Wells, Maine would have insignificant and discountable and not likely adversely affect piping plovers and red knots.

6. *Estuary Protection Act (16 U.S.C. 1221)*

Compliance: Not applicable.

7. *Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.*

Compliance: Coordination with the USFWS, NMFS, and the New Hampshire State Planning Office, Maine State Planning Office, and Massachusetts Division of Marine Fisheries signifies compliance with the Fish and Wildlife Coordination Act.

8. *National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321 et seq.*

Compliance: Preparation of this report signifies partial compliance with NEPA. Full compliance shall be noted at the time the Finding of No Significant Impact is issued.

9. *Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271 et seq.*

Compliance: Not Applicable.

10. *Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1431 et seq.*

Compliance: A CZM consistency determination was provided to the States of New Hampshire and Maine on April 3, 2014 and April 8, 2014 respectively for review and concurrence that the proposed project is consistent, to the maximum extent practicable, with the approved State CZM programs. The New Hampshire Department of Environmental Services found the proposed project to be consistent to the maximum extent practicable in a letter dated June 2, 2014. The State of Maine provided its concurrence for its CZM program in a letter dated June 30, 2014.

11. *Clean Air Act, as amended U.S.C. 7401 et seq.*

Compliance: Public notice of the availability of this report to the Regional Administrator of the Environmental Protection Agency for review pursuant to Sections 176c and 309 of the Clean Air Act signifies compliance.

12. *Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.*

Compliance: Not Applicable

13. *Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-1.*

Compliance: Public notice of the availability of this report to the National Park Service (NPS) and the office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

14. *Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.*

Compliance: No requirements for Corps' projects or programs authorized by Congress.

15. *Watershed Protection and Flood Prevention Act, as amended, 16 U.S.C. 1001 et seq.*

Compliance: Not applicable.

16. *Marine Mammal Protection Act of 1972*

A Letter of Authorization from the National Marine Fisheries Service may need to be obtained in the Design Phase of the project.

Executive Orders

1. *Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 13, 1971, (36 FR 8921, May 15, 1971).*

Compliance: This order has been incorporated into the National Historic Preservation Act of 1980.

2. *Executive Order 11988, Floodplain Management, 24 May 1977 amended by Executive Order 12148, 20 July 1979.*

Compliance: Not applicable.

3. *Executive Order 11990, Protection of Wetlands, 24 May 1977.*

Compliance: Not applicable.

4. *Executive Order 12372, Intergovernmental Review of Federal Programs, July 14, 1982, (47 FR 3959, July 16, 1982).*

Compliance: Not applicable.

5. *Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, 4 January 1979.*

Compliance: Not applicable.

6. Executive Order 12898, Environmental Justice, 11 February 1994.

Compliance: Not Applicable; project is not expected to have a significant impact on minority or low income population, or any other population in the United States.

7. Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, 21 April 1997.

Compliance: Not Applicable; the project would not create a disproportionate environmental health or safety risk for children.

Executive Memorandum

1. Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA, 11 August 1980.

Compliance: Not Applicable; project does not involve our impact agricultural lands.

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FINDING OF NO SIGNIFICANT IMPACT

The Federally preferred project would widen the existing 800-wide turning basin located at the upstream end of the Federal channel in the Piscataqua River in New Hampshire and Maine to 1,200 feet at the existing depth of -35-feet MLLW plus two feet of overdepth. Approximately 728,100 cubic yards (cy) of coarse grained and gravelly material and 25,300 cy of rock would be removed. The Isles of Shoals-North (IOS-N) ocean placement site was selected as the Federal base plan for dredged material placement.

Several municipalities in Maine and Massachusetts have expressed an interest in receiving the sandy dredged material for placement in the nearshore feeder bar systems off their eroding beaches. For these alternative placement options to be considered during the next project phase (the Design Phase), these communities would need to secure all necessary Federal, State and local approvals for placement, and would need to pay the difference in cost between the transport of dredged material to the Isles of Shoals-North and the nearshore placement locations. Under these non-Federal proposals approximately 364,100 cy of dredged material would be disposed nearshore off the coast of Wells, Maine, with the remaining 364,000 cy divided between the three Massachusetts communities of Salisbury, Newburyport, and Newbury. While the final distribution of material among the Massachusetts communities will be worked-out by those parties during design, the current plan calls for the following distribution: Salisbury – 90,900 cy, Newburyport – 36,400 cy, and Newbury – 236,700 cy.

The bedrock would be removed to a design depth of 35-feet MLLW plus an additional two feet for safety clearance and another two feet of overdepth to an elevation of -39-feet MLLW. The rock would be removed and taken to the IOS-N site, the Cape Arundel Disposal Site (CADS), or preferably beneficially reused. If non-Federal investigations and permitting are completed and interest is still viable, then the rock could be used for upland projects by the state of Maine or New Hampshire or in the Pepperell Cove wave berm project proposed by the town of Kittery. Other beneficial uses include placement of the rock at a suitable site for a rock reef, if the necessary studies are performed and documented. These efforts to use the rock beneficially would occur during the Design Phase of the project. See Section X Mitigation in the Environmental Assessment for a discussion of methods to avoid or minimize impacts to biological resources from blasting.

In addition to the material described above for removal, approximately 2,100 cy of maintenance material within the turning basin and its channel approaches could potentially be removed if it meets the suitability requirement for placement at either of the ocean placement sites or the nearshore beneficial use sites. Testing for suitability would occur during project design.

To protect the right whale and other whale species, the contractor will be required to contact the Right Whale Advisory prior to transit and a threatened and endangered species monitor will be present for transport of material to the IOS-N site to avoid potential ship strikes. Vessels will not be allowed to travel greater than 10 knots.

Material would be removed between the months of mid-October through mid-April to protect biological resources. Prior to placement at the Massachusetts nearshore placement sites, shellfishermen will be allowed to remove any surf clams (*Spisula solidissima*) located at these sites.

I find that based on the evaluation of environmental effects discussed in this document, the decision on this application is not a major federal action significantly affecting the quality of the human environment. Under the Council on Environmental Quality (CEQ) NEPA regulations, "NEPA significance" is a concept dependent upon context and intensity (40 C.F.R. § 1508.27). When considering a site-specific action like the proposed project, significance is measured by the impacts felt at a local scale, as opposed to a regional or nationwide context. The CEQ regulations identify a number of factors to measure the intensity of impact. These factors are discussed below, and none are implicated here to warrant a finding of NEPA significance. A review of these NEPA intensity factors reveals that the proposed action would not result in a significant impact--neither beneficial nor detrimental--to the human environment.

Impacts on Public Health or Safety: The project is expected to have no effect on public health and safety.

Unique Characteristics: There are no unique characteristics associated with this project.

Controversy: The proposed project is not controversial. State and Federal resource agencies agree with the USACE impact assessment.

Uncertain Impacts: The impacts of the proposed project are not uncertain, they are readily understood based on past experiences the USACE has had with similar dredging projects, such as the Wells Harbor, Newburyport, and Boston Harbor.

Precedent for Future Actions: The proposed project is a navigation improvement dredging project and will not establish a precedent for future actions.

Cumulative Significance: As discussed in the Environmental Assessment, to the extent that other actions are expected to be related to project as proposed, these actions will provide little measurable cumulative impact.

Historic Resources: The project will have no known negative impacts on any pre-contact, contact, or post-contact archaeological sites as coordinated with the states of Maine, New Hampshire, and Massachusetts, as well as the tribes of Wampanoag, Penobscot, and the Passamaquoddy.

Endangered Species: The project will have no known positive or negative impacts on any State or Federal threatened or endangered species.

Potential Violation of State or Federal Law: This Federal action would not violate Federal or State law.

Based on my review and evaluation of the environmental effects as presented in the Environmental Assessment, I have determined that the navigation improvement project at Portsmouth Harbor/Piscataqua River is not a major Federal action significantly affecting the quality of the human environment. Therefore, this action is exempt from requirements to prepare an Environmental Impact Statement.

15 JUN 2015
Date

Christopher J. Barron
Colonel, Corps of Engineers
District Engineer

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX A
PUBLIC INVOLVEMENT AND
PERTINENT CORRESPONDENCE

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
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APPENDIX A
PUBLIC INVOLVEMENT AND PERTINENT CORRESPONDENCE

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North Atlantic Division – Memo to HQUSACE with Final Report Submittal – 1 July 2014
Maine Coastal Program – CZM Consistency Concurrence – Letter to NAE – 30 June2014
  Attaching Maine DEP Review and Findings of Fact – 30 June 2014
New England District – Memo to NAD on Study Cost Increase – 27 June 2014
New England District – Memo to NAD with Final Report Submittal – 19 June 2014
National Marine Fisheries Service – Email to NAE on EFH – 19 June 2014
Town of Newbury, Massachusetts - Letter to NAE – 18 June 2014
North Atlantic Division – Quality Assurance Review Memo – 16 June 2014
Deep Draft Navigation PCX - ATR Certification Memo – 12 June 2014

Part 2. Correspondence During Public Review of the Draft Feasibility Report and Draft Environmental Assessment

City of Newburyport, Massachusetts – Letter to NAE – 13 June 2014
New England District – Letter to USF&WS Maine Field Office – 4 June 2014
New Hampshire DES, Coastal Program – CZM Consistency Concurrence – 2 June 2014
New England District – Memo to NAD with Final Report Submittal – 30 May 2014
Pease Development Authority – Sponsor Commitment Letter to NAE – 29 May 2014
New England District – Letter to Maine Coastal Program on Public Notice – 22 May 2014
Town of Wells, Maine – Letter to NAE – 21 May 2014
USF&WS Maine Field Office – Letter to NAE on ESA & FWCA – 21 May 2014
North Atlantic Division – Memo with Policy Review Comments – 20 May 2014
Passamaquoddy Tribe – Letter to NAE – 15 May 2014
HQUSACE – Memo with Policy Review Comments – 14 May 2014
National Marine Fisheries Service – Email to NAE on ESA – 13 May 2014
New England District – Letter to Maine Coastal Program – 13 May 2014
Sea-3 Inc. – Letter to New England District – 5 May 2014
Pike Industries, Inc. – Letter to NAE – 2 May 2014
Sprague Operating Resources, LLC – Letter to NAE – 30 April 2014
Georgia Pacific Gypsum, LLC – Letter to NAE – 30 April 2014
Portsmouth Harbor Pilots – Letter to NAE – 30 April 2014
Massachusetts Division of Marine Fisheries – Letter to NAE – 30 April 2014
MA Board of Underwater Archaeological Resources – Letter to NAE – 28 April 2014
International Salt – Letter to NAE-24 April 2014
Town of Salisbury, Massachusetts – Letter to NAE – 14 April 2014
HQUSACE – Economic Model Certification Memo to DDN-PCX – 25 March 2014

Part 3. Draft Feasibility Report and Draft Environmental Assessment Transmittal Documents

New England District – Letter to Maine Coastal Program with Consistency Determination – 8 April 2014

NAE - Memorandum to North Atlantic Division – Transmitting Report – 4 April 2014
New England District – Letter to NH CZM with Consistency Determination – 3 April 2014
New England District – Letter to USF&WS Maine Office on ESA & FWCA – 2 April 2014
New England District – News Release on Availability of Draft Report – 31 March 2014
New England District – Public Notice on Availability of Draft Report – 31 March 2014
New England District – To Whom It May Concern Draft Report Transmittal – 31 March 2014
New England District – Letters Transmitting the Draft Report for Review – 31 March 2014

- Geno Marconi, Director, New Hampshire Port Authority
- Honorable Maggie Hassan, Governor of New Hampshire
- Honorable Kelly Ayotte, United States Senate
- Honorable Jeanne Shaheen, United States Senate
- Honorable Carol Shea-Porter, Representative in Congress
- Honorable Paul R. LePage, Governor of Maine
- Honorable Angus S. King, Jr., United States Senate
- Honorable Susan M. Collins, United States Senate
- Honorable Chellie Pingree, Representative in Congress
- Honorable Deval L. Patrick, Governor of Massachusetts
- Honorable Elizabeth Warren, United States Senate
- Honorable Edward J. Markey, United States Senate
- Honorable John F. Tierney, Representative in Congress
- Rear Admiral Daniel B. Abel, Commander, First Coast Guard District
- Captain William Greene, Commander, Portsmouth Naval Shipyard
- U.S. Environmental Protection Agency, Region I
- NOAA Fisheries Service, Northeast Regional Office
- U.S. Fish and Wildlife Service, New England Field Office
- U.S. Fish and Wildlife Service, Maine Field Office
- New Hampshire State Historic Preservation Office
- New Hampshire Natural Heritage Bureau
- New Hampshire Department of Fish and Game
- Maine Historic Preservation Commission
- Maine Department of Environmental Protection
- Maine Department of Marine Resources
- Massachusetts Historical Commission
- Massachusetts Board of Underwater Archaeological Resources
- Massachusetts Executive Office of Energy and Environmental Affairs
- Massachusetts Coastal Zone Management Office
- Massachusetts Department of Conservation and Recreation
- Massachusetts Division of Marine Fisheries
- Wampanoag Tribe of Gay Head (Aquinnah), Tribal Historic Preservation Officer
- Passamaquoddy Tribe of Indians, Tribal Historic Preservation Officer
- Penobscot Nation, Tribal Historic Preservation Officer
- City of Portsmouth, New Hampshire, City Manager
- Town of Newington, New Hampshire, Town Administrator
- Town of Eliot, Maine, Planning Assistant
- Town of Wells, Maine, Town Manager
- Town of Kittery, Maine, Town Manager
- Town of Salisbury, Massachusetts, Town Manager

Honorable Donna D. Holaday, Mayor, City of Newburyport, Massachusetts
Town of Newbury, Massachusetts, Town Administrator
Portsmouth Harbor Pilots
Sprague Energy, Portsmouth, New Hampshire
Sea-3 Incorporated, Portsmouth, New Hampshire
Irving Oil, Portsmouth, New Hampshire
Granite State Minerals, Portsmouth, New Hampshire
Public Service Company of New Hampshire, Schiller Station, Portsmouth, NH

Part 4. Correspondence During Preparation of the Draft Feasibility Report and Draft Environmental Assessment

New England District – Letter to PDA – 18 March 2014
US Fish and Wildlife Service – ESA Letter to NAE – 14 February 2014
National Marine Fisheries Service – Letter to NAE on ESA – 3 February 2014
Maine Historic Preservation Commission – 3 January 2014
US Fish and Wildlife Service – ESA Letter to NAE – 11 December 2013
New England District – Letter to NMFS on Endangered Species Act – 9 December 2013
New Hampshire Natural Heritage Bureau – 4 Dec 2013 – memo to NAE on Listed Species
New England District –Memo to Headquarters USACE on AFB – 20 November 2013
Environmental Protection Agency, Region I – Letter to NAE – 18 November 2013
National Marine Fisheries Service – Letter to NAE on ESA – 15 November 2013
Massachusetts Division of Marine Fisheries – Letter to NAE – 14 November 2013
Massachusetts Historical Commission – Concurrence – 12 November 2013
New Hampshire DES Coastal Program – Email to NAE – 4 November 2013
National Marine Fisheries Service – Email to NAE on EFH and F&WCA – 1 November 2013
New England District – Letter to the New Hampshire Historical Preservation Officer – 30 October 2013 – Cultural Resource Coordination
New England District – Cultural Resource Coordination Letters – 29 October 2013
    Maine State Historical Preservation Officer
    Penobscot Nation
    Passamaquoddy Tribe of Indians
New England District – Letter to National Marine Fisheries Service on Delay in Agency Coordination due to Government Shutdown – 24 October 2013
New England District – Letter to the US Environmental Protection Agency on NEPA and Clean Air Act Coordination – 15 October 2013
New England District – Letter to the Massachusetts Historical Commission – 8 October 2013 – Cultural Resource Coordination for Nearshore Sand Placement Sites
New England District – Letter to the MA Board of Underwater Archaeological Resources – 8 October 2013 – Cultural Resource Coordination for Nearshore Sand Placement Sites
New England District – Letter to the Wampanoag Tribe of Gay Head (Aquinnah) – 8 October 2013 – Cultural Resource Coordination for Nearshore Sand Placement Sites
Maine Geological Survey – Email to MEDEP and Town of Wells – 2 October 2013
Massachusetts Natural Heritage & Endangered Species Program (NHESP) of the MA Division of Fisheries & Wildlife – 2 October 2013 – Email to NAE

New England District – Letter to National Marine Fisheries Service on F&WCA and ESA Coordination – 4 September 2013
New England District – Letter to the US Fish and Wildlife Service on F&WCA and ESA Coordination – 4 September 2013
New England District – Letter to the US Fish and Wildlife Service, Maine Field Office on F&WCA and ESA Coordination – 4 September 2013
New England District – Coordination Letters to State & Federal Agencies – 4 September 2013
    Letter to the New Hampshire Coastal Program
    Letter to the New Hampshire Department of Environmental Services
    Letter to the New Hampshire Fish and Game Department
    Letter to the Massachusetts Office of Coastal Zone Management
    Letter to the Massachusetts Department of Environmental Protection
    2 Letters to the Massachusetts Division of Marine Fisheries
    Letter to the Massachusetts Division of Fisheries and Wildlife
    Letter to the Maine State Planning Office
    Letter to the Maine Department of Environmental Protection
    Letter to the Maine Department of Marine Resources
    Letter to the Maine Geological Survey
New England District – Letter to the US Environmental Protection Agency on NEPA and Clean Air Act Coordination – 3 September 2013
City of Newburyport – Letter to NAE Requesting Sandfill – 25 February 2013
Town of Kittery, Maine, Harbormaster – Letter to NAE – 21 September 2012 – Requesting Rock be Used to Build a Breakwater at Pepperell Cove
New Hampshire Department of Resources and Economic Development – Letter to NAE Requesting Sandfill – 1 August 2012
Town of Salisbury – Letter to NAE Requesting Sandfill – 30 July 2012
Town of Wells – Letter to NAE Requesting Sandfill – 13 July 2012
New England District – Letter to Town of Wells on Beneficial Use – 5 July 2012
New England District – Letter to the Massachusetts Department of Conservation and Recreation on Beneficial Use – 3 July 2012
New England District – Letter to Town of Winthrop on Beneficial Use – 5 July 2012
New England District – Letter to City of Newburyport on Beneficial Use – 5 July 2012
New England District – Letter to Town of Newbury on Beneficial Use – 5 July 2012
New England District – Letter to Maine Coastal Program on Beneficial Use – 5 July 2012
New England District – Letter to the New Hampshire Department of Resources and Economic Development on Beneficial Use – 5 July 2012
New England District – Letter to Town of Kittery on Beneficial Use – 3 July 2012
New England District – Letter to Town of Salisbury on Beneficial Use – 3 July 2012
New England District – Letter to Town of Rye on Beneficial Use – 3 July 2012
New England District – Letter to Town of Ogunquit on Beneficial Use – 3 July 2012
Town of Wells – Letter to NAE Requesting Sandfill – 13 March 2012
Environmental Protection Agency, Region I – Letter to NAE on IOSN – 7 September 2011
National Marine Fisheries Service – Letter to NAE on IOSN & ESA – 2 September 2011
New England District – Letter to National Marine Fisheries Service on IOSN – 22 July 2011
New England District – Letter to US EPA on IOSN – 22 July 2011
New England District – Letter to NH Division of Ports and Harbors – 27 April 2011
USACE Director of Civil Works – Memo to NAD on IEPR Waiver – 8 February 2011

New England District – Memo thru NAD to USACE CECW-P on IEPR Waiver – 25 August 2010
New England District –Email to Federal, State and Local Agencies on 3-State Meeting on Beneficial Use of Sand – May 6, 2010
US Environ Protection Agency – Email to NAE – 27 August 2009 – Suitability Concurrence
New England District Memorandum – Regulatory Division – Second Suitability Determination for Dredged Material Disposal – 19 August 2009
US Fish & Wildlife Service – Email to NAE – 18 August 2009 – Suitability Concurrence
New England District Memorandum – Regulatory Division – Suitability Determination for Dredged Material Disposal – 21 April 2009
US Environ Protection Agency – Email to NAE – 21 April 2009 – Suitability Concurrence
New Hampshire Coastal Program – Email to NAE – 9 April 2009 – Suitability Concurrence
US Fish & Wildlife Service – Email to NAE – 30 March 2009 – Suitability Concurrence
Maine DEP – Email to NAE – 30 March 2009 – Suitability Concurrence
National Marine Fisheries Service - Letter to NAE – May 27, 2008
New England District –Invitational Letters for Coordinated Site Visit – 22 April 2008
    Letter to US EPA, Region I, Water Quality Unit on CWA, NEPA, CAA & MPRSA
    Letter to National Marine Fisheries Service on F&WCA, EFH and ESA Coordination
    Letter to the US Fish and Wildlife Service on F&WCA and ESA Coordination
    Letter to the New Hampshire Coastal Program on CZM Coordination
    Letter to the New Hampshire Department of Environmental Services on F&WCA
    Letter to the New Hampshire DES, Water Division on F&WCA, CWA & CAA
    Letter to the New Hampshire Fish and Game Department on F&WCA
    Letter to the University of New Hampshire, Marine Program
    Letter to the Maine Department of Environmental Protection on F&WCA, CWA & CAA
    Letter to the Maine Department of Marine Resources on F&WCA
    Letter to the Maine Department of Inland Fisheries on F&WCA and ESA
    Letter to the Maine State Planning Office on CZM Coordination
    Letter to the Town of Newington, New Hampshire
    Two Letters to the Town of Eliot, Maine –Town Administrator and Harbormaster

Part 5. Correspondence During Preparation of the Reconnaissance Report and FCSA

Pease Development Authority – Letter to NAE returning signed FCSA – June 7, 2006
New Hampshire Legislative Budget Assistant – Letter to NH PDA – June 1, 2006
New England District – Letter to NH Division of Ports and Harbors – 26 May 2006
New Hampshire Pease Development Authority – Letter to NAE – 21 February 2006
USACE North Atlantic Division – 21 October 2004 – Approving Reconnaissance Report
Pease Development Authority – Letter to NAE – September 23, 2004 Concurring in Recon
New England District –Memo to NAD – 31 August 2004 – Transmitting Recon Report
New England District – Letter to Honorable Senator Judd Gregg – 22 May 2003
Honorable Judd Gregg, United State Senate – Letter to NAE – 18 April 2003
Pease Development Authority – Letter to Senate Gregg – 14 April 2003

APPENDIX A
PUBLIC INVOLVEMENT AND PERTINENT CORRESPONDENCE

Public Involvement Plan and Coordination for the Portsmouth Harbor and Piscataqua River Feasibility Study and Environmental Assessment

Public Information and Scoping Session

At the initiation of the Feasibility Study, the New Hampshire Coastal Program hosted an feasibility study scoping session for Federal and State agencies and local and harbor interests on May 13, 2008 at its Portsmouth offices. Advance notice to the meeting was provided by U.S. Army Corps of Engineers (USACE) and the Pease Development Authority (PDA) in letters of invitation to interested parties (see correspondence Part 4). The Corps and PDA provided an overview of prior and ongoing project efforts and a description of the reconnaissance recommendations, feasibility study scope and timeline, NEPA process, and proposed public involvement plan. PDA and the Portsmouth Pilots also discussed the importance of the turning basin widening improvements to the future of the Port of Portsmouth. A question and answer session and dialogue on study scope followed the presentations.

Public Review of Draft Feasibility Report and Draft Environmental Assessment

A public notice was be issued on 31 March 2014 inviting comment during a 30-day public comment period under the Federal National Environmental Policy Act (NEPA) on the Draft Feasibility Report and Draft Environmental Assessment following internal Corps and PDA reviews and approval for public release of the draft report. Comment under specific applicable Federal laws and regulations were solicited concurrently by letters to Federal and State agencies. Affected municipalities and harbor interests also received notice by letter. Copies of the Draft reports were provided to these parties on compact disk. Comment letters received are included in Correspondence Part 2. A total of eleven comments letters were received. Five were from port terminal interests and one from the Portsmouth Pilots expressing support for the project, and one from the Town of Salisbury, Massachusetts, expressing its continued interest in receiving sand dredged from the project.

State Regulatory Process - Notice and Scoping

The State of New Hampshire will coordinate review of the Draft Feasibility Report and Draft Environmental Assessment, typically in accordance with its applicable delegated authorities under the Clean Water Act, Clean Air Act, Coastal Zone Management Act, Fish and Wildlife Coordination Act, Endangered Species Act, and other applicable Federal authorities. The Corps will request State concurrence and approval of the project under these authorities based on the analysis and recommendations in the Draft Feasibility Report and Draft Environmental Assessment. Both the State and Corps review processes provide for public meetings or hearings should significant comments or concerns be raised during the public and State review. Once all significant issues have been resolved, the State would issue its Coastal Zone Management Consistency Concurrence for the project. These documents would be appended to the final report. Since the Federal base plan calls for placement of all dredged materials and rock in ocean waters outside the territorial sea, no Water Quality Certification is required.

It should be noted that beneficial use opportunities for the sand and rock to be generated by the Portsmouth Harbor project come from nearby areas of Maine and Massachusetts as well as New Hampshire. Beach nourishment proposals have been made for several communities. And rock use proposals include both Maine and New Hampshire interests. Accordingly, the Portsmouth project is regularly briefed and coordinated with agencies and interests in all three states. Should beneficial use ultimately be recommended or pursued by the Corps or other interests from outside New Hampshire, then State regulatory processes for either or both Maine and Massachusetts would be followed as applicable to those activities. Presently these proposals involve nearshore placement of sand off beaches in Maine and Massachusetts, and placement of rock in Maine waters in Kittery. All costs beyond the Federal base plan for these alternative uses will be borne by the proposing interests, including the responsibility for securing all necessary regulatory approvals.

New Hampshire State Dredging Task Force

New Hampshire's state dredging team is the State Dredging Task Force and meets four or more times a year at the NH Coastal Program offices in Portsmouth. The team is composed of Federal and State agencies, University of New Hampshire researchers, representatives of consulting firms working on marine projects in the state, port authorities for New Hampshire, New Hampshire Congressional delegation staff, and municipal officials from NH coastal towns and the border Towns of Maine. The Portsmouth feasibility study scope and progress has been briefed to the Task Force since the study began. Recent meetings of the NHDTF have occurred on the following dates:

4 November 2004
17 February 2005
7 April 2005
26 May 2005
21 July 2005
22 September 2005
2 November 2005
23 January 2006
16 February 2006
10 May 2006
16 August 2006
11 October 2006
29 November 2006
14 February 2007
20 March 2007
31 May 2007
12 September 2007
9 January 2008
26 March 2008
25 June 2008
10 September 2008
14 January 2009
8 April 2009
15 July 2009
21 October 2009
27 January 2010
21 April 2010
15 September 2010
17 November 2010
16 February 2011
4 May 2011
28 September 2011
7 December 2011
21 March 2012
5 September 2012
14 November 2012
23 January 2013
15 May 2013
18 September 2013
15 January 2014
30 April 2014

Maine State Dredging Team

The Maine State Dredging Team generally meets at least twice a year at either the ME DOT offices in Augusta or at the ME DEP offices in Portland. The team is composed of Federal and State agencies, local port authorities, municipal officials and harbormasters, bay keepers, Congressional delegation staff, and representatives of consulting firms working on marine projects in the state. The Portsmouth feasibility study scope and progress has been briefed to the Maine Dredging Team since the study began. Recent meetings of the MEDT have occurred on the following dates:

17 November 2006 – ME DEP Portland
19 March 2007 – ME DOT Augusta
16 April 2008 – ME DEP Portland
9 October 2008 – ME DEP Portland
27 February 2009 – ME DOT Augusta
` 22 June 2010 – ME DEP Portland
18 February 2011 – ME DOT Augusta
17 January 2012 – ME DEP Portland
25 October 2012 – ME DEP Portland
25 January 2013 – ME DOT Augusta
1 November 2013 – ME DEP Portland

Massachusetts State Dredging Team

The Massachusetts State Dredging Team (MASDT) is chaired by the Massachusetts Office of Coastal Zone Management. The team has met quarterly since MA CZM took over hosting the meetings from USEPA in late 2006. At each dredging team meeting the USACE provides updates on the Portsmouth Harbor project and the beneficial use opportunities put forth by various parties for the sand and rock to be generated by the turning basin improvement, some of which are in Massachusetts communities. Massachusetts state dredging team meetings where developments in the Portsmouth feasibility study were briefed have been held as follows:

14 December 2005 – Black Falcon Terminal, South Boston
24 January 2006 – US EPA Region I, Boston
17 October 2006 – US EPA Region I, Boston
20 December 2006 – MACZM Offices, Boston
18 January 2007 – MACZM Offices, Boston
8 March 2007 – MACZM Offices, Boston
15 May 2007 – MACZM Offices, Boston
15 November 2007 – MACZM Offices, Boston
16 January 2008 – MACZM Offices, Boston
11 May 2010 – MACZM Offices, Boston
18 November 2010 – MACZM Offices, Boston
28 January 2011 – MACZM Offices, Boston
19 October 2012 – MACZM Offices, Boston
27 February 2014 – MACZM Offices, Boston

Annual Planning and Navigation Program Briefings

Annual planning and navigation program briefings are held in the second or third quarter of the Federal fiscal year as requested by the states of New Hampshire and Maine. State agencies, port authorities and Congressional staff are briefed on programs and project status in their states to assist in state outreach and coordination. Due to the importance of the Portsmouth project and its beneficial use opportunities to these states, the project is briefed to each. These meetings have been held as follows:

New Hampshire Annual Program Briefing – 14 February 2005 – NH DES Portsmouth
New Hampshire Annual Program Briefing – 7 February 2006 – NH DES Portsmouth
Maine Annual Program Briefing – 15 February 2006 – ME DOT Augusta
New Hampshire Annual Program Briefing – 23 February 2007 – NH DES Portsmouth
Maine Annual Program Briefing – 19 March 2007 – ME DOT Augusta
New Hampshire Annual Program Briefing – 13 February 2008 – NH DES Portsmouth
Maine Annual Program Briefing – 26 February 2008 – ME DOT Augusta
Maine Annual Program Briefing – 10 February 2009 – ME DOT Augusta
New Hampshire Annual Program Briefing – 13 February 2009 – NH DES Portsmouth
Maine Annual Program Briefing – 4 March 2010 – ME DOT Augusta
New Hampshire Annual Program Briefing – 12 March 2010 – NH DES Portsmouth
Maine Annual Program Briefing – 18 February 2011 – ME DOT Augusta
New Hampshire Annual Program Briefing – 22 February 2011 – NH DES Portsmouth
Maine Annual Program Briefing – 5 March 2012 – ME DOT Augusta
New Hampshire Annual Program Briefing – 19 March 2012 – NH DES Portsmouth
Maine Annual Program Briefing – 25 January 2013 – ME DOT Augusta
New Hampshire Annual Program Briefing – 6 March 2013 – NH DES Portsmouth
Maine Annual Program Briefing – 24 February 2014 – ME Public Safety Augusta
New Hampshire Annual Program Briefing – 30 April 2014 – NH DES Portsmouth

Regional Federal Agency Coordination

The U.S. EPA, U.S. FWS, and NMFS with responsibility for New England and for Portsmouth Harbor in particular have held several sessions over the course of the feasibility study to update agency management on study progress and interim findings, and to foster improved interagency coordination. The Federal agencies meet annually, generally in the second quarter of the Federal fiscal year when project budget allocations typically become known to review last year's project activities and be briefed on the coming year's river and harbor work. No meetings were held in 2006, 2008-2010, 2012 or 2013 due to the lateness of the budget allocations. A project by project presentation and discussion is used to surface and help resolve any outstanding issues and concerns. The status of the Portsmouth Harbor Feasibility Study and the work plan for the coming year's study activities is briefed and discussed by the agencies.

21 January 2004 – New England District, Concord, MA
20 January 2005 – New England District, Concord, MA
26 February 2007 – New England District, Concord, MA
10 March 2011 – New England District, Concord, MA
19 September 2011 – New England District, Concord, MA

New England Regional Dredging Team Coordination

New England's Regional Dredging Team (NERDT), known also as the Sudbury Group after its original meeting place at the Great Meadows National Wildlife Refuge in Sudbury, Massachusetts, meets twice annually to discuss issues of regional scope for the dredging and regulatory programs. Each meeting includes a briefing on the status and progress of the Portsmouth Harbor Feasibility Study.

17 May 2005 – Kittery, Maine, Town Council Room
16 November 2005 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
5 October 2006 – Kittery, Maine, Town Council Room
15 February 2007 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
10 May 2007 – Kittery, Maine, Town Council Room
20 November 2007 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
29 May 2008 – New Hampshire DES Offices, Portsmouth, NH
21 October 2008 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
26 February 2009 – New Hampshire DES Offices, Portsmouth, NH
23 June 2009 – Kittery, Maine, Town Council Room
19 November 2009 – Fort Trumbull, New London, Connecticut
16 April 2010 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
13 October 2010 – New Hampshire DES Offices, Portsmouth, NH
6 December 2011 – New Hampshire DES Offices, Portsmouth, NH
8 May 2012 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
27 November 2012 – Save the Bay Offices, Providence, Rhode Island
3 April 2013 – New England District, Concord, Massachusetts and via Webinar
11 June 2013 – University of Connecticut, Groton, Avery Point, CT
7 November 2013 – EPA New England Laboratory, Chelmsford, MA
1 July 2014 – EPA New England Laboratory, Chelmsford, MA

Other Agency Coordination

The New England regional offices of the Federal agencies also meet at least annually for a Mid-Level Managers Meeting (MLM), which typically involves staff one management level above those that attending the NERDT meetings. These managers meet to resolve policy and process issues referred up by the NERDT. The MLM is been briefed in detail on the Portsmouth Harbor Feasibility Study progress at each meeting.

30 September 2004 – MLM Meeting at New England District, Concord, MA
16 March 2005 – MLM Meeting at New England District, Concord, MA
26 October 2005 – MLM Meeting at New England District, Concord, MA
15 November 2006 – MLM Meeting – at New England District, Concord, MA
15 March 2007 – MLM Meeting at New England District, Concord, MA
13 September 2007 – MLM at New England District, Concord, MA
23 October 2008 – MLM at New England District, Concord, MA
7 May 2009 – MLM at New England District, Concord, MA
10 March 2011 – MLM Meeting at New England District, Concord, MA
19 September 2011 – MLM Meeting at New England District, Concord, MA

Portsmouth Specific Agency Coordination

The opportunities for beneficial of the dredged material from the Portsmouth Harbor Turning Basin project have led to several meetings with Federal and State agencies to work through issues with disposal and beneficial use of these materials. These meetings are expected to continue through the study review and project design phases as proponents of such use further develop their plans and begin the process of securing approvals for these uses. Meeting held to date are as follows:

5 January 2010 – Meeting with Town of York and York Lobstermen on nearshore placement of Sand at Long Sands beach
26 January 2010 – Conference call with Maine agencies on nearshore placement of sand
12 February 2010 – Meeting with Federal and State agencies at NH DES Portsmouth
21 May 2010 – NH DES Portsmouth – Meeting on Isles of Shoals North site
14 April 2010 – Meeting at NMFS Gloucester with NMFS and EPA on IOSN Site
12 January 2011 – NH DES Portsmouth – Meeting on Isles of Shoals North Site
19 March 2014 – USF&WS Falmouth Maine – Meeting on ESA Coordination

Public Notice, Meetings and Hearings

A Public Notice and News Release on the availability of the Draft Feasibility Report and Draft Environmental Assessment for public review were issued on 31 March 2014. Specific notice was also made through letters to the many Federal and State agencies, municipalities, port interests and Federal and State elected officials. Specific notices included a copy of the subject draft documents on compact disk. The Public Notice included instructions for downloading the draft documents from the New England District public website. Subsequent to the Public Notice, application was made to the States of New Hampshire and Maine for Coastal Zone Management Consistency Concurrence.

Public and Agency Review Comments on the March 2014 Draft Feasibility Report and Draft Environmental Assessment and Responses

Only seven letters were received in response to the 31 March 2014 Public Notice on public review of the Draft Feasibility Report and Draft Environmental Assessment before the close of the comment period on 30 April 2014. Twelve more letters or emails with comments were received after the close of the comment period. These communications are summarized below, and copies of that correspondence are included in Part 2 of this appendix.

General Responses to Correspondence Received

Comment letters received in response to release of the draft reports for public review are included in Correspondence Part 2. A total of seventeen comment letters were received. Five were from port terminal interests and one from the Portsmouth Pilots expressing support for the project, one from the non-Federal Sponsor, six from Federal and State agencies, one from the Passamaquoddy Tribe, and four from communities interested in receiving sand from the project. No letters or other communications expressing opposition to the project were received.

Specific Responses to Correspondence Received

In addition to commonly raised issues and comments, agencies and individual commenters raised specific comments and questions on a variety of topics and concerns. The discussions below summarize those comments and the results of project coordination.

The Sponsor and various port interests (terminals, pilots, shippers) all stressed the need for the turning basin widening for the future of navigation in the port and the benefits of being able to receive and ship cargoes on larger vessels with less delays and risk of grounding.

The municipalities of Wells, Maine and Salisbury, Newburyport and Newbury, Massachusetts expressed their continued interest in receiving sand dredged from the project.

This proposed project was coordinated with the Maine State Historic Preservation Officer (SHPO), the New Hampshire SHPO, the Massachusetts SHPO, the Massachusetts Board of Underwater Archaeological Resources, the Penobscot Nation Tribal Historic Preservation Officer (THPO), the Wampanoag Tribe of Gay Head (Aquinnah) THPO, and the Passamaquoddy THPO. The MA SHPO concurred on November 12, 2013 with the determination that the proposed navigation improvement project will have no effect on historic properties in Massachusetts. The Massachusetts Board of Underwater Archaeological Resources requested that a cultural resource permittee with a site offshore of Salisbury be notified of that Town's proposal to receive sand for nearshore placement. The ME SHPO concurred on January 3, 2014 that no historic properties in Maine would be affected by the proposed project. The Passamaquoddy Tribe concurred on May 15, 2014 that the proposed project would have no impact on cultural or historical concerns of the tribe. We can assume that the NH SHPO, the Wampanoag Tribe THPO, and the Penobscot THPO concur with the no effect determination stated in the USACE letters sent to these organizations as no responses were received within 30 days on the proposed project from these entities.

Massachusetts Division of Marine Fisheries suggested that surveys and pre-harvesting of shellfish be included in the nearshore bar nourishment areas proposed by that State's coastal communities.

Coordination with the National Marine Fisheries Service (letter dated February 3, 2014 and email dated May 13, 2014) indicated that the effects from the proposed project would be insignificant and discountable and not likely to adversely affect listed species or designated critical habitat. The U.S. Fish and Wildlife Service, New Hampshire office (letter dated December 11, 2013) indicated that no Federally listed endangered and/or threatened species or their critical habitat are known to exist in the project area. The U.S. Fish and Wildlife Service, Maine office in a letter dated May 21, 2014 concurred with our determination that nearshore placement of material off of Wells Beach, Wells, Maine would have insignificant and discountable and not likely adversely affect piping plovers and red knots. The New England District in its letter of 4 June 2014 responded to the US Fish and Wildlife Service's 21 May 2014 letter with questions on the suitability of the dredged material.

A CZM consistency determination was provided to the States of New Hampshire and Maine on April 3, 2014 and April 8, 2014 respectively for review and concurrence that the proposed project is consistent, to the maximum extent practicable, with the approved State CZM programs. The Coastal Program office of the New Hampshire Department of Environmental Services concurred in the Corps Federal Consistency Determination for the project on 2 June 2014. The Maine Coastal Program issued its concurrence with the Corps Federal Consistency Determination for the project on 30 June 2014. That concurrence was conditioned on the Corps acceptance of the Maine Department of Environmental Protection Findings of Fact made upon its review of the project and accompanying the consistency concurrence, including coordination of scow haul routes with the local lobster zone council. The Corps agreed with the Maine DEP's conditions and recommendations.

Specific Management Practices adopted in Responses to Correspondence and Coordination

Dredging will be scheduled from mid-October through mid-April in order to avoid the spawning periods of the most sensitive resources. Blasting impacts will be avoided or minimized by instituting the following methods and procedures:

- No blasting will occur after March 31st;
- Blast during periods of slack tide;

- Use of a fish detecting and startle system to avoid blasting when fish are present or transiting through the area, including placing the fish startle system on a separate boat;
- Require the use of sonar and the presence of a fisheries and marine mammal observer;
- Prohibiting blasting during the passage of schools of fish, or in the presence of marine mammals, unless human safety was a concern;
- Monitor the blast pressure waves and hydroacoustics;
- Using inserted delays of a fraction of a second per blast drill hole, and;
- Placing material on top of the borehole (stemming) to deaden the shock wave reaching the water column.

The proposed dredging and placement of dredged material at the IOS-N is the least costly environmentally acceptable alternative. However, placement at the nearshore placement sites in Wells, Maine and Salisbury, Newburyport and Newbury, Massachusetts will provide a beneficial use to nearby beaches as a source of sand for indirect beach nourishment. Local sponsors will be required to fund the difference in cost between placement at the IOS-N and the nearshore placement sites, as well as obtain all necessary approvals. No significant adverse long term impacts are anticipated or cumulative impacts from dredging and placement at either the IOS-N or the nearshore placement sites.

Prior to any sand placement at the Massachusetts nearshore placement sites, coordination will be conducted with the MA DMF and local commercial shellfishermen, who will be allowed to remove any surf clams from the placement areas.

Scow haul routes through and offshore of Maine waters for placement of dredged material at either the IOS-N ocean site or nearshore off Wells Beaches will be coordinated with the local lobster zone council and the Maine DMR.

To protect the right whale and other whale species, the contractor will be required to contact the Right Whale Advisory prior to transit and a threatened and endangered species monitor will be present for transport of material to the IOS-N site to avoid potential ship strikes. Vessels will not be allowed to travel greater than 10 knots.

As mentioned in the Federally preferred project description above, approximately 2,100 cy of maintenance material within the existing turning basin limits and its channel approaches could potentially be removed if it meets the suitability requirement for placement at the ocean or alternative nearshore placement sites. Testing for suitability for placement in these nearshore areas would occur during the Design Phase. All other maintenance material removed from the river over the several decades since the 35-foot deepening has been clean sandy material.

Comments and Response on Public and Agency Review of the Draft Feasibility Report and Draft Environmental Assessment for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, Navigation Improvement Project

Only seven letters were received in response to the 31 March 2014 Public Notice on public review of the Draft Feasibility Report (FR) and Draft Environmental Assessment (EA) before the close of the comment period on 30 April 2014. Twelve more letters or emails with comments were received after the close of the comment period. Significant comments and responses are summarized below.

	Commenter	Comment Summary	Response
1	National Marine Fisheries Service – Email to NAE on ESA – 13 May 2014 (See Appendix A, page A-2-31)	The Service state that they evaluated the effects of dredged material deposition at near shore and off shore locations as per section 7 of the ESA, and concluded that the action may affect, but is not likely to adversely affect listed species or designation critical habitat	Noted. Discussion of ESA coordination with the NMFS, including the blasting mitigation measures agreed to with the Service, are included on pages EA-47 to 49 of the Environmental Assessment and pages 55-59 of the Feasibility Report. The detailed ESA assessment is provided as Appendix Q to the FR/EA.
2	National Marine Fisheries Service – Email to NAE on EFH – 19 June 2014 (See Appendix A, page A-1-25)	The NMFS-Habitat Conservation Division (NMFS-HCD) declined to provide comments on the Draft FR/EA.	Noted. The NMFS-HCD had previously commented on Essential Fisheries Habitat technical assessment (see the Service's letter of 15 Nov 2013, Appendix A page A-4-38). The EFH assessment is Appendix P to the feasibility report and EA. Discussion of prior coordination is included in the EA on pages EA-49 to 53.
3A	USF&WS Maine Field Office – Letter to NAE on ESA & FWCA – 21 May 2014 (See Appendix A, page A-2-17)	There may be indirect effect to piping plovers from material incompatibility between the dredge and nearshore disposal site in Maine.	The Corps responded via letter (New England District – Letter to USF&WS Maine Field Office – 4 June 2014) (See Appendix A, page A-2-2) stating that multiple rounds of sediment grain size testing have shown that the dredge material is compatible with sediments at the proposed disposal sites.

3B	USF&WS Maine Field Office – 21 May 2014	Piscataqua River sediments could be contaminated	The Corps responded via letter (New England District – Letter to USF&WS Maine Field Office – 4 June 2014) disagreeing that the material to be dredged is contaminated, as the material is mainly glacial till that has not been exposed to anthropogenic sources of contamination.
4	Passamaquoddy Tribe – Letter to NAE – 15 May 2014 (See Appendix A, page A-2-25)	The Tribe stated that the “proposed project will not have any impact on cultural and historical concerns of the Passamaquoddy Tribe.”	The Corps thanks the Passamaquoddy Tribe for their review of the draft reports. The Tribes letter is discussed on page 65 of the Feasibility Report.
5	Pease Development Authority – Sponsor Commitment Letter to NAE – 29 May 2014 (See Appendix A, page A-2-10)	The PDA concurred in the report recommendations and supports the recommended plan. The PDA reviewed the draft design and project partnership agreements, stated its willingness and capability to meet its responsibilities as the project sponsor.	The Corps thanks the PDA for their continued Sponsorship of the project. Status of Sponsor support is discussed on page 82 of the Feasibility Report.
6	New Hampshire DES, Coastal Program – CZM Consistency Concurrence – 2 June 2014 (See Appendix A, page A-2-6)	Found the proposed project to be consistent with the State’s approved enforceable coastal management policies. Recommended that work in New Hampshire waters be limited to the 15 November to 15 March timeframe.	The Corps will comply with the State’s recommendation that the very minor amount of project work in New Hampshire waters be limited to the 15 November to 15 March period.
7A	Maine Coastal Program – CZM Consistency Concurrence – Letter to NAE Attaching Maine DEP Review and Findings of Fact – 30 June 2014 (See Appendix A, page A-1-26)	The State conditionally concurred with the Corps coastal zone management consistency determination. The State noted that the Corps had agreed to its condition	The New England District in its 13 May 2014 letter to the Maine Coastal Program provided the additional information and forms the State requested for their review. (See Appendix A, page A-2-32). The

		to conduct outreach with the lobster industry through the Lobster Zone and Shellfish Advisory Councils.	Corps concurrence with the State's conditions is stated on page 80 of the feasibility report. This includes the Corps commitment to conduct outreach with the lobster industry during the design phase when scow haul routes are finalized.
7B	Maine Coastal Program and Maine DEP Findings of Fact – 30 June 2014	The State determined that the proposed activity will not (1) interfere with scenic, aesthetic, recreational, or navigational uses, (2) cause erosion, (3) inhibit soil transfer from terrestrial sources to aquatic/marine environments, (4) unreasonably affect ecological resources in the project area, and (5) will not unreasonably interfere with the flow of surface or subsurface waters, cause flooding, or violate state water quality law. .	Noted and concur.
8	Massachusetts Division of Marine Fisheries – Letter to NAE – 30 April 2014 (See Appendix A, page A-2-49)	• Surf clams (*Spisula solidissima)* are present in the nearshore disposal sites. A layer of ½ to 2 inches +/- of sediment over a large area would have minimal impact to surf clams. • If material is dumped quickly in deep piles or if sediments are significantly courser grain size than the existing conditions, there could be a greater impact from burial and clams may not recover. • MADMF recommends that the disposal design take into consideration the above parameters, to minimize impacts to fisheries.	Material placement at the nearshore disposal sites cannot be "layered" in increments of inches. However, it is noted in Appendix A, Page A-7, Paragraph 6, that Mass DMF suggested pre-harvesting of surf clams prior to disposal. The local communities funding the optional nearshore placement alternatives are required to secure all necessary permits for that beneficial placement. Those communities would be required to accomplish any shellfish pre-harvesting requirements of their permits. The State permit process will determine

		• We request more information as to the method of disposal and the expected depth of sediment when it is available and would like to review disposal siting to ensure avoidance of surf clams.	any requirements.
9	MA Board of Underwater Archaeological Resources – Letter to NAE – 28 April 2014 (See Appendix A, page A-2-51)	The Massachusetts Board of Underwater Archaeological Resources requested that a cultural resource permittee with a site offshore of Salisbury be notified of that Town's proposal to receive sand for nearshore placement.	Noted. As with the shellfish concerns discussed above, the proponent local communities will be required to secure all necessary Federal and state permits to place sand nearshore in areas to be determined by that process, including notification to potentially affected parties.
10	Town of Salisbury, Massachusetts – Letter to NAE – 14 April 2014 (See Appendix A, page A-2-53)	Affirmed that the Town is very interested in receiving a portion of the dredged sand from the project for nearshore placement and will work with the other towns to divide the sand and pay for its placement	Descriptions, estimates and evaluation of the locally proposed alternative beneficial use options are included throughout the report and the Environmental Assessment. Current cost estimates for these additional placement options are shown on page 73 of the FR. The Corps will continue to work with the Town of Newbury and the other communities interested in receiving the dredged sand as the project moves forward.
11	City of Newburyport, Massachusetts – Letter to NAE – 13 June 2014 (See Appendix A, page A-2-1)	Confirmed the City's interest in receiving sand from the Portsmouth project as nearshore nourishment for its beaches. Stated that the City was working with the other interested towns in Massachusetts to secure the necessary funding and approvals for that placement.	See response to #10 above. The Corps will continue to work with the Town of Newbury and the other communities interested in receiving the dredged sand as the project moves forward.

12	Town of Newbury, Massachusetts - Letter to NAE – 18 June 2014 (See Appendix A, page A-1-26)	The Town expressed their continued interest in receiving dredged sand from the Portsmouth project for nearshore placement off their beaches, and their understanding that all required permitting and additional placement costs would be their responsibility	See response to #10 above. The Corps will continue to work with the Town of Newbury and the other communities interested in receiving the dredged sand as the project moves forward.
13	Town of Wells, Maine – Letter to NAE – 21 May 2014 (See Appendix A, page A-2-16)	The Town re-asserted its commitment to receive half of the dredged sand from the project for nearshore placement off its eroding beaches, advice on when to begin applying for permits for that placement, and requested to be updated on its estimated cost for that work as the project advances.	See response to #10 above. The Corps will continue to work with the Town of Wells and the other communities interested in receiving the dredged sand as the project move forward.
14	International Salt – Letter to NAE – 24 April 2014 (See Appendix A, page A-2-52)	International Salt stated their support for expanding the upper turning basin	Thank-you for your support and assistance with this project.
15	Portsmouth Harbor Pilots – Letter to NAE – 30 April 2014 (See Appendix A, page A-2-47)	The Portsmouth Pilots stated their strong support for the project	Thank-you for your support and assistance with this project.
16	Georgia Pacific Gypsum, LLC – Letter to NAE – 30 April 2014 (See Appendix A, page A-2-46)	Georgia Pacific Gypsum stated their support for expansion of the turning basin	Thank-you for your support and assistance with this project.
17	Sprague Operating Resources, LLC – Letter to NAE – 30 April 2014 (See Appendix A, page A-2-44)	Sprague stated that it is essential that the widening of the upriver turning basin move forward	Thank-you for your support and assistance with this project.

18	Pike Industries, Inc. – Letter to NAE – 2 May 2014 (See Appendix A, page A-2-43)	Pike Industries expressed its support for expanding the upper turning basin	Thank-you for your support and assistance with this project.
19	Sea-3 Inc. – Letter to New England District – 5 May 2014 (See Appendix A, page A-2-42)	Sea-3 expressed its support for the expansion and widening of the upper turning basin	Thank-you for your support and assistance with this project.

PART 1

FINAL FEASIBILITY REPORT AND FINAL ENVIRONMENTAL ASSESSMENT TRANSMITTAL DOCUMENTS AND CORRESPONDENCE RECEIVED AFTER TRANSMITTAL OF FINAL REPORT

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN NY 11252-6700

1 July 2014

CENAD-PD-CS

MEMORANDUM FOR Commander, Headquarters, US Army Corps of Engineers, (CECW-NAD/Ms. Shuman), 441 G Street, NW, Washington, DC 20314

SUBJECT: Portsmouth Harbor & Piscataqua River Navigation Improvement Project, New Hampshire and Maine

I hereby submit the Portsmouth Harbor & Piscataqua River Navigation Improvement Project Final Feasibility Report and Environmental Assessment and supporting documentation (enclosed). Further, I concur with the findings and recommendations of the New England District Commander, COL Charles P. Samaris. In addition, I confirm that the report complies with all applicable policy and laws in place at the time of its completion.

Encl
as

KENT D. SAVRE
Brigadier General, USA
Commanding

CF: CENAE-DE

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY
DIVISION OF GEOLOGY, NATURAL AREAS, AND COASTAL RESOURCES
93 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0093

PAUL R. LEPAGE
GOVERNOR

WALTER E. WHITCOMB
COMMISSIONER

June 30, 2014

Mr. John R. Kennelly
Chief, Planning Branch
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, Massachusetts 01742-2751

Re: CZMA Consistency; Dredging of the Piscataqua River Federal Navigation Project; Maine

Dear Mr. Kennelly:

I am writing in response to the Army Corps of Engineers' ("ACOE") letter dated April 8, 2014, which provides its determination that the proposed maintenance and improvement dredging of the Piscataqua River federal navigation project and related dredged materials disposal activity, as described in its letter and related information, are consistent with the enforceable policies of Maine's coastal zone management program.[1]

In accordance with the findings, conclusions, terms, and conditions of the Department of Environmental Protection's ("DEP") Order dated June 30, 2014 (L-20323-4E-C-N), which is incorporated herein by reference, the State conditionally concurs with the ACOE's consistency determination. Please note that under 15 C.F.R. §930.4 the State's conditional concurrence will be treated as an objection if the ACOE does not agree to modify its proposal, if and as necessary, to meet the conditions in DEP's above-referenced Order. We note that the ACOE has agreed to "conduct outreach directly with the lobster industry through venues such as the Lobster Zone Councils and the Shellfish Advisory Council" as part of its proposed action to ensure there will not be significant impacts to existing fisheries and encourage this effort.[2]

Please contact Todd Burrowes on my staff (207-287-1496) if you have questions or need additional information.

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[1] At the State's request, the ACOE submitted additional information in support of its consistency determination following its initial submission. The ACOE agreed that the federal consistency review period would begin on the date of receipt of that information, which is May 16, 2014.

[2] *See* Findings 4 and 8 of DEP Order L-20323-4E-N, dated June 30, 2014.

MAINE COASTAL PROGRAM
KATHLEEN LEYDEN, DIRECTOR
17 ELKINS LANE - WILLIAMS PAVILLION
AUGUSTA
www.maine.gov/doc/nrimc/
PH: (207) 287-2801
FAX: (207) 287-2353

Sincerely,

Kathleen Leyden
Director, Maine Coastal Program

cc:\
Robert Green, DEP

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
COMMISSIONER

June 2014

U. S. Army Corps of Engineers
C/o Mark Habel
New England District, Army COE
696 Virginia Road
Concord, MA 01742-2751

RE: Natural Resources Protection Act Application/Federal Consistency Review, Eliot
DEP #L-20323-4E-C-N

Dear Mr. Habel:

Please find enclosed a signed copy of your Department of Environmental Protection's Findings of Fact pertaining to Federal consistency review of the proposed Piscataqua River Turning Basin expansion project. You will note that the attached document includes a description of your project, findings of fact that relate to the approval criteria the Department used in evaluating your project, and conditions that are based on those findings and the particulars of your project. Please take several moments to read the document carefully, paying particular attention to the conditions of the approval. The Department reviews every application thoroughly and strives to formulate reasonable conditions of approval within the context of the Department's environmental laws. You will also find attached some materials that describe the Department's appeal procedures for your information.

If you have any questions about the permit or thoughts on how the Department processed this application please get in touch with me directly. I can be reached at 207- 822-6300 or at robert.green@maine.gov.

Sincerely,

Robert L. Green, Jr.

Robert L. Green, Jr., Project Manager
Division of Land Resource Regulation
Bureau of Land and Water Quality

pc: File

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

U.S. ARMY CORPS OF ENGINEERS) NATURAL RESOURCES PROTECTION ACT
Eliot, York County) COASTAL WETLAND ALTERATION
PISCATAQUA RIVER TURNING BASIN)
L-20323-4E-C-N (approval)) FINDINGS OF FACT AND ORDER

Pursuant to the provisions of 38 M.R.S.A. Sections 480-A et seq. and Section 401 of the Federal Water Pollution Control Act, the Department of Environmental Protection has considered the application of the U.S. ARMY CORPS OF ENGINEERS with the supportive data, agency review comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

1. PROJECT DESCRIPTION:

A. History of Project: The Federal Navigation Project (FNP) for the Portsmouth Harbor and Piscataqua River was initially authorized by Congress in 1879 and substantially modified in the 1960's. The U.S. Army Corps of Engineers (the Corps) is authorized to maintain the federal channel in Portsmouth Harbor, located at the mouth of the Piscataqua River. The FNP for the Piscataqua River consists, in part, of a 400-foot wide channel extending from deep water in Portsmouth Harbor to the confluence of Adlington Creek, approximately 2,750 feet upstream of Frankfort Island. The turning basin, located at the head of the FNP, is approximately 800 feet wide. The authorized depth of the federal channel and turning basin is -35 feet mean lower low water (MLLW), which is the average of the lower low water height of each tidal day. Shoaling within the channel occurs along the portion of the FNP known as Simplex Reach and requires periodic maintenance dredging to maintain the authorized depth.

In Department Order #L-20323-4E-A-N, dated August 29, 2000, the Department issued a federal consistency finding and water quality certification to the Corps for dredging approximately 20,000 cubic yards of material to restore the channel to its authorized depth. In Department Order #L-20323-4E-B-N, dated December 20, 2011, the Department issued a federal consistency finding and water quality certification for the removal of approximately 50,000 cubic yards of sandy material from the Simplex Reach to restore the authorized 35-foot deep channel. This portion of the FNP was last dredged in February 2013.

B. Summary: The port facilities along the New Hampshire side of the river receive cargoes from vessels ranging in length from 420 to 747 feet and with drafts of 30 to 36 feet. The existing width of the turning basin is too narrow for the efficient and safe handling of these larger vessels. The Corps proposes to widen the existing 800-foot wide turning basin to 1,200 feet to the authorized depth of -35 feet MLLW, plus an additional two feet of allowable overdredge. The area proposed to be dredged is located on the

Maine side of the river. The Corps is also seeking to conduct a maintenance dredge of the entire turning basin concurrent with the widening. The proposed project is estimated to generate approximately 735,900 cubic yards of coarse-grained sand and gravel material. Bedrock in the proposed project site will require blasting to remove this material and will generate approximately 25,300 cubic yards of rock ledge. The Corps anticipates beginning dredging operations October 15 and taking four months to remove unconsolidated material. This would be followed by one month of drilling and blasting the uncovered ledge areas (mid-Feb to mid-March), which would then be followed by one month of dredging to remove the blasted rock. The entire project is expected to be completed by April 15, in a single dredge season.

Dredged material will be disposed of at an offshore location north of the Isle of Shoals and approximately ten miles seaward of the entrance to Portsmouth Harbor. The disposal site is located outside State waters and the Department has only considered the geological suitability of the disposal site for the dredged material; therefore, a Water Quality Certification under Section 401 of the Federal Water Pollution Control Act is not required or included with this permit.

The Corps noted that several options for nearshore disposal of dredged material for beach nourishment are still being discussed with municipalities in Maine and Massachusetts. The Corps intends to move forward with the disposal of dredged material offshore of the Isle of Shoals until such time as any of the municipalities provide the funding for the additional costs above the Corps' Base Plan for disposing of dredged material. Securing approvals and permits for nearshore disposal options will also be the responsibility of each municipality. The Corps also noted that rock ledge could be disposed of at the Cape Arundel Disposal Site (CADS), but because it is located within State waters, a water quality certification would first have to be obtained prior to disposing any dredged material at this location.

The proposed dredge project is shown on an undated plan sheet entitled "Portsmouth Harbor turning Basin Widening Project Feasibility Study," prepared by the Corps.

C. Current Use of the Site: The Maine side of the Piscataqua River is lightly developed with single-family residences. The New Hampshire side of the river is developed with commercial port facilities.

2. EXISTING SCENIC, AESTHETIC, RECREATIONAL OR NAVIGATIONAL USES:

The Natural Resources Protection Act (NRPA) requires the Corps to demonstrate that the proposed project will not unreasonably interfere with existing scenic, aesthetic, and recreational uses pursuant to 38 M.R.S.A.§ 480-D(1).

In accordance with Chapter 315, Assessing and Mitigating Impacts to Scenic and Aesthetic Uses, the Corps submitted a copy of the Department's Visual Evaluation Field Survey Checklist as Appendix A to the application along with a description of the property and the proposed project. The Corps also submitted several photographs of the proposed project site.

The proposed project is located in the Piscataqua River, which is a scenic resource visited by the general public, in part, for the use, observation, enjoyment and appreciation of its natural and cultural visual qualities. There will be no permanent changes to the scenic and aesthetic values of the river, because dredging activities will take place in the subtidal area. The Corps intends to use a mechanical dredge to perform the proposed project, working 24 hours a day, seven days a week over a course of a six- to seven-month period that extends between October 15 and April 15.

The proposed project was evaluated using the Department's Visual Impact Assessment Matrix and was found to have an acceptable potential visual impact rating. Based on the information submitted in the application and the visual impact rating, the Department determined that the location and scale of the proposed activity is compatible with the existing visual quality and landscape characteristics found within the viewshed of the scenic resource in the project area.

The Department of Marine Resources (DMR) stated that the proposed project should not cause any significant adverse impact to navigation or recreation. DMR commented that the proposed time frame of the dredging operation may potentially increase the interaction with lobster gear on the transportation route; however, as discussed in Finding 8, DMR determined that the proposed activity can be managed to reduce potential impacts to existing uses.

The Department finds that the proposed activity will not unreasonably interfere with existing scenic, aesthetic, recreational or navigational uses of the protected natural resource.

3. SOIL EROSION:

As described in Finding 1, the dredging activity will be conducted using a mechanical bucket dredge and the dredged material will be disposed at an offshore location north of the Isle of Shoals.

Based on the materials submitted with the application, the Department finds that the activity will not cause unreasonable erosion of soil or sediment nor unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment.

4. HABITAT CONSIDERATIONS:

The NRPA requires the Corps to demonstrate that the proposed project will not unreasonably harm significant wildlife habitat, estuarine and marine fisheries, and other aquatic life pursuant to 38 M.R.S.A. § 480-D(3).

Department staff reviewed a Geographic Information System (GIS) database that contains site-specific information on existing natural resources provided by both the DMR and the Department of Inland Fisheries and Wildlife (MDIFW). The GIS database indicates that there are no mapped Essential or Significant Wildlife Habitats associated with the proposed project.

The site of the Federal channel and turning basin is located in the estuarine portion of the Piscataqua River. The Great Bay, located approximately 0.25 miles upstream of the project site on the New Hampshire side of the river is designated as a National Estuarine Research Reserve. The March 2014 Draft Environmental Assessment (EA) submitted by the Corps states that numerous marine and estuarine fish species use the Piscataqua River and Great Bay area as a nursery, feeding, and resting area. Shellfish, such as lobsters (*Homarus americanus*), soft-shell clams (*Mya arenaria*), and harbor seals and harbor porpoises are present in the Great Bay and mouth of the river. Within the project site, benthic surveys have documented the presence of a few species of amphipods which are mostly opportunistic species adapted to frequent disturbances. The EA states that dredging to widen the turning basin is not expected to alter the benthic community. Recolonization is expected to occur within a few months following dredging and any temporary loss of fish foraging area is expected to be localized and short-lived. The EA also stated that the Great Bay Estuary supports 52 species of resident and migratory fish. Commercially and recreationally important species include, smelt, winter flounder, smooth flounder, and striped bass. The Corps proposes to conduct dredging operations between October 15 and April 15 to avoid impacts to the spring and fall runs of migratory fish.

DMR reviewed the proposed project and submitted written comments to the Department, dated June 26, 2014. DMR stated that diadromous fish species native to Maine including alewives, blueback herring, striped bass, American eels and sturgeon all potentially use habitat in the Piscataqua River, and that October is a timeframe when juvenile river herring might be emigrating and sturgeon are still present before they move to wintering grounds. The April timeframe is also a known period of elver (juvenile American eel) migration up stream. DMR noted that typical dredge windows include the periods between November 8 and April 8 of any year in order to minimize potential adverse impacts to fish in the area. However, DMR recognizes the navigational and safety hazards and the need to move ahead with the proposed project, and that the impact to diadromous fish species and lobster fisheries can be adequately mitigated. After consideration, DMR recommended that the Corps conduct outreach directly with the lobster industry through venues such as the Lobster Zone Councils and the Shellfish Advisory Council. The Corps agreed to undertake these efforts.

The effects of turbidity from dredging operations have been documented to result in adverse impacts to finfish and shellfish. The EA asserts that increased turbidity around the project site will be localized, and that the strong river current will disperse the fine grained sediment: thus high turbidity levels will be of a short duration such that adverse impacts are not expected. Impacts from turbidity are expected to be further minimized by limiting dredging operations to late fall to early winter, thus avoiding those times when lobster larvae are most abundant in the estuary and when fish are spawning. The EA also states that fish passage is not expected to be impeded because of the width of the river at the project site and because of the grain size of the dredged material, specifically, that sand-sized particles, which make up more than 95% of the dredged material, are expected to settle quickly to the river bottom.

The Corps stated that Atlantic Sturgeon (*Acipenser oxyrhynchus oxyrinchus*), a federally-listed threatened species, and Short-nose Sturgeon (*Acipenser brevirostrum*) and Gulf of Maine Atlantic Salmon (Atlantic Salmon), both federally-listed endangered species, have been found to use the Piscataqua River. Acoustic receivers have documented Atlantic Sturgeon in the Great Bay. The EA states that the portion of the river around the project site is not suitable sturgeon overwintering habitat because of high currents and salinities.

The EA acknowledges the November 13, 2013 letter from the National Marine Fisheries Service (NMFS), which notes that the sound effects from blasting have the potential to injure or kill fish in the area of the blast site. At particular risk of injury are the two species of sturgeon. To minimize potential blasting impacts to marine mammals and fish, the Corps will take mitigating actions to the maximum extent practicable. These actions include: placing material on top of the borehole (stemming) to deaden the shock wave reaching the water column; staggered detonation of charges in a sequential blasting circuit; blasting during periods of slack tide and within a confined bubble curtain; using inserted delays of a fraction of a second per blast drill hole; requiring the use of sonar and the presence of a fisheries and marine mammal observer; prohibiting blasting during the passage of schools of fish or in the presence of marine mammals, unless human safety is a concern; and using a fish detecting and startle system to avoid blasting when fish are present or transiting through the area, including placing the fish startle system on a separate boat.

Although not subject to this review, the EA characterized the Isle of Shoals disposal site as a relatively flat plain surrounded by higher elevations and under approximately 300 feet of water. The benthic report for the disposal site summarizes the area as being physically homogeneous and inhabited by a limited benthic invertebrate community. Grain size data confirmed that the site is fine-grained as seven of the nine samples contained more than 95% fines and the remaining two samples contained more than 79% fines. The material proposed for placement is composed of coarse-grained material. Disposal mounds of coarser grained material and rock are expected to improve fish habitat by providing some physical diversity to the site which may attract additional species to the disposal area.

Based on depth and substrate type, a large number of fish species are likely to use the disposal site at some stage of their life cycle. These species include, among others, Atlantic cod, pollock, whiting, red hake, white hake, redfish, winter flounder, American plaice, ocean pout, Atlantic halibut, Atlantic sea scallop, Atlantic sea herring, long-finned squid, short-finned squid, Atlantic mackerel, summer flounder, ocean quahog, spiny dogfish, and bluefin tuna. Any eggs and larvae suspended at the placement site would be entrained in the dredged material as it is released from the scow and destroyed. Eggs and larvae on the bottom of the sea floor would also be destroyed from burial during placement. It is possible that juveniles and adults would be able to escape impacts from placement. The temporary and limited impact of disposal on these species is not expected to have a significant impact.

NMFS noted that seaward migrating juveniles of the Gulf of Maine Distinct Population Segment of Atlantic salmon have been recorded by acoustic telemetry moving southward toward the vicinity of the disposal area; however, they have not been detected by the buoy closest to the disposal site. It is not expected that this species will be in the vicinity of the Isle of Shoals disposal area during the time of disposal operations. In addition, no tagged Short-nose Sturgeon were detected at a deployed buoy in the vicinity of the disposal site.

The site would be tidally flushed and have good water quality. The effect of storms on the bottom sediments within the site would be expected to be minimal as the site is located in a deep area (approximately 300 feet deep).

At the disposal site, right whales, as well as occasional humpback whales and fin whales, could be present. The EA recommends that the contractor be required to contact the Right Whale Sighting Advisory System prior to transit. A threatened and endangered species monitor will be present on board during transport of material to the disposal site from the project area to avoid potential ship strikes. It is also recommended that vessels not be allowed to travel greater than 10 knots in speed to minimize the potential for ship strike.

Based on the material submitted with the application and DMR's review comments, the Department finds that the activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life provided that dredging and disposal operations are performed between October 15 and April 15, that the Corps implements the recommended mitigation efforts designed to limit the impacts of sound created during blasting and that a threatened and endangered species monitor is present during all dredging and disposal operations.

5. WATER QUALITY CONSIDERATIONS:

The NRPA requires the Corps to demonstrate that the dredging project will not violate any state water quality law, including those governing the classification of the State's waters pursuant to 38 M.R.S. § 480-D(5). The project site is located within Class SB waters.

The water quality standards dictate that SB waters shall be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation and navigation, and as habitat for fish and other estuarine and marine life. Additionally, the State's water quality standards include an antidegradation policy found at 38 M.R.S. § 464(4)(F). This policy provides that existing uses and the level of water quality necessary to protect those existing uses must be maintained and protected. As discussed in Finding 2 and Finding 4, and based on DMR comments, the Corps has demonstrated that the proposed activity will not result in a significant degradation of recreational uses, fishing, and commercial harvesting of shellfish and other estuarine and marine life and as habitat for such species.

Based upon information contained in the record, the Department finds that the Corps has demonstrated that the proposed project will maintain and protect existing uses and the level of water quality necessary to protect those existing uses; will protect the existing water quality of affected SB waters; will not significantly impair the viability of existing estuarine and marine life; and will not result in a significant degradation of existing recreation, fishing, and commercial harvesting of such estuarine and marine species.

Therefore, the Department finds that the proposed project will not violate any state water quality law, including those governing the classification of the State's waters.

6. WETLANDS AND WATERBODIES PROTECTION RULES:

The NRPA requires the Corps to demonstrate that the proposed project will not unreasonably harm significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered species plant habitat, or aquatic or adjacent upland habitat pursuant to 38 M.R.S.A. § 480-D(3).

The Wetland Protection Rules interpret and elaborate on the NRPA criteria for obtaining a permit. The rules guide the Department in its determination of whether a project's impacts would be unreasonable. A proposed project would generally be found to be unreasonable if it would cause a loss in wetland area, functions and values and there is a practicable alternative to the project that would be less damaging to the environment. Each application for a NRPA permit that involves a coastal wetland alteration must provide an analysis of alternatives in order to demonstrate that a practicable alternative does not exist.

The portion of the project that the Department has considered consists of the dredging of approximately 20.4 acres of river bottom adjacent to the existing turning basin and Federal channel. The disposal site is located outside of State waters and the Department has only considered the geological suitability of the disposal site for the dredged material as discussed in Finding 7.

A. Avoidance. No activity may be permitted if there is a practicable alternative to the project that would be less damaging to the environment. The Corps submitted an alternatives analysis for the proposed project in the EA. The purpose of the proposed project is to widen the existing turning basin to ensure safe navigation for commercial vessels and to conduct a maintenance dredge of the entire turning basin concurrent with the widening. No practicable alternative to maintenance dredging at the same time as the widening was identified since it would require remobilization of equipment and disruption of existing uses during another dredge season in the near future. The alternatives analysis considered a no-action alternative, widening the turning basin to alternate widths, alternate dredging methods (hydraulic, hopper, or mechanical), and alternate disposal methods (upland, beach nourishment, nearshore placement, or ocean).

The Corps stated that the no-action alternative would continue to restrict the size of vessels that can use wharf facilities above the I-95 Bridge and continued hazardous navigation conditions at the turning basin. The no-action alternative was dismissed by the Corps because it did not meet the project purpose, which is to widen the existing 800-foot wide turning basin to allow for the efficient and safe turning of ships.

The Corps examined whether relocating the turning basin or widening the turning basin at its present location to 1,020 feet to accommodate ships less than 680 feet in length or 1,120 feet to accommodate those ships up to 747 feet in length were practicable alternatives. It was determined that the selected alternative, widening the turning basin to 1,200 feet at its present location would have little additional environmental impacts and would be the most cost efficient. In addition, the existing turning basin is located adjacent to the Sprague River Road Terminal, which handles an estimated two-thirds of the vessel traffic on the upper portion of the river. The Portsmouth pilots involved in turning the vessels would be able to maneuver the vessel to or from the dock to the turning basin.

The Corps considered three dredging methods: hydraulic dredge, hopper dredge, or mechanical bucket dredge. A hydraulic dredge loosens the bottom sediments and entrains them in a water slurry that is pumped up from the river bottom. The material is then discharged away from the channel or is pumped via a pipeline to a dewatering area or disposal site. This type of dredge is generally used for sandy material that will be disposed of in an upland area or on a nearby beach. Since the material to be dredged is compacted glacial till and there are no available upland disposal sites, this type of dredge was rejected. The second method considered was a hopper dredge, which uses a suction pump to loosen and remove material from the river bottom. The material is then deposited into hoppers aboard the dredge vessel. In this region, this type of dredge is most often used to remove sandy material from harbor entrance channels and deposit the material offshore of beaches to nourish littoral bar systems. The compacted sediment proposed to be removed makes use of this type of dredging operation impracticable. Furthermore, the haul distance to the proposed disposal site would make the use of a hopper dredge uneconomical. For these reasons, this alternative was rejected. The third option considered is a mechanical bucket dredge that involves the use of a barge-mounted crane, backhoe, or cable-arm with a bucket to dig the material from the river bottom. The material is placed in a scow for transport to a disposal site by tug. The material is discharged at a dump buoy and commonly forms a discrete mound of dredged material at the disposal site to minimize off-site migration. The Corps determined that since the material dredged for this project is suitable for unconfined open water placement, this dredge method was the best alternative.

The alternatives analysis also included three disposal methods: upland placement, unconfined open water placement, or nearshore placement. The Corps examined upland disposal opportunities and concluded that there were no upland sites available that could handle the dewatering and permanent storage of the large amounts of dredged material. Therefore, this alternative was rejected since upland disposal would raise the project costs significantly.

Another option considered was unconfined open ocean placement. Given the composition of the dredge material and the results of the sediment testing, the Corps has determined this disposal option is most suitable for the proposed project. CADS was determined to be impracticable because the Congressional action that re-opened the site placed a per-project disposal limitation of no more than 80,000 cubic yards. The Corps has considered disposing of the estimated 25,300 cubic yards of rock to be removed by the proposed project at CADS, but noted that a water quality certification would have to be obtained prior to disposing any dredged material at this location.

The Corps examined whether the site located off Isle of Shoals that had historically been used to dispose of dredged material was suitable for a project of this size. Given the volume of material to be dredged and the amount of fishing now present at the previous disposal site, the Corps located a new site north of the Isle of Shoals. Conditions at this site were reviewed in Finding 4. Use of this disposal alternative was included in the Corps development of a Base Plan. The costs and net economic benefits of the project are projected from the Base Plan. Deviations from the Base Plan are allowed provided those deviations are equal to or less than the cost reflected in the Base Plan.

The Corps also considered nearshore placement, which involves the placement of dredge material in nearshore areas from which it can be moved by littoral processes. Locations for nearshore disposal included beaches in New Hampshire and Maine that are within ten miles of the mouth of the river. However, there was no local interest in receiving the dredged material, so this alternative was determined to be impracticable. However, four coastal municipalities have indicated that they desire that the dredged material be placed in nearshore areas to nourish nearby beaches, and are willing to fund the cost differential between the Base Plan and nearshore placement. The EA examined the nearshore locations at each of the four locations (three in Massachusetts and one at Wells Beach in Wells, Maine) and made an initial determination that disposal of dredged material at these sites are not expected to result in an adverse impact to the environment. The Corps has stated that, because nearshore placement at these locations exceeds the costs established in the Base Plan, covering the additional costs and securing all approvals and permits will be the responsibility of the local municipality.

The Department concurs with the Corps' conclusions that the no-action alternative would not meet the stated project purpose and is not a practicable alternative. In addition, the Department concurs with the Corps' determination that the conditions at the turning basin warrant dredging at the scale proposed and that the use of a mechanical bucket dredge is the best method for completing the project. The Department finds that the selected dredging and disposal methods are the most practicable alternatives that would have the least amount of environmental impact.

B. Minimal Alteration. The amount of coastal wetland to be altered must be kept to the minimum amount necessary for meeting the overall purpose of the project. The Corps prepared a detailed bathymetric survey of the project site to ensure that the minimum amount of material will be removed from the project area to meet the Project Need. The Corps stated that removing bottom material will not permanently alter the characteristics of the existing bottom sediment and habitat characteristics and therefore minimizes the impact to marine fisheries. Dredging is proposed during the fall and winter to minimize the impacts to marine life that use the area as discussed in Finding 4.

Based on the conclusions of the alternatives analyses above, the Department finds that the Corps has adequately demonstrated that the amount of coastal wetland to be altered by the proposed project is the minimum amount necessary to meet the stated project need and purpose.

C. Compensation. In accordance with Chapter 310, compensation is required to achieve the goal of no net loss of coastal wetland functions and values. The Corps has demonstrated that the proposed dredge will not permanently alter the characteristics of the project area. Based on the information provided in the EA and comments from DMR, the Department finds that the impact to wetland functions from the proposed project will be temporary and not significant. Therefore, no compensation is required.

The Department finds that the Corps has avoided and minimized coastal wetland impacts to the greatest extent practicable, and that the proposed project represents the least environmentally damaging alternative that meets the overall purpose of the project.

7. GEOLOGICAL CONSIDERATIONS:

Sediment core samples were collected from 21 locations in 2007 and 2009 within the project site. Grain size analysis results demonstrated that the material was a mix of gravel, coarse to fine-grained sands, and silt with rock ledge present above the proposed dredge depth of -35 feet MLLW. The Corps proposes to dispose of the material at an unconfined disposal site approximately five to six miles northeast of the Isle of Shoals and the disposal site used in previous dredge events. The Isle of Shoals – North site is seaward of the three-nautical mile limit of the territorial sea, in Federal waters. The EA characterized the disposal site as a relatively flat plain surrounded by higher elevations and under approximately 300 feet of water with fine-grained sediments and little species diversity and use.

The Department finds that the Corps has demonstrated that the disposal site is geologically suitable.

8. DREDGE SPOILS TRANSPORTATION CONSIDERATIONS:

The Corps submitted a map that outlines the proposed transportation route to the Isle of Shoals Disposal Site which was reviewed by DMR. DMR stated that the October 15 start date could potentially increase the interaction with lobster gear on the transportation route in areas along the transportation route. As discussed in Finding 4, the Corps agreed to conduct outreach directly with the lobster industry through venues such as the Lobster Zone Councils and the Shellfish Advisory Council. To further minimize this impact and in accordance with 38 M.R.S.A § 480-D(9), the Department finds that one week prior to commencing the dredging operation, the Corps must:

a. Clearly mark or designate the dredging area, the disposal area, and the transportation route;

b. Publish in a newspaper of general circulation in the area adjacent to the route the approved transportation route of the dredge spoils;

c. Publish in a newspaper of general circulation in the area adjacent to the route a procedure that the Corps will use to respond to inquiries regarding the loss of fishing gear during the dredging operation.

Provided the Corps marks the transportation route and publishes notices as described above, the Department finds that the transportation route of the proposed project minimizes adverse impacts on the fishing industry.

9. FUTURE DREDGE EVENTS:

The NRPA was amended to allow for maintenance dredging with a Permit-by-Rule notification (pursuant to Chapter 305 of the Department's Rules) if the area to be dredged is located in the same area that was dredged within the last ten years, and the amount of material to be dredged does not exceed the amount approved by the Department (38 M.R.S.A § 480-E(8), effective September 28, 2011). Use of a Permit-By-Rule notification to renew this Federal consistency finding is limited only to dredging the turning basin. Dredging in the remainder of the Federal channel may require a separate consistency review and, possibly, Water Quality Certification.

The Department has determined that to ensure that future dredge events will not result in an unreasonable impact to the environment and will not violate the standards of the NRPA, information specific to each dredge event must be provided. When seeking renewal of this Federal consistency finding, the Corps must submit an estimate of the volume of material to be dredged, a characterization of the material to be dredged, the location of where the dredged material will be disposed, and a schedule for completing dredging, to the Department's satisfaction, prior to receiving a renewal for all subsequent dredge events.

If the Corps proposes to dispose of dredged material by any other means than at the Isle of Shoals – North site, a new or revised Federal consistency finding may be required from the Department.

The Department finds that the Corps will have demonstrated that conditions for future dredge events will be similar to those discussed in this Federal consistency finding provided that, prior to a future dredge event, the Corps submits data to the Department that clearly characterizes the composition of the material to be dredged, accurately estimates the volume of material to be dredged, identifies the location of where the dredged material will be disposed, and submits a schedule for completing the dredging.

10. OTHER CONSIDERATIONS:

The Department did not identify any other issues involving existing scenic, aesthetic, or navigational uses, soil erosion, habitat or fisheries, the natural transfer of soil, natural flow of water, water quality, or flooding.

BASED on the above findings of fact, and subject to the conditions listed below, the Department makes the following conclusions pursuant to 38 M.R.S.A. Sections 480-A et seq. and Section 401 of the Federal Water Pollution Control Act:

A. The proposed activity will not unreasonably interfere with existing scenic, aesthetic, recreational, or navigational uses.

B. The proposed activity will not cause unreasonable erosion of soil or sediment.

C. The proposed activity will not unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment.

D. The proposed activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine, or marine fisheries or other aquatic life provided that: dredging and disposal operations are performed between October 15 and April 15: the Corps implements the recommended mitigation efforts designed to limit the impacts of sound created during blasting; a threatened and endangered species monitor will be present during all dredging and disposal operations as described in Finding 4; the Corps marks the transportation route and publishes the appropriate notices one week prior to commencing the dredging operation as described in Finding 8; and that prior to a future dredge event, the Corps submits data to the Department as described in Finding 9.

E. The proposed activity will not unreasonably interfere with the natural flow of any surface or subsurface waters.

F. The proposed activity will not violate any state water quality law including those governing the classifications of the State's waters.

G. The proposed activity will not unreasonably cause or increase the flooding of the alteration area or adjacent properties.

H. The proposed activity is not on or adjacent to a sand dune.

I. The proposed activity is not on an outstanding river segment as noted in Title 38 M.R.S.A. Section 480-P.

J. The proposed activity will not unreasonably impact the fishing industry and the proposed disposal site is geologically suitable provided the Corps marks the transportation route and publishes the appropriate notices one week prior to commencing the dredging operation as described in Finding 8.

THEREFORE, the Department APPROVES the above noted application of the U.S. ARMY CORPS OF ENGINEERS to widen the Piscataqua River Turning Basin and conduct maintenance dredging in the existing basin as described in Finding 1, SUBJECT TO THE ATTACHED CONDITIONS, and all applicable standards and regulations:

1. Standard Conditions of Approval, a copy attached.

2. The Corps shall take all necessary measures to ensure that its activities or those of its agents do not result in measurable erosion of soil on the site during the construction of the project covered by this approval.

3. Severability. The invalidity or unenforceability of any provision, or part thereof, of this License shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

4. All dredging activities and disposal of the dredged material shall be limited to the period between October 15 and April 15 of any given calendar year.

5. The Corps shall implement the recommended mitigation efforts in the EA designed to limit the impacts of sound created during blasting operations.

6. The Corps shall have a threatened and endangered species monitor present during all dredging and disposal operations.

7. The Corps shall comply with the provisions of 38 M.R.S.A 480-9(D) and shall:

   a. Clearly mark or designate the dredging area, the disposal area, and the transportation route;

b. Publish in a newspaper of general circulation in the area adjacent to the route the approved transportation route of the dredge spoils;

c. Publish in a newspaper of general circulation in the area adjacent to the route a procedure that the Corps will use to respond to inquiries regarding the loss of fishing gear during the dredging operation.

8. Prior to any future dredge event, the Corps shall submit to the Department data that clearly characterizes the composition of the material to be dredged, accurately estimates the volume of material to be dredged, the location of where the dredged material will be disposed, and a schedule for completing the dredging.

THIS APPROVAL DOES NOT CONSTITUTE OR SUBSTITUTE FOR ANY OTHER REQUIRED STATE, FEDERAL OR LOCAL APPROVALS NOR DOES IT VERIFY COMPLIANCE WITH ANY APPLICABLE SHORELAND ZONING ORDINANCES.

DONE AND DATED IN AUGUSTA, MAINE, THIS 30th DAY OF June, 2014.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Michael Kuhns
For: Patricia W. Aho, Commissioner

Filed
JUN 30 2014
State of Maine
Board of Environmental Protection

PLEASE NOTE THE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES…

RLG/L20323CN/ATS#77749

Natural Resources Protection Act (NRPA)
Standard Conditions

THE FOLLOWING STANDARD CONDITIONS SHALL APPLY TO ALL PERMITS GRANTED UNDER THE NATURAL RESOURCE PROTECTION ACT, TITLE 38, M.R.S.A. SECTION 480-A ET.SEQ. UNLESS OTHERWISE SPECIFICALLY STATED IN THE PERMIT.

A. Approval of Variations From Plans. The granting of this permit is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. Any variation from these plans, proposals, and supporting documents is subject to review and approval prior to implementation.

B. Compliance With All Applicable Laws. The applicant shall secure and comply with all applicable federal, state, and local licenses, permits, authorizations, conditions, agreements, and orders prior to or during construction and operation, as appropriate.

C. Erosion Control. The applicant shall take all necessary measures to ensure that his activities or those of his agents do not result in measurable erosion of soils on the site during the construction and operation of the project covered by this Approval.

D. Compliance With Conditions. Should the project be found, at any time, not to be in compliance with any of the Conditions of this Approval, or should the applicant construct or operate this development in any way other the specified in the Application or Supporting Documents, as modified by the Conditions of this Approval, then the terms of this Approval shall be considered to have been violated.

E. Time frame for approvals. If construction or operation of the activity is not begun within four years, this permit shall lapse and the applicant shall reapply to the Board for a new permit. The applicant may not begin construction or operation of the activity until a new permit is granted. Reapplications for permits may include information submitted in the initial application by reference. This approval, if construction is begun within the four-year time frame, is valid for seven years. If construction is not completed within the seven-year time frame, the applicant must reapply for, and receive, approval prior to continuing construction.

F. No Construction Equipment Below High Water. No construction equipment used in the undertaking of an approved activity is allowed below the mean high water line unless otherwise specified by this permit.

G. Permit Included In Contract Bids. A copy of this permit must be included in or attached to all contract bid specifications for the approved activity.

H. Permit Shown To Contractor. Work done by a contractor pursuant to this permit shall not begin before the contractor has been shown by the applicant a copy of this permit.

Revised (12/2011/DEP LW0428)

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-EP-PN 27 June 2014

MEMORANDUM FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers, ATTN: CENAD-PD-CID-P (Attn: Mr. Paul Sabalis), Fort Hamilton Military Community, 301 General Lee Avenue, Brooklyn, NY 11252-6700

SUBJECT: Portsmouth Harbor and Piscataqua River, NH & ME, Navigation Improvement Project, Final Feasibility Report and Final Environmental Assessment/FONSI, Increased Feasibility Phase Costs, PWI #013654

REFERENCE: Feasibility Cost Sharing Agreement with the New Hampshire Pease Development Authority for the subject feasibility study executed 12 June 2006, and modified 23 May 2013.

1. In accordance with Amendment #1 to the FCSA for the subject study, dated 23 May 2013, total study costs were estimated at $930,000, with Federal and non-Federal shares of $465,000.

2. Total study costs are now estimated at $1,126,400, with Federal and non-Federal shares of $563,200. This increase in study cost was due to additional work needed to finalize the recommended dredged material disposal base plan, address issues with newly listed species (Atlantic sturgeon), and to produce, review and process the draft and final reports through public, State and Corps reviews using a hybrid Legacy/SMART planning process. The new estimate also better anticipates the costs of producing final documents for State and Agency Review and final reviews by the ASA (CW) and OMB given the District's recent experience with the Boston Harbor project.

3. This revised study cost estimate represents an increase of $196,400, or $98,200 in additional Sponsor contributions. The Sponsor has provided $67,400 of that sum, and intends to provide the remaining $30,800 after the beginning of the State's Fiscal Year 2015 on 1 July 2014. The District has sought and received reprogramming of $49,000 in FY 2014 funds, and will seek the remaining Federal funds in our FY 2015.

4. The project is scheduled for presentation to the Civil Works Review Board at its 21 August 2014 meeting. If further information is needed, please contact, the study manager, Mr. Mark Habel at (978) 318-8871.

SCOTT E. ACONE, P.E.
Chief, Engineering/Planning Division

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-EP-PN 19 June 2014

MEMORANDUM FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers, ATTN: CENAD-PD-CID-P (Attn: Mr. Paul Sabalis), Fort Hamilton Military Community, 301 General Lee Avenue, Brooklyn, NY 11252-6700

SUBJECT: Portsmouth Harbor and Piscataqua River, NH & ME, Navigation Improvement Project, Final Feasibility Report and Final Environmental Assessment/FONSI, CWRB Submittal Package, PWI #013654

REFERENCE: Appendix H, Amendment #1, ER 1105-2-100, Policy Compliance Review and Approval of Decision Documents, dated 20 November 2007, Planning Bulletin No. PB-2013-03-Re-issue dated 14 March 2014, Civil Works Review Board Expectations and Guidance Memo dated 2 May 2014, and Policy Review Comments Memos from CECW-NAD and CENAD-PD dated 14 May and 20 May 2014, respectively.

1. In accordance with the referenced guidance, and vertical team conferences with Division and HQUSACE staff, the New England District is submitting copies of the subject Final Feasibility Report, Final Environmental Assessment/FONSI, and associated documents for endorsement and transmittal to HQUSACE in preparation for the Civil Works Review Board for this project scheduled for 21 August 2014.

2. The final report submittal package to NAD and HQUSACE includes the items on the attached list, with numbers of copies in accordance with direction from the NAD RIT.

3. As has been discussed on the weekly vertical team conference calls, State CZM consistency concurrence has been received from New Hampshire, but Maine's CZM concurrence is still pending. Maine expects to have completed their review process and issued their concurrence by the end of June.

4. The project is scheduled for presentation to the Civil Works Review Board at its 21 August 2014 meeting. If further information is needed, please contact NAE Planning Branch Chief, Mr. John Kennelly at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871.

Encl

CHARLES P. SAMARIS
COL, EN
Commanding

CF:
Joseph Vietri, NAD
Naomi Fraenkel, NAD
Michael Keegan, NAE PPM

Portsmouth Harbor and Piscataqua River
Navigation Improvement Project
Final Feasibility Report and Final Environmental Assessment
Submittal Package
19 June 2014

Tab #	Item Description	Copies Provided to NAD	Copies Provided to HQ	Binder #
	Division Commander's Letter (provided by NAD)		2	
	District Engineer's Transmittal Letter	1	2	1 & 2
1	Final Feasibility Report & EA **(and 9 CD's)**	1 with 6 CDs	9 with 9 CDs	1
	FONSI (See after EA)			
	M-CACES Estimate & Risk Analysis (See Appendix E)			
	Real Estate Activities (See Appendix H - RE Plan)			
	Public Review Documentation (See Appendix A)			
2	Report Summary (& Word file)	1	9	1 & 2
3	Report Synopsis (& Word file)	1	9	1 & 2
4	Study Issue Checklist	1	9	1 & 2
5	Report Mailing List (& Word file)	1	2	2
6	Value Engineering Statement	1	2	2
7	Sponsor's Letter of Support	1	2	2
8	Sponsor's Self-Certification of Financial Capability	1	2	2
9	Draft Proposed Chief of Engineers Report (& Word file)	1	2	2
10	Risk Register	1	2	2
11	Decision Log	1	2	2
12	Project Briefing Map (Placemat) 9 Extra Unbound Provided	1	2	2
13	Project Fact Sheet	1	2	2
14	CWRB Web Abstract (with Word file)	1	2	2
15	Draft ASA(CW)/OMB Briefing Slides (& PPT File)	1	2	2
	Review Documentation			
16	Economic Model Certification	1	2	2
17	District Quality Control Cert & Report on Final Report	1	2	2
18	Certification of Legal Review on Final Report	1	2	2
19	Policy Compliance Memorandum (with Word file)	1	2	2
20	ATR Report and Certification on Final Report	1	2	2
21	Cost Certification (NWW)	1	2	2
22	IEPR Review Documentation (Exclusion Memo)	1	2	2
23	IPR and TSP Memorandums for Record	1	2	2
24	Review Plan for PED (submitted to Division only)	1	2	2

Deviations from Appendix H
Instead of Project Risk Management Plan – a Risk Register is provided

From: Mike R Johnson - NOAA Federal
To: Rogers, Catherine J NAE
Cc: Habel, Mark L NAE; Christopher Boelke - NOAA Federal
Subject: [EXTERNAL] Re: FW: EFH NMFS Additional Information - Portsmouth (UNCLASSIFIED)
Date: Thursday, June 19, 2014 1:53:30 PM

Cathy,

As I mentioned in our phone conversation today, we do not currently have the staff resources to review and provide comments to your EA for the Piscataqua River Turning Basin dredging project.

Mike

On Thu, May 15, 2014 at 10:38 AM, Rogers, Catherine J NAE <Catherine.J.Rogers@usace.army.mil> wrote:

Classification: UNCLASSIFIED
Caveats: NONE

Hi Mike,

Please find attached the information you requested for Portsmouth Harbor/Piscataqua River EFH. Let us know if you have any questions.

Thanks.

Catherine J. Rogers, Ecologist
U.S. Army Corps of Engineers
696 Virginia Rd
Concord, MA 01742
Phone: (978) 318-8231 <tel:%28978%29%20318-8231>
Fax: (978)318-8560 <tel:%28978%29318-8560>
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Habel, Mark L NAE
Sent: Wednesday, May 14, 2014 4:09 PM
To: Rogers, Catherine J NAE
Subject: EFH NMFS Additional Information - Portsmouth

Classification: UNCLASSIFIED
Caveats: NONE

Cathy: We now have the additional information that Mike Johnson requested on Portsmouth. Specifically the drawings showing the extent of required and allowable dredging footprint for the basin and its expansion. Required is grey-shaded. OD-out is dashed line.

Required Improvement	15.0 acres
Allowable OD Improvement	1.5 acres
Required O&M	0.1 acres
Allowable OD O&M	1.3 acres

Mark L. Habel, Chief, Navigation Section
Engineering-Planning Division
US Army Corps of Engineers

Town Of Newbury
Office of the Conservation Commission
25 High Road
Newbury, MA 01951-4799
Tel: 978-465-0862 X310
Fax: 978-465-3064

6-18-2014

Army Corp of Engineers
New England District
696 Virginia Road
Concord, Ma.01742

Mr. Mark Habel
Chief, Navigation Section
Engineering/Planning Division

The Town of Newbury is, through this correspondence, expressing our continued interest in receiving dredged spoils from the Piscataqua River turning basin project. The Town is aware that approximately 360,000+- cubic yards of material will become available for Massachusetts for placement in the near shore area off our eroded beaches. The material will be shared by the Town of Salisbury, the City of Newburyport, and the Town of Newbury as agreed upon during regional meetings of the Merrimac River Beach Alliance. We have also been informed and understand that all required permitting and additional disposal costs will be the responsibility of the Towns and City.

Sincerely,

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, US ARMY CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN, NEW YORK 11252-6700

CENAD-PD-PP

16 June 2014

MEMORANDUM FOR: Chief, CENAD-PD-C (Attn: Mr. Paul Sabalis)

SUBJECT: Completion of Quality Assurance Review of the Portsmouth River and Piscataqua River Final Feasibility Report and Environmental Assessment

1. Reference is made to the Portsmouth River and Piscataqua River Final Feasibility Report and Environmental Assessment dated July 2014.

2. All comments resulting from the Quality Assurance review have been fully resolved, which led to the finalization of the referenced document by New England District.

3. Please direct any questions to Ms. Naomi Fraenkel, AICP, the QA lead for the referenced document at 917-790-8615.

JOSEPH R. VIETRI
Chief, Planning and Policy Division
Programs Directorate

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
SOUTH ATLANTIC DIVISION
60 FORSYTH STREET SW, ROOM 10M15
ATLANTA, GA 30303-8801

CESAM-PD-D (1105-2-40a) 12 June 2014

MEMORANDUM FOR MR MARK HABEL, CENAE-EP-PN, U.S. ARMY CORPS of ENGINEERS, NEW ENGLAND DISTRICT, 696 VIRGINIA ROAD, CONCORD, MASSACHUSETTS 01742-2751

SUBJECT: Certification of Final Agency Technical Review, Portsmouth Harbor and Piscataqua River, New Hampshire and Maine Navigation Improvement Project

1. References:

   a. EC 1165-2-214, Civil Works Review, 15 December 2012

   b. EC 1105-2-412, Assuring Quality of Planning Models, 31 March 2011

   c. Memorandum, CECW-CP, 30 March 2007, Subject: Peer Review Process

   d. Supplemental information for the "Peer Review Process" Memo, dated March 2007

2. In accordance with EC 1165-2-214, "Civil Works Review," dated 15 December 2012, Final Agency Technical Review (ATR) of the Portsmouth Harbor and Piscataqua River New Hampshire and Maine Navigation Improvement Project has successfully been executed through the New England District and coordinated with the Deep Draft Navigation Planning Center of Expertise (DDNPCX).

3. We certify that Final ATR of the study documents has been completed and satisfies peer review policy requirements outlined in Engineering Circular (EC) 1165-2-214, Civil Works Review, dated 15 December 2012. All outstanding issues have been addressed and satisfied. The ATR Completion Report and the DrChecks Comment Report are enclosed. The Project Delivery Team was led by Mr. Mark Habel, CENAE-EP-PN, and the ATR Leader was Ms. Lekesha Reynolds, CESAM-PD-EC, (251) 690-3260.

Johnny L. Grandison

Encls

JOHNNY L. GRANDISON
Review Manager, DDNPCX

CF:
CESAD-PD-S/PAYNE
CESAD-PD-/SMALL
CESAD-PD-S/STRATTON

PART 2

CORRESPONDENCE RECEIVED DURING PUBLIC REVIEW OF THE DRAFT FEASIBILITY REPORT AND DRAFT ENVIRONMENTAL ASSESSMENT

CITY OF NEWBURYPORT
OFFICE OF THE MAYOR
DONNA D. HOLADAY, MAYOR

60 PLEASANT STREET - P.O. BOX 550
NEWBURYPORT, MA 01950
978-465-4413 PHONE
978-465-4402 FAX

June 13, 2014

Mark L. Habel
Chief of Navigation, Northeast Region
USACE, New England District
696 Virginia Road
Concord, MA 01742

Dear Mr. Habel,

Please accept this letter as confirmation of the City of Newburyport's request for near shore disposal of sand from the proposed Piscataqua River dredging project. The City is committed to working with the towns of Newbury and Salisbury to obtain the necessary funding and approvals for placement of this sand off of Plum Island and Salisbury beach. .

As you know the ocean beaches in Newbury, Newburyport and Salisbury, Massachusetts are suffering severe and damaging erosion. We cooperated fully with the USACE on the recent Merrimack River dredging and beach replenishment project that placed sand on the beaches north of Plum Island Center and near the south end of Salisbury Beach. The project was highly beneficial, but much more sand is needed to help protect the homes, businesses and infrastructure on our beaches.

The City of Newburyport already has a Beach Management Plan in place, approved by the Massachusetts DEP and Newburyport Conservation Commission, which allows the nourishment of our beach with compatible sand, when necessary. Near shore disposal sites have already been identified and permitted off both beaches and we are prepared to obtain any and all additional permits that may be necessary. In addition, we are confident that the necessary funds for transport of the sand will be available from a non-federal sponsor.

Based on the suitability of the sand from the Piscataqua River, cost of transportation and Newburyport's dire need for a source of sand to nourish Plum Island's eroding beach and dune system, we believe this is an opportunity that we cannot afford to miss

Thank you for allowing us to participate in this very beneficial project.

Sincerely,

Donna D Holaday

Donna D. Holaday
Mayor

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

June 4, 2014

Engineering/Planning Division
Evaluation Branch

Ms. Laury Zicari, Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services, Maine Field Office
17 Godfrey Drive, Suite 2
Orono, Maine 04473

Dear Ms Zacari:

We are writing this letter to clarify some of the Fish and Wildlife Coordination Act comments we received in your most recent letter dated May 21, 2014 for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine Federal Navigation Improvement Project. Your letter was written in response to our request to conclude both the Endangered Species Act and the Fish and Wildlife Coordination Act.

There are two points from your letter that we believe are particularly important to explain, in regards to the proposed expanded turning basin at the head of the federal navigation channel in the Piscataqua River. They are:

1. the characteristics of the material from the proposed turning basin; and

2. the possibility of contaminants associated with the fine-grained (silt/clay) portion of the material from the proposed turning basin.

As you are aware, most projects, including this one, undergo multiple rounds of sediment sampling and testing as materials and resources are characterized, and project requirements and limits are refined. In your letter, information is cited from the initial suitability determination which documented the first round of sampling and testing. One boring sample out of the six samples collected in the first round of sampling in 2007 showed a much higher amount of fine-grained material than the other samples. This sample, B-5, was located in the northeast corner of the proposed turning basin and had 94.3% silt/clay at the surface and 41.5% silt/clay near the bottom of the boring sample.

As a result, additional grab samples were collected in 2009 on a 75-foot grid pattern in the area of sample B-5 to delineate the size of this fine-grained pocket. A total of 22 grab samples were attempted, with 16 samples successfully obtained. The remaining six samples were not collected after five attempts. The lack of a sample from the remaining six samples was attributed by the sampling crew to either a rocky bottom or coarse material preventing the grab from closing. Of all the attempted and collected samples, only one sample, station 6, contained more than 20% silt/clay. Station 6 contained slightly over 30% silt/clay, much less than boring sample B-5 which had slightly over 94% silt/clay at the surface.

Station 6 is located approximately halfway between boring samples B-5 and B-6. The grab samples collected closest to boring sample B-5, stations 15 and 16, contained only 1% and 9% silt respectively. This would indicate that fine-grained pockets, when present, have a very small footprint. Variability is characteristic of glacial till deposits and localized lenses or pockets of both coarse and fine materials are to be expected; they are often encountered during improvement dredging of parent material such as found here. The predominant nature of this deposit, based on the full body of sampling and testing, is sand. Therefore, we believe that the amount of silt/clay present in the proposed expanded turning basin is very small, sporadic and not significant.

We disagree with the assertion in your letter that there could be sediment contamination in the fine material lenses within the glacial till deposit to be dredged for the proposed turning basin expansion. It appears that there is some confusion on how the suitability determination for the proposed project was prepared, based on the statements made in the 5th paragraph on the second page of your letter. As stated in the paragraphs above, the first set of boring samples to determine grain size did indicate that one sample (B-5) had high levels of silt/clay. This one sample did not meet the exclusionary criteria, as indicated in the first suitability determination (dated April 21, 2009). As a result, an additional round of sediment testing was performed from locations at or near sample B-5 to delineate the size of the fine material lens or pocket. As noted above, none of these samples came close to the level of silt seen in boring sample B-5, thus indicating that the size of the fine-grained material pocket is very small. The second suitability determination (dated August 19, 2009, also included in Appendix K) was based on the entire body of sediment test results. Based on this additional information, the area of sample B-5 was determined to meet the exclusionary criteria and the suitability determination stated that all of the material from the proposed turning basin is acceptable for aquatic disposal at the selected placement sites. (As a side note, the information from the GeoTesting report cited in your letter is actually the suitability determination prepared for this project by our Regulatory Division, Policy Analysis and Technical Support Branch. GeoTesting only provided the sediment sampling grain size curves; they do not have the authority to make a suitability determination on a project.)

Potential sources of contamination noted in your letter include the Portsmouth Naval Shipyard and the former Pease Air Force base. The Portsmouth Naval Shipyard is located downstream of the proposed project at the mouth of the Piscataqua River, which is found approximately four miles from the turning basin. The former Pease Air Force base is located inland from the Piscataqua River. Both locations are generally considered to be too great a distance to have an influence on the sediments at the turning basin. In addition, the Piscataqua Region Estuaries Partnership Report (2009) documents the sediment and benthic results of two samples collected close to the turning basin location. The sediment sample results indicated that both samples were below the screening values for contaminants (meaning none of the sampled contaminants exceeded the screening value). The two benthic sample results indicated that both samples were in good benthic community condition.

As stated in the draft Feasibility Report and the Environmental Assessment, the material proposed to be removed from the expanded turning basin would not have been exposed to anthropogenic sources. This material is glacial till material deposited thousands of years ago, prior to human influence.

To summarize, we disagree that the material from the turning basin, and in particular the fine-grained material, would be a carrier of contaminants that could cause injury to fish and wildlife resources in the Piscataqua River estuary or the placement sites. First, as noted above, the amount of fine-grained material in the turning basin is expected to be negligible; second, the proposed expanded turning basin is located in an area with swift currents and no known sources of contaminants; third, the material to be removed was deposited prior to human influence; fourth and finally, the second suitability determination prepared for the proposed project took in to account all of the grain size results collected from the proposed turning basin (and currents) and concluded that the material met the exclusionary criteria and is not a carrier of contaminants.

Please call Ms. Catherine Rogers at (978) 318-8231 if you have any further questions about the suitability of the material from the proposed turning basin for placement at the nearshore or deepwater sites.

Sincerely,

John R. Kennelly
Chief of Planning

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

Reference:

Piscataqua Region Estuaries Partnership Environmental Indicators Report. June 2009. Prepared by Philip Trowbridge, Coastal Scientist, Piscataqua Regions Estuaries Partnership.

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

June 2, 2014

John R. Kennelly
Chief, Planning Branch
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

RE: File No. 2014-01; Portsmouth Harbor and Piscataqua River Navigation Improvement and Project

Dear Mr. Kennelly:

The New Hampshire Coastal Program (NHCP) has received the U.S. Army Corps of Engineers' federal consistency determination for the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, pursuant to Section 307(c)(1) of the Coastal Zone Management Act, 16 U.S.C. §1456(c)(1). The proposed project would widen the upper-most turning basin at the head of the deep-draft navigation channel in the Piscataqua River from 800 feet to 1,200 feet. Maintenance dredging of the existing basin and its approaches would also be performed. The basin would retain its current -35-foot depth at mean lower low water. Approximately 728,100 cubic yards (cy) of predominantly sand and gravel, and approximately 25,300 cy of ledge would be removed for the improvement project. Based on discussions with your staff, we understand that the estimated volume of material to be removed for maintenance dredging has been reduced from 7,800 cy to 2,100 cy. All proposed work associated with the improvement project would occur in Maine waters, while maintenance dredging would occur in both New Hampshire and Maine waters.

The federal base plan for disposal of the dredge material is at the Isles of Shoals-North ocean placement site, located approximately ten miles seaward of the entrance to Portsmouth Harbor. However, several communities in Maine and Massachusetts have proposed to beneficially use the sandy/gravelly material and rock for beach nourishment and wave attenuation. Should these communities be successful in securing the necessary regulatory approvals for such work and be willing to pay any increase in project cost to implement these proposals, then placement of some or all of the material removed from the federal navigation project at the Isles of Shoals-North site may not be necessary.

Information contained in the federal consistency determination, and in the Draft Feasibility Report and Draft Environmental Assessment submitted in support of the federal consistency determination, indicates that the proposed project is expected to take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect federally-listed threatened or endangered species, including shortnose sturgeon and Atlantic sturgeon. As you may be aware, New Hampshire Department of Environmental Services (NHDES) Wetlands Bureau rules at Env-Wt 304.11 limit dredging in tidal waters to the period of November 15 to March 15 to protect fish and shellfish resources. The NHCP, therefore, strongly recommends that all work in New Hampshire waters occur between November 15 and March 15 to minimize impacts to biological resources, including Atlantic and shortnose sturgeon, diadromous fish species and lobster. We also recommend that any proposed modification to the November 15 to March 15 dredging timeline be approved by the NHDES Wetlands Bureau in consultation with the New Hampshire Fish and Game Department.

After reviewing the federal consistency determination and supporting documentation, we find the proposed project to be consistent, to the maximum extent practicable, with the enforceable policies of New Hampshire's federally approved coastal management program.

Should you have any questions, please feel free to contact me at (603) 559-0025.

Sincerely,

Christian Williams
Federal Consistency Coordinator
New Hampshire Coastal Program

cc: Doug Grout, NH Fish & Game Department
Geno Marconi, Pease Development Authority – Division of Ports and Harbors
Dori Wiggin, NHDES Wetlands Bureau

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-EP-PN 30 May 2014

MEMORANDUM FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers, ATTN: CENAD-PD-CID-P (Attn: Mr. Paul Sabalis), Fort Hamilton Military Community, 301 General Lee Avenue, Brooklyn, NY 11252-6700

SUBJECT: Portsmouth Harbor and Piscataqua River, NH & ME, Navigation Improvement Project, Final Feasibility Report and Final Environmental Assessment/FONSI, Final NAD Submittal Package, PWI #013654

REFERENCE: Appendix H, Amendment #1, ER 1105-2-100, Policy Compliance Review and Approval of Decision Documents, dated 20 November 2007, Planning Bulletin No. PB-2013-03-Re-issue dated 14 March 2014, Civil Works Review Board Expectations and Guidance Memo dated 2 May 2014, and Policy Review Comments Memos from CECW-NAD and CENAD-PD dated 14 May and 20 May 2014, respectively.

1. In accordance with the referenced guidance, and vertical team conferences with Division and HQUSACE staff, the New England District is submitting copies of the subject Final Feasibility Report, Final Environmental Assessment/FONSI, and associated documents for concurrent Division review and final ATR. The final report submittal package to NAD includes the items on the attached list.

2. The hard copies of the Final Feasibility Report and Final EA were shipped to NAD on 23 May 2014 (four copies of the report and EA with CDs of the entire report and appendices, plus one copy with CD of the report and revised appendices). Also included were five hard copies of additional submittal items as noted on the list.

3. Enclosed with this memorandum please find five copies of each of the remaining checklist items, except the ASA/OMB briefing slides which will be transmitted electronically, and the Sponsor's letter of support and financial self certification which are still being worked on by the Sponsor.

4. As has been discussed on the weekly vertical team conference calls requests for State CZM consistency concurrence from New Hampshire and Maine have been filed with those states, but State reviews have not yet been completed.

5. The District's draft Policy Compliance Memorandum, including HQ and NAD comments with discussion and responses are included in this submittal package.

6. The project is scheduled for presentation to the Civil Works Review Board at its 21 August 2014 meeting. If further information is needed, please contact NAE Planning Branch Chief, Mr. John Kennelly at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871.

For the Commander

Encl

SCOTT E. ACONE, PE
Chief, Engineering-Planning Division

Copy Furnished (w/o encl):

Joseph Vietri, NAD
Naomi Fraenkel, NAD
Michael Keegan, NAE PPM

PEASE
INTERNATIONAL
DEVELOPMENT
AUTHORITY

May 29, 2014

Mr. John Kennelly
Chief, Planning Branch
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

Re: Portsmouth Harbor and Piscataqua River Navigation Improvement Project

Dear Mr. Kennelly:

Pease Development Authority and its Division of Ports and Harbors (PDA-DPH) has reviewed the draft Feasibility Report and Environmental Assessment in connection with the Portsmouth Harbor and Piscataqua River Navigation Improvement Project and concurs with the recommendations set forth therein and supports the recommended plan of improvement for the harbor. The recommended plan consists of dredging and rock removal to expand the turning basin width to 1,200 feet at its existing depth of -35 feet at mean lower low water. The plan includes ocean placement of all dredged materials at the Isles of Shoals North site seaward of the territorial sea. Any additional costs for the several nearshore placement plans for the dredged materials as proposed by coastal communities are not part of the recommended plan being shared by the PDA-DPH.

The current 800-foot turning basin causes major safety concerns for LPG and other bulk shippers and limits the existing and future uses of the terminals. The proposed turning basin widening will allow the current trend of larger vessels to be safely turned, the economic impact of which is considerable.

PDA-DPH has also reviewed the model design and model project cooperation agreements which have been provided for review and will serve as the basis for the agreements the US Army Corps of Engineers will require PDA-DPH to enter into. PDA-DPH fully understands, appreciates and accepts its responsibilities as the non-federal sponsor for the project and asserts, subject to securing legislative approval as noted below, it is willing and capable of meeting its responsibilities under said agreements. As you are aware, PDA-DPH has successfully partnered with the US Army Corps of Engineers in connection with projects in the past (e.g., the Section 107 navigation improvement project in Hampton Harbor).

In addition to this letter of support, I have attached the Non-Federal Sponsor's Self-Certification of Financial Capability for Agreements which has been signed off on by PDA-DPH's Director of Finance. As an agency of the State of New Hampshire, PDA-DPH must adhere to a set protocol for securing funding and entering into agreements with the US Army Corps of Engineers. Subject to the approval of the NH State legislature, PDA-DPH intends to meet the non-federal sponsor's cost sharing requirements for this project. Note however that future budgets are subject to the State legislature's appropriation process. To date PDA-DPH has committed a total of $532,400 towards this project and is committed to contributing an additional $30,800 on or shortly after July 1, 2014. Finally, please note that, as in the past, PDA-DPH is required to seek legislative approval to enter into the model design and project cooperation agreements. In this instance, PDA-DPH will initiate legislation which will seek approval to enter into and proceed with this project as proposed.

Sincerely,

David R. Mullen
Executive Director

Enclosure

cc: Geno J. Marconi, Director, PDA-DPH
Mark H. Gardner, Deputy General Counsel

P:\PortAuthority\Dredging\KennellyPiscataquaSupportLtr052814.wpd

NON-FEDERAL SPONSOR'S
SELF-CERTIFICATION OF FINANCIAL CAPABILITY
FOR DECISION DOCUMENTS

I, IRVING CANNER, do hereby certify that I am the DIRECTOR OF FINANCE ~~Chief Financial Officer~~ of the Pease Development Authority (the "Non-Federal Sponsor"); that I am aware of the financial obligations of the Non-Federal Sponsor for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, Navigation Improvement Project; and that the Non-Federal Sponsor will have the financial capability to satisfy the Non-Federal Sponsor's obligations for that project. I understand that the Government's acceptance of this self-certification shall not be construed as obligating either the Government or the Non-Federal Sponsor to implement the project.

IN WITNESS WHEREOF, I have made and executed this certification this 29TH day of MAY, 2014.

BY: ______________________________________

TITLE: DIRECTOR OF FINANCE

DATE: MAY 29 2014

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

May 22, 2014

Engineering/Planning Division
Evaluation Branch

Ms. Kathleen Leyden
Maine Coastal Program
Maine Department of Agriculture, Conservation and Forestry
98 State House Station
17 Elkins Lane
Augusta, Maine 04333-0038

Dear Ms. Leyden:

At the request of your staff, and as discussed in our letter to your office dated May 13, 2014, we are enclosing for verification a copy of the public notice of our intent to submit a consistency determination for the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project. This public notice was published in the Portland Press Herald on Saturday May 17, 2014. A copy of the public notice will also be sent to the Maine Department of Environmental Protection and the town offices in Eliot and Kittery.

If you have any questions or comments, please contact Ms. Catherine Rogers at (978) 318-8231, or the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosure

Copy Furnished (w/ encl):

Mr. Robert Green
Maine Department of Environmental Protection
Southern Maine Regional Office
312 Canco Road
Portland, Maine 04103

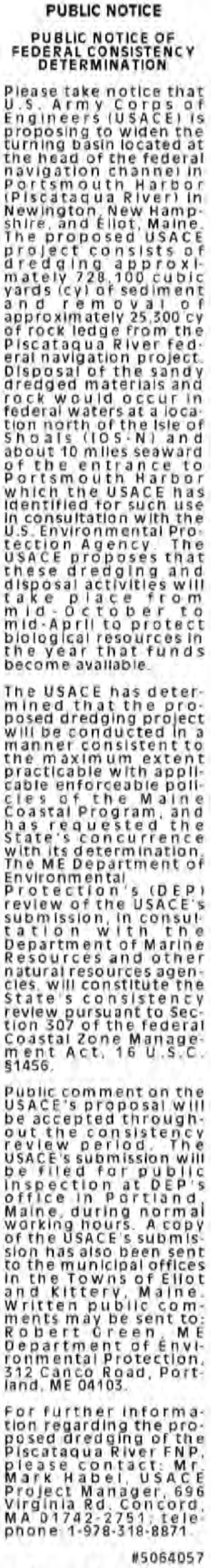
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03802

Mr. Jonathan L. Carter, Town Manager
Town Offices
P.O. Box 398
Wells, Maine 04090

Mr. Nancy Colbert Puff, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

Ms. Kate Pelletier, Planning Assistant
Town of Eliot
1333 State Road
Eliot, Maine 03903

Ad ID 5064057 **Date** 05/15/2014 **Time** 3:45 PM



PUBLIC NOTICE

PUBLIC NOTICE OF FEDERAL CONSISTENCY DETERMINATION

Please take notice that U.S. Army Corps of Engineers (USACE) is proposing to widen the turning basin located at the head of the federal navigation channel in Portsmouth Harbor (Piscataqua River) in Newington, New Hampshire, and Eliot, Maine. The proposed USACE project consists of dredging approximately 728,100 cubic yards (cy) of sediment and removal of approximately 25,300 cy of rock ledge from the Piscataqua River federal navigation project. Disposal of the sandy dredged materials and rock would occur in federal waters at a location north of the Isle of Shoals (IOS-N) and about 10 miles seaward of the entrance to Portsmouth Harbor which the USACE has identified for such use in consultation with the U.S. Environmental Protection Agency. The USACE proposes that these dredging and disposal activities will take place from mid-October to mid-April to protect biological resources in the year that funds become available.

The USACE has determined that the proposed dredging project will be conducted in a manner consistent to the maximum extent practicable with applicable enforceable policies of the Maine Coastal Program, and has requested the State's concurrence with its determination. The ME Department of Environmental Protection's (DEP) review of the USACE's submission, in consultation with the Department of Marine Resources and other natural resources agencies, will constitute the State's consistency review pursuant to Section 307 of the federal Coastal Zone Management Act, 16 U.S.C. §1456.

Public comment on the USACE's proposal will be accepted throughout the consistency review period. The USACE's submission will be filed for public inspection at DEP's office in Portland, Maine, during normal working hours. A copy of the USACE's submission has also been sent to the municipal offices in the Towns of Eliot and Kittery, Maine. Written public comments may be sent to: Robert Green, ME Department of Environmental Protection, 312 Canco Road, Portland, ME 04103.

For further information regarding the proposed dredging of the Piscataqua River FNP, please contact: Mr. Mark Habel, USACE Project Manager, 696 Virginia Rd. Concord, MA 01742-2751; telephone 1-978-318-8871.

#5064057

Ad shown is not actual print size

Office of the Town Manager

208 Sanford Road
Wells, Maine 04090

Voice: 207-646-5113
Fax: 207-646-2935
TDD: 207-646-7892
E-mail: jcarter@wellstown.org

May 21, 2014

Mark L. Habel, Chief,
Navigation Section Engineering-Planning Division
US Army Corps of Engineers New England District
696 Virginia Road,
Concord, MA 01742

Re: Dredge Materials from Portsmouth Harbor Piscataqua River- Turning Basin Project

Dear Mr. Habel:

The Board of Selectmen is writing to re-assert the commitment by the Town of Wells to receive the dredge materials from the Portsmouth, NH Turning Basin Project. We are interested in receiving half the quantity of the sand projected at 365,000cy. The Town is extremely interested in the sand as it will assist in the community's beach replenishment efforts.

The Town requested from Dr. Stephen Dixon of the Maine Geologic Survey to review the amount of materials the Wells system might be able to reasonably handle. Dr. Dixon's report is enclosed which supports the amount of sand we are requesting.

The Town continues to raise funds for the project. However, the Town would appreciate a more firm cost per cy when possible as it will assist in reaching that target. Obviously when the project was initially discussed, we saw estimates from $2-$4 per cy delivered to Wells and disposed near shore. That is a vast range and we hope will end up being on the lower end.

The Town seeks your guidance as to what further permits we need to be applying for and whether these are solely Wells applications or if the ACOE is a co-applicant.

Regards,

BOARD OF SELECTMEN OF THE TOWN OF WELLS:

Karl Ekstedt
Karl Ekstedt

Richard Clark
Richard Clark

Christopher Chase

Tim Roche

Robert Foley
Robert Foley

cc: Jonathan Carter, Town Manager
Maine Delegation

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Maine Field Office
17 Godfrey Drive, Suite 2
Orono, Maine 04473
207/866-3344 Fax: 207/866-3351

May 21, 2014

John R. Kennelly
Chief of Planning
U. S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

This letter is in response to your letter dated April 2, 2014 regarding a study proposal for the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project. Specifically, you requested that we conclude coordination under both the Endangered Species Act and the Fish and Wildlife Coordination Act.

Project Name/Location: Piscataqua River Federal Navigation Improvement Project
Log Number: **05E1ME00-2013-I-0282**

Our comments only apply to the Maine portion of this project. The U. S. Fish and Wildlife Service's (Service) New England Field Office commented on the New Hampshire and Massachusetts portions of this project in a letter dated December 11, 2013.

The project is described in previous correspondence between the Service and the Corps and in the *Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, Draft Feasibility Report and Draft Environmental Assessment for Navigation Improvement Project.*

Endangered Species Act Comments

Based on the information currently available to us, no federally-listed species under the jurisdiction of the Service occur at the Piscataqua River dredging site. The piping plover (*Charadrius melodus*, federally threatened) and red knot (*Calidris canutus*, proposed for federal listing as threatened) occur at the Wells Beach, Maine disposal site. These birds are present on Wells Beach, approximately 500 feet from the disposal site, from March 15 to September 15. Plovers nest on Wells Beach and red knots frequent the beach especially during their southward migration in late summer.

Your April 2, 2014 letter considers the direct effects on piping plovers and red knots. Placement of dredged materials will occur between mid-October and late-February. This is outside of the time that these species are generally present on Wells Beach.

Your letter also considers indirect effects to these species. Sand from this project would be expected to migrate on to Wells Beach and reduce beach erosion. This sand will create habitat for piping plovers and red knots and increase recreational value of the beach. Unmanaged recreation could result in adverse effects to these birds. Our offices recently consulted on the dredging of the Wells Harbor Federal Navigation Project and associated beach nourishment, which was completed this past winter. To avoid potential adverse indirect effects to plovers and knots, the town of Wells has a Beach Management Agreement with the Service and Maine Department of Inland Fisheries and Wildlife that meets the Service's piping plover guidelines.

We raised two additional indirect effects at our March 19, 2014 meeting – dredged material characteristics and contaminants.

An indirect effect to piping plovers includes the possibility of incompatible dredge material. Data from sediment core samples ((EA pp. 12-13, Appendices J and K) indicate most of the sample cores contain medium to fine sands and gravel with some silt. Additional sediment size information in Appendix K (p. K-4), indicates there were several samples with higher gravel and silt composition (see next paragraph). The draft EA indicates coarse and fine materials will be sorted by dredging and wave action at the disposal site and only sand would make its way to the beach. The dredged materials (except for predominantly silt and gravel), likely will be compatible with existing sand on Wells Beach. Concerning dredged material characteristics, we conclude that adverse effects to plovers and knots would be insignificant and discountable.

There could be contamination in the Piscataqua River sediments, especially in areas with higher silt content. The GeoTesting reports includes an assessment of the Ocean Dumping Act Regulatory Requirements K-2 and3), which indicates most of the dredge materials met the requirement of section b(1) of the this Act; "Dredged material that is predominantly sand, gravel, rock, or any other naturally occurring bottom material with particle size greater than silt and is found in areas of high current or wave energy can be disposed of in a 103 site without further testing. This portion of the Piscataqua River (the northernmost turning basin) is well known for its fast tidal currents. The NOAA-predicted tidal currents for this portion of the Piscataqua River from 15 July to 11 August 2009 varied from 2.0 knots to 4.1 knots. As the material from the samples (in the northernmost turning basin) is predominantly sand and gravel (0% to 31.3% fines), it does meet this exclusion and can be disposed of as proposed." However, a second set of sediment samples indicated that 2 of 10 (20%) samples in the turning basin had high silt content (41-94%)(p. K-10). The GeoTesting report cites Section b(3) of the Act and concludes "when dredged material…is taken from a site far removed from known sources of pollution, it can be disposed of without further testing. This project's material does not meet this exclusion." (p. K-9).

Because of the high current velocities, much of the silt, and contaminants contained therein, will be mobilized in the Piscataqua River during dredging and will be flushed into the estuary

(Appendix Q, response to NOAA comments). Any contaminants in silt will be further dispersed when the dredge materials are dispersed into the water column at the Wells disposal site and by subsequent wave and current action.

Thus, we concur with your determination that direct and indirect effects of this project are insignificant and discountable and not likely to adversely affect piping plovers and red knots.

Fish and Wildlife Coordination Act Comments

Sediments in the lower Piscataqua River likely contain contaminants as this is a highly industrialized area (EA Figure 2). We briefly searched the draft EA and its many appendices for information on contaminants sampling but could find none. The draft EA indicates that, "The material to be dredged is considered to be uncontaminated because water quality in the area is high and because the shoal area is a relatively high energy sand environment with a low percentage of fines. Therefore little release of sediment contaminants into the water column is expected. Any release of contaminants would be quickly diluted by the tidal flushing in the area" (p. 42 of the EA, and response to NOAA endangered species, p. Q-11). The draft EA further states that the area has not been dredged before so the material has little anthropogenic influences (contamination), and that "the dredged sediments are clean, coarse sand and gravel that is considered to be free of contaminants (pp. 45, 53)."

The action area is upriver of the Portsmouth Naval Shipyard identified by the EPA as a National Priority List Superfund site in 1994 and downstream of superfund sites at the former Pease Air Force base (http://www.epa.gov/superfund/sites/npl/nar1393.htm last accessed May 19, 2014). EPA sampling indicate the presence of contaminants at locations up- and down-river of the project area (http://www.prep.unh.edu/resources/pdf/2009_state_of_the-prep-09.pdf last accessed May 19, 2014). A review of contaminants in New Hampshire coastal sediments (http://prep.unh.edu/resources/pdf/atechnicalcharacterization-nhep-00.pdf last accessed on May 19, 2014) provides additional information on heavy metals and toxic contaminants in Piscataqua River sediments.

Contaminants are likely to be retained in silt deposits. We note above that GeoTesting found high silt content in several samples in the turning basin.

GeoTesting indicated that the draft suitability determinations for sediments were sent to Maine and New Hampshire DEPs, US EPA, and the Service for their review. On August 12, 2009, the Service's Maine Field Office responded indicating we could not comment on this suitability determination because of other workload priorities (pp. Appendix K).

There could be contaminated sediment in the project area, especially associated with pockets of substrates with higher silt content. According to the draft EA, this is the first time that the river bottom has been disturbed "so the material has little anthropogenic influences (contamination)" (p. EA-45) and is "removed from any known sources of contamination" (p. EA-46)," and "is considered to be free of contaminants" (p. 53), and "no chemical impacts on the disposal site biota are anticipated" (p. 54). We find this incongruous with previously cited information about contaminants in the lower Piscataqua River. If significant contaminants are present, releasing them from river sediments would be expected to cause injury to fish and wildlife resources in the Piscataqua River estuary and possibly at the deposition sites. Levels of injury would depend on the amount and type of contaminants present and released into the environment. Intertidal estuaries and flats are important sources of food for both humans and wildlife in the Piscataqua River estuary and Wells.

The Corps concludes "no release (of) contaminants into the water column during the dredging operations are expected" (EA p. 51). This may not be a correct conclusion given the potential for contamination in the action area and the possibility that contaminated silt may have accumulated in sediments in the project area. We encourage the Corps to identify areas of higher silt content in the turning basin and sample these areas for contaminants. If contaminants are found, we encourage the Corps to take measures to avoid releasing contaminants into the Piscataqua River ecosystem. We also encourage contaminant monitoring in the estuary during and after dredging to document contaminants released into the greater Piscataqua ecosystem.

Please contact us at 207 866-3344 if you have any questions or comments.

Sincerely,

Mark McCollough
acting for
Laury Zicari
Field Supervisor
Maine Field Office

cc: Kimberly Damon-Randall, Endangered Species, NOAA Fisheries

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN NY 11252-6700

CENAD-PD-C

20 May 2014

MEMORANDUM FOR Commander, US Army Corps of Engineers, New England District (CENAE-EP), 696 Virginia Road, Concord, MA 01742-2752

SUBJECT: Portsmouth Harbor, New Hampshire – Draft Feasibility Report and Environmental Assessment (CWIS: 013856, P2 109098)

1. Reference is made to CENAE-EP-PN memorandum dated, 4 April 2014 requesting review of the subject document.

2. Enclosed are the Division's review comments, which were already provided to your staff on 5 May 2014.

3. The point of contact for this action is Mr. Paul Sabalis, who may be reached at (347) 370-4589.

~~LINDA~~ MONTE
Chief, Civil Works integration Division

Portsmouth Harbor, NH

Planning and Policy

See attached memo with comments (received 20 May 2014)

Operations

1. Since the majority (about 90 percent) of ships that use these terminals are less than 680 feet in length, a basin width of 1,020 feet was the smallest to be evaluated. The next basin width to be analyzed was 1,120 feet. This is based on a 747 foot long vessel which represents over 99 percent of vessel trips over the last 5 years."

I understand what is trying to be said, but think the last two sentences of the above could be clearer if stated like this:

"The next basin width to be analyzed was 1,120 feet, which is based on a 747 foot long vessel. This basin width would be able to handle about 99 percent of the vessel trips made over the last 5 years."

I noted that ATR comment 5451996 raised a similar concern with the wording in this para.

Engineering

1. The subject report is satisfactory.

ATR comment 544812 recommended a waiver be requested for omitting a ship simulation study. EM 1110-2-1613, Hydraulic Design of Deep Draft Navigation Projects, indicate that ship simulation is needed for determining channel configuration. Paragraph 9-2c(1) states that a turning basin should be elongated along the prevailing current direction when currents are greater than 1.5 knots and designed according to tests conducted on a ship simulator. Since turns will be made during slack tides when currents are less than 1.5 knots and based on the input of local pilots, a ship simulation does not appear warranted at this time.

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
GENERAL LEE AVENUE, BLDG 301
BROOKLYN, NY 11252

REPLY TO

CENAD-PD-P 5 May 2014

MEMORANDUM FOR Civil Works District Support Team (Sabalis)

SUBJECT: Portsmouth Harbor, New Hampshire Feasibility Study Draft Feasibility Report and Environmental Assessment (P2#: 109098 CWIS#: 013856)

1. Reference is made to
   a. CENAD-PD-CS memorandum, dated 10 April 2014, requesting MSC review and approval of NAE's Draft Feasibility Report and Environmental Assessment.
   b. CENAE-EP-PN memorandum, dated 4 April 2014, which transmitted subject report for review and approval.

2. At your request (Reference 1a), Division staff has reviewed the subject report as requested in Reference 1b. This document has already undergone significant review and during the DQC, ATR, and Model Review Process. Nonetheless, there are a few changes and issues addressed in the version that will be part of the Civil Works Review Board submission.

   a. On page ES-6, the last sentence should be changed to read "expected average annual **net** benefits of $2,208,800".

   b. The Executive Summary clarifies that the tentatively recommended plan includes nearshore placement of dredged material but should these communities fail to secure appropriate approvals or funding the federal base plan (IOS-N) would be implemented. Based upon these 2 eventualities ESA and EFH coordination should cover both dredged material placement options.

   c. Section 3.10.2 IOS-N dredged material placement site discussion states that by letter of February 3, 2014 NMFS determined that use of the IOS-N site is not likely to affect listed species. However, the referenced letter discussed placement of rock only at the IOS-N site, and assumed placement of the other material at nearshore sites. District is asked to clarify whether NMFS made that same determination based upon placement of all dredged material at the IOS-N site.

   d. Section 5.1 of the main report says that VOC's used are from 2008 while the Economics Appendix says that the VOCs were from 2011. Given the back and forth on these items during the model review, it is anticipated that this is a mistake in the main report that requires a text change. The documents should be consistent.

   e. Section 5.5.2 and EA-45, Impacts of disposal states, "This area has not been dredged before so has little anthropogenic influences (contamination.) Whether an area has been or not been dredged before is not a determining factor in the presence of contaminants. It is recommended this sentence be deleted.

   f. Section 5.5.2, Impacts of Disposal. This section is written for the tentatively selected plan of nearshore disposal. As the possibility remains that the Federal base plan will be used it is recommended that this section be re-written in the final report to include the Federal base as well as nearshore betterment alternatives.

g. Section 5.5.3, paragraph 3 references, “information you provided in your letter”: it is unclear what letter is being referenced.
h. Section 6.0, Description of Tentatively Recommended plan is unclear as to whether the Federal base plan or the “betterments” plan is the tentatively recommended plan.
i. EA-48: The Maine USFWS office stated that USACE would need to make a determination of effects based upon a clear project description and evaluation of effects. This determination of effects should take place in the Feasibility Phase as part of ESA coordination and may not be deferred to the design phase.
j. EA-60, Endangered Species Act Compliance states that Section 7 consultation will either be completed before construction or the material will be placed at other sites. District is advised that this Study cannot proceed to CWRB before conclusion of Section 7 consultation. District is strongly advised to either initiate Section 7 consultation immediately, or remove the Wells Beach nearshore site as a dredged material placement site.
k. EA-60, CZM discussion states that a CZM consistency determination shall be provided for review and concurrence. District is reminded that said concurrence is required for the Final EA and for report approval. It is recommended that District prepare and provide the CZM consistency determination in the very near future.
l. ESA: FWS Maine office correspondence dated February 14, 2014 references “future ESA Section 7 consultation, and the need for the Corps to make a determination of effects”. Have these been initiated and if so, what is the target completion date?

In addition, ATR comment 544812 recommended a waiver be requested for omitting a ship simulation study. EM 1110-2-1613, Hydraulic Design of Deep Draft Navigation Projects, indicate that ship simulation is needed for determining channel configuration. Paragraph 9-2c(1) states that a turning basin should be elongated along the prevailing current direction when currents are greater than 1.5 knots and designed according to tests conducted on a ship simulator. Since turns will be made during slack tides when currents are less than 1.5 knots and based on the input of local pilots, a ship simulation does not appear warranted at this time. If the district has to request a waiver, NAD will support this request as necessary.

3. The point of contact for this action is Ms. Naomi Fraenkel, AICP (NAE Planning Program Manager). Ms. Fraenkel may be reached at (917) 790-8615.

JOSEPH R. VIETRI
Chief, Planning and Project Formulation
Programs Directorate

Tribal Historic Preservation Office

Passamaquoddy Tribe
PO Box 159 Princeton, Me. 04668
207-796-5533

USACE
NE District
696 Virginia Rd
Concord, MA

May 15, 2014

Re: Portsmouth Harbor – Eliot ME & Newington NH

Dear Colonel Samaris;

The Passamaquoddy THPO has reviewed the following application regarding the historic properties and significant religious and cultural properties in accordance with NHPA, NEPA, AIRFA, NAGPRA, ARPA, Executive Order 13007 Indian Sacred Sites, Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, and Executive Order 12898 Environmental Justice.

The above listed proposed project will not have any impact on cultural and historical concerns of the Passamaquoddy Tribe.

Sincerely;

Donald Soctomah
Soctomah@gmail.com
THPO
Passamaquoddy Tribe

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET NW
WASHINGTON, D.C. 20314-1000

CECW-NAD 14 May 2014

MEMORANDUM THRU COMMANDER, NORTH ATLANTIC DIVISION, (CENAD-PD-CS, Ms. Linda Monte)

SUBJECT: Headquarters Policy Review Comments for Portsmouth Harbor and Piscataqua River Navigation Improvement Project, New Hampshire and Maine, Draft Feasibility Report and Environmental Assessment

1. Reference:

a. CENAE-EP-PN Memorandum, dated 4 April 2014, subject as above.

2. Policy compliance review comments submitted for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project, New Hampshire and Maine, Draft Feasibility Report and Environmental Assessment and Policy Guidance Memorandum are enclosed. Satisfactory resolution of the comments is necessary to complete the review and approval process.

3. All comments are to be addressed. When submitting the response to policy comments, provide a copy electronically in Word format in addition to the hard copies.

4. Questions regarding this matter may be directed to Ms. Grace Bowles, at (202) 761-4235.

Catherine Shuman

ENCL

CATHERINE M. SHUMAN
Deputy Chief, North Atlantic Division
Regional Integration Team
Directorate of Civil Works

CECW-PC **15 May 2014**

Portsmouth Harbor and Piscataqua River Navigation Improvement Project
New Hampshire and Maine
Draft Feasibility Report and Draft Environmental Assessment and FONSI
Policy Compliance Review Comments

I. BACKGROUND. This Feasibility Report and Environmental Assessment (EA) presents the findings of a study to determine whether navigation improvements to the existing Federal navigation project at Portsmouth Harbor and Piscataqua River are warranted and in the Federal interest. The proposed project site is located in the upper turning basin of the upper reach of the Piscataqua River, which borders New Hampshire and Maine. This report presents the results of studies concerning the feasibility of providing a wider turning basin and describes the engineering, economic, social, and environmental analyses that were conducted to develop a selected plan of action.

II. STUDY STATUS. This study is following a modified legacy milestone path and is directed by Section 436 of the Water Resources Development Act of 2000 (P.L. 106-541). The New England District began vertical team coordination with an In Progress Review on 27 December 2013. A Tentatively Selected Plan meeting was held on 11 March 2014 and the draft Feasibility Report and EA were approved for release for concurrent public, agency, and policy compliance review subject to the receipt of economic review model certification. Model certification was received on 25 March 2014. The Draft Feasibility Report and Environmental Assessment were received at USACE HQ on 10 April 2014. Following review comments received from NAD and HQ, the vertical team held an In Progress Review meeting on 7 May 2014 to discuss those comments.

III. REVIEW COMMENTS. This section captures the policy and legal review comments. Several of these comments were addressed during the In Progress Review on 7 May 2014.

A. Plan Formulation

1. **Base Year.** A Base Year of 2015 does not seem realistic. The study is expected to be completed by 2015 and then design/implementation is expected to take 1.5 years. Suggest the PDT reevaluate the Base Year.

2. **Value Engineering.** The submittal indicates that Value Engineering activities will be conducted during the Design Phase. VE is also required in Feasibility phase, per ER 1110-2-1150. The submittal should articulate what activities occurred during feasibility that meets the intent of VE. The district should ensure future submittals include VE in the Engineering documentation to comply with the requirements prescribed in ER 1110-2-1150 and ER 11-1-321.

3. **Dredge Disposal –**While the report lays out the details for dredge disposal (base plan is identified, but project <u>may</u> utilize beneficial use at four communities), it is uncertain that the plan is documented correctly for project approval or authorization. The documentation indicates that the decision on disposal will be decided in a later project phase. The CW Review Board will likely have issues with not having a singular dredged material placement plan rather than a couple of "incomplete" placement options which would be completed in PED. The Environmental Assessment & Finding of No Significant Impact state that additional testing needs to be done to get the proposed ocean site identified as the Isle of Shoals-North. The historic IOS site may not be available. Also, the details with the four communities who wish to receive some of the material have not been worked out. While these alternative disposal sites could conceivably be pursued as a "locally preferred plan" requiring ASA(CW) waiver in order to allow the Corps to recommend their implementation, the district should give careful consideration of whether such an approach would be necessary and appropriate. Making alternative disposal sites part of the recommended plan could raise a couple of possible concerns, including a question of how to recommend such sites consistent with the Corps' "Federal standard" requirements, as well as run the risk of creating unrealistic expectations that such sites will be used before necessary permitting and funding is confirmed. These activities should be addressed in the report in a manner that makes clear that the Federal plan is the recommended plan. This will ensure that the project is ultimately able to be implemented consistent with that Federal plan with a minimum of ancillary obstacles, while also acknowledging the potential for alternative sites if non-Federal interests are able to fulfill their responsibility for the timely securing of necessary permits and provide funding to cover the incremental cost of alternative placement (see, for example, discussion in part 5.3 on pages 49-50 of the report).

B. Environmental

1. **Update red knot listing.** The red knot listing as threatened under the ESA has been updated. The report should reflect the current status. The listing process

was restarted or updated April 3, 2014. This would impact the IOSN site but may affect some nearshore sites.

2. **Environmental compliance updates.** The VT should discuss the current status of any incomplete environmental compliance issues (WQC, CZM etc) to ensure these can be dealt with prior to the CWRB.

C. Cost Sharing

1. **Items of local cooperation.** The items of local cooperation included in part 7.0 on pages 80-81 of the report require a minor change. Language in item a.(1) stating "25 percent of design costs . . ." should be replaced with "the required non-Federal share of design costs". These edits are needed to conform the lists to more recent ASA(CW) policy guidance which now contemplates the use of cost share percentages in design agreements that match the construction cost sharing percentage appropriate for a project's purpose or purposes.

2. **Sponsor certification of financial capability.** Part 6.14 on page 79 of the draft report acknowledges that the sponsor will need to submit a self-certification of financial capability. This will be required prior to finalization of the report. See CECW-PC memorandum dated 12 June 2007, Lean Six Sigma (L6S) Actions to Improve the Project Cooperation Agreement Process – Non-Federal Sponsor's Self-Certification of Financial Capability ("a non-Federal sponsor will sign the Non-Federal Sponsor's Self-Certification of Financial Capability For Decision Documents (enclosure 3) for such purpose."). The District should confirm that this certification will be included in the report.

3. **Sponsor letter of intent.** Part 6.14 on page 79 of the report states that the sponsor supports the project and understands its responsibilities under the future PPA. An actual signed letter of intent from the sponsor is also required prior to final approval of the report, as required by ER 1105-2-100, Appendix G, at G-9 ("The non-Federal sponsor's acceptance of, or desired departures from, the terms of the applicable model PCA must be presented, including: 1) applicable cost sharing and financial policies; 2) policies regarding provision and valuation of non-Federal lands, easements, rights-of-way, and disposal areas provided by non-Federal sponsors; 3) policies governing non-Federal project construction; and, 4) other provisions required by law and policy for new start construction projects."). Note that this letter of intent is a requirement separate from the financial self-certification, which does appear to be included in the report appendices.

4. **Non-Federal share of construction costs.** Table ES-1 on page ES-1 of the executive summary includes reference to the “Non-Federal Up-Front Share (25%)”. This is not entirely accurate, as the sponsor is free either to fund its construction cost share prior to the initiation of construction, or to pay its cost share proportionally during construction. Suggest revising this phrase to read “Non-Federal Share During Construction (25%)”. In addition, Table 19 on page part 6.3, subsection c. on page 71 of the report characterizes the sponsor’s additional 10 percent payment as a “Post Construction Reimbu[r]sement.” This is not really an accurate reflection of the 10 percent payment requirement, which does not actually reimburse the Corps’ costs but functions simply as an additional payment obligation of the sponsor, which can occur long after the Corps completes construction and even be reduced depending upon the sponsor’s LERR contributions. Suggest revising this phrase to read “Post Construction Payment”.

D. Real Estate

1. **Need a Real Estate Plan.** ER 405-1-12, Chapter 12-16 (b) states a REP must be prepared in support of decision documents for all types of water resources projects. The level of detail required for each item described in the scope and content section of the ER (Chapter 12) will vary depending on the scope and complexity of each project. The REP should describe and discuss the lands, easements, rights-of-way, relocations, and borrow materials and dredged or excavated material disposal required for the project and respective ownerships etc. In addition to LERRD costs, the estimated administrative and incidental costs should be included. Please provide a real estate plan tailored to the particular facts and circumstances of the Portsmouth Harbor and Piscataqua River navigation improvement project.

From: Rogers, Catherine J NAE
To: Max Tritt - NOAA Federal
Cc: Mike R Johnson - NOAA Federal; Habel, Mark L NAE; Mackay, Joseph B NAE
Subject: RE: Section 7 - Portsmouth Turning Basin Expansion (UNCLASSIFIED)
Date: Tuesday, May 13, 2014 11:08:39 AM

Classification: UNCLASSIFIED
Caveats: NONE

Thanks Max.

Catherine J. Rogers, Ecologist
U.S. Army Corps of Engineers
696 Virginia Rd
Concord, MA 01742
Phone: (978) 318-8231
Fax: (978)318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Max Tritt - NOAA Federal [mailto:max.tritt@noaa.gov]
Sent: Tuesday, May 13, 2014 9:32 AM
To: Rogers, Catherine J NAE
Cc: Mike R Johnson - NOAA Federal
Subject: Section 7 - Portsmouth Turning Basin Expansion

Hi Catherine,

We have evaluated the effects of dredged materiel deposition at near shore and off shore locations as per section 7 of the ESA in regards to their potential impacts to listed species and/or designated critical habitat. We concluded that the action may affect, but is not likely to adversely affect listed species or designation critical habitat under our jurisdiction. Once the spoil has been tested and determined suitable for aquatic disposal, the project has effectively cleared the ESA hurdle. Should the dredged materiel fail the suitability test, an alternate terrestrial disposal site must be found, but such actions are beyond NMFS purview.

As for potential effects to essential fish habitat or effects to managed fisheries, I must defer to our Habitat Conservation Division. Its my understanding that you have been in contact with Mike Johnson regarding this project. Please follow up with Mike regarding any unresolved issues pertaining to potential habitat modification at the disposal sites.

Cheers,

Max

H. Max Tritt
Fishery Biologist
National Marine Fisheries Service
Maine Field Station
7 Godfrey Drive, Suite 1
Orono, ME. 04473
Tel: 207.866.3756
Fax: 207.866.7342

Classification: UNCLASSIFIED
Caveats: NONE

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

May 13, 2014

Engineering/Planning Division
Evaluation Branch

Ms. Kathleen Leyden
Maine Coastal Program
Maine Department of Agriculture, Conservation and Forestry
98 State House Station
17 Elkins Lane
Augusta, Maine 04333-0038

Dear Ms. Leyden:

This letter and enclosures provides the Maine Coastal Program the additional information requested by your staff to assist them in reviewing our Federal consistency determination for concurrence under the Coastal Zone Management Act § 307(c) and 15 CFR Part 930, Subpart C for the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project. In particular, the amended Natural Resources Protection Act form and applicable supplemental information is attached. A letter was sent to your office on April 8, 2014 describing the proposed project and attaching our determination of how the proposed Federal action is consistent with the enforceable policies of the Maine Coastal Program. A CD containing the Draft Feasibility Report and Draft Environmental Assessment (FR/EA) on the proposed project was also enclosed with that letter for your information and reference.

A public notice of our intent to submit a consistency determination will be published in a local paper shortly and a copy will be submitted to your office for verification once it is published. A copy of the public notice and the additional information enclosed will also be sent to the town offices in Eliot and Kittery. These towns were previously sent the Federal public notice and Draft FR/EA.

If you have any questions or comments, please contact Ms. Catherine Rogers at (978) 318-8231, or the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures

Copy Furnished w/ Encls:

Mr. Robert Green
Maine Department of Environmental Protection
Southern Maine Regional Office
312 Canco Road
Portland, Maine 04103

Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03802

Mr. Jonathan L. Carter, Town Manager
Town Offices
P.O. Box 398
Wells, Maine 04090

Mr. Nancy Colbert Puff, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

Ms. Kate Pelletier, Planning Assistant
Town of Eliot
1333 State Road
Eliot, Maine 03903

[redacted]

➔**PLEASE TYPE OR PRINT IN *BLACK INK ONLY***

1. Name [redacted]:	**U.S. Army Corps of Engineers, New England District**	**5.Name of Agent:**	
2. [redacted] Mailing Address:	**696 Virginia Road Concord, MA 01742**	**6. Agent's Mailing Address:**	
3. [redacted] Daytime Phone #:	**978-318-8871: Mr. Mark Habel**	**7. Agent's Daytime Phone #:**	
4. [redacted] Email Address (Required from *either* applicant or agent):	**mark.l.habel@usace.army.mil**	**8. Agent's Email Address:**	

9. Location of Activity: **(Nearest Road, Street, Rt.#)**	**Portsmouth Harbor**	**10. Town:**	**Eliot**	**11. County:**	**York**

12. Type of Resource: **(Check all that apply)**	X River, stream or brook **(coastal port)** ☐ Great Pond ☐ Coastal Wetland ☐ Freshwater Wetland ☐ Wetland Special Significance ☐ Significant Wildlife Habitat ☐ Fragile Mountain	**13. Name of Resource:**	**Portsmouth Harbor**
		14. Amount of Impact: (Sq.Ft.)	**Fill:** **Dredging: Improvement - about 730,000 cy and 25,000 cy of rock**

15. Type of Wetland: **(Check all that apply)**	☐ Forested ☐ Scrub Shrub ☐ Emergent ☐ Wet Meadow ☐ Peatland ☐ Open Water ☐ Other__________	**FOR FRESHWATER WETLANDS** *Tier 1* ☐ 0 - 4,999 sq ft. ☐ 5,000-9,999 sq ft ☐ 10,000-14,999 sq ft	*Tier 2* ☐ 15,000 – 43,560 sq. ft.	*Tier 3* ☐ > 43,560 sq. ft. or ☐ smaller than 43,560 sq. ft., not eligible for Tier 1

16. Brief Activity Description:	**Approximately 730,00 cy of coarse grained dredged material and 25,000 cy of rock would be removed to widen the turning basin at the head of the Federal navigation channel from 800-feet to 1200-feet to a depth of -35 feet MLLW + 2 feet allowable overdepth to -37 feet MLLW. In areas where rock removal is required an additional two feet would be removed (-37 feet MLLW +2 feet overdepth to -39 feet MLLW). Disposal would occur at the Isle of Shoals-North (IOS-N) site, located seaward of the territorial sea outside of State waters. Up to about 7,800 of sand maintenance material would also be removed.**
17. Size of Lot or Parcel & UTM Locations:	☐ ______square feet, or ☐ ______acres UTM Northing: _________ UTM Easting: ________
18. Title, Right or Interest:	☐ own ☐ lease ☐ purchase option ☐ written agreement N/A

19. Deed Reference Numbers:	Book#: Page:	**20. Map and Lot Numbers:**	Map #:	Lot #:

21. DEP Staff Previously Contacted:	**Bob Green**	**22. Part of a larger project:**	☐ Yes X No	**After-the-Fact:**	☐ Yes X No

23. Resubmission?	☐ Yes➔ X No	**If yes, previous application #**		**Previous project manager:**	

24. Written Notice of Violation?	☐ Yes ➔ X No	**If yes, name of DEP enforcement staff involved:**		**25. Previous Wetland Alteration:**	☐ Yes ☐ No

26. Detailed Directions to the Project Site:	**Project is located at head of deep-draft navigation in Portsmouth Harbor. The upper turning basin is adjacent to Mast Cove in Eliot, Maine; there is no direct landside access. Take route 103 north off of I-95. Take Mast Cove Road or Trillium Way off of route 103.**

27. TIER 1	**TIER 2/3 AND INDIVIDUAL PERMITS**	
☐ Title, right or interest documentation ☐ Topographic Map ☐ Narrative Project Description ☐ Plan or Drawing (8 1/2" x 11") ☐ Photos of Area ☐ Statement of Avoidance & Minimization ☐ Statement/Copy of cover letter to MHPC	☐ Title, right or interest documentation X Topographic Map X Copy of Public Notice [redacted] ☐ Wetlands Delineation Report (Attachment 1) that contains the Information listed under Site Conditions X Alternatives Analysis (Attachment 2) including description of how wetland impacts were Avoided/Minimized	☐ Erosion Control/Construction Plan X Functional Assessment (Attachment 3), if required ☐ Compensation Plan (Attachment 4), if required ☐ Appendix A and others, if required X Statement/Copy of cover letter to MHPC ☐ Description of Previously Mined Peatland, if required

28. FEES Amount Enclosed:	

[redacted]

IMPORTANT: IF THE SIGNATURE BELOW IS NOT THE APPLICANT'S SIGNATURE, ATTACH LETTER OF AGENT AUTHORIZATION SIGNED BY THE APPLICANT.

By signing below the applicant (or authorized agent), certifies that he or she has read and understood the following :

DEP SIGNATORY REQUIREMENT

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor a permit be issued.

CORPS SIGNATORY REQUIREMENT

USC Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry shall be fines not more than $10,000 or imprisoned not more than five years or both. I authorize the Corps to enter the property that is subject to this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein.

DEP SIGNATORY REQUIREMENT

"I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Further, I hereby authorize the DEP to send me an electronically signed decision on the license I am applying for with this application by emailing the decision to the address located on the front page of this application (see #4 for the applicant and #8 for the agent)."

____ Date:________________________

SIGNATURE OF AGENT/APPLICANT

APPENDIX C:

SUPPLEMENTAL INFORMATION FOR DREDGING ACTIVITIES IN A COASTAL WETLAND, GREAT POND, RIVER, STREAM OR BROOK

(Discard this part if dredging is not proposed as part of your activity.)

Volume to be dredged:	About 730,000 cy of sandy material and about 25,000 cy of rock from the upper basin widening. Also about 7,800 cy of maintenance material from the existing basin area and its approaches.		
Sq. ft. to be dredged:	17 acres		
Max. depth of dredging below existing grade:	The widened turning basin would be dredged to a depth of -35 feet MLLW plus two feet of allowable overdepth to -37 feet MLLW. The same depth as the existing turning basin which would be maintained concurrently. In areas where rock removal is required an additional two feet would be removed (-37 feet MLLW +2 feet allowable overdepth to -39 feet MLLW).		
Type of material (example: sand, silt, clay, gravel. etc.) to be dredged:	The majority of the material is sand and gravel, with some minor amounts of fines. See Section VI.C. of the Environmental Assessment for grain size distribution data.		
Describe what erosion and sediment control measures will be used during the dredging operation. (attach separate sheet if necessary):	None.		
Describe how and where the dredged material will be dewatered (attach separate sheet if necessary): **Show dewatering location and erosion control measures on activity drawings.**	Not applicable.		
What equipment will be used for the dredge?	All material will be removed by a mechanical bucket dredge and placed into scows that will be towed to the Isles of Shoals-North ocean placement site. Drilling and blasting will likely be needed to remove the some or all of the rock.		
Disposal Location: (Check one)	**Upland disposal:** ☐ On site ☐ Landfill ☐ Other____________	**Ocean disposal:** Federal Disposal Site ☐ Arundel ☐ Portland ☐ Rockland X Other: Isle of Shoals - North	

(pink)

FOR UPLAND DISPOSAL:

Contact the Division of Solid Waste Management at (207) 822-6300:

Contacted: ☐ Yes ☐ No If yes, attach a copy of any correspondence.
Permitted: ☐ Yes ☐ No If yes, provide the permit number______________________.

FOR OCEAN DISPOSAL:

☐ Submit as **Attachment 15,** a copy of the test results performed in accordance with the U.S. Environmental Protection Agency and the Army Corps of Engineers' document entitled "Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters" (May 2002). This is available from the Army Corps of Engineers (207) 623-8367

NOTE: Applicants are STRONGLY recommended to contact the DEP prior to performing any sediment sampling. Improperly sampled or analyzed sediments may have to be retested.

☐ Submit as **Attachment 16,** a copy of a map showing the proposed transportation route to the disposal site.

List all municipalities adjacent to the proposed transportation site:

In Maine: Eliot and Kittery

In New Hampshire: Newington, Portsmouth and New Castle

____

A copy of the application must be submitted to all municipalities adjacent to the proposed transportation site.

☐ Submit as **Attachment 17,** a copy of the notice of the proposed transportation route. A copy of the proposed transportation route must be published in a newspaper of general circulation in the area of the proposed route. (The notice of the proposed route must include compass bearings or Loran coordinates). The notice must be published under the heading "NOTICE TO FISHERMAN".

This project is still several years from construction. Following state regulatory approval the project reports will be submitted to Corps Headquarters in Washington, DC, for review. Upon completion of that review a Draft Chief of Engineers Report, accompanied by the final Feasibility Report will be transmitted to the governors of the two states for their approval. Next the Assistant Secretary of the Army for Civil Works (ASA-CW) and the Office of Management and Budget will review the documents for their concurrence. The Finding of No Significant Impact would then be signed, and a final Chief of Engineers Report with the Final Feasibility Report and Environmental Assessment would then be transmitted to Congress for consideration in response to their original request for the study of improvements to Portsmouth Harbor. That entire process typically takes six to nine months.

Legislation by Congress would be required to authorize the project for construction, followed by the final design phase and construction. Design and construction would require appropriations by both Congress and the State of New Hampshire.

Publication of the proposed dredged material haul route would be required of the contractor awarded the contract for construction of the project under the plans and specifications for that contract. That publication would be made as required in the local papers in Maine and New Hampshire, and through a Notice to Mariners.

(pink)

FEDERAL COASTAL ZONE MANAGEMENT CONSISTENCY DETERMINATION
PISCATAQUA RIVER AND PORTSMOUTH HARBOR FEDERAL NAVIGATION PROJECT
MAINE AND NEW HAMPSHIRE

This document constitutes a request to the Maine Coastal Program for the Federal Consistency Review of the proposed navigation improvement dredging project in the Piscataqua River and Portsmouth Harbor Federal Navigation Project in Eliot, Maine. Per the request of the Maine Coastal Program, the project information provided follows the format of the State of Maine's Natural Resources Protection Act (NRPA) application. However, it is noted that this is not a request for an NRPA permit.

SUBMITTED INFORMATION:

Attachment 1, an activity description. *See attached Environmental Assessment: Section V.*

Attachment 2, an alternatives analysis report. *See attached Environmental Assessment: Section IV.*

Attachment 3, map with the activity location clearly marked. *See attached Environmental Assessment: Figures EA-1 and EA-2.*

Attachment 4, color photographs that clearly show the area to be altered. *Not applicable; project is subtidal.*

Attachment 5, overhead and side view plan drawn to scale. *See attached plans.*

Attachment 6, additional plans, if applicable. *See attached plans.*

Attachment 7, a construction plan. *See attached Environmental Assessment.*

Attachment 8, an erosion control plan**.** *Not applicable.*

Attachment 9, a site condition report for activities impacting a freshwater wetland, coastal wetland, great pond, and a river, stream, or brook. *See attached Environmental Assessment.*

For activities impacting **coastal wetlands**, submit the coastal wetland characterization checklist described and provided in Appendix B. *Not applicable – all work subtidal.*

Attachment 10, the Notice of Intent to File. *A notice of intent to submit a Federal CZM consistency determination will be public noticed and a copy provided to the State. Additionally, this notice with a copy of this information submittal was sent to the Towns of Eliot, and Kittery, Maine.*

Attachment 11, must submit a copy of this form and plans to the Maine Historic Preservation Commission (MHPC). *MHPC has been coordinated with. See attached Environmental Assessment.*

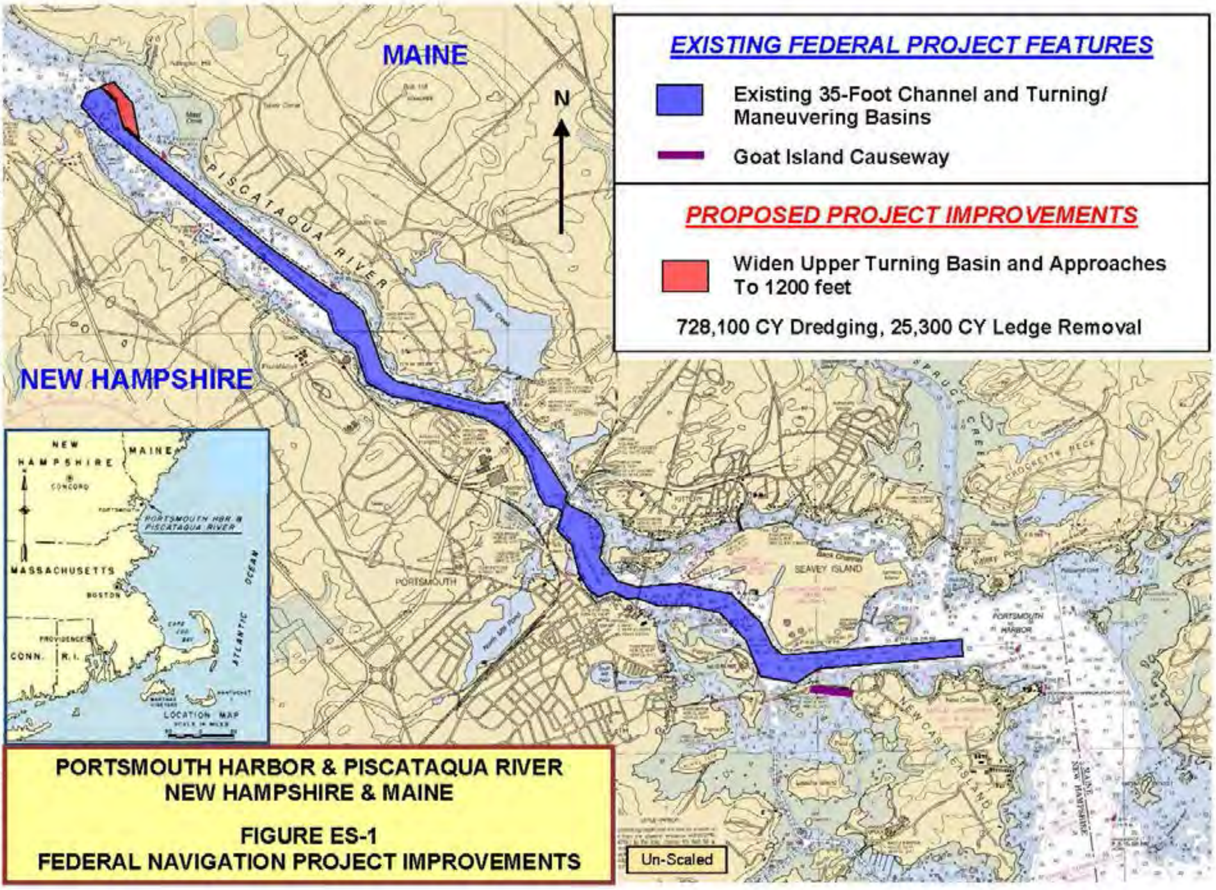
Attachment 12, Functional Assessment. *See attached Environmental Assessment.*

Attachment 15, a copy of the test results performed in accordance with the U.S. Environmental Protection Agency and the Army Corps of Engineers' document entitled "Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters" (May 2002). *See attached Environmental Assessment.*

Attachment 16, a copy of a map showing the proposed transportation route to the disposal site. *See attached figure showing the proposed haul route.*

List all municipalities adjacent to the proposed transportation site: *Eliot and Kittery, ME*

Attachment 17, a copy of the notice of the proposed transportation route. *This will be published in a paper when the project will be constructed, which will be several years from now. See description under above.*



PORTSMOUTH HARBOR & PISCATAQUA RIVER
NEW HAMPSHIRE & MAINE

FIGURE ES-1
FEDERAL NAVIGATION PROJECT IMPROVEMENTS

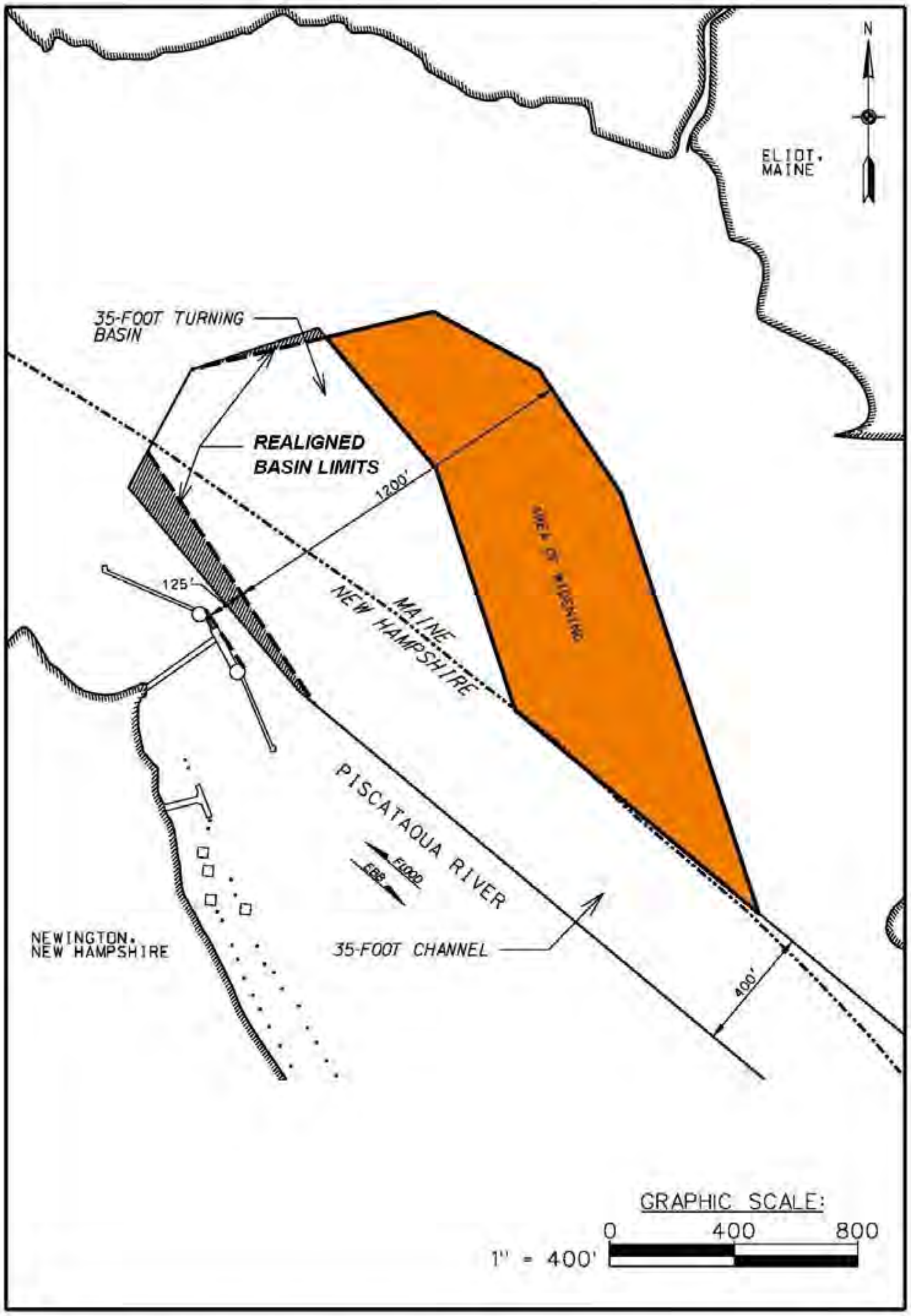


Figure 6. Recommended Turning Basin Widening Plan

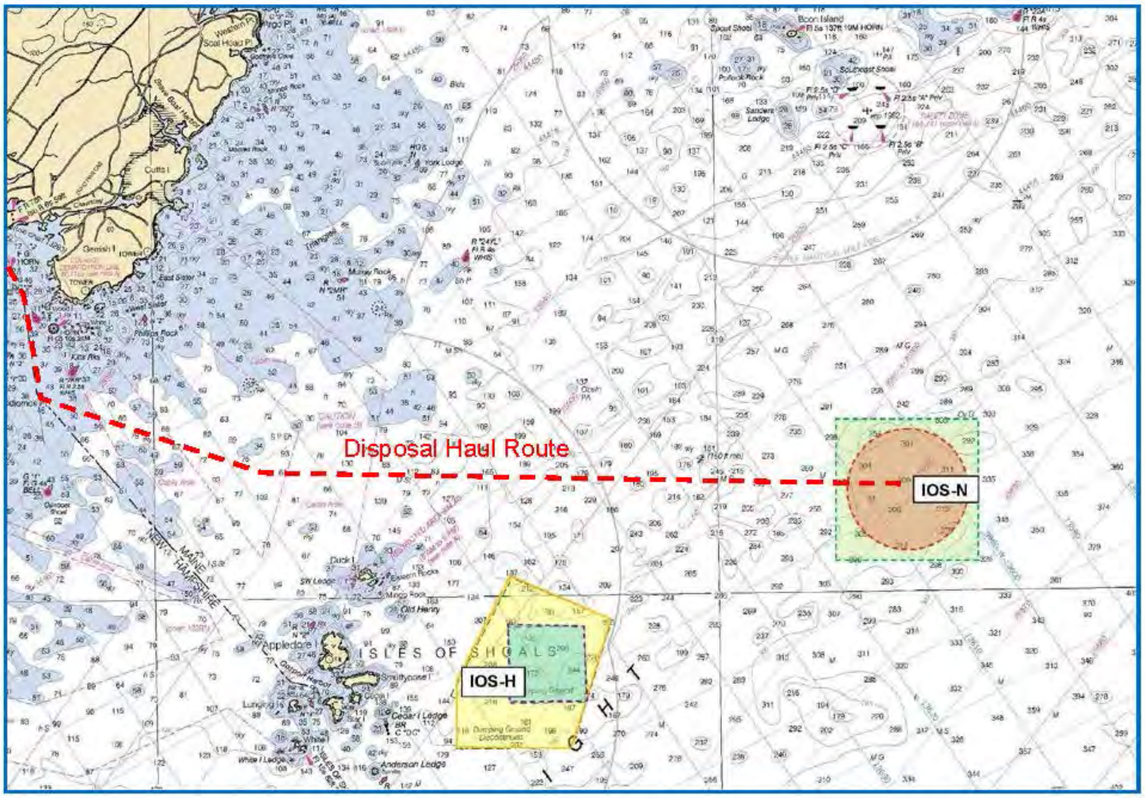


Figure 4. Isle of Shoals Ocean Placement Sites

Sea-3, Inc. Terminal: **190 Shattuck Way Newington, NH 03801-7868 Tel: (603) 431-5990 Fax: (603) 431-5652 E-mail: newington@sea-3.com**

May 5, 2014

U.S. Army Corps
District Engineer
696 Virginia Road
Concord, MA 01742-2751
Attn: Engineering & Planning Division – Ms. Barbara Blumeris
Cenae-ep@usace.army.mil

Re: Piscataqua River Upper Turning Basin Expansion

Dear Mrs. Blumeris:

Sea-3 Inc. would like to join with our business community neighbors, Sprague Operating Resources and GP Gypsum supporting the expansion and widening of the upper turning basin in the Piscataqua River.

Since 1975 we have been a major supplier of propane fuel to New England through our import terminal facility. We are located on a 12-acre site on the banks of the Piscataqua. Our facility has two insulated storage tanks with a total capacity of 27.5 million gallons with the capability of receiving propane by ship, barge or rail. We have significant investments in our facility, and ongoing employee training guarantees safe and timely access to our energy supply. By keeping product readily available we are committed to providing propane as affordably and conveniently as possible.

When unexpected needs arise, whether due to harsh winter conditions or some unforeseen demand, Sea-3 provides manufacturers, utilities and distributor with the propane they need. We are in the process of expanding our facility to further meet those demands and we rely heavily on import vessels offloading at our facility.

Sea-3 utilizes the Sprague Avery Road terminal berth, under contract, to bring in large ocean going vessels. Sea-3, and other industries receiving water-borne cargo relies on the 35 foot design depth when scheduling ships for arrival during mean slack low and this is a major concern for providing safe passage and would echo the comments of others involved that we need to move forward on this project as soon as possible.

Sincerely yours,

Paul N. Bogan
Vice President, Operations

PIKE INDUSTRIES, INC.
3 Eastgate Park Road • Belmont, New Hampshire 03220 • (603) 527-5100
AN EQUAL OPPORTUNITY EMPLOYER
ESTABLISHED 1872

CHRISTIAN ZIMMERMANN
PRESIDENT

May 2, 2014

US Army Corps
District Engineer
696 Virginia Road
Concord, MA 01742-2751
Attn: Engineering & Planning Division – Mrs. Barbara Blumeris
Cenae-ep@usace.army.mil

Re: Piscataqua River Upper Turning Basin Expansion

Dear Mrs. Blumeris;

I am writing this letter on behalf of Pike Industries in support of expanding the turning basin adjacent to Sprague's terminal in Newington NH. Pike is a major road contractor and a supplier of road grade asphalt in New England and throughout the rest of the country via our parent company Oldcastle. Pike has leased tank space and services from Sprague in Newington since 1981 and has contractual rights to continue using the terminal through 2041. Our asphalt products are used for all manner of projects ranging from a homeowner's driveway to a major stretch of an interstate highway to airport runways.

Pike leases over 500,000 barrels of storage in the Avery Lane terminal allowing us to take advantage of large ship quantity deliveries when available. Vessels calling on the terminal are dependent on and limited by the upper turning basin. As constructed, the turning basin limits the length of vessels which may be used. With recent changes in crude slates, asphalt production from refineries has been decreased and we are forced to evaluate many non-traditional sources of imported supply. In many cases that increases the distance we need to have product transported and that cost is increased when the quantity that can be transported is impacted by the more limited number of vessels which can be accommodated in the turning basin. A larger turning basin would allow us to more competitively serve the local market while increasing the safety of all vessels that we use to supply the Avery Lane terminal.

I would like to reiterate that our business relies on the upper turning basin of the Piscataqua River and the Sprague terminal and is important that the enlargement of the upriver turning basin move forward as quickly as possible.

Sincerely,

Christian Zimmermann
President

Sprague

185 International Drive
Portsmouth, NH 03801
(603) 431 1000

US Army Corps
District Engineer
696 Virginia Road
Concord, MA 01742-2751
Attn: Engineering & Planning Division – Mrs. Barbara Blumeris
Cenae-ep@usace.army.mil

April 30, 2014

Dear Mrs. Blumeris;

Sprague Operating Resources, LLC is pleased to have an opportunity to provide comments in support of the Army Corps of Engineers' Project to widen the upper turning basin in the Piscataqua River. Sprague currently owns and operates two deep water marine facilities on the Piscataqua River that rely on large deep draft commercial vessels to both import and export products that serve New Hampshire and the neighboring northeast states. While shore based terminal infrastructure and vessels have developed over the years to accommodate the increased market demand for products shipped by sea, the Upper River Turning Basin requires maintenance dredging and widening to safely accommodate today's current vessel traffic.

In 1959 Sprague purchased the property that is now known as our River Road Terminal in Newington, NH. The facility has a long and colorful history which clearly illustrates that by adapting to an ever-changing market, it can remain an essential part of the State's energy infrastructure and a key component of the regional economy. During World War I, the terminal operated as a shipyard for more than two years producing wooden hulled vessels for the US Board of Shipping. After the closure of the shipyard the terminal operated as a dye plant and then in 1933 become an oil terminal with a single 30,000 barrel tank. In the ensuing years the facility served as a refinery, cement handler and gypsum handler, a tallow terminal, and a road salt depot. Through multiple transformations the terminal has evolved into one of the largest and most diverse marine terminals north of Boston. Today the largest tank holds 250,000 barrels and the Terminal serves as a critical link in the distribution of energy to homes and businesses throughout the State of New Hampshire as well as to the bordering states of Maine, Massachusetts and Vermont. The River Road terminal is truly a commercial hub for many businesses and products in addition to the refined petroleum products imported by Sprague. On any given day the terminal handles Yellow Grease and Tallow for Baker Commodities, Gypsum used for wallboard for GP Gypsum, Salt for International Salt, and Cement for Dragon Products.

In addition to owning and operating the River Road Terminal, Sprague more recently acquired the Avery Lane Terminal in Newington, NH in 1995. The Avery Lane Terminal has served as a former gasoline and distillate terminal and currently is the largest asphalt terminal north of Boston. It provides road grade liquid asphalt to regional "batch" plants that then distribute paving aggregate throughout northern New England. Avery Lane also supports the State's only bulk storage tank of 100 octane aviation gasoline used throughout the region. In addition the Avery Lane Terminal marine dock is shared with Sea3, an LPG distribution facility. Sea3 imports LPG from multiple sources and distributes much needed heating fuel for residents and businesses throughout New England.

Sprague and the many other companies that own and import or export products through our two Seacoast Terminals rely on the deep water access provided by the Piscataqua River to ship our products into the New England marketplace. As these facilities have changed drastically over the years to meet current market demands of consumers and businesses, their reliance on a safe navigable waterway is even more critical now than it was when it was used by a simple wooden ship builder. As the Terminals have developed to a modern, commercially viable center of commerce as dictated by the changing world, they also must be able to safely accommodate today's larger vessels. The Upper Turning Basin which was last improved in 1966 is long overdue for widening to ensure an appropriate margin of safety for this critical waterway. As stated in the 2013 report on the Piscataqua River Channel:

> *"Currently the Portsmouth Pilots report that they are turning 800 foot ships in the 850 foot upper turning basin. The width of this basin poses significant safety concerns and limits the existing and future use of the industrial waterfront."*

Sprague's reliance on this waterway for commercial vessel traffic is well documented by earlier data provided to the Corps indicating numbers and types of vessel's calling on our facilities. The many businesses, communities and people that rely on our products and services similarly rely on the Piscataqua River for their livelihoods and products, and it is essential that the widening of the Up River Turning Basin move forward. This is an important safety and commercial project. Sprague is committed to adapting to evolving market demands and we commend the Corps for their recognition of the critical need for the proposed Turning Basin Widening Project.

Sincerely,

Burton S. Russell
Vice President, Operations

April 30, 2014

US Army Corps
District Engineer
696 Virginia Road
Concord, MA 01742-2751
Attn: Engineering & Planning Division – Mrs. Barbara Blumeris
Cenae-ep@usace.army.mil

Re: Piscataqua River Upper Turning Basin Expansion

Dear Mrs. Blumeris;

On behalf of GP Gypsum, we join the Newington, NH business community in support of expanding the turning basin adjacent to Sprague River Road terminal in Newington NH. GP Gypsum manufactures wallboard at a plant adjacent to the Sea-3 facility along the Piscataqua River employing approximately 110 employees. We supply the New England region from this facility also indirectly employing transportation, electrical/mechanical contractors and other service companies at our plant. This production facility has been in operation since 1989 and we continue to invest in its viability. We utilize the Sprague River Road terminal and dock to import gypsum rock, the majority of which is delivered by large ocean going vessels that utilize this turning basin. GP recently invested approximately $2.5 million at the Sprague terminal for a newly expanded multi-hopper conveyor system to better ensure long term sustainability and competitiveness of this site. We would like to maximize its commercial capability through the use of larger vessel and cargo sizes.

We remain committed to the region and our agreement with Sprague grants us contractual dock usage rights through 2079. In order to remain strong in this wallboard manufacturing market, it is vitally important that we maximize our cargo sizes to minimize our freight costs. The current size of the turning basin has limited the size vessel we can use for our International deliveries, which is not the most efficient state for our manufacturing operations. The expansion of the turning basin will help us to remain commercially viable in a competitive market while increasing the safety factor in maneuvering all vessels that call the port.

In closing I would like to state that for our business which relies so heavily on the Piscataqua River and its facilities for our plant site, it is highly important that the enlargement of the upriver turning basin move forward. GP Gypsum is in support of this initiative and asks that the Corps immediately move forward with this valuable project.

Sincerely,

J. Gregory Haygood
Director, Int'l Supply & Trading
Georgia-Pacific Gypsum LLC

PORTSMOUTH PILOTS, INC.
Ports of Portsmouth and Newington, New Hampshire
CERES STREET WHARF, BOX 72
PORTSMOUTH, NH 03802
603-436-1209 • FAX 603-436-0417

April 30, 2014

US Army Corps of Engineers New England,

I am writing you to express my strong support for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project. Portsmouth Pilots has been working on this project for years. The turning basin at end of navigation channel is almost 50 years old and needs to be upgraded to continue to accommodate todays larger size ocean going commercial vessels. When turning basin was made the average size ship using the basin was less than 550 feet long. The jumboized T2 tanker was the supertanker of that time era. The largest vessel to use turning basin to date was the CSL Metis at 760 feet long. The strong current in the Piscataqua River, and having little margin for error turning a 760 foot long ship in a 800 foot turning basin, the job is risky and is very difficult. A near miss every time. The turning basin has out lived its useful life span and needs to be made larger.

For example, to turn the CSL Metis in the turning basin, we will set ideal parameters so we can have the conditions as safe as possible for turning the ship around. This is restrictive to the ship and the terminal. This cost both delays which in turn is money. We need low water day light to safely turn this vessel and wind below 25 knots. All this is because of how small the turning basin is for many of today's ships. The CSL Metis is not the only vessel that has restrictions for sailing due to a small turning basin size. Any vessel over 690 feet is generally low water day light sailing.

Portsmouth Pilots receives many calls for what size vessels we can handle in the port. We are limited to what length ship because of turning basin size. A larger turning basin would benefit Sea-3 Propane, International Salt, Public Service N.H. and Sprague Energy. Presently we do 760 feet with many restrictions as stated before. A larger ship means better economics for the Companies involved. It is a very completive business. All users on the river would like to do a larger size ship but we cannot due to size of turning basin.

Many improvements have been made to the water way in the past. Every improvement has helped Portsmouth Harbor handle larger size ships. The Sarah Long Bridge replacement is going to enable us to do larger ships than present because new bridge will be at least 75 feet wider and built will less skew angle to the river. After New Sarah Long Bridge is built, should be complete in 2018, the turning basin at end of navigation project will be needed to be upgraded so entire port infrastructure can handle 800 foot ships safely and with out delays.

PORTSMOUTH PILOTS, INC.
Ports of Portsmouth and Newington, New Hampshire
CERES STREET WHARF, BOX 72
PORTSMOUTH, NH 03802
603-436-1209 • FAX 603-436-0417

1. A larger turning basin will help us move some average size ships while the current is running. We would have more room and more margin for error. We presently only move within one hour of slack water. This saves time for ship owner and terminal. Less congestion at berth.
2. We would be able to go from 3 tugs down to two tugs with a larger size turning basin. This saves money for customers. More margin for error so you can eliminate one tug for turning ship.
3. Ships over 690, some require low water day light to turn in basin. During winter time with short days you may go three days with out a low water day light tide window. Big delay costs a lot of money. Not many ship owners want to get trapped for three days at a berth.
4. A larger basin will allow better economies of scale. Mass economics will make port more competitive for port users.
5. A much lower risk of collision with dock or grounding while turning a 760 foot ship in an 800 foot turning basin. We have had at least 4 groundings in last 30 years. Many near misses.
6. Safety improvement thru risk reduction. A 760 foot ship should have at least a 1,125 foot turning basin. We think an 800 foot long ship could be handled in the port after Long Bridge is replaced, so a 1,200 foot basin would fit entire navigation project.
7. A larger turning basin at end of navigation channel would be the best turning basin in the river. Other turning basins are much smaller. A modern turning basin at end of navigation channel could be used by all users on the river above the Long Bridge.

It is time to upgrade the Harbor infrastructure and build a 1,200 foot turning basin for the benefit of all users on the Piscataqua River. A practical and functional turning basin at the end of deep water navigation channel is needed. A new turning basin would save on delays for current users of basin and save money and be safer. In the future, the larger turning basin will help the Port of Portsmouth compete with other ports.

I strongly believe this project will help all port users, present and future. This will benefit the entire seacoast area and the hinterland for the port of Portsmouth to stay relevant and completive for many years to come. A larger turning basin will improve safety, less risk to environment, and moving commerce more efficiently and safely. The new turning basin will accomplish all.

Best regards,

Rich Holt JR

Captain Dick Holt Jr.

Commonwealth of Massachusetts
Division of Marine Fisheries
30 Emerson Ave.
Gloucester, MA 01930
(617)727-3336
fax (617)727-3337

Paul J. Diodati
Director

Deval Patrick
Governor
Richard K. Sullivan, Jr.
Secretary
Mary B. Griffin
Commissioner

April 30, 2014

Engineering and Planning
Attn: Mark Habel
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

Dear Mr. Habel:

The Division of Marine Fisheries (*MarineFisheries*) has reviewed the Public Notice for the Draft Feasibility Report and Draft Environmental Assessment (FR/EA) for Portsmouth Harbor and Piscataqua River Navigation improvement project and dredge material disposal. The proposed project, submitted by the U.S. Army Corps of Engineers, New England District, in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors includes near-shore dredged material disposal in Massachusetts to contribute to beach nourishment in Newbury, Newburyport and Salisbury. The material is course to medium sand and the proposed Massachusetts receiving sites are currently medium to fine sands. It is expected that 360, 000 cubic yards of material would be divided between the three Massachusetts communities.

The nearshore disposal sites are mapped habitat for surf clams (*Spisula solidissima*). Surf clams routinely burry themselves to ½ inch below the sediment surface. Within the temperature range from 45 degrees to 72 degrees the clams are active and would be able to dig themselves out if burial exceeds the preferred ½ inch above the top of the shell (Ropes 1980). A layer of ½ to 2 inches +/- of sediment over a large area would have minimal impact. However, if material is dumped quickly in deep piles, if temperatures are outside of the range stated above, or if sediments are significantly courser grain size than the existing conditions, there would be a greater impact from burial and clams may not recover. We recommend that the disposal design take into consideration the above parameters, to minimize impacts to fisheries. We request more information as to the method of disposal and the expected depth of sediment when it is available and would like to review disposal siting to ensure avoidance of surf clams.

Thank you for considering our comments. Please contact Tay Evans of my staff at 978-282-0308 x. 168 if you have any questions about our review.

Sincerely,

Tay Evans

N. Tay Evans
Marine Fisheries Biologist and Technical Review Coordinator

cc
K. Ford DMF
T. Evans, DMF
K. Ostrikis, DMF

B. Boeri
K. Chin

Reference:

Ropes, J. W.1980. Biological and Fisheries Data on Surf Clam. NOAA Tech. Ser. Rep. No 24.

Sincerely,

N Tay Evans

N. Tay Evans
Marine Fisheries Biologist and Technical Review Coordinator

TE/

cc.

The COMMONWEALTH OF MASSACHUSETTS
BOARD OF UNDERWATER ARCHAEOLOGICAL RESOURCES
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
251 Causeway Street, Suite 800, Boston, MA 02114-2136
Tel. (617) 626-1200 Fax (617) 626-1240 Web Site: www.mass.gov/czm/buar/index.htm

April 28, 2014

Mark Habel
Engineering/Planning Division
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: Navigation Improvement of Portsmouth Harbor, NH and ME
Beach Nourishment/Nearshore Disposal, Salisbury, Newbury, Newburyport, MA

Dear Mr. Habel:

The staff of the Massachusetts Board of Underwater Archaeological Resources has reviewed the above referenced project's Public Notice, dated March 31, 2014. We offer the following comments. The Board concurs that the planned activities as currently proposed will not adversely affect submerged cultural resources at this time.

The on-going needs for the proposed beach nourishment and near shore disposal activities are necessitated by the erosion occurring on a dynamic shoreline. Given the coastal processes taking place along Salisbury Beach and Plum Island, circumstances and condition are likely to change. Therefore, the Board welcomes continued consultation in the event of any changes in the current plan and when future activities are considered even at the current disposal/nourishment locations.

If the Corps has not already done so, the Board encourages your agency to notify our permittee, Victor Ricardo, of the subject disposal. His address is 148 Kings Highway, Hampton, NH 03842. His permit area forms a square beginning at MLW and extend seaward 1 nautical and beginning at the NH/MA border running south 1 nautical mile.

Should heretofore-unknown submerged cultural resources be encountered during the course of the project, the Board expects that the project's sponsor will take steps to limit adverse effects and notify the Board, as well as other appropriate agencies in accordance with the Board's *Policy Guidance for the Discovery of Unanticipated Archaeological Resources* (updated 9/28/06).

If you should have any questions, do not hesitate to contact me at 617-626-1141 or the address above.

Sincerely,

Victor T. Mastone
Director and Chief Archaeologist

/vtm
Cc: Brona Simon, MHC
Kate Atwood, USACE (via email attachment)
Robert Boeri and Kathryn Glenn, MCZM (via email attachment)
Victor Ricardo (via email attachment)

INTERNATIONAL SALT
an SPL company

April 24, 2014

US Army Corps
District Engineer
696 Virginia Road
Concord, MA 01742-2751
Attn: Engineering & Planning Division – Mrs. Barbara Blumeris
Cenae-ep@usace.army.mil

Re: Piscataqua River Upper Turning Basin Expansion

Dear Mrs. Blumeris;

I am writing this letter on behalf of International Salt in support of expanding the turning basin adjacent to Sprague's River Road terminal in Newington NH. International Salt is a major supplier of road salt to New England and we lease space and services at the Sprague terminal for the importation and distribution of salt to state and local government entities as well as to commercial road salt vendors. International has the ability to store upwards of 160,000 metric tons of road salt at the River Road terminal. Much of that salt is delivered on large self-discharging vessels utilizing the Sprague conveyor system. Self-discharging vessels are not plentiful in number, and the size of that pool of vessels is further limited by the size of the turning basin adjacent to the Sprague terminal. In some cases the vessels we could otherwise use are too long to be able to call this terminal. This has the impact of increasing our transport costs. A larger turning basin would allow us to more competitively serve the local market while increasing the safety of all vessels that we deploy in serving the local area.

Decreasing the pool of available vessels also makes resupply in an inclement winter season, like this past year, more difficult. If abnormal demand exceeds our expectations and available storage space, we may be required to resupply mid-season on fairly short notice. While International utilizes other facilities in the New England region, a more capable turning basin would make emergency resupply more prompt and less costly to this region.

In closing I would like emphasize that our business relies on the Piscataqua River and the Sprague terminal and is important that the enlargement of the upriver turning basin move forward as quickly as possible.

Sincerely,

Paul F. McDermott
Vice President Operations & Logistics

PFM/kew

A K+S Group Company

655 Northern Boulevard
Clarks Summit, PA 18411
T: (888) 388-4726
F: (570) 586-6463

Town of Salisbury
5 Beach Road
Salisbury, Massachusetts 01952

Neil J. Harrington
Town Manager

April 14, 2014

Mr. Mark L. Habel
Chief of Navigation, Northeast Region
USACE, New England District
696 Virginia Road
Concord, MA 01742

Subject: Portsmouth Harbor and Piscataqua River Navigation Improvement Project
Nearshore Sand Disposal Site off Salisbury Beach

Dear Mr. Habel:

The Town of Salisbury appreciates being afforded the opportunity to evaluate the possibility of receiving dredged material from the proposed Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project ("the Project").

Salisbury Beach, which is owned by the Commonwealth of Massachusetts and maintained and managed by the Department of Conservation (DCR), has four miles of natural beach and dunes that are enjoyed by thousands of visitors and residents each year, making it one of the most popular beaches in the State. Hundreds of homes also line Salisbury Beach, protected from the Atlantic Ocean's fury by a line of vegetated dunes. Several winter storms in recent years have breached the dunes and damaged homes and infrastructure and made it clear just how important a healthy dune system is to the abutting development and infrastructure.

With sea level rise shortening the beach and winter storms eroding what is left of the dunes, the Town is forced to look for ways to protect these homes and preserve the beach. One way to do that is by adding sand to the system. Over the past several years, the Town and DCR have opted to restore dunes through importing of compatible sand and placing it directly on the beach, shaping it into a dune and planting it with native beach vegetation. This method has worked, but it is very expensive and that financial burden limits the size of projects to small areas that have continued to be severely eroded. Many years ago, when the Merrimack River channel was regularly dredged, sand was placed in the near shore disposal area off area beaches, including Salisbury Beach, and naturally migrated landward. This was an effective beach management technique that added sand to local beaches for many years.

I understand that the Army Corps has estimated that the proposed dredging of the Piscataqua River will yield approximately 730,000 cubic yards of sand. If this material is divided between the states of Maine and Massachusetts, and within our state between the towns in the Merrimack River Beach Alliance (Salisbury, Newburyport and Newbury), it could potentially yield a significant volume of sand for Salisbury Beach and at a significant cost savings.

Two years ago, the Army Corps provided soil boring logs from the potential sand to be dredged from the Project, and at that time our Conservation Agent indicated that the material would not likely be compatible with the sand found on Salisbury Beach. However, more recent soil samples of potential material to be dredged have indicated a much greater level of compatibility and I have been informed by the Town's Conservation Agent that an offshore deposit of such sand would not be incompatible with the Town's standards for Salisbury Beach.

Consequently, I am writing to affirm that the Town of Salisbury is very interested in receiving a portion of the sand from the Project for near shore placement, if and when that possibility becomes available. We are committed to working with DCR and the other towns in the Merrimack River Beach Alliance to agree upon a plan to divide the available dredged sand and pay the cost of transporting the Town's portion of this sand to Salisbury Beach.

Please contact me with any questions or to discuss this matter further.

Sincerely,

Neil J. Harrington

Neil J. Harrington
Town Manager

cc: Board of Selectmen
Conservation Agent
MRBA Co-Chairs Sen. Bruce Tarr and Jerry Klima

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

CECW-P

25 March 2014

MEMORANDUM FOR Director, National Deep Draft Navigation Planning Center of Expertise (DDN-PCX)

SUBJECT: Portsmouth Harbor and Piscataqua River Navigation Improvement Project - Approval of the Economic Spreadsheet Model

The economic spreadsheet model for estimating navigation improvement benefits for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project is approved for use. Adequate technical reviews have been accomplished and the model meets the certification criteria contained in EC 1105-2-412. Documentation of the model and its use must be included in the Feasibility Report. This approval for use is based on the decision of the HQUSACE Model Certification Panel which considered the PCX-DDN assessment of the model. There are no unresolved issues with the model at this time.

APPLICABILITY: This approval for use is limited to the subject feasibility report.

HARRY E. KITCH, P.E.
Deputy Chief, Planning and Policy Division
Directorate of Civil Works

PART 3

DRAFT FEASIBILITY REPORT AND DRAFT ENVIRONMENTAL ASSESSMENT TRANSMITTAL DOCUMENTS

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 8, 2014

Engineering/Planning Division
Evaluation Branch

Ms. Kathleen Leyden
Maine Coastal Program
Maine Department of Agriculture, Conservation and Forestry
98 State House Station
17 Elkins Lane
Augusta, Maine 04333-0038

Dear Ms. Leyden:

This letter and attachment provides the Maine Coastal Program with the U.S. Army Corps of Engineers (USACE), New England District's consistency determination under the Coastal Zone Management Act § 307(c) and 15 CFR Part 930, Subpart C for the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project. The proposed project would widen the upper-most turning basin at the head of deep-draft navigation channel in the Piscataqua River from its current width of 800-foot to a width of 1200 feet. The basin would retain its current -35-foot depth at mean lower low water. Maintenance dredging of the existing basin and its approaches would also be performed at the same time. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy of dredge material would be removed for maintenance dredging. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The navigation improvement project is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. Widening the turning basin would allow these larger vessels to carry additional cargo and have fewer limitations in turning and transiting the upper river reaches. They would also be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be likely suitable for open water placement at an ocean site identified as the Isle of Shoals-North (IOS-N). The IOS-N is located about ten miles offshore of Portsmouth, New Hampshire. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. As described in the Draft Feasibility Report and Draft

Environmental Assessment (FR/EA), the local communities of Wells, Maine, and Salisbury, Newburyport, and Newbury, Massachusetts have expressed an interest in receiving the sand dredged from the proposed project to nourish nearshore bars located off of their eroding beaches. We also understand that the town of Kittery is proposing to beneficially use the blasted rock to form a wave break at the mouth of Pepperell Cove in that community. The additional cost of transporting and placing the dredged materials at more distant locations for beach nourishment or other purposes would be borne by the communities requesting that use. Those communities would also be required to secure all necessary Federal and State permits and approvals to receive those materials prior to completion of the project's design phase. As these uses are more costly than the Federal base plan, and involve purposes unrelated to the navigation improvement, they are not part of the Federal action.

Please find attached our determination of how the proposed Federal action is consistent with the enforceable policies of the Maine Coastal Program. A CD containing the Draft FR/EA is also enclosed for your information.

Based upon the above and attached information, the USACE finds that the Portsmouth Harbor and Piscataqua River Navigation Improvement Project is consistent to the maximum extent practicable with the enforceable polices of the Maine Coastal Program. If you have any questions or comments, please contact Ms. Catherine Rogers at (978) 318-8231, or the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA

Copy Furnished without Enclosures:

Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03802

Mr. Jonathan L. Carter, Town Manager
Town Offices
P.O. Box 398
Wells, Maine 04090

ENFORCEABLE POLICIES OF THE MAINE COASTAL PROGRAM

Natural Resources Protection Act (38 M.R.S. §§480-A to 480-S; and 480-U to 480-HH)

- Permit by Rule Standards (DEP rules ch. 305)

Not applicable. The proposed project is mainly improvement dredging, with a minor amount of maintenance material.

- Wetlands Protection Rules (Department of Environmental Protection (DEP) rules ch. 310)

Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy of dredged material would be removed for maintenance dredging, all in subtidal waters. The material to be dredged from the turning basin is generally composed of clean sand, gravel, and blasted rock. Given the coarse grained nature of the dredged material, and blasted rock, any increases in turbidity are expected to be short-term, minimal, and localized to the dredging and disposal sites. The maintenance material will be tested prior to dredging to determine its suitability for aquatic disposal at the Isle of Shoals-North (IOS-N) or the nearshore sites located off of the coasts of Maine or Massachusetts. Maintenance material previously removed from the Piscataqua River has been clean sandy material; therefore impacts from removal of this material are expected to be minimal also. All dredging is located seaward of mean lower low water.

- Scenic Impact Rules (DEP rules ch. 315)

Not applicable. The proposed project is a navigation improvement and maintenance dredging project and will not have a negative effect on the visual quality of a landscape.

- Significant Habitat Rules (DEP rules ch. 335; Department of Inland Fisheries and Wildlife (DIFW) rules chapter 10)

Significant Wildlife Habitat means that the area has been mapped by the Department of Inland Fisheries and Wildlife (DIFW) or is located within any other protected natural resource such as habitat for species appearing on State or Federal list of endangered or threatened animal species; high or moderate value deer wintering areas and travel corridors, seabird nesting islands, and critical spawning and nursery areas for Atlantic salmon; significant vernal pool habitat; high and moderate value waterfowl and wading bird habitat, including nesting and feeding areas; and shorebird nesting, feeding, and staging areas as defined by the appropriate State agencies.

The proposed dredge area is not known to be adjacent to or a high or moderate value deer wintering area and travel corridor, seabird nesting island, critical spawning and nursery area for Atlantic salmon, or significant vernal pool habitat. Tidal Waterfowl and Wading Bird Habitat has been mapped in the vicinity of the project. However, no mudflats would be impacted *as the turning basin expansion is in subtidal waters. No eelgrass was found in the proposed turning basin expansion area during video surveys in 2008 and 2009. However, it has been reported that some eelgrass has been planted in an area located off of Adlington Creek on the Maine side of the river in 2011.*

The proposed dredging and blasting activities at the Portsmouth Harbor upper turning basin are planned to be conducted during the period of mid-October to mid-April. A small number of shortnose sturgeons could be potentially exposed to the effects of dredging and blasting between mid-October and early November. Beyond early November, shortnose sturgeon in the action area is extremely unlikely. Given the relatively low probability that shortnose sturgeon would be present when and where dredging will occur and the low likelihood that any individual sturgeon would be captured in a slow moving dredge bucket, it is extremely unlikely that a sturgeon would be captured, injured, or killed during dredging activities, or that turbidity increases or reduced prey base would be significant (see NMFS letter dated February 3, 2014). Due to the proposed mitigation measures to reduce blast impacts to aquatic resources as noted in Section VII.b of the Draft Environmental Assessment, any behavioral disturbance is expected to be brief as impacts to sturgeon would be of a very short duration (less than seven seconds). Any disturbance to sturgeons would be expected to quickly resume to pre-disturbance behaviors (see NMFS letter dated February 3, 2014).

There are no known Essential Habitats that would be impacted by the proposed dredge area.

- Coastal Sand Dune Rules (DEP rules ch. 355)

Not applicable. The proposed project does not impact any coastal sand dunes.

Maine Endangered Species Act (12 MRSA §§12801-12810 [inland species]; 12 M.R.S. §6971-6977 [marine species]; and 12 M.R.S. §10001, sub-§§19 and 62 [definitions])

- Endangered species (DIFW rules ch. 8)

No Piping Plover, Least Tern, or Roseate Tern nesting, feeding, or brood-rearing areas have been identified as Essential Habitat in the dredge area. No whale species or sea turtle species listed as threatened or endangered would be expected to be in the project area during dredging or blasting. Only the shortnose sturgeon listed as endangered may occur in the dredge area.

Based on information contained within the National Marine Fisheries (NMFS) letter dated February 3, 2014, the Piscataqua River does not currently support a known spawning population of shortnose sturgeon. According to NMFS, available information indicates that some individual shortnose sturgeons make at least occasional short visits up the Piscataqua River to Great Bay in New Hampshire. NMFS expects that these individuals would be present in the dredge area between early May and early November. Considering the low probability that shortnose sturgeon will be present in the dredge area between mid-October to early November and the low probability that an individual sturgeon would be captured in a slow moving dredge bucket, NMFS considers it extremely unlikely that any shortnose sturgeon would be captured, injured or killed during dredging activities. As previously established, only occasional shortnose *sturgeon are likely to be present when blasting occurs. The use of sonar to scan the area prior to blasting will also ensure that large fish such as sturgeon are not exposed to the potentially injurious pressure levels (<1,500 feet) from detonation.*

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-EP-PN 4 April 2014

MEMORANDUM FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers, ATTN: CENAD-PD-CID-P (Attn: Mr. Paul Sabalis), Fort Hamilton Military Community, 301 General Lee Avenue, Brooklyn, NY 11252-6700

SUBJECT: Portsmouth Harbor and Piscataqua River, NH & ME, Navigation Improvement Project, Draft Feasibility Report and Environmental Assessment, Policy Compliance Review Submission Package, PWI #013654

1. References:

a. Appendix H, Amendment #1, or ER 1105-2-100. Policy Compliance Review and Approval of Decision Documents, dated 20 November 2007.

b. Planning Bulletin No. PB-2013-03-Re-issue, dated 14 March 2014.

2. In accordance with the referenced guidance, and vertical team conferences with Division and HQUSACE staff, the New England District is submitting copies of the subject report and associated documents (see attached list) for concurrent HQUSACE and Division review. The final report submittal package includes the items on the attached list.

3. The hard copies of the Draft Feasibility Report and Draft EA were shipped separately to NAD (4 copies with CDs of the report and appendices, plus one hard copy with all appendices and CD) and HQUSACE (8 copies with CDs of report and appendices, plus one hard copy with all appendices and CD).

4. The public notice for the project was issued on 31 March 2014 for a 30-day review period. Requests for State CZM consistency concurrence from New Hampshire and Maine have been filed with those states.

5. The project is scheduled for presentation to the Civil Works Review Board at its 21 August 2014 meeting.

6. If further information is needed, please contact NAE Planning Branch Chief, Mr. John Kennelly at (978) 318-8505, the study manager, Mr. Mark Habel at (978) 318-8871, or the project manager, Mr. Michael Keegan at (978) 318-8087.

FOR THE COMMANDER

Encl

Scott Acone, PE
Chief, Engineering-Planning Division

CF:
Joseph Vietri, NAD
Naomi Fraenkel, NAD
Michael Keegan, NAE PPM

Portsmouth Harbor and Piscataqua River, New Hampshire and Maine
Navigation Improvement Project
Draft Feasibility Report and Draft Environmental Assessment
Policy Compliance Review Submittal Documents
April 2014

Item #	Document	Hard Copies HQ/NAD	Electronic Copies
1	Draft Feasibility Report and Draft Environmental Assessment Complete with All Appendices	1/1	9/5
1A	Draft Feasibility Report and Draft Environmental Assessment with Cost Engineering Appendix	8/4	See #1
2	Current Public Fact Sheet	8/4	Included with #1
3	Report Synopsis	8/4	
4	Project Study Issue Checklist	8/4	
5	Legal Review Sufficiency	8/4	
6	Review Documentation	8/4	
	ATR Review Documentation	8/4	
	IEPR Review Waiver	8/4	
	DQC Certification	8/4	
	Economic Model Certification	8/4	
7	Value Engineering Statement	8/4	
8	IPR and TSP Milestone Memoranda	8/4	
9	Risk Register	8/4	
10	Decision Log	8/4	
11	Milestone Schedule	8/4	
12	Updated Project Powerpoint Presentation	8/4	

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 3, 2014

Engineering/Planning Division
Evaluation Branch

Christian Williams, Federal Consistency Coordinator
New Hampshire Coastal Program - DES
Pease Field Office
22 International Drive, Suite 175
Portsmouth, New Hampshire 03801

Dear Mr. Williams:

This letter and attachment provides the New Hampshire Coastal Program (NHCP) with the U.S. Army Corps of Engineers (USACE), New England District's consistency determination under the Coastal Zone Management Act § 307(c) and 15 CFR Part 930, Subpart C for the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project. The proposed project would widen the upper-most turning basin at the head of deep-draft navigation channel in the Piscataqua River from its current width of 800-foot to a width of 1200 feet. The basin would retain its current -35-foot depth at mean lower low water. Maintenance dredging of the existing basin and it approaches would also be performed at the same time. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy of dredge material would be removed for maintenance dredging. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources. Work within New Hampshire waters would consist of dredging somewhat more than half of the 7,800 cy of sandy maintenance material from the existing basin area and its approaches. All other work would occur in Maine state waters.

The navigation improvement project is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. Widening the turning basin would allow these larger vessels to carry additional cargo and have fewer limitations in turning and transiting the upper river reaches. They would also be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be likely suitable for open water placement at an ocean site identified as the Isle of Shoals-North and located about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. As described in the Draft Feasibility Report and Draft Environmental Assessment (FR/EA), the local communities of Wells, Maine, and Salisbury, Newburyport, and Newbury, Massachusetts have expressed an interest in receiving the sand dredged from the proposed project to nourish nearshore bars located off of their eroding beaches. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use. Those communities would also be required to secure all necessary permits and approvals to receive those materials prior to completion of the project's design phase.

Please find attached the enforceable policies of the NHCP and how the proposed navigation improvement project complies with those policies. A CD containing the Draft FR/EA is also enclosed for your information.

Based upon the above and attached information, data, and analysis, the USACE finds that the Portsmouth and Piscataqua River Navigation Improvement Project is consistent to the maximum extent practicable with the enforceable polices of the NHCP. If you have any questions or comments, please contact Ms. Catherine Rogers at (978) 318-8231, or the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA

Copy Furnished without Enclosures:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03801

ENFORCEABLE POLICIES OF THE NEW HAMPSHIRE COASTAL PROGRAM

PROTECTION OF COASTAL RESOURCES

1. Protect and preserve and, where appropriate, restore the water and related land resources of the coastal and estuarine environments. The resources of primary concern are coastal and estuarine waters, tidal and freshwater wetlands, beaches, sand dunes, and rocky shores.

No impacts to wetlands, beaches, sand dunes or rocky shores in New Hampshire are expected to occur from the proposed project. The material to be dredged from the improvement areas of the widened turning basin is generally composed of clean sand, gravel, and blasted rock. Given the coarse grained nature of the dredged material, and blasted rock, any increases in turbidity are expected to be short-term, minimal, and localized to the dredging and disposal sites. The maintenance material will be tested prior to dredging to determine its suitability for aquatic disposal at the Isle of Shoals-North (IOS-N) or the nearshore sites located off of the coasts of Maine or Massachusetts. Maintenance material previously removed from the Piscataqua River has been clean sandy material; therefore impacts from removal of this material are expected to be minimal as well.

2. Manage, conserve and, where appropriate, undertake measures to maintain, restore, and enhance the fish and wildlife resources of the state.

Dredging will be scheduled between mid-October through mid-April to avoid the spawning periods of most sensitive aquatic resources. Blasting will not begin until most of the sandy material has been removed, and will not occur after March 31st. Blasting impacts will be minimized by restricting blasting activities during slack tides, use of a fish detecting and startle system, use of a trained fisheries and marine mammal observer to avoid blasting during the passage of fish or when marine mammals are in the project area (unless human safety is a concern), use of inserted delays, use of stemming, and monitoring of the blast pressure wave.

3. Regulate the mining of sand and gravel resources in offshore and onshore locations so as to ensure protection of submerged lands, and marine and estuarine life. Ensure adherence to minimum standards for restoring natural resources impacted from onshore sand and gravel removal operations.

Not applicable; the proposed project is a navigation improvement and maintenance project. However, if possible, the maintenance material and material removed from the turning basin may be used for indirect beach nourishment through placement at nearshore areas.

4. Undertake oil spill prevention measures, safe oil handling procedures and, when necessary, expedite the cleanup of oil spillage that will contaminate public waters. Institute legal action to collect damages from liable parties in accordance with state law.

All appropriate Federal and State laws and regulations will be applied to minimize oil spills during construction of the proposed project.

5. Encourage investigations of the distribution, habitat needs, and limiting factors of rare and endangered animal species and undertake conservation programs to ensure their continued perpetuation.

Not applicable; the proposed project is a navigation improvement and maintenance project. The proposed project is not expected to have any significant adverse impacts on State listed rare or endangered animal species.

6. Identify, designate, and preserve unique and rare plant and animal species and geologic formations which constitute the natural heritage of the state. Encourage measures, including acquisition strategies, to ensure their protection.

Not applicable; the proposed project is a navigation improvement and maintenance project. The proposed project is not expected to have any significant adverse impacts on State listed rare or endangered plant or animal species, or geological formations which constitute the natural heritage in New Hampshire.

RECREATION AND PUBLIC ACCESS

7. Provide a wide range of outdoor recreational opportunities including public access in the seacoast through the maintenance and improvement of the existing public facilities and the acquisition and development of new recreational areas and public access.

Not applicable; the proposed project is a navigation improvement and maintenance project.

MANAGING COASTAL DEVELOPMENT

8. Preserve the rural character and scenic beauty of the Great Bay estuary by limiting public investment in infrastructure within the coastal zone in order to limit development to a mixture of low and moderate density.

Not applicable; the proposed project is a navigation improvement and maintenance project. However, by expanding the existing turning basin, the construction of an alternative turning basin location upstream of the current turning basin is avoided along with its associated infrastructure.

9. Reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to preserve the natural and beneficial value of floodplains, through the implementation of the National Flood Insurance Program and applicable state laws and regulations, and local building codes and zoning ordinances.

Not applicable; the proposed project is a navigation improvement and maintenance project. No impacts to the floodplains are expected.

10. Maintain the air resources in the coastal area by ensuring that the ambient air pollution level, established by the New Hampshire State Implementation Plan pursuant to the Clean Air Act, as amended, is not exceeded.

The dredge area, located in Rockingham County, is designated as an attainment area for Clean Air Act priority pollutants; therefore, the requirements of the Conformity Rule do not apply and conditions of the State Implementation Plan are met.

11. Protect and preserve the chemical, physical, and biological integrity of coastal water resources, both surface and groundwater.

No groundwater impacts are expected. The material to be dredged from the widened turning basin improvement is generally composed of clean sand, gravel, and blasted rock. Given the coarse grained nature of the dredged material, and blasted rock, any increases in turbidity are expected to be short-term, minimal, and localized at the dredging and disposal sites. The maintenance material will be tested prior to dredging to determine its suitability for aquatic disposal at the IOS-N or the nearshore sites located off of the coasts of Maine or Massachusetts. Maintenance material previously removed from the Piscataqua River has been clean sandy material; therefore any impacts from removal of this material are expected to be minimal as well.

12. Ensure that the siting of any proposed energy facility in the coast will consider the national interest and will not unduly interfere with the orderly development of the region and will not have an unreasonable adverse impact on aesthetics, historic sites, coastal and estuarine waters, air and water quality, the natural environment and the public health and safety.

Not applicable; the proposed project is a navigation improvement and maintenance project.

COASTAL DEPENDENT USES

13. Allow only water dependent uses and structures on State properties in Portsmouth-Little Harbor, Rye Harbor, and Hampton-Seabrook Harbor, at State port and fish pier facilities and State beaches (except those uses or structures which directly support the public recreation purpose). For new development, allow only water dependent uses and structures over waters and wetlands of the State. Allow repair of existing over-water structures within guidelines. Encourage the siting of water dependent uses adjacent to public waters.

Although improvement of the existing turning basin is located in Maine waters, the beneficiaries are the terminal operators at the two upper berths in New Hampshire. The existing width of the upper turning basin is too narrow for efficient and safe turning and maneuvering of the larger vessels calling on two of those terminals, which constrains existing and future commerce.

14. Preserve and protect coastal and tidal waters and fish and wildlife resources from adverse effects of dredging and dredge disposal, while ensuring the availability of navigable waters to coastal-dependent uses. Encourage beach renourishment and wildlife habitat restoration as a means of dredge disposal whenever compatible.

The purpose of the proposed navigation improvement and maintenance project is to ensure the safe and efficient turning and maneuvering of the larger ships calling on the two upper terminals at the head of the navigation channel. Where possible, the dredged material will be *used for beach nourishment off the coasts of Maine and Massachusetts. The rock removed may be used by the Town of Kittery to construct a wave break at Pepperell Cove. The responsibility for funding and securing all necessary Federal and State permits for the proposed beneficial uses, including beach nourishment and rock use rests with the communities proposing such use and is not part of the Federal action.*

PRESERVATION OF HISTORIC AND CULTURAL RESOURCES

15. Support the preservation, management, and interpretation of historic and culturally significant structures, sites and districts along the Atlantic coast and in the Great Bay area.

The proposed project has been coordinated with the State Historic Preservation Office. As no response was received within 30 days, we assume they have concurred with our determination that the proposed project will have no effect on historic properties in New Hampshire.

MARINE AND ESTUARINE RESEARCH AND EDUCATION

16. Promote and support marine and estuarine research and education that will directly benefit coastal resource management.

Not applicable. Proposed project is a navigation improvement and maintenance project.

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 2, 2014

Engineering/Planning Division
Evaluation Branch

Ms. Laurie Zacari, Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services, Maine Field Office
17 Godfrey Drive, Suite 2
Orono, Maine 04473

Dear Ms Zacari:

Thank you for hosting the meeting of our two agencies at your Falmouth, Maine office on March 19, 2014. The purpose of this letter is to provide additional information to that presented in our letter of September 4, 2013 in order to conclude our coordination under both the Endangered Species Act and the Fish and Wildlife Coordination Act for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine Federal Navigation Improvement Project.

The current description of the project is as follows. The project consists of both maintenance and improvement dredging of the upper turning basin and its approaches at the head of the existing 35-foot deep mean lower low water Federal navigation channel. The existing 800-foot wide turning basin would be widened to 1200 feet. The work entails dredging of about 728,100 cubic yards of sandy glacial till and removal of about 25,300 cubic yards of rock, which would require drilling and blasting before removal. Concurrently the existing turning basin and channel approach will undergo maintenance dredging of about 7,800 cubic yards of sand shoal material. The work would take about six months, including four months to first dredge the sandy till material, followed by about one month for drilling and blasting, and concluding with about one month for dredging of the blasted rock. The work window would be mid-October through mid-April. There may be some overlap in these activities; for example drilling and blasting in some areas may begin before dredging of sandy material was completed.

The Federal base plan for disposal of this material is at an ocean placement site located about ten miles seaward of the harbor entrance seaward of the territorial sea at a location determined by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) to be 'likely suitable' for selection under the criteria specified in the Marine Protection Research and Sanctuaries Act, as amended, and identified in the draft Environmental Assessment as Isles of Shoals-North. Several communities in Maine and Massachusetts have expressed an interest in receiving the dredged sandy material for placement in nearshore bars off of eroding beaches in their communities. These include Wells, Maine and Salisbury, Newburyport and Newbury, Massachusetts. Figures showing the dredge area and placement sites are included in the draft Environmental Assessment. Under the local plan for beneficial use of the sand, about 365,100 cubic yards of material would be placed off of Wells Beach. The type of equipment expected to bid on a project of this size would require that material to be placed seaward of the -12-foot mean low water contour offshore of the beach from the end of Mile Road northward.

The USACE has considered the effects of the project on the Federally threatened piping plover and on the red knot which has been proposed for listing as threatened. Placement of sand offshore of Wells Beach would occur between mid-October and late-February. This is outside of the time that these species are generally present on Wells Beach. Dredging and rock removal in the upper Piscataqua River would not impact these species. Furthermore, the Town of Wells has a beach management plan already in place which was developed in consultation with your agency to protect piping plovers and by extension the red knot, if listed.

It is expected that adding this volume of sandy material to the Wells Beach littoral system would allow much of the sand to be sorted by natural processes and migrate onto Wells Beach over the near term and contribute to a lessening of beach erosion. This should result in a larger and healthier beach area available to plovers and other shorebirds for nesting and foraging. Provided that the Town of Wells continues to pursue the action items in its beach management plan, the overall impact of the project on these species should be favorable.

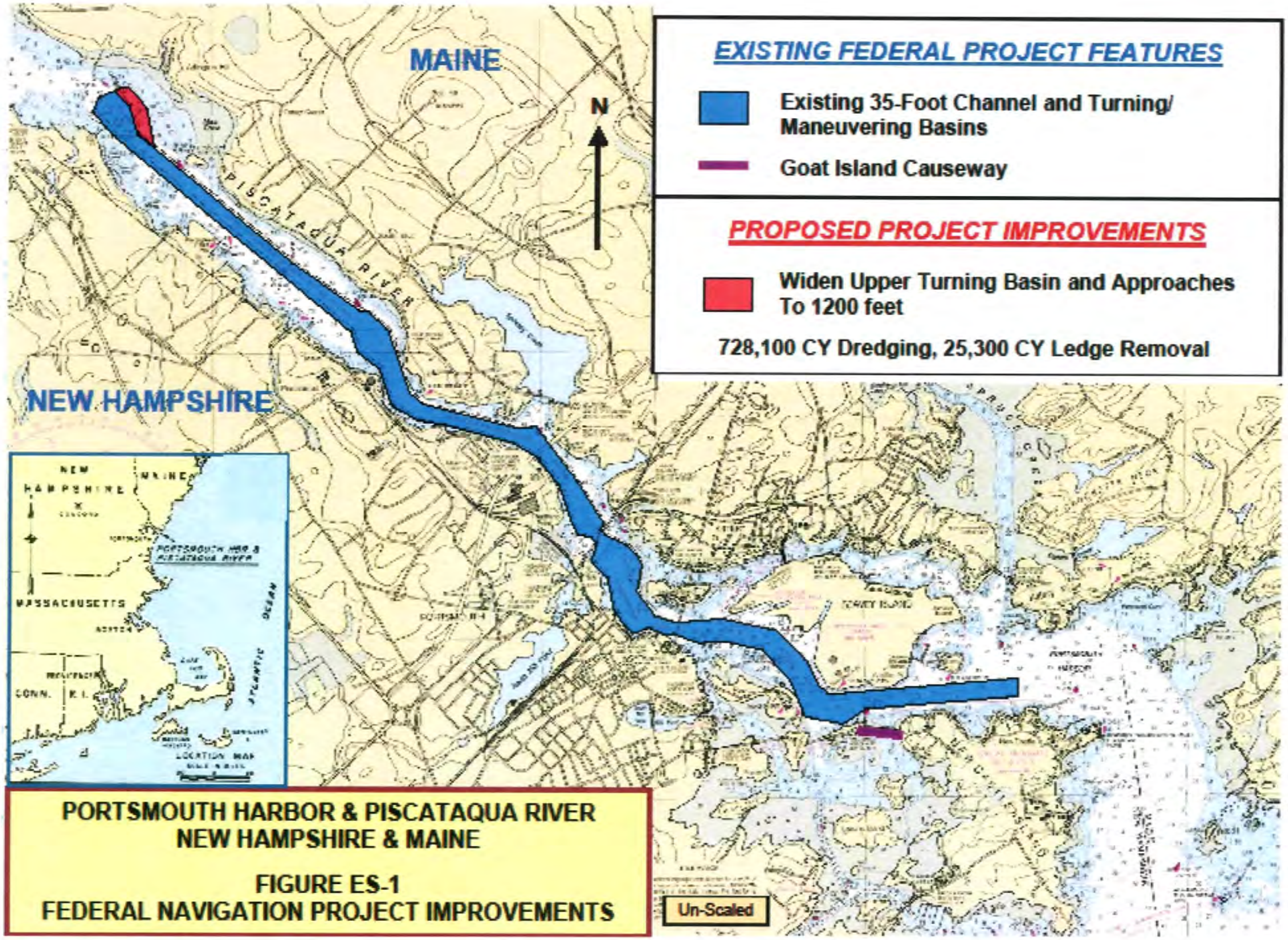
I would appreciate your reply concluding coordination under the requirements of both the Endangered Species Act and the Fish and Wildlife Coordination Act within thirty days of the date of this letter. A CD with the Draft Feasibility Report and Draft Environmental Assessment (FR/EA) has been provided for your information. Should you have any questions please contact Ms. Catherine Rogers, the environmental team member, at (978) 318-8231 or at her e-mail address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures
CD with Draft FR/EA

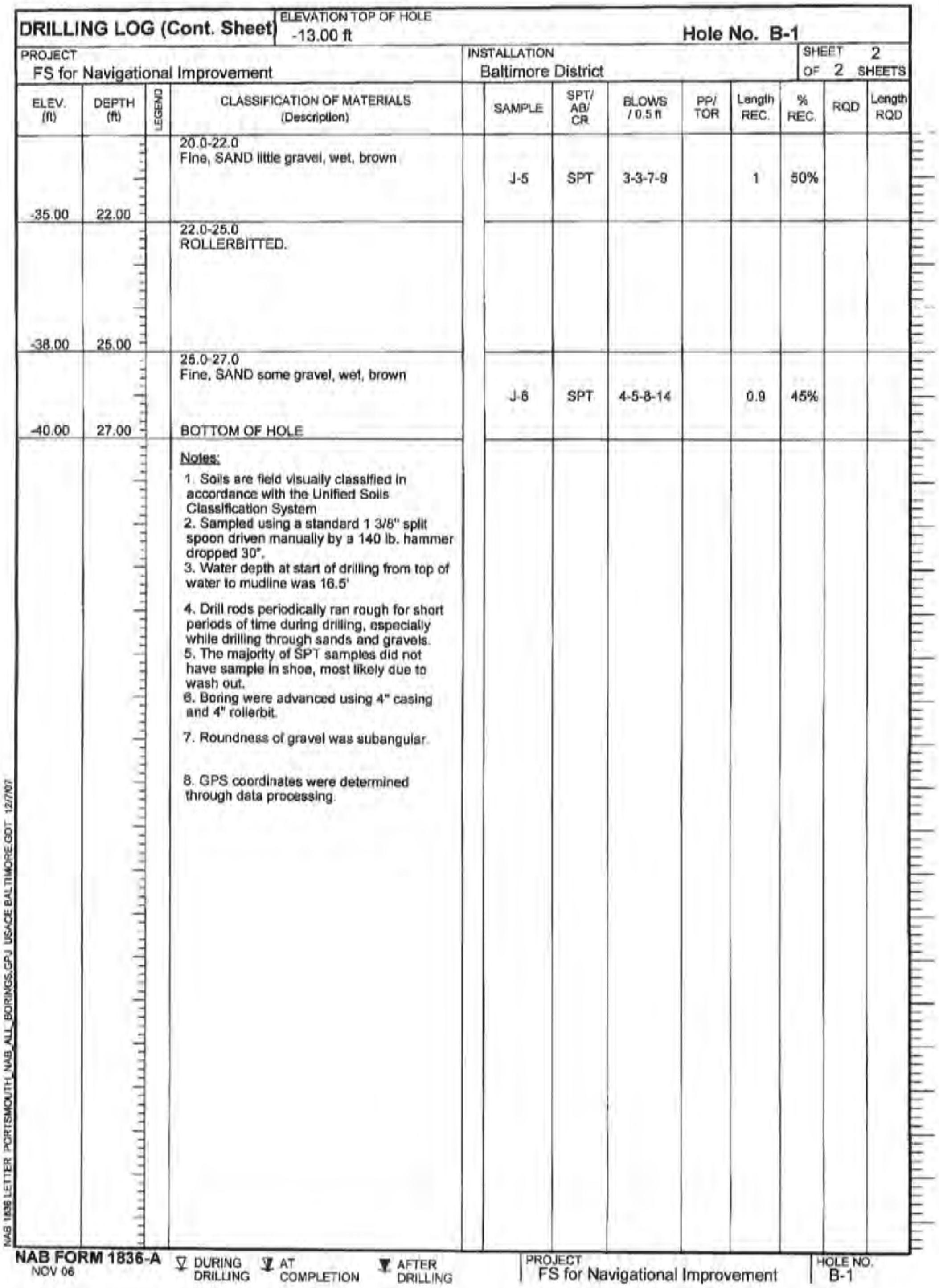
Copy Furnished:
Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802



Attachment 1 – Location of Federal Channel and Turning Basin

Attachment 2 – Turning basin survey locations

Attachment 2 (cont'd) – Survey data



DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-13.00 ft

Hole No. B-1

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-35.00	22.00		20.0-22.0 Fine, SAND little gravel, wet, brown	J-5	SPT	3-3-7-9		1	50%		
-38.00	25.00		22.0-25.0 ROLLERBITTED.								
-40.00	27.00		25.0-27.0 Fine, SAND some gravel, wet, brown BOTTOM OF HOLE	J-6	SPT	4-5-8-14		0.9	45%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 16.5'
4. Drill rods periodically ran rough for short periods of time during drilling, especially while drilling through sands and gravels.
5. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
6. Boring were advanced using 4" casing and 4" rollerbit.
7. Roundness of gravel was subangular.
8. GPS coordinates were determined through data processing.

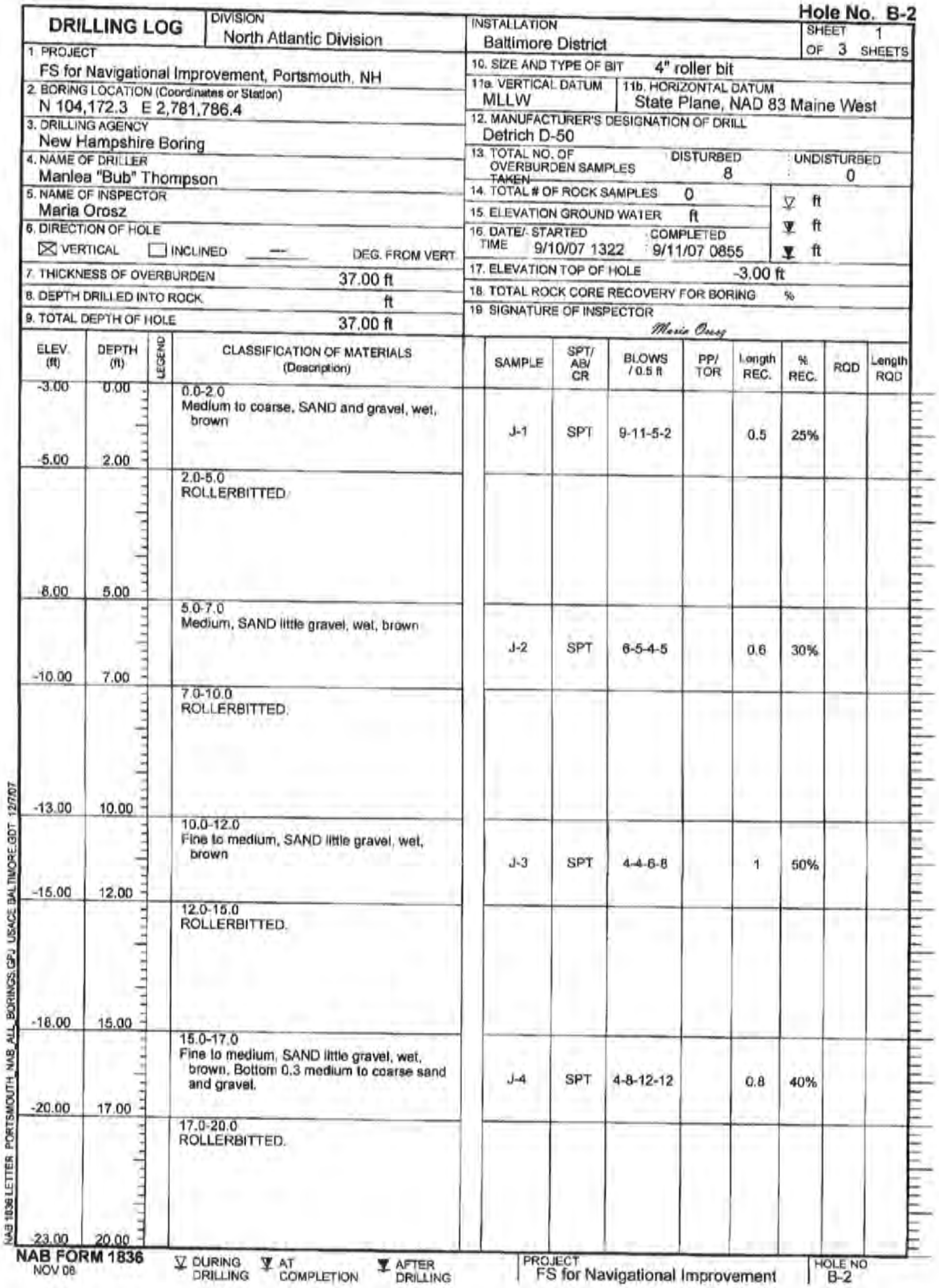
NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

∇ DURING DRILLING ⊻ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
B-1



Hole No. B-2

DRILLING LOG	DIVISION North Atlantic Division
INSTALLATION Baltimore District	SHEET 1 OF 3 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,172.3 E 2,781,786.4

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Manlea "Bub" Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 37.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 37.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES ~~TAKEN~~ DISTURBED 8 UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

16. DATE/ TIME STARTED 9/10/07 1322 COMPLETED 9/11/07 0855

▽ ft
▼ ft
▼ ft

17. ELEVATION TOP OF HOLE -3.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-3.00 -5.00	0.00 2.00		0.0-2.0 Medium to coarse, SAND and gravel, wet, brown	J-1	SPT	9-11-5-2		0.5	25%		
-8.00	5.00		2.0-5.0 ROLLERBITTED.								
-10.00	7.00		5.0-7.0 Medium, SAND little gravel, wet, brown	J-2	SPT	6-5-4-5		0.6	30%		
-13.00	10.00		7.0-10.0 ROLLERBITTED.								
-15.00	12.00		10.0-12.0 Fine to medium, SAND little gravel, wet, brown	J-3	SPT	4-4-6-8		1	50%		
-18.00	15.00		12.0-15.0 ROLLERBITTED.								
-20.00	17.00		15.0-17.0 Fine to medium, SAND little gravel, wet, brown. Bottom 0.3 medium to coarse sand and gravel.	J-4	SPT	4-8-12-12		0.8	40%		
-23.00	20.00		17.0-20.0 ROLLERBITTED.								

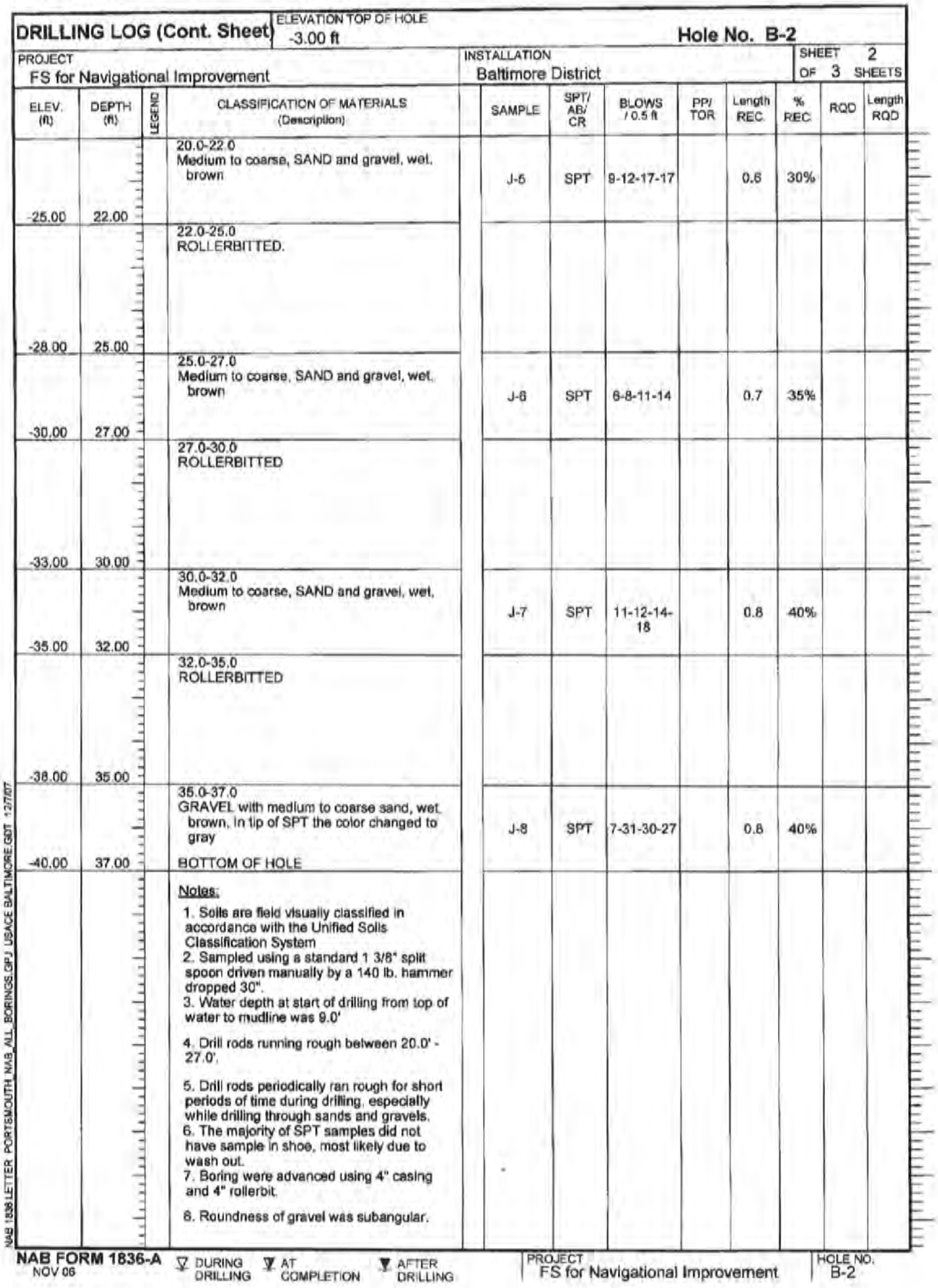
NAB 1836 LETTER PORTSMOUTH NAB ALL BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 08

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO B-2



DRILLING LOG (Cont. Sheet) | ELEVATION TOP OF HOLE -3.00 ft | **Hole No. B-2**

PROJECT FS for Navigational Improvement | INSTALLATION Baltimore District | SHEET 2 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC	% REC	RQD	Length RQD
-25.00	22.00		20.0-22.0 Medium to coarse, SAND and gravel, wet, brown	J-5	SPT	9-12-17-17		0.6	30%		
-28.00	25.00		22.0-25.0 ROLLERBITTED.								
-30.00	27.00		25.0-27.0 Medium to coarse, SAND and gravel, wet, brown	J-6	SPT	6-8-11-14		0.7	35%		
-33.00	30.00		27.0-30.0 ROLLERBITTED								
-35.00	32.00		30.0-32.0 Medium to coarse, SAND and gravel, wet, brown	J-7	SPT	11-12-14-18		0.8	40%		
-38.00	35.00		32.0-35.0 ROLLERBITTED								
-40.00	37.00		35.0-37.0 GRAVEL with medium to coarse sand, wet, brown, in tip of SPT the color changed to gray BOTTOM OF HOLE	J-8	SPT	7-31-30-27		0.8	40%		

Notes:

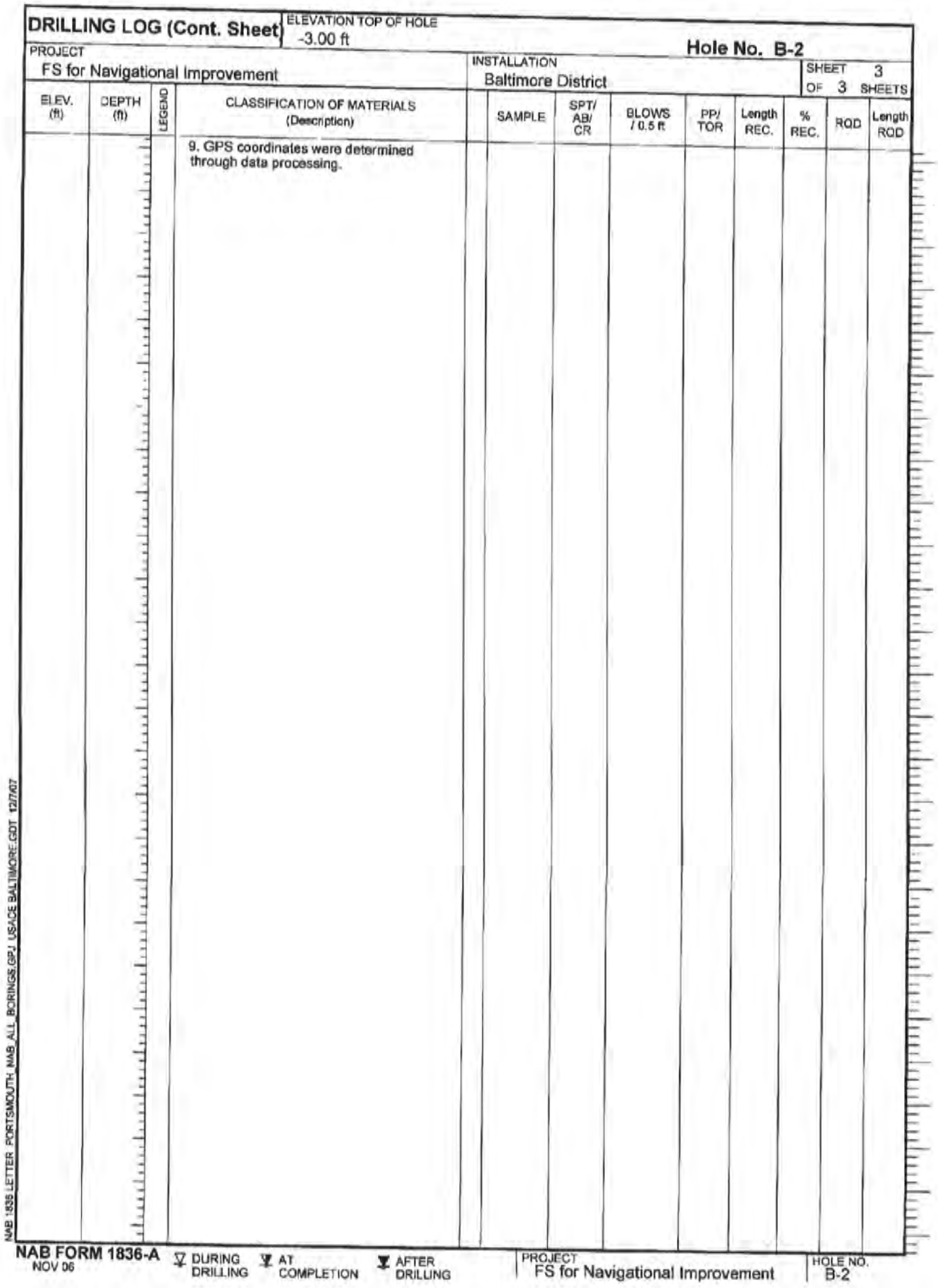
1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 9.0'
4. Drill rods running rough between 20.0' - 27.0'.
5. Drill rods periodically ran rough for short periods of time during drilling, especially while drilling through sands and gravels.
6. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
7. Boring were advanced using 4" casing and 4" rollerbit.
8. Roundness of gravel was subangular.

NAB 1836 LETTER PORTSMOUTH NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement | HOLE NO. B-2



DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-3.00 ft

Hole No. B-2

PROJECT
FS for Navigational Improvement

INSTALLATION
Baltimore District

SHEET 3
OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			9. GPS coordinates were determined through data processing.								

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
B-2

Hole No. B-3

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT 4" roller bit
2. BORING LOCATION (Coordinates or Station) N 104,052.6 E 2,782,268.9	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Manlea "Bub" Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN — DISTURBED 6 — UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 0
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	15. ELEVATION GROUND WATER ft ∇ ft ∇ ft ▼ ft
7. THICKNESS OF OVERBURDEN 27.00 ft	16. DATE/ TIME STARTED 9/11/07 1000 COMPLETED 9/11/07 1310
8. DEPTH DRILLED INTO ROCK ft	17. ELEVATION TOP OF HOLE -15.00 ft
9. TOTAL DEPTH OF HOLE 27.00 ft	18. TOTAL ROCK CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-15.00	0.00		0.0-2.0 Fine to medium, SAND contains shells, little gravel, wet, black and brown	J-1	SPT	3-3-3-2		0.4	20%		
-17.00	2.00		2.0-5.0 ROLLERBITTED.								
-20.00	5.00		5.0-5.6 Fine to medium, SAND little gravel, wet, brown	J-2	SPT	31-120/0.1		0.6	100%		
-20.60	5.60		7.0-10.0 ROLLERBITTED.								
-25.00	10.00		10.0-12.0 Sandy fine, SILT with gravel, wet, brown	J-3	SPT	2-5-22-37		1.2	60%		
-27.00	12.00		12.0-15.0 ROLLERBITTED.								
-30.00	15.00		15.0-17.0 Fine, SAND with two interbedded silt layers, wet, brown	J-4	SPT	4-5-5-6		0.7	35%		
-32.00	17.00		17.0-20.0 ROLLERBITTED.								
-35.00	20.00										

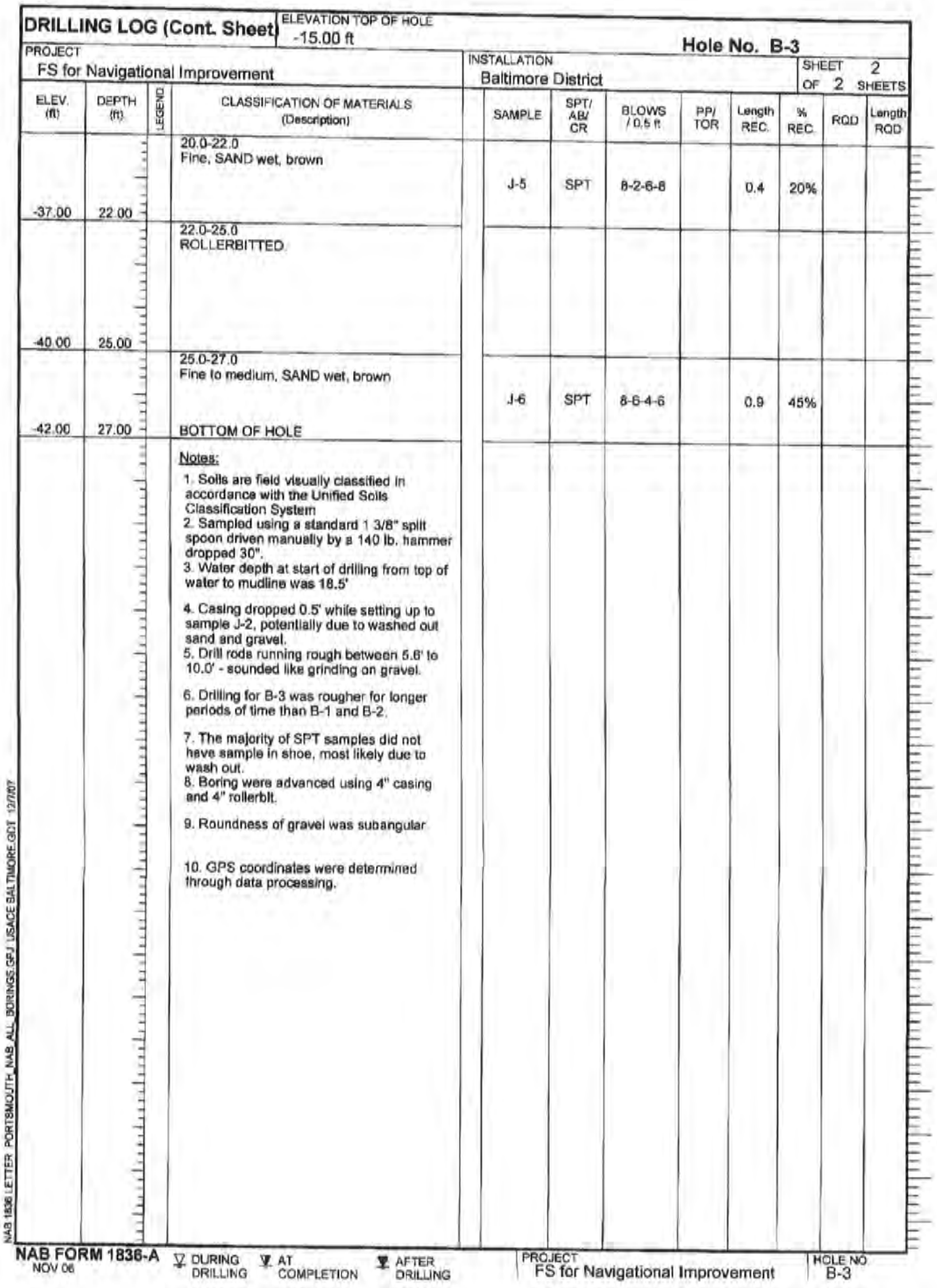
NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

∇ DURING DRILLING ∇ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
B-3



DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -15.00 ft

Hole No. B-3

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-37.00	22.00		20.0-22.0 Fine, SAND wet, brown	J-5	SPT	8-2-6-8		0.4	20%		
-40.00	25.00		22.0-25.0 ROLLERBITTED								
-42.00	27.00		25.0-27.0 Fine to medium, SAND wet, brown BOTTOM OF HOLE	J-6	SPT	8-6-4-6		0.9	45%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 18.5'
4. Casing dropped 0.5' while setting up to sample J-2, potentially due to washed out sand and gravel.
5. Drill rods running rough between 5.6' to 10.0' - sounded like grinding on gravel.
6. Drilling for B-3 was rougher for longer periods of time than B-1 and B-2.
7. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
8. Boring were advanced using 4" casing and 4" rollerbit.
9. Roundness of gravel was subangular
10. GPS coordinates were determined through data processing.

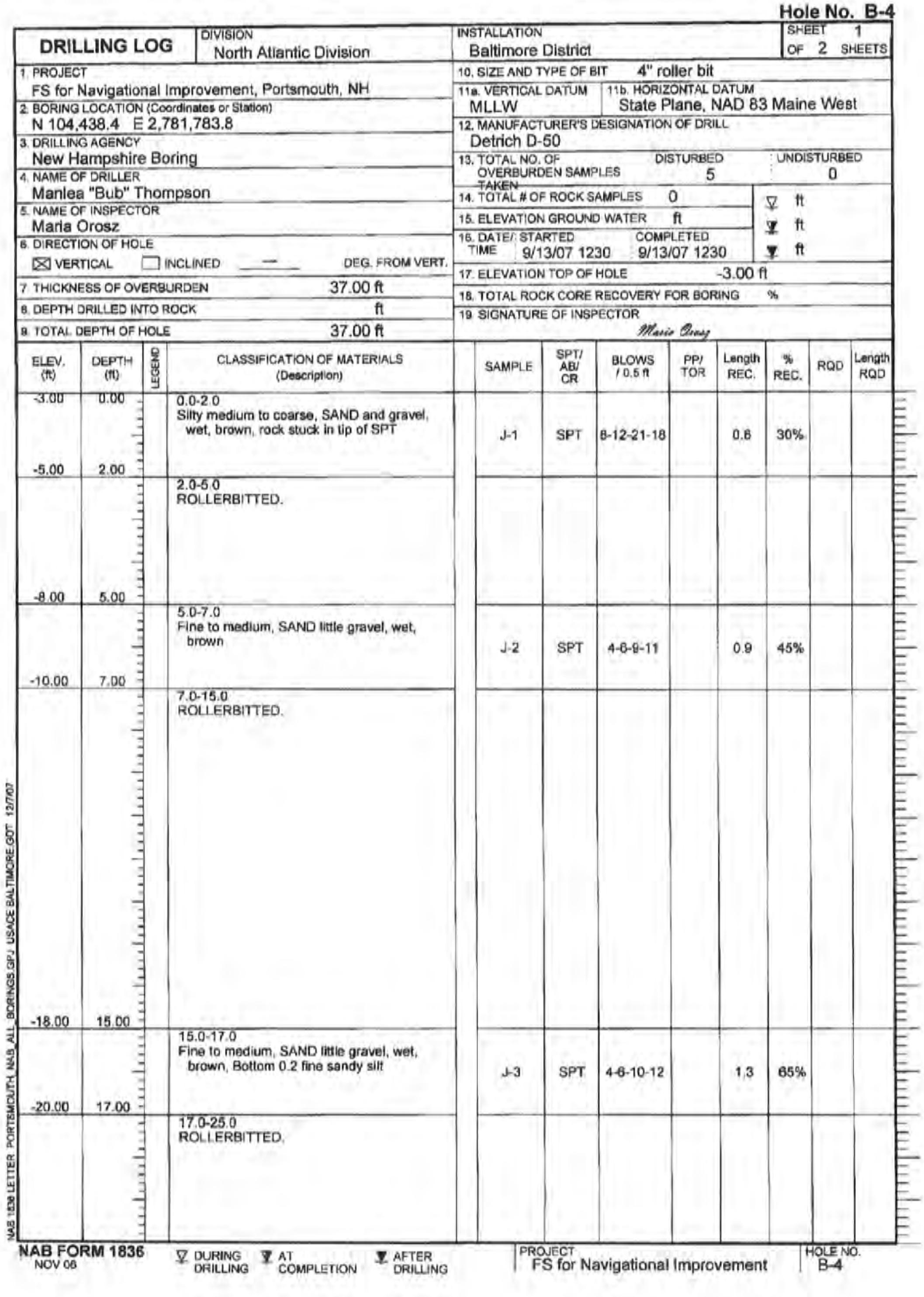
NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-3



Hole No. B-4

DRILLING LOG

DIVISION North Atlantic Division

INSTALLATION Baltimore District

SHEET 1 OF 2 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH
2. BORING LOCATION (Coordinates or Station) N 104,438.4 E 2,781,783.8
3. DRILLING AGENCY New Hampshire Boring
4. NAME OF DRILLER Manlea "Bub" Thompson
5. NAME OF INSPECTOR Maria Orosz
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED — DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN 37.00 ft
8. DEPTH DRILLED INTO ROCK ft
9. TOTAL DEPTH OF HOLE 37.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN DISTURBED 5 UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

16. DATE/TIME STARTED 9/13/07 1230 COMPLETED 9/13/07 1230

▽ ft

▼ ft

▼ ft

17. ELEVATION TOP OF HOLE -3.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-3.00	0.00		0.0-2.0 Silty medium to coarse, SAND and gravel, wet, brown, rock stuck in tip of SPT	J-1	SPT	8-12-21-18		0.6	30%		
-5.00	2.00		2.0-5.0 ROLLERBITTED.								
-8.00	5.00		5.0-7.0 Fine to medium, SAND little gravel, wet, brown	J-2	SPT	4-6-9-11		0.9	45%		
-10.00	7.00		7.0-15.0 ROLLERBITTED.								
-18.00	15.00		15.0-17.0 Fine to medium, SAND little gravel, wet, brown, Bottom 0.2 fine sandy silt	J-3	SPT	4-6-10-12		1.3	65%		
-20.00	17.00		17.0-25.0 ROLLERBITTED.								

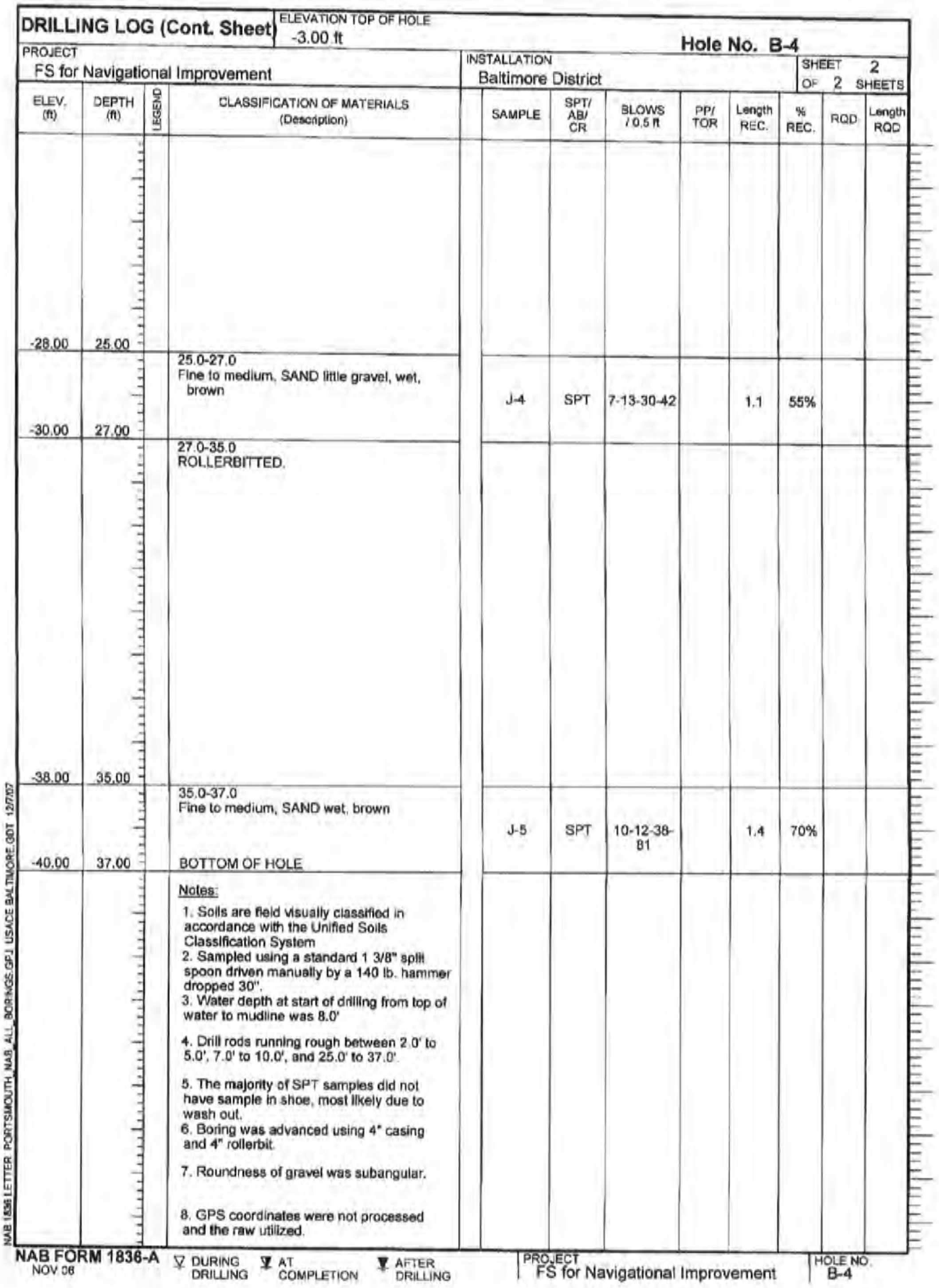
NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-4



DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -3.00 ft

Hole No. B-4

PROJECT FS for Navigational Improvement

INSTALLATION Baltimore District

SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-28.00	25.00		25.0-27.0 Fine to medium, SAND little gravel, wet, brown	J-4	SPT	7-13-30-42		1.1	55%		
-30.00	27.00		27.0-35.0 ROLLERBITTED.								
-38.00	35.00		35.0-37.0 Fine to medium, SAND wet, brown	J-5	SPT	10-12-38-81		1.4	70%		
-40.00	37.00		BOTTOM OF HOLE								

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 8.0'
4. Drill rods running rough between 2.0' to 5.0', 7.0' to 10.0', and 25.0' to 37.0'.
5. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
6. Boring was advanced using 4" casing and 4" rollerbit.
7. Roundness of gravel was subangular.
8. GPS coordinates were not processed and the raw utilized.

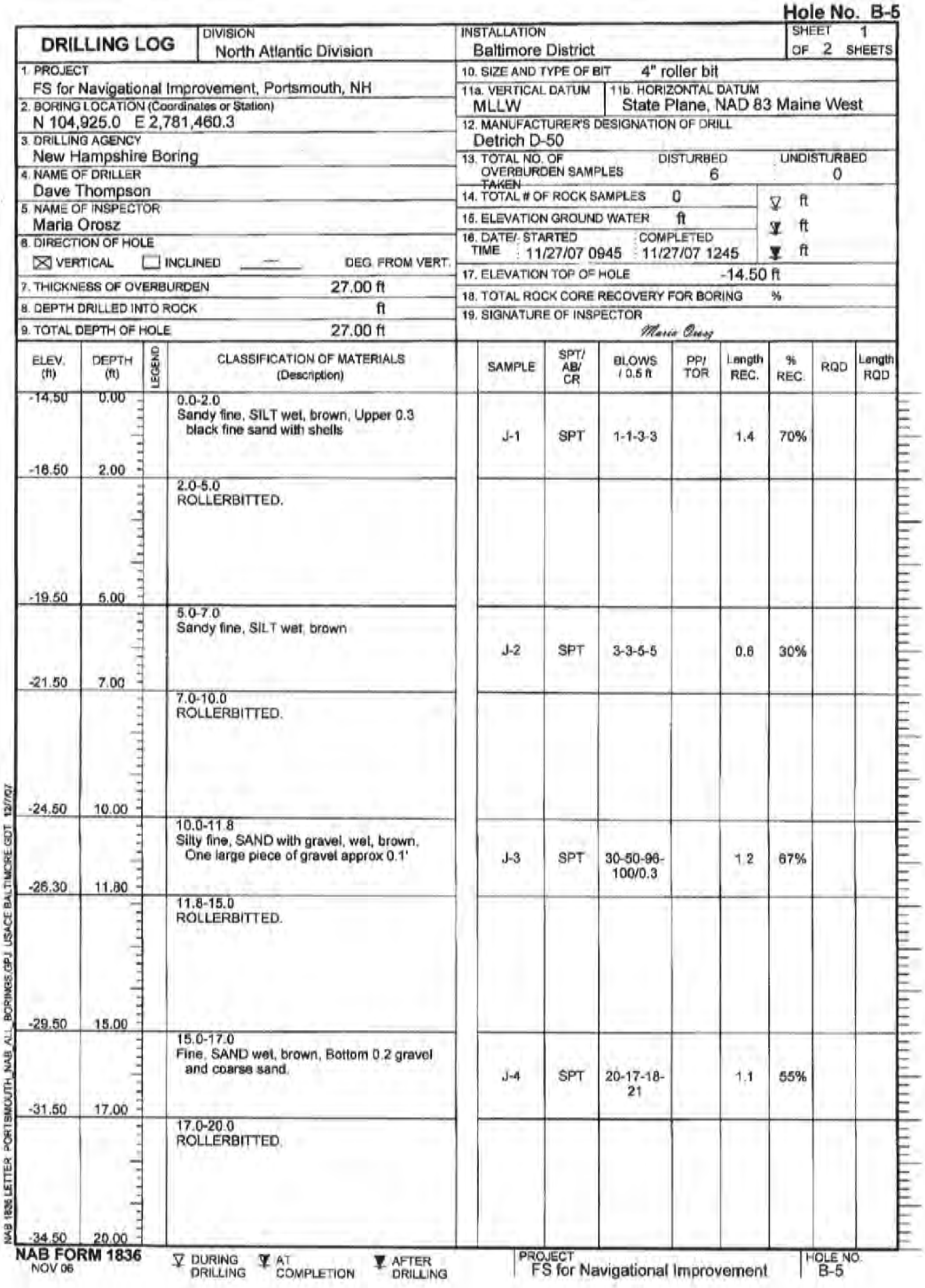
NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-4



Hole No. B-5

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District
SHEET 1 OF 2 SHEETS		

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,925.0 E 2,781,460.3

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Dave Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED — DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 27.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 27.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN — DISTURBED 6 — UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

∇ ft
▼ ft
▼ ft

16. DATE/TIME — STARTED 11/27/07 0945 — COMPLETED 11/27/07 1245

17. ELEVATION TOP OF HOLE -14.50 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-14.50 -16.50	0.00 2.00		0.0-2.0 Sandy fine, SILT wet, brown, Upper 0.3 black fine sand with shells	J-1	SPT	1-1-3-3		1.4	70%		
-19.50	5.00		2.0-5.0 ROLLERBITTED.								
-21.50	7.00		5.0-7.0 Sandy fine, SILT wet, brown	J-2	SPT	3-3-5-5		0.6	30%		
-24.50	10.00		7.0-10.0 ROLLERBITTED.								
-26.30	11.80		10.0-11.8 Silty fine, SAND with gravel, wet, brown. One large piece of gravel approx 0.1'	J-3	SPT	30-50-96-100/0.3		1.2	67%		
-29.50	15.00		11.8-15.0 ROLLERBITTED.								
-31.50	17.00		15.0-17.0 Fine, SAND wet, brown, Bottom 0.2 gravel and coarse sand.	J-4	SPT	20-17-18-21		1.1	55%		
-34.50	20.00		17.0-20.0 ROLLERBITTED.								

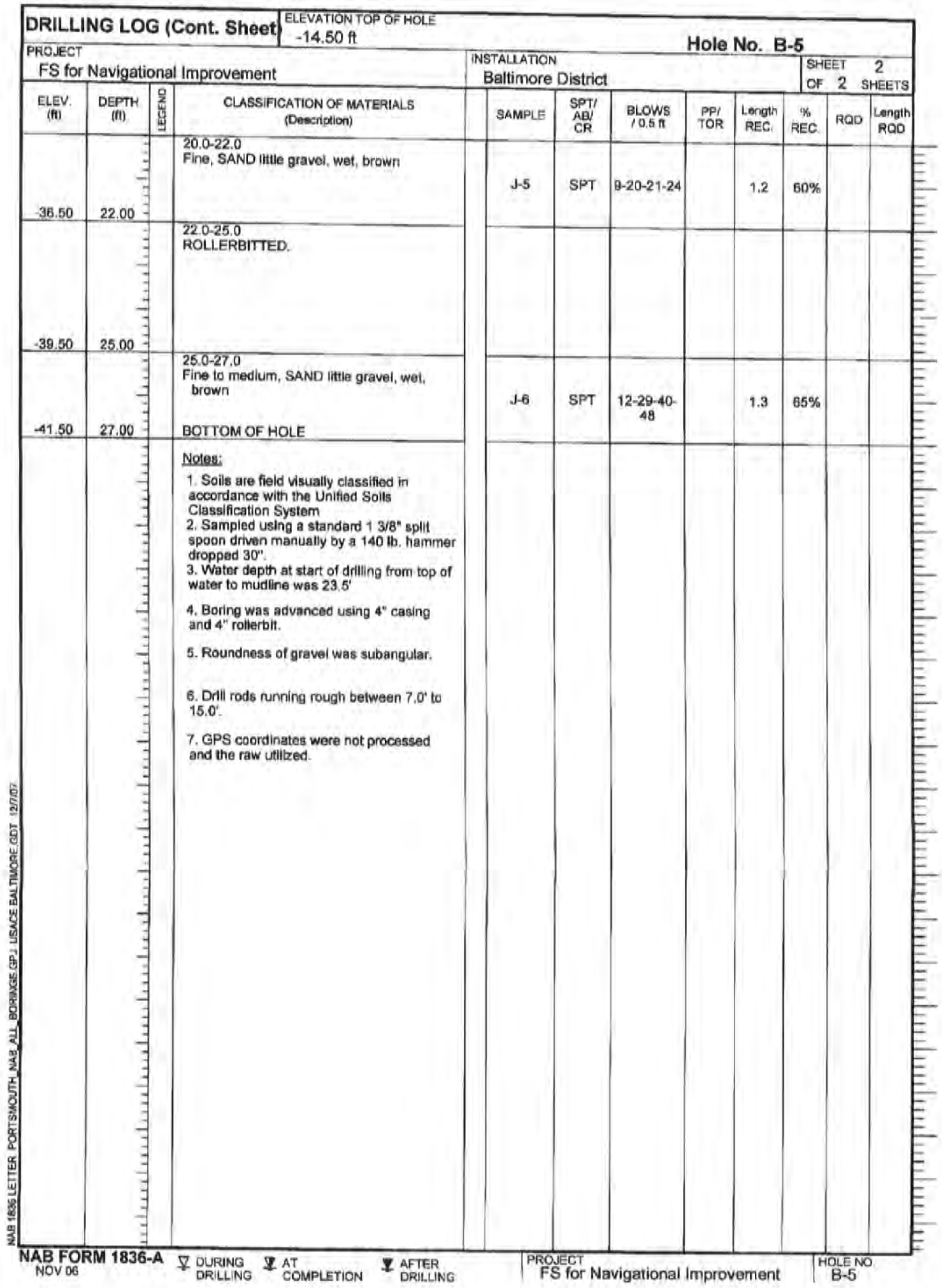
NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

∇ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-5



DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -14.50 ft

Hole No. B-5

PROJECT FS for Navigational Improvement

INSTALLATION Baltimore District

SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-36.50	22.00		20.0-22.0 Fine, SAND little gravel, wet, brown	J-5	SPT	9-20-21-24		1.2	60%		
-39.50	25.00		22.0-25.0 ROLLERBITTED.								
-41.50	27.00		25.0-27.0 Fine to medium, SAND little gravel, wet, brown BOTTOM OF HOLE	J-6	SPT	12-29-40-48		1.3	65%		
			Notes: 1. Soils are field visually classified in accordance with the Unified Soils Classification System 2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30". 3. Water depth at start of drilling from top of water to mudline was 23.5' 4. Boring was advanced using 4" casing and 4" rollerbit. 5. Roundness of gravel was subangular. 6. Drill rods running rough between 7.0' to 15.0'. 7. GPS coordinates were not processed and the raw utilized.								

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-5

Hole No. B-6

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,631.0 E 2,781,500.2

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Dave Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 12.00 ft

8. DEPTH DRILLED INTO ROCK 10.00 ft

9. TOTAL DEPTH OF HOLE 28.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN DISTURBED 3 UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 2

15. ELEVATION GROUND WATER ft

∇ ft
▼ ft
▼ ft

16. DATE/ TIME STARTED 11/28/07 0800 COMPLETED 11/28/07 1305

17. ELEVATION TOP OF HOLE -15.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING 100%

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-15.00 -17.00	0.00 2.00		0.0-2.0 Fine to medium, SAND with gravel, wet, brown	J-1	SPT	7-8-9-10		0.6	30%		
-20.00	5.00		2.0-5.0 ROLLERBITTED.								
-22.00	7.00		5.0-7.0 Silty fine, SAND with gravel, wet, brown	J-2	SPT	18-28-40-43		0.5	25%		
-25.00	10.00		7.0-10.0 ROLLERBITTED.								
-27.00	12.00		10.0-12.0 Silty fine, SAMD with gravel, wet, brown. Upper 0.2 black gravel and coarse sand	J-3	SPT	76-88-63-72		1	50%		
-33.00	18.00		12.0-15.0 ROLLERBITTED. 15.0-18.0 SPT refusal @ 15' (0.0/100). ROLLERBITTED to 18.0'. Wash water from tailings was cloudy gray, and tailings appeared to be crushed rock. Began coring at 18.0.'								
			18.0-23.0 Gneiss gray, slightly weathered, fine, medium hard, Rock contained pitted voids from 18.0 to 19.0'. One apparent fracture at 19.9'. Fracture was slightly stained, rough, narrow, dipping at approx 50 degrees								

NAB 1836 LETTER PORTSMOUTH NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

∇ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-6

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -15.00 ft

Hole No. B-6

PROJECT FS for Navigational Improvement

INSTALLATION Baltimore District

SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC	RQD	Length RQD
-38.00	23.00		Mechanical breaks occurred at 18.2', 18.9', 20.1', 20.5' and 22.2'.		CR Run 1			5	100%	0.92	55.2
-43.00	28.00		23.0-28.0 Gneiss gray, slightly weathered, fine, medium hard, One apparent fracture at 23.7'. Fracture was slightly stained, rough, narrow, dipping at approx 60 degrees. Mechanical breaks occurred at 24.6', 25.3', 25.7', and 26.5'. Mechanical break angles ranged from 40 to 70 degrees. BOTTOM OF HOLE		CR Run 2			5	100%	0.94	56.4

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 15.0'
4. Boring was advanced using 4" casing and 4" rollerbit
5. Roundness of gravel was subangular
6. Run Times (ft/min) for Run #1: 3-4-4-4-4, and Run#2: 4-3-3-3-3.
7. Poor recovery for J-2 due to rock in catcher.
8. Drill rods running rough between 7.0' to 10.0'.
9. GPS coordinates were determined through data processing

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A NOV 06 ▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-6

Hole No. B-7

DRILLING LOG

DIVISION: North Atlantic Division

INSTALLATION: Baltimore District

SHEET 1 OF 2 SHEETS

1. PROJECT: FS for Navigational Improvement, Portsmouth, NH
2. BORING LOCATION (Coordinates or Station): N 103,983.5 E 2,781,847.7
3. DRILLING AGENCY: New Hampshire Boring
4. NAME OF DRILLER: Dave Thompson
5. NAME OF INSPECTOR: Maria Orosz
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED — DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 22.00 ft
8. DEPTH DRILLED INTO ROCK: ft
9. TOTAL DEPTH OF HOLE: 22.00 ft

10. SIZE AND TYPE OF BIT: 4" roller bit

11a. VERTICAL DATUM: MLLW

11b. HORIZONTAL DATUM: State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL: Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 5 UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES: 0

15. ELEVATION GROUND WATER: ft

▽ ft

▼ ft

▼ ft

16. DATE/TIME: STARTED 11/29/07 0830 COMPLETED 11/28/07 1100

17. ELEVATION TOP OF HOLE: -19.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING: %

19. SIGNATURE OF INSPECTOR: Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-19.00 -21.00	0.00 2.00		0.0-2.0 Fine, SAND little gravel, wet, brown	J-1	SPT	11-4-3-2		1	50%		
-24.00	5.00		2.0-5.0 ROLLERBITTED.								
-26.00	7.00		5.0-7.0 Fine to medium, SAND little gravel, wet, brown	J-2	SPT	5-5-3-5		1.3	65%		
-29.00	10.00		7.0-10.0 ROLLERBITTED.								
-31.00	12.00		10.0-12.0 Fine to coarse, SAND with gravel, wet, brown	J-3	SPT	4-4-4-8		1.2	60%		
-34.00	15.00		12.0-15.0 ROLLERBITTED.								
-36.00	17.00		15.0-17.0 Medium to coarse, SAND with gravel, wet, brown	J-4	SPT	7-8-12-31		0.9	45%		
-39.00	20.00		17.0-20.0 ROLLERBITTED.								

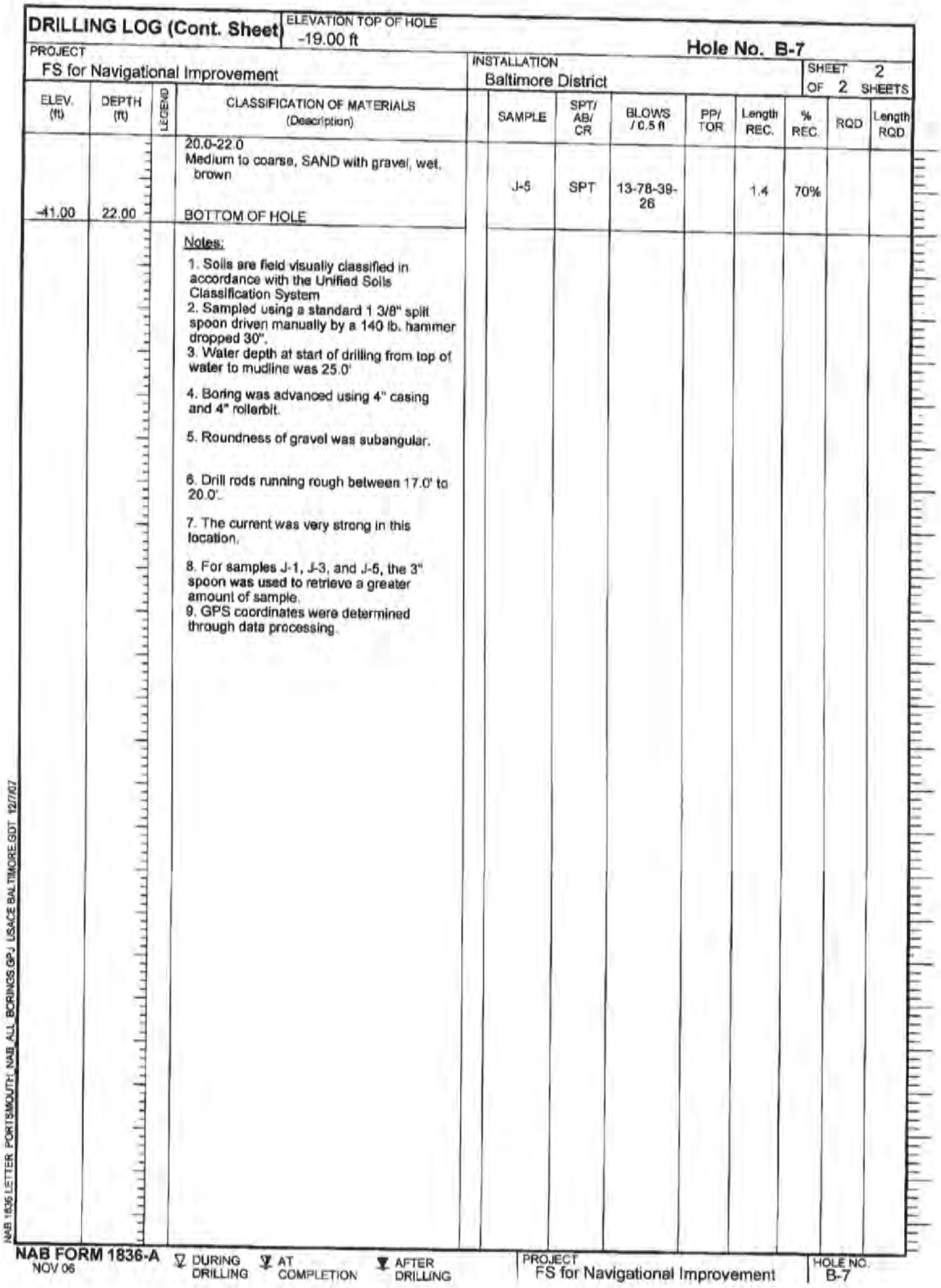
NAB 1836 LETTER PORTSMOUTH NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT: FS for Navigational Improvement

HOLE NO. B-7



DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-19.00 ft

Hole No. B-7

PROJECT
FS for Navigational Improvement

INSTALLATION
Baltimore District

SHEET 2
OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-41.00	22.00		20.0-22.0 Medium to coarse, SAND with gravel, wet, brown BOTTOM OF HOLE	J-5	SPT	13-78-39-26		1.4	70%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 25.0'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. Drill rods running rough between 17.0' to 20.0'.
7. The current was very strong in this location.
8. For samples J-1, J-3, and J-5, the 3" spoon was used to retrieve a greater amount of sample.
9. GPS coordinates were determined through data processing.

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
B-7

Hole No. B-8

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 103,732.7 E 2,782,109.8

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Dave Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED — DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 22.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 22.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM
MLLW

11b. HORIZONTAL DATUM
State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN DISTURBED 5 UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▼ ft
▼ ft

16. DATE/TIME STARTED 11/29/07 1237 COMPLETED 11/30/07 1000

17. ELEVATION TOP OF HOLE -18.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-18.00 -20.00	0.00 2.00		0.0-2.0 Fine to medium, SAND wet, brown, One large piece of gravel approx 0.3'	J-1	SPT	19-6-2-2		0.7	35%		
-23.00	5.00		2.0-5.0 ROLLERBITTED.								
-25.00	7.00		5.0-7.0 Coarse, SAND AND GRAVEL wet, brown	J-2	SPT	5-5-7-9		1	50%		
-28.00	10.00		7.0-10.0 ROLLERBITTED.								
-30.00	12.00		10.0-12.0 Fine to medium, SAND AND GRAVEL little gravel, wet, brown	J-3	SPT	14-19-23-30		0.9	45%		
-33.00	15.00		12.0-15.0 ROLLERBITTED.								
-35.00	17.00		15.0-17.0 Medium to coarse, SAND AND GRAVEL wet, brown	J-4	SPT	12-30-31-40		2	100%		
-38.00	20.00		17.0-20.0 ROLLERBITTED.								

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
B-8

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: -18.00 ft

Hole No. B-8

PROJECT: FS for Navigational Improvement

INSTALLATION: Baltimore District

SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			20.0-22.0 Coarse, SAND AND GRAVEL wet, brown	J-5	SPT	13-15-17-14		1	50%		
-40.00	22.00		BOTTOM OF HOLE								

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 25.0'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. For samples J-1, J-2, J-4, and J-5, the 3" spoon was used to retrieve a greater amount of sample.
7. GPS coordinates were determined through data processing.

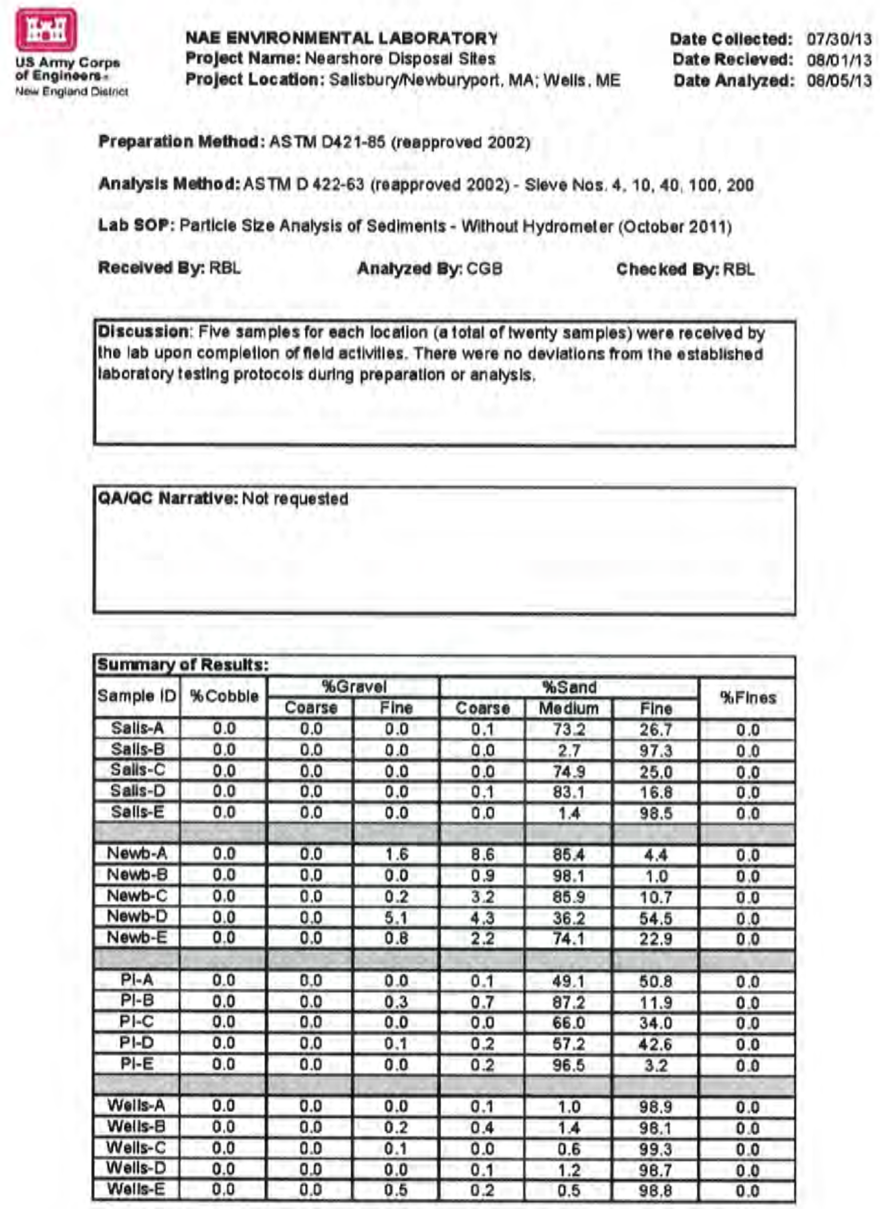
NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT: FS for Navigational Improvement

HOLE NO. B-8



US Army Corps of Engineers
New England District

NAE ENVIRONMENTAL LABORATORY
Project Name: Nearshore Disposal Sites
Project Location: Salisbury/Newburyport, MA; Wells, ME

Date Collected: 07/30/13
Date Recieved: 08/01/13
Date Analyzed: 08/05/13

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

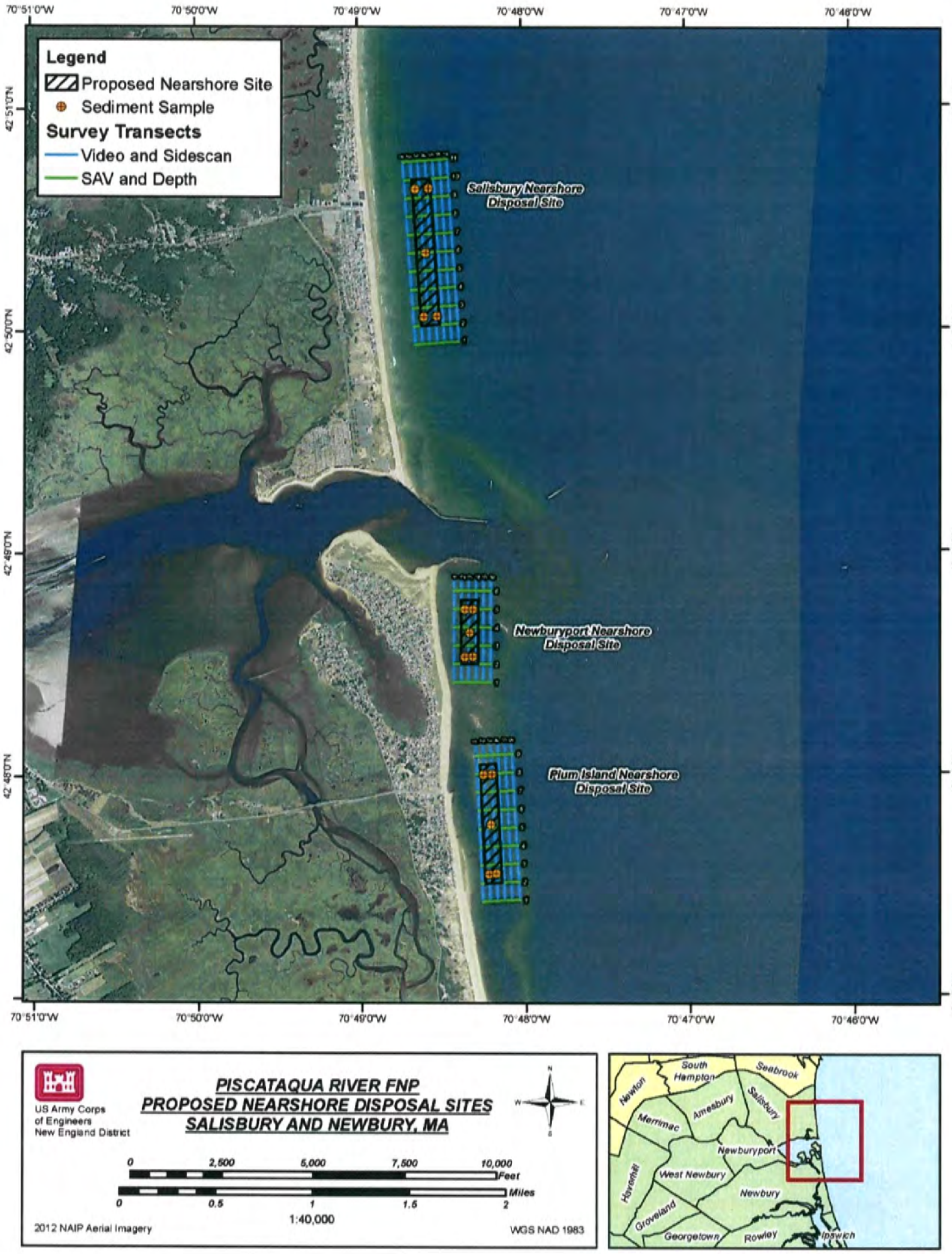
Discussion: Five samples for each location (a total of twenty samples) were received by the lab upon completion of field activities. There were no deviations from the established laboratory testing protocols during preparation or analysis.

QA/QC Narrative: Not requested

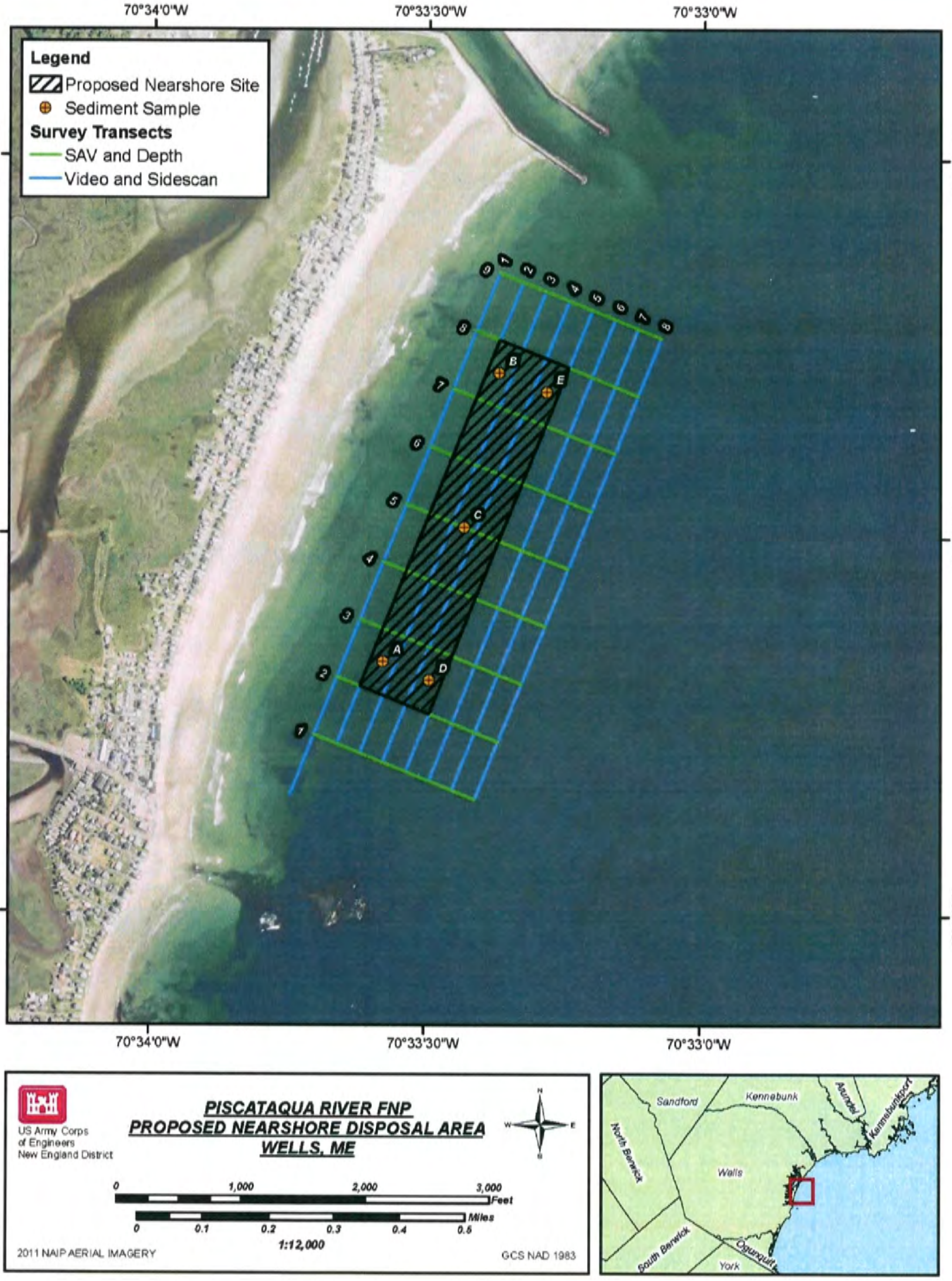
Summary of Results:

Sample ID	%Cobble	%Gravel		%Sand			%Fines
		Coarse	Fine	Coarse	Medium	Fine	
Salis-A	0.0	0.0	0.0	0.1	73.2	26.7	0.0
Salis-B	0.0	0.0	0.0	0.0	2.7	97.3	0.0
Salis-C	0.0	0.0	0.0	0.0	74.9	25.0	0.0
Salis-D	0.0	0.0	0.0	0.1	83.1	16.8	0.0
Salis-E	0.0	0.0	0.0	0.0	1.4	98.5	0.0
Newb-A	0.0	0.0	1.6	8.6	85.4	4.4	0.0
Newb-B	0.0	0.0	0.0	0.9	98.1	1.0	0.0
Newb-C	0.0	0.0	0.2	3.2	85.9	10.7	0.0
Newb-D	0.0	0.0	5.1	4.3	36.2	54.5	0.0
Newb-E	0.0	0.0	0.8	2.2	74.1	22.9	0.0
PI-A	0.0	0.0	0.0	0.1	49.1	50.8	0.0
PI-B	0.0	0.0	0.3	0.7	87.2	11.9	0.0
PI-C	0.0	0.0	0.0	0.0	66.0	34.0	0.0
PI-D	0.0	0.0	0.1	0.2	57.2	42.6	0.0
PI-E	0.0	0.0	0.0	0.2	96.5	3.2	0.0
Wells-A	0.0	0.0	0.0	0.1	1.0	98.9	0.0
Wells-B	0.0	0.0	0.2	0.4	1.4	98.1	0.0
Wells-C	0.0	0.0	0.1	0.0	0.6	99.3	0.0
Wells-D	0.0	0.0	0.0	0.1	1.2	98.7	0.0
Wells-E	0.0	0.0	0.5	0.2	0.5	98.8	0.0

Attachment 3: Grain size analysis for nearshore disposal sites



Attachment 4: Proposed nearshore placement sites in Massachusetts



Attachment 5: Proposed nearshore placement site in Maine

NEWS RELEASE

U.S. ARMY CORPS OF ENGINEERS **BUILDING STRONG®**

For Immediate Release:
March 31, 2014
Release No. NH 2014-033

Contact:
Tim Dugan, 978-318-8264
cenae-pa@usace.army.mil

Corps of Engineers proposes improvements to Portsmouth Harbor turning basin at head of Federal navigation channel

CONCORD, Mass. – The U.S. Army Corps of Engineers, New England District, in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors (New Hampshire Port Authority), has prepared a Draft Feasibility Report and Draft Environmental Assessment (FR/EA) to examine improvements to the turning basin located at the head of the Federal navigation channel in Portsmouth Harbor in Newington, New Hampshire, and Eliot, Maine.

The purpose of the proposed project is to reduce transportation costs from navigation inefficiencies, and to address navigation safety concerns for commercial navigation in the upper reaches of the deep draft channel. The Piscataqua River is known for its strong tidal currents and tight turns that make navigation through this area difficult.

"Vessels use the upper turning basin to access the commercial terminals on the New Hampshire side of the river above the I-95 Bridge," said Study Manager Mark Habel, of the Corps' New England District, Engineering and Planning Division, in Concord, Mass. "The existing width of the upper turning basin is too narrow for efficient and safe turning and maneuvering of these large vessels."

As a result of the narrow turning basin, ships have been damaged from grounding and incur delays in channel transit. To compensate for the narrow turning basin, the harbor pilots will only turn ships when currents are slower during the high or low slack tidal periods and during daylight hours.

These conditions put a severe constraint on the available time to transit the river and to unload goods. Additional costs associated with these delays include the cost to remain at the berth until the tide is right, and the cost of additional tugs to turn and maneuver the ships up and down the river. Cargo vessel sizes are limited by these conditions requiring extra ships to transport the same amount of goods.

The Recommended Plan would widen the existing 35-foot deep MLLW 800-foot wide turning basin located at the upstream end of the Federal navigation channel to 1,200 feet. The existing project depth of 35 feet MLLW plus two feet of allowable overdepth would be retained. Approximately 728,100 cubic yards of coarse grained sandy and gravelly material, and approximately 25,300 cubic yards of rock would be removed.

The Draft Feasibility Report and Draft Environmental Assessment (FR/EA) are available for review on the Corps website at: http://www.nae.usace.army.mil/Missions/ProjectsTopics/NewHampshire/PortsmouthHarborandPiscataquaRiver.aspx.

– more –

Concurrent with the improvement dredging, some maintenance dredging would be required to bring the current turning basin and its approaches to its authorized depth of 35 feet. Approximately 7,800 cubic yards of material, including two feet of allowable overdepth, would be removed for maintenance dredging. Dredging would take approximately six months to complete and be accomplished during the period from mid-October to mid-April to protect biological resources.

The Isle of Shoals – North (IOS-N) ocean placement site was selected as the Federal base plan for dredged material placement. Several local communities in Massachusetts and Maine have expressed an interest in the nearshore placement of the dredged material and rock for beneficial uses. All additional permits and costs above the base plan would be borne by the local communities. Locally proposed beneficial use plans would be finalized during the project's design phase.

The proposed work is being coordinated with: U.S. Environmental Protection Agency; U.S. Fish and Wildlife Service; National Marine Fisheries Service; U.S. Coast Guard; U.S. Navy; Maine Department of Agriculture, Conservation, and Forestry, Coastal Zone Management Program; Maine Department of Environmental Protection; Maine Division of Marine Resources; Maine Department of Inland Fisheries and Wildlife; Maine State Historic Preservation Office; New Hampshire Pease Development Authority; New Hampshire Department of Environmental Services; New Hampshire Department of Fish and Game; New Hampshire Natural Heritage Bureau; New Hampshire Department of Resources and Economic Development, Division of Parks and Recreation; New Hampshire Division of Historic Resources; Massachusetts Historical Commission; Massachusetts Department of Conservation and Recreation; Massachusetts Natural Heritage and Endangered Species Program; Massachusetts Division of Marine Fisheries; and Massachusetts Office of Coastal Zone Management.

The public notice for this proposed work, with more detailed information, is available for review on the Corps website at: http://www.nae.usace.army.mil/Missions/PublicNotices.aspx.

Public comments on this proposed work should be forwarded no later than April 30, 2014 to the U.S. Army Corps of Engineers, New England District, ATTN: Engineering and Planning Division (Mr. Mark Habel), 696 Virginia Road, Concord, MA 01742-2751 or by email to cenae-ep@usace.army.mil.

# # #

Public Notice

U.S. Army Corps
of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

In Reply Refer to: Engineering and Planning Division
Email: cenae-ep@usace.army.mil
Date: MARCH 31, 2014
Comment Period Closes: APRIL 30, 2014

30-DAY PUBLIC NOTICE

NAVIGATION IMPROVEMENT OF PORTSMOUH HARBOR NEW HAMPSHIRE AND MAINE

Interested parties are hereby notified that the U.S. Army Corps of Engineers, New England District, in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has prepared a Draft Feasibility Report and Draft Environmental Assessment (FR/EA) to examine improvements to the turning basin located at the head of the Federal navigation channel in Portsmouth Harbor in Newington, New Hampshire and Eliot, Maine. The study was directed by Section 436 of the Water Resources Development Act of 2000. Ocean disposal would occur under the provisions of Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (P.L. 106-580).

Purpose of the Work: The purpose of the proposed project is to reduce transportation costs from navigation inefficiencies, and to address navigation safety concerns for commercial navigation in the upper reaches of the deep draft channel. The Piscataqua River is known for its strong tidal currents and tight turns that make navigation through this area difficult. Vessels use the upper turning basin to access the commercial terminals on the New Hampshire side of the river above the I-95 Bridge. The existing width of the upper turning basin is too narrow for efficient and safe turning and maneuvering of these large vessels. As a result of the narrow turning basin, ships have been damaged from grounding and incur delays in channel transit. To compensate for the narrow turning basin, the harbor pilots will only turn ships when currents are slower during the high or low slack tidal periods and during daylight hours. These conditions put a severe constraint on the available time to transit the river and to unload goods. Additional costs associated with these delays include the cost to remain at the berth until the tide is right and the cost of additional tugs to turn and maneuver the ships up and down the river. Cargo vessel sizes are limited by these conditions requiring extra ships to transport the same amount of goods.

Recommended Project Description: The Recommended Plan would widen the existing 35-foot deep MLLW 800-wide turning basin located at the upstream end of the Federal navigation channel to 1,200 feet. The existing project depth of 35-feet MLLW plus two feet of overdepth would be retained. See Figure 1. Approximately 728,100 cubic yards (cy) of coarse grained sandy and gravelly material, and approximately 25,300 cy of rock would be removed.

Concurrent with the improvement dredging, some maintenance dredging would be required to bring the current turning basin and its approaches to its authorized depth 35-foot depth. Approximately 7,800 cy of material, including two feet of allowable overdepth, would be removed for maintenance dredging. A waterborne mechanical dredging plant would be used to construct the project, which would take approximately six months to complete. The material would be removed from mid-October to mid-April to protect biological resources.

The Federal base plan for disposal of both the sandy dredged material and the rock is ocean placement at the Isle of Shoals-North (IOS-N) ocean placement site located about ten miles seaward of the entrance to

Portsmouth Harbor in waters more than 300 feet deep. The IOS-N was identified in consultation with the US EPA but has not yet been officially designated as an ocean placement site and therefore has never been used for ocean placement. Sediment testing of the IOS-N site showed that in general the grain size was found to be nearly uniform in composition. The samples contained at least 90% fines, with most samples containing more than 95% fines (silt and clay).

The proposed transportation of this dredged material for disposing of it in ocean waters is being evaluated to determine that the proposed disposal will not unreasonably degrade or endanger human health, welfare, or amenities or the marine environment, ecological systems, or economic potentialities. In making this determination, the criteria established by the Administrator, EPA pursuant to section 102(a) of the Ocean Dumping Act (ODA) will be applied. In addition, based upon an evaluation of the potential effect which the failure to utilize this ocean disposal site will have on navigation, economic and industrial development, and foreign and domestic commerce of the United States, an independent determination will be made of the need to dispose of the dredged material in ocean waters, other possible methods of disposal, and other appropriate locations.

There are also several proposals by the communities of Wells, Maine and Salisbury, Newburyport and Newbury, Massachusetts, to use the sand for nearshore placement off of eroding beaches. The Town of Kittery, Maine is also pursuing a beneficial use project to use the rock as a wave break at Pepperell Cove in that community. Should these communities be successful in securing the necessary regulatory approvals for such work and be willing to pay any increase in project cost to implement these proposals, then placement of some or all of the material removed for the Federal navigation improvement project at the IOS-N ocean site may not be necessary. A final determination on this will be made during the project's design phase.

Alternatives: Several local communities in Massachusetts and Maine have expressed an interest in the nearshore placement of the dredged material and rock for beneficial uses. All additional permits and costs above the base plan would be borne by the local communities. Locally proposed beneficial use plans would be finalized during the project's design phase. See Figure 2 for locations of the base disposal plan and the local communities that have expressed an interest in the material.

Coordination: The proposed work is being coordinated with the following Federal, State, and local agencies:

Federal
Environmental Protection Agency
U.S. Fish and Wildlife Service
National Marine Fisheries Service
U.S. Coast Guard
U.S. Navy

State of Maine
Coastal Zone Management Program
Department of Environmental Protection
Division of Marine Resources
Department of Inland Fisheries and Wildlife
State Historic Preservation Office

State of New Hampshire
Pease Development Authority
Department of Environmental Services
Department of Fish and Game
Natural Heritage Bureau
Department of Resources and Economic Development, Division of Parks and Recreation
State Historic Preservation Office

State of Massachusetts
Department of Conservation and Recreation
EOEEA – Coastal Zone Management
State Historic Preservation Office
Board of Underwater Archaeological Resources

The draft Feasibility Report and Draft Environmental Assessment are being circulated for public review at this time. Public comments and the results of state and Federal regulatory approvals will be addressed in these documents before their transmittals to Corps Headquarters for review. Ultimately Congressional authorization would be required for the project to proceed. Once authorized the project's design phase would take about one year. Construction would take about six months.

Environmental Impacts: A Draft FR/EA has been prepared for this navigation improvement project. Temporary impacts to Essential Fish Habitat will occur by removing the benthic habitat in the navigation channels from dredging and disposal at the disposal site, and from blasting at the dredge site. No significant water quality violations are expected from the temporary dredging and disposal impacts.

Endangered Species: Dredging and dredged material placement would occur from mid-October to mid-April. However, all blasting would be completed no later than March 31st to protect the endangered shortnose sturgeon and threatened Atlantic sturgeon. No other endangered species or their critical habitat designated as endangered or threatened pursuant to the Endangered Species Act of 1973 (87 Stat. 844) are expected to be effected by the proposed project.

Cultural Resources: Coordination with the appropriate agencies and tribes has determined that no archaeological or historic resources impacts are expected to occur in the project areas.

Clean Water Act: No Clean Water Act Section 404 (b)(1) Evaluation has been prepared as part of the Draft FR/EA. A Water Quality Certification will not be obtained as the Federal base plan for disposal will occur seaward of the limit of the territorial sea. If the material is used as beneficial use in nearshore areas, then the local communities sponsoring such use will be responsible for obtaining the necessary approvals.

Coastal Zone Management Act: A determination that the proposed project is consistent to the maximum extent practicable with the State's approved coastal management policies will be submitted to the States of Maine and New Hampshire.

Marine Protection Research and Sanctuaries Act: Should any of the local community proposals for non-Federal beneficial use of the dredged material not be included in the final plans, the Federal base plan for ocean placement of some or all of the dredged material would be followed. In that event the Corps would prepare a site selection document for this project and the IOS-N site and submit that document to US EPA for concurrence prior to any use of the site. This would include a determination that the decision whether to perform the work will be based on an evaluation of the probable impact of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, will be balanced against its reasonably foreseeable detriments. All factors, which may be relevant to the proposal, will be considered; among these are conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use classification, and the welfare of the people.

Compliance: This Public Notice is being issued in compliance with the environmental laws, regulations, and directives in the Attachment. The decision whether to perform the work will be based on an evaluation of the probable impact of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, will be balanced against its reasonably foreseeable detriments. All factors, which may be relevant to the proposal, will be considered; among these are conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use classification, and the welfare of the people.

Additional Information: Any person who has an interest which may be affected by the dredging and disposal of this dredged material may request a public hearing. The request must be submitted in writing to the District Engineer within the comment period of this notice and must clearly set forth the interest which may be affected and the manner in which the interest may be affected by this activity. Please bring this notice to the attention of anyone you know to be interested in the project. Comments are invited from all concerned parties relating to this project and should be directed to the District Engineer at 696 Virginia Road, Concord, MA 01742-2751, ATTN: Engineering and Planning Division (Mr. Mark Habel, 978-318-8871) within 30 days of this notice.

31 Mar 14
Date

CHARLES P. SAMARIS
Colonel, Corps of Engineers
District Engineer

Attachment
Pertinent Laws, Regulations and Directives

American Indian Religious Freedom Act of 1978, 42 U.S.C. 1996.

Archaeological Resources Protection Act of 1979, as amended, 16 U.S.C. 470 et seq.

Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 et seq.

Coastal Zone Management Act of 1982, as amended, 16 U.S.C. 1451 et seq.

Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

Estuarine Areas Act, 16 U.S.C. 1221 et seq.

Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.

Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.

Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-1

Magnuson-Stevens Act, as amended, 16 U.S.C. 1801 et seq.

Marine Protection, Research, and Sanctuaries Act of 1971, as amended, 33 U.S.C. 1401 et seq.

National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321 et seq.

National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq.

Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3000-3013, 18 U.S.C. 1170

Preservation of Historic and Archaeological Data Act of 1974, as amended, 16 U.S.C. 469 et seq. This amends the Reservoir Salvage Act of 1960 (16 U.S.C. 469).

Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.

Watershed Protection and Flood Prevention Act, as amended, 16 U.S.C. 1001 et seq.

Wild and Scenic Rivers Act, as amended, 16 U.S.C 1271 et seq.

Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 13, 1971.

Executive Order 11988, Floodplain Management, May 24, 1977 amended by Executive Order 12148, July 20, 1979.

Executive Order 11990, Protection of Wetlands, May 24, 1977.

Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, January 4, 1979.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994.

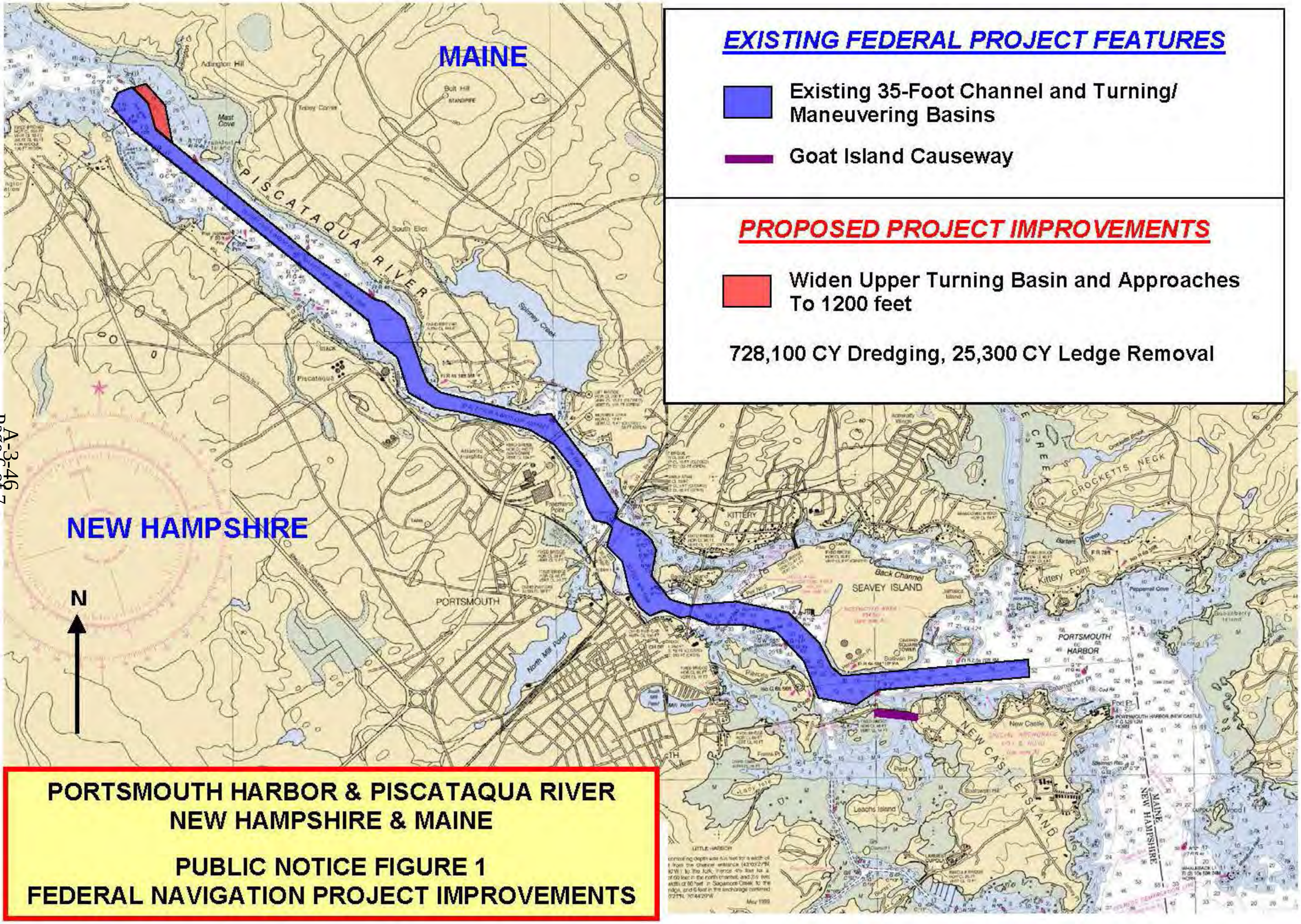
Executive Order 13007, Accommodations of Sacred Sites, May 24, 1996.

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, April 21, 1997.

Executive Order 13061, and Amendments – Federal Support of Community Efforts Along American Heritage Rivers.

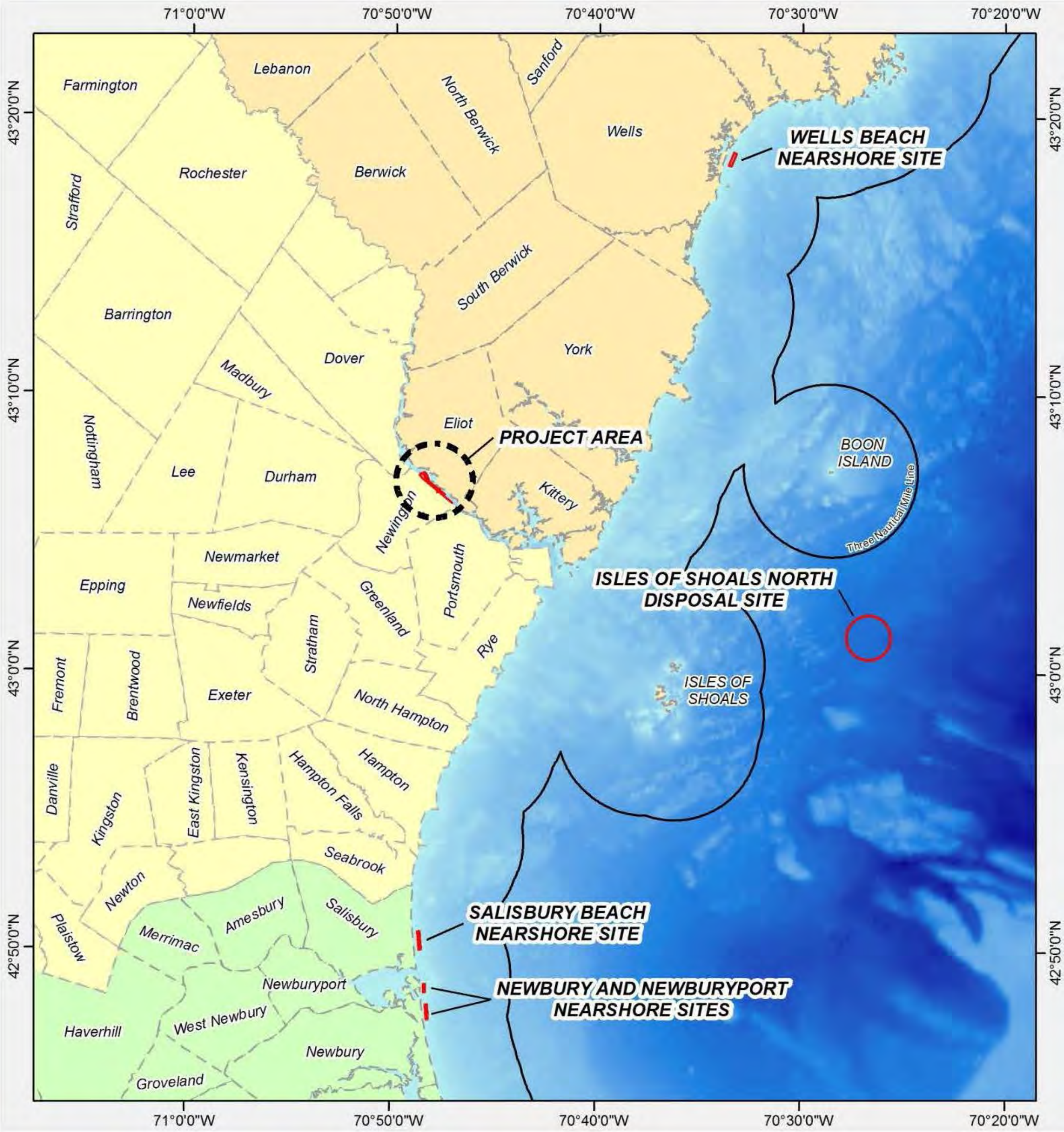
Executive Order 13175, Consultation and Coordination with Tribal Governments, November 2000.

White House Memorandum, Government-to-Government Relations with Indian Tribes, April 29, 1994.



PORTSMOUTH HARBOR & PISCATAQUA RIVER
NEW HAMPSHIRE & MAINE

PUBLIC NOTICE FIGURE 1
FEDERAL NAVIGATION PROJECT IMPROVEMENTS



Public Notice Figure 2 – Nearshore Placement Sites and Location of IOS-N

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

To Whom it May Concern:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The improvement is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. With the improvements these larger vessels could carry additional cargo and would have fewer limitations in turning and transiting the upper river reaches and would be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be suitable for open water placement at an ocean site about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use.

The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

The recommendations contained in the draft FS/EA reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, New Hampshire Pease Development Authority, Division of Ports and Harbors and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. If you have any questions or comments, please contact the study manager, Mr. Mark Habel at (978) 318-8871. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
Public Notice

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Geno Marconi, Director
New Hampshire Port Authority
P.O. Box 369, 555 Market Street
Portsmouth, New Hampshire 03802-0369

Dear Mr. Marconi:

The New England District in partnership with the New Hampshire Port Authority has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. These documents are submitted for your review and concurrence. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Before moving forward with a revised draft to our Washington headquarters a letter must be received from the project's Non-Federal Sponsor concurring in the draft report and its recommendations, and stating your commitment to comply with the items of local cooperation expressed in the report's recommendation, including the required cost-sharing. If you have any questions or comments you may contact me at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Maggie Hassan
Governor of New Hampshire
State House
107 North Main Street
Concord, New Hampshire 03301

Honorable Governor Hassan,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Kelly Ayotte
United States Senate
144 Russell Senate Office Building
Washington, DC 20510

Honorable Senator Ayotte,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Honorable Kelly Ayotte
United States Senator
14 Manchester Square, Suite 140
Portsmouth, New Hampshire 03801

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Jeanne Shaheen
United States Senate
520 Hart Senate Office Building
Washington, DC 20510

Honorable Senator Shaheen,

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The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Honorable Jeanne Shaheen
United States Senator
340 Central Avenue, Suite 205
Dover, New Hampshire 03820

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Carol Shea-Porter
Representative in Congress
1530 Longworth House Office Building
Washington, DC 20515

Honorable Representative Shea-Porter,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Honorable Carol Shea-Porter
Representative in Congress
20 North Main Street
Rochester, New Hampshire 03867

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Paul R. LePage
Governor of Maine
#1 State House Station
Augusta, Maine 04333-0001

Honorable Governor LePage,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Angus S. King, Jr.
United States Senate
188 Russell Senate Office Building
Washington, DC 20510

Honorable Senator King,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copies Furnished:
Honorable Angus S. King, Jr.
United States Senator
40 Western Avenue, Suite 412
Augusta, Maine 04330

Honorable Angus S. King, Jr.
United States Senator
Attn: Bonnie Pothier
383 US Route 1, Suite C
Scarborough, Maine 04074

DEPARTMENT OF DEFENSE UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Susan M. Collins
United States Senate
413 Dirksen Senate Office Building
Washington, DC 20515

Honorable Senator Collins,

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copies Furnished:
Honorable Susan M. Collins
United States Senator
202 Harlow Street, Room 204
Bangor, Maine 04402

Honorable Susan M. Collins
United States Senator
Attn: Cathy Goodwin
160 Main Street, Suite 103
Biddeford, Maine 04005

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Chellie Pingree
Representative in Congress
1318 Longworth House Office Building
Washington, DC 20515

Honorable Representative Pingree,

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Honorable Chellie Pingree
Representative in Congress
2 Portland Fish Pier, Suite 304
Portland, Maine 04101

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Deval L. Patrick
Governor of Massachusetts
State House
Room 105
Boston, Massachusetts 02133

Honorable Governor Patrick,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

Charles P. Samaris
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Public Notice

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Elizabeth Warren
United States Senate
317 Hart Senate Office Building
Washington, DC 20510

Honorable Senator Warren,

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The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The improvement is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. With the improvements these larger vessels could carry additional cargo and would have fewer limitations in turning and transiting the upper river reaches and would be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be suitable for open water placement at an ocean site about ten miles offshore of Portsmouth. This

is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use.

The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

The recommendations contained in the draft FS/EA reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, New Hampshire Pease Development Authority, Division of Ports and Harbors and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Honorable Elizabeth Warren
United States Senator
2400 JFK Federal Building
15 New Sudbury Street
Boston, Massachusetts 02203

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Edward J. Markey
United States Senate
218 Russell Senate Office Building
Washington, DC 20510

Honorable Senator Markey,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Honorable Edward J. Markey
United States Senator
975 JFK Federal Building
15 New Sudbury Street
Boston, Massachusetts 02203

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable John F. Tierney
Representative in Congress
2238 Rayburn House Office Building
Washington, DC 20515

Honorable Representative Tierney,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Honorable John F. Tierney
Representative in Congress
17 Peabody Square
Peabody, Massachusetts 01960

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

RADM Daniel B. Abel
Commander
First Coast Guard District
408 Atlantic Avenue
Boston, Massachusetts 02110

Dear Admiral Abel:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Draft Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine, and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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The material to be dredged for the Federal project was determined to be suitable for open water placement at an ocean site about ten miles offshore of Portsmouth which has depths of at least 300 feet. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use.

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Sincerely,

Charles P. Samaris
Colonel, Corps of Engineers
District Engineer

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Lieutenant Nathaniel Robinson
U.S. Coast Guard
P.O. Box 1000, 25 Wentworth Road
New Castle, New Hampshire 03854

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-EP-PN 31 March 2014

MEMORANDUM FOR Captain William Greene, Commander, Portsmouth Naval Shipyard, Building: 86-1, Portsmouth, NH 03804-5000

SUBJECT: Portsmouth Harbor and Piscataqua River, NH & ME, Navigation Improvement Project, Draft Feasibility Report and Draft Environmental Assessment, Public and Agency Review

1. The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Draft Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine, and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

2. The Draft Feasibility Study identifies a tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

3. The improvement is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. With the improvements these vessels could carry additional cargo and would have fewer limitations in turning and transiting the upper river reaches and would be less likely to ground on the basin slopes.

4. The material to be dredged for the Federal project was determined to be suitable for open water placement at an ocean site about ten miles offshore of Portsmouth which

has a depth of at least 300 feet. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use.

5. The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

6. The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

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Charles P. Samaris
COL, EN
District Commander

Enclosures
CD with Draft FR/EA
Public Notice

CF:
CDR Brian Weinstein, Public Works Officer
NAVFAC PWD-Maine
Portsmouth Naval Shipyard
Building: 59 Fl2
Portsmouth, New Hampshire 03804-5000

Lisa Joy, Environmental Director
NAVFAC PWD-Maine EV
Portsmouth Naval Shipyard
Building: 59 Fl3
Portsmouth, New Hampshire 03804-5000

Carol A. Eaton, P.E.
Environmental Engineer
NAVFAC Mid-Atlantic EV
PWD-Maine, Bldg. 59 Fl 3
Portsmouth Naval Shipyard
Portsmouth, New Hampshire 03804-5000

DEPARTMENT OF DEFENSE UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Mr. Mel Cote, Supervisor
Ocean and Coastal Protection Unit
U.S. Environmental Protection Agency
Mail Code: OEP06-1
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

Dear Mr. Cote:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. Thank you for your agency's previous coordination and comments made on the proposed project. The draft documents are ready for agency and public review.

The Draft Feasibility Study identified widening the upper-most turning basin at the head of deep-draft navigation channel from its current width of 800-foot to a width of 1200 feet as the tentatively selected plan for navigation improvement in Piscataqua River. The basin would retain its current -35-foot depth at mean lower low water. Maintenance dredging of the existing basin and it approaches would also be performed at the same time. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy of dredge material would be removed for maintenance dredging. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The navigation improvement project is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. Widening the turning basin would allow these larger vessels to carry additional cargo and have fewer limitations in turning and transiting the upper river reaches. They would also be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be likely suitable for open water placement at an ocean site identified as the Isle of Shoals-North and located about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. As described in the Draft FR/EA, the local communities of Wells, Maine, and Salisbury, Newburyport, and Newbury, Massachusetts have also expressed an interest in receiving the sand dredged from the proposed project to nourish nearshore bars located off of their eroding beaches. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use. Those communities would also be required to secure all necessary permits and approvals to receive those materials prior to completion of the project's design phase.

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Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03801

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Mr. John K. Bullard
NOAA Fisheries Service
Northeast Regional Office
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Dear Mr. Bullard:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. Thank you for your agency's previous coordination and comments made on the proposed project. The draft documents are ready for agency and public review.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the Draft FR/EA, including an Essential Fish Habitat (EFH) Assessment. Please provide any Magnuson-Stevens Fishery Conservation and Management Act EFH conservation recommendations for the proposed project by April 30, 2014. If you have any questions or comments, please contact the study manager, Mr. Mark Habel at (978) 318-8871, or Ms. Catherine Rogers at (978) 318-8231.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished:
Mr. Lou Chiarella
NOAA National Marine Fisheries Service
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03801

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Mr. Thomas R. Chapman, Supervisor
New England Field Office
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

Dear Mr. Chapman:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. Thank you for your agency's previous coordination and comments made on the proposed project. The draft documents are ready for agency and public review.

The Draft Feasibility Study identified widening the upper-most turning basin at the head of deep-draft navigation channel from its current width of 800-foot to a width of 1200 feet as the tentatively selected plan for navigation improvement in Piscataqua River. The basin would retain its current -35-foot depth at mean lower low water. Maintenance dredging of the existing basin and it approaches would also be performed at the same time. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy of dredge material would be removed for maintenance dredging. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The navigation improvement project is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. Widening the turning basin would allow these larger vessels to carry additional cargo and have fewer limitations in turning and transiting the upper river reaches. They would also be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be likely suitable for open water placement at an ocean site identified as the Isle of Shoals-North and located about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. As described in the Draft FR/EA, the local communities of Wells, Maine, and Salisbury, Newburyport, and Newbury, Massachusetts have also expressed an interest in receiving the sand dredged from the proposed project to nourish nearshore bars located off of their eroding beaches. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use. Those communities would also be required to secure all necessary permits and approvals to receive those materials prior to completion of the project's design phase.

The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/cost ratio for the selected plan is about 3.1 to 1.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the Draft FR/EA. If you have any questions or comments, please contact the study manager, Mr. Mark Habel at (978) 318-8871, or Ms. Catherine Rogers at (978) 318-8231. If you have any further comments beyond those already made during prior coordination, please forward them to me by April 30, 2014.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

Same Letter Sent To:
Ms. Laurie Zacari, Field Supervisor
Maine Field Office, Ecological Services
U.S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, Maine 04473

Copy Furnished:
Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Ms. Laurie Zacari, Field Supervisor
Maine Field Office, Ecological Services
U.S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, Maine 04473

Dear Ms. Zacari:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. Thank you for your agency's previous coordination and comments made on the proposed project. The draft documents are ready for agency and public review.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the Draft FR/EA. If you have any questions or comments, please contact the study manager, Mr. Mark Habel at (978) 318-8871, or Ms. Catherine Rogers at (978) 318-8231. If you have any further comments beyond those already made during prior coordination, please forward them to me by April 30, 2014.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

Same Letter Sent To:
Mr. Thomas R. Chapman, Supervisor
New England Field Office
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

Copy Furnished:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03801

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Ms. Elizabeth H. Muzzey
Director and State Historic Preservation Office
New Hampshire Division of Historic Resources
State Historic Preservation Office
19 Pillsbury Street
Concord, New Hampshire 03301-3570

Dear Ms. Muzzey:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. Previous correspondence on this project was transmitted on October 30, 2013.

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The navigation improvement project is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. Widening the turning basin would allow these larger vessels to carry additional cargo and have fewer limitations in turning and transiting the upper river reaches. They would also be less likely to ground on the basin slopes.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the Draft FR/EA. If you have any questions or comments, please contact Ms. Kate Atwood at (978) 318-8537, or the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Mr. Donald M. Kent, Administrator
New Hampshire Natural Heritage Bureau
P.O. Box 1856
172 Pembroke Road
Concord, New Hampshire 03302-1856

Dear Mr. Kent:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identified widening the upper-most turning basin at the head of deep-draft navigation channel from its current width of 800-foot to a width of 1200 feet as the tentatively selected plan for navigation improvement in Piscataqua River. The basin would retain its current -35-foot depth at mean lower low water. Maintenance dredging of the existing basin and it approaches would also be performed at the same time. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy of dredge material would be removed for maintenance dredging. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the Draft FR/EA. The comment period closes on April 30, 2014. If you have any questions or comments, please contact the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished without Enclosures:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Mr. Earle G. Shettleworth, Jr., Director and
State Historic Preservation Officer
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333

Dear Mr. Shettleworth:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. Previous correspondence on this project was transmitted on October 29, 2013.

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Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished without Enclosures:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03801

Same letter sent to:
Mr. Donald Soctomah
Tribal Historic Preservation Officer
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
P.O. Box 301
Princeton, Maine 04668

Mr. Chris Sockalexis
Tribal Historic Preservation Officer
Cultural and Historic Preservation Program
Penobscot Nation
6 River Road
Indian Island Reservation
Old Town, Maine 04468

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

Dear Mr. Mastone:

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Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished without Enclosures:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03801

Same letter sent to:
Mr. Donald Soctomah
Tribal Historic Preservation Officer
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
P.O. Box 301
Princeton, Maine 04668

Mr. Chris Sockalexis
Tribal Historic Preservation Officer
Cultural and Historic Preservation Program
Penobscot Nation
6 River Road
Indian Island Reservation
Old Town, Maine 04468

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Mr. Earle G. Shettleworth, Jr., Director and
State Historic Preservation Officer
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Richard K. Sullivan, Jr. Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Dear Mr. Sullivan:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identified widening the upper-most turning basin at the head of deep-draft navigation channel from its current width of 800-foot to a width of 1200 feet as the tentatively selected plan for navigation improvement in Piscataqua River. The basin would retain its current -35-foot depth at mean lower low water. Maintenance dredging of the existing basin and it approaches would also be performed at the same time. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy of dredge material would be removed for maintenance dredging. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The navigation improvement project is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. Widening the turning basin would allow these larger vessels to carry additional cargo and have fewer limitations in turning and transiting the upper river reaches. They would also be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be likely suitable for open water placement at an ocean site identified as the Isle of Shoals-North and located about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. As described in the Draft FR/EA, the local communities of Wells, Maine, and Salisbury, Newburyport, and Newbury, Massachusetts have also expressed an interest in receiving the sand dredged from the proposed project to nourish nearshore bars located off of their eroding beaches. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use. Those communities would also be required to secure all necessary permits and approvals to receive those materials prior to completion of the project's design phase.

The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/cost ratio for the selected plan is about 3.1 to 1.

The recommendations contained in the Draft FS/EA reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, New Hampshire Pease Development Authority, Division of Ports and Harbors and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

A copy of the Public Notice for the project is enclosed, along with a CD containing the Draft FR/EA. The comment period closes on April 30, 2014. If you have any questions or comments, please contact the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

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CD with Draft FR/EA
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Copy Furnished without Enclosures:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Robert Boeri, Dredging Coordinator
Massachusetts Coastal Zone Management
Executive Office of Energy and Environmental Affairs
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2104

Dear Mr. Boeri:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Mr. Jack Murray., Commissioner
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2104

Dear Mr. Murray:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

John R. Kennelly
Chief, Planning Branch

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Public Notice

Copy Furnished with Enclosures:
Mr. Joseph R. Orfant, Bureau Chief
Planning and Resource Protection
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2104

Copy Furnished without Enclosures:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Paul J. Diodati, Director
Massachusetts Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, Massachusetts 02114

Dear Mr. Diodati:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Engineering/Planning Division
Evaluation Branch

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Dear Ms. Washington:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. Previous correspondence on this project was transmitted on October 8, 2013.

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Sincerely,

John R. Kennelly
Chief, Planning Branch

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New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03801

Same letter sent to:
Mr. Donald Soctomah
Tribal Historic Preservation Officer
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
P.O. Box 301
Princeton, Maine 04668

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Maine Historic Preservation Commission
55 Capitol Street
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Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
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Ms. Brona Simon, Executive Director
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220 Morrissey Boulevard
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Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Evaluation Branch

Mr. Chris Sockalexis
Tribal Historic Preservation Officer
Cultural and Historic Preservation Program
Penobscot Nation
6 River Road
Indian Island Reservation
Old Town, Maine 04468

Dear Mr. Sockalexis:

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine. The draft documents are ready for agency and public review. Previous correspondence on this project was transmitted on October 29, 2013.

The Draft Feasibility Study identified widening the upper-most turning basin at the head of deep-draft navigation channel from its current width of 800-foot to a width of 1200 feet as the tentatively selected plan for navigation improvement in Piscataqua River. The basin would retain its current -35-foot depth at mean lower low water. Maintenance dredging of the existing basin and it approaches would also be performed at the same time. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy of dredge material would be removed for maintenance dredging. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The navigation improvement project is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. Widening the turning basin would allow these larger vessels to carry additional cargo and have fewer limitations in turning and transiting the upper river reaches. They would also be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be likely suitable for open water placement at an ocean site identified as the Isle of Shoals-North and located about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. As described in the Draft FR/EA, the local communities of Wells, Maine, and Salisbury, Newburyport, and Newbury, Massachusetts have also expressed an interest in receiving the sand dredged from the proposed project to nourish nearshore bars located off of their eroding beaches. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use. Those communities would also be required to secure all necessary permits and approvals to receive those materials prior to completion of the project's design phase.

The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/cost ratio for the selected plan is about 3.1 to 1.

The recommendations contained in the Draft FS/EA reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, New Hampshire Pease Development Authority, Division of Ports and Harbors and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

A copy of the Public Notice for the project is enclosed, along with a CD containing the Draft FR/EA. If you have any questions or comments, please contact Ms. Kate Atwood at (978) 318-8537, or the study manager, Mr. Mark Habel at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

Copy Furnished without Enclosures:
Geno Marconi, Director
New Hampshire Port Authority
555 Market Street
Portsmouth, New Hampshire 03801

Same letter sent to:
Mr. Donald Soctomah
Tribal Historic Preservation Officer
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
P.O. Box 301
Princeton, Maine 04668

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Mr. Earle G. Shettleworth, Jr., Director and
State Historic Preservation Officer
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Mr. John P. Bohenko
City Manager
City of Portsmouth
1 Junkins Avenue
Portsmouth, New Hampshire 03801

Dear Mr. Bohenko,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The improvement is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. With the improvements these larger vessels could carry additional cargo and would have fewer limitations in turning and transiting the upper river reaches and would be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be suitable for open water placement at an ocean site about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use.

The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Ms. Martha Roy
Town Administrator
Town of Newington
205 Nimble Hill Road
Newington, New Hampshire 03801

Dear Ms. Roy,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Ms. Kate Pelletier, Planning Assistant
Town of Eliot
1333 State Road
Eliot, Maine 03903

Dear Ms. Pelletier,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The improvement is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. With the improvements these larger vessels could carry additional cargo and would have fewer limitations in turning and transiting the upper river reaches and would be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be suitable for open water placement at an ocean site about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use.

The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

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A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Mr. Jonathan L. Carter, Town Manager
Town Offices
P.O. Box 398
Wells, Maine 04090

Dear Mr. Carter,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

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Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Mr. Nancy Colbert Puff, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

Dear Mr. Colbert Puff,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Mr. Neil Harrington, Town Manager
Town of Salisbury
Town Hall
5 Beach Road
Salisbury, Massachusetts 01952

Dear Mr. Harrington,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

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The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

The recommendations contained in the draft FS/EA reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, New Hampshire Pease Development Authority, Division of Ports and Harbors and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Honorable Donna D. Holaday, Mayor
Newburyport Office of the Mayor
60 Pleasant Street
Newburyport, Massachusetts 01950

Dear Mayor Holaday,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The improvement is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. With the improvements these larger vessels could carry additional cargo and would have fewer limitations in turning and transiting the upper river reaches and would be less likely to ground on the basin slopes.

The material to be dredged for the Federal project was determined to be suitable for open water placement at an ocean site about ten miles offshore of Portsmouth. This is the Federal base plan for the project used to measure cost-sharing for other proposed placement alternatives. The additional cost of transporting the dredged materials to more distant locations for beach nourishment purposes would be borne by the communities requesting that use.

The fully funded improvement project cost for the turning basin widening under the base plan is estimated at $21,295,000. This number is based on the improvement project cost (October 2013 price level) escalated to the mid-point of construction (assumed as February 2016). The up-front non-Federal share of design and construction is 25% and is estimated at $5,324,000. In addition post construction, the non-Federal sponsor must pay an additional 10% of the cost of design and construction and this payment is estimated at $2,130,000. The total estimated non-Federal cost share is $7,454,000.

The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

The recommendations contained in the draft FS/EA reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, New Hampshire Pease Development Authority, Division of Ports and Harbors and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

DEPARTMENT OF DEFENSE UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

March 31, 2014

Engineering/Planning Division
Planning Branch

Tracy Blais, Town Administrator
Newbury Town Hall
25 High Road
Newbury, Massachusetts 01951

Dear Ms. Blais,

The New England District in partnership with the New Hampshire Pease Development Authority, Division of Ports and Harbors, has completed the Draft Feasibility Report and Environmental Assessment (FR/EA) examining improvements to the Federal navigation project at Portsmouth Harbor and the Piscataqua River, New Hampshire and Maine and is releasing these documents for State and public review. The documents also outline proposals by local communities in Wells, Maine and Salisbury, Newburyport, and Newbury, Massachusetts to receive the sand dredged from the project to nourish nearshore bars off eroding beaches in those towns.

The Draft Feasibility Study identifies the tentatively selected plan for navigation improvement for Portsmouth Harbor that would expand the upper-most turning basin at the head of deep-draft navigation to a width of 1200 feet from the current 800-foot width. The basin would retain its current -35-foot depth at mean lower low water. Maintenance of the existing basin and it approaches would also be conducted. Approximately 728,100 cubic yards (cy) of sandy material, and 25,300 cy of ledge would be removed for the improvement project, and about 7,800 cy for maintenance. The ledge would likely require drilling and blasting to facilitate removal. A waterborne mechanical dredging plant would be used to remove the sandy material and blasted rock. Construction would take approximately six months to complete and would be limited to the period of mid-October to mid-April to protect fisheries resources.

The improvement is intended to provide safer and more efficient navigation for the large dry and liquid bulk carriers that call on the existing terminals located upstream of Interstate 95. With the improvements these larger vessels could carry additional cargo and would have fewer limitations in turning and transiting the upper river reaches and would be less likely to ground on the basin slopes.

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The expected annual economic benefit of the proposed navigation improvements is about $3,285,500. The annualized cost of the tentatively selected plan, expressed in average annual equivalent terms, includes the estimated costs of project design, construction, management, interest during construction, contingencies, and the cost of deepening berths by the non-Federal sponsor and is estimated at $1,076,700. With expected average annual benefits of $2,208,800 the benefit/ cost ratio for the selected plan is about 3.1 to 1.

The recommendations contained in the draft FS/EA reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor, New Hampshire Pease Development Authority, Division of Ports and Harbors and other parties would be advised of any modifications and would be afforded an opportunity for further comment.

A copy of the Public Notice for the project is enclosed, along with a CD containing the draft FR/EA. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8505, or the study manager, Mr. Mark Habel at (978) 318-8871. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosures
CD with Draft FR/EA
Public Notice

PART 4

CORRESPONDENCE RECEIVED DURING PREPARATION OF THE DRAFT FEASIBILITY REPORT AND DRAFT ENVIRONMENTAL ASSESSMENT

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

March 18, 2014

Engineering/Planning Division
Planning Branch

Mr. David R. Mullen
Executive Director
Pease Development Authority
55 International Drive
Portsmouth, New Hampshire 03801

Dear Mr. Mullen:

The purpose of this letter is to update you on the financial status of the Portsmouth Harbor and Piscataqua River, New Hampshire, and Maine, Navigation Improvement Project Feasibility Study and Environmental Assessment (FS/EA) and to request additional funding to complete the study and complete the required reviews and Federal and State regulatory approvals. The Pease Development Authority and the Corps of Engineers are conducting the study under a Feasibility Cost-Sharing Agreement executed June 12, 2006, and amended May 23, 2013. Recent Corps guidance allows us to update and modify the project management plan and project cost-sharing requirements without going through the process of formally amending the cost-sharing agreement.

Under the amended agreement, the total study cost was estimated at $930,000, to be shared equally by the Government and the PDA, or $465,000 each. There are a number of major tasks remaining to bring this study to conclusion. A revised study cost estimate is enclosed which lays out the several remaining steps and the estimated effort and cost to complete each.

In brief the remaining steps in the process are as follows:

Draft Report for Public Review (31 March 2014)	The Draft documents would be completed and published via Public Notice for a 30-day review period. Concurrently the Corps would apply for State approvals from NH & ME for the dredging.
Final Draft Report and Draft Chief of Engineers Report To CWRB (26 August 2014)	The reports would be revised to address public review and receipt of State approvals. A final draft and draft chief of Engineers report would be prepared, submitted for Corps HQ review and further revised before transmittal to the CWRB. The Corps and PDA staff would travel to DC to present the project to the Board.

Draft Chief's Report and Supporting Final Feasibility Report/EA to State (Governor) and Federal Agency Review (September 2014)	CWRB approval clears the release of the draft Chief's Report for transmittal to the Governor and Federal agency heads for review after final edits. The Chief's report and supporting documents may require updates based on comments received.
Assistant Secretary of the Army review and Office of Management and budget Review and Approval (December 2014)	The ASA reviews the documents and prepares its own summaries with Corps assistance. Document package is forwarded to OMB for that office's review and comment. Responses are developed before OMB prepares its own report returns the package to the ASA. ASA signs the FONSI and forwards the package to Congress for action. This concludes the Feasibility Phase.

The total study cost, prior to any Sponsor in-kind costs, is now estimated at $1,126,400, with Federal and Non-Federal shares at $563,200 each, leaving a remaining Non-Federal contribution of $98,200. Ultimately any Sponsor in-kind credits would be added to the total study cost and credited against the Sponsor's share. At this time, an additional cash contribution of $67,400 is requested from the Pease Development Authority to complete the public review process and then prepare a revised report and supporting documents for submittal to the Civil Works Review Board (CWRB) for a decision. The submittal date for documents for consideration at the August CWRB meeting is July 10, 2014. Please provide a check made payable to "FAO, USAED, New England District". The remaining $30,800 of the Non-Federal share may be provided after July 1, 2014.

We look forward to continuing to work with you to complete this important navigation study. If you have any questions or require additional information, please contact Mr. Mark Habel of my staff at (978) 318-8871.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosure

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Maine Field Office
17 Godfrey Drive, Suite 2
Orono, Maine 04473
207/866-3344 Fax: 207/866-3351

February 14, 2014

John R. Kennelly
Chief of Planning
U. S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, Massachusetts 01742-2751

Dear Mr. Kennelly:

This letter responds to your letter dated September 4, 2013 regarding a study proposal for the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project. Specifically, you requested review of the proposal and comments in accordance with the Fish and Wildlife Coordination Act (FWCA)(16 U.S.C. 662) and the Endangered Species Act (ESA) as amended (16 U.S.C. 1531-1543).

Project Name/Location: **Piscataqua River Federal Navigation Improvement**
Log Number: **05E1ME00-2013-TA-0282**

Our comments apply only to the Maine portions of this project. The U. S. Fish and Wildlife Service's (Service) New England Field Office commented on the New Hampshire and Massachusetts portions of this project in a letter dated December 11, 2013.

This letter provides technical assistance to the Army Corps of Engineers (Corps). This project may affect the federally threatened piping plover and red knot (proposed for threatened listing). In our future ESA section 7 consultation, the Corps will need to make a determination of effects based on a clear project description and an evaluation of effects on these species.

Project Description

The existing Piscataqua River Federal Navigation Project includes two turning basins and a 35 foot deep, 400 foot wide channel which extends from Portsmouth Harbor at river mile 2.6, upstream to river mile 8.8. The purpose of the project is to increase the width of the upper turning basin from 850 feet wide to 1,200 feet wide at the current depth of 35 feet to improve the efficiency and safety of vessels that utilize the basin. The widening would be accomplished by mechanical dredging and would generate approximately 720,000 cubic yards of sand and gravel. In addition, bedrock will be drilled and blasted. The bedrock will generate about 16,000 cubic yards of material. Approximately half the dredge material would be placed in a nearshore disposal area off Wells Beach in Wells, Maine.

Endangered Species Act Comments

Based on information currently available to us, the federally threatened short-nosed sturgeon and Atlantic sturgeon occur in the Piscataqua River. We understand that the Corps is consulting with the National Oceanic and Atmospheric Administration concerning these fish. To our knowledge, there are no federally listed species under the jurisdiction of the Service in the Federal navigation project area on the Piscataqua River. The project area is outside of the Gulf of Maine Distinct Population Segment of the Atlantic salmon.

The federally threatened piping plover and red knot (proposed for listing as threatened) occur at Wells Beach, approximately 500 feet adjacent to the proposed nearshore disposal area. These birds are present on Wells Beach from March 15 to September 15. Plovers nest on Wells Beach and red knots frequent the beach during their southward migration in late summer.

Our offices recently consulted on the dredging of the Wells Harbor Federal Navigation Project and associated beach nourishment, which is currently underway. In our letter, we encouraged the Corps to look for opportunities to address the sand deficit in the Wells Beach littoral system. It would seem that a nearshore disposal of 360,000 cubic yards of sand that closely matches the color and grain size of sand currently on Wells Beach would help reduce this deficit and improve habitat for nesting piping plovers and migrating red knots. The Town of Wells has a current Beach Management Agreement with the Service and Maine Department of Inland Fisheries and Wildlife that meets the Service's piping plover guidelines. Recent correspondence indicates that Corps plans to deposit the sand at the nearshore disposal area during the winter months when piping plovers and red knots are not present.

From the Endangered Species Consultation Handbook (March 1998) section 3.4:

> "By regulation, a biological assessment is prepared for "major construction activities" considered to be Federal actions significantly affecting the quality of the human environment as referred to in the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*). A major construction activity is a construction project or other undertaking having similar physical impacts, which qualify under NEPA as a major federal action. Major construction activities include dams, buildings, pipelines, roads, water resource developments, channel improvements, and other such projects that modify the physical environment and that constitute major Federal actions. As a rule of thumb, if an Environmental Impact Statement is required for the proposed action and construction-type impacts are involved, it is considered a major construction activity"

and

> "The agency is not required to prepare a biological assessment for actions that are not major construction activities, but, if a listed species or critical habitat is likely to be affected, the agency must provide the Services with an account of the basis for evaluating the likely effects of the action. The Services use this documentation along with any other

> available information to decide if concurrence with the agency's determination is warranted".

Because the project was not considered a major construction activity, preparation of a Biological Assessment is not required; however, when plans are complete we do need to see a "biological evaluation" which includes a full project description including conservation measures, and an evaluation of effects on red knots and piping plovers. We look forward to then completing consultation under section 7 of the ESA.

Fish and Wildlife Coordination Act Comments

Because of staffing constraints at this office, we are not able to provide detailed comments on project effects to other wildlife species pursuant to the FWCA. However, any effects on the listed species, evaluated in the Corps biological evaluation, will have similar effects on other fish and wildlife, including migratory and other shorebirds, and waterfowl; and on fish and wildlife habitat. This determination does not preclude future evaluation and recommendations by the Service should project plans or conditions change.

Thank you for your continued coordination. Please contact Mark McCollough at 207/866-3344 Extension 115 or by email at *Mark_McCollough@fws.gov* if we can be of further assistance.

Sincerely,

Laury Zicari

Laury Zicari
Field Supervisor
Maine Field Office

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

FEB 3 - 2014

John R. Kennelly
Deputy Chief, Engineering/Planning Division
Department of the Army, Corps of Engineers
New England District
696 Virginia Road
Concord, MA

RE: Portsmouth Harbor and Piscataqua River Upper Turning Basin Expansion Navigation Improvement Project, in New Hampshire, and Maine

Dear Mr. Kennelly:

Your December 9, 2013 letter requests consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, regarding the U.S. Army Corps of Engineers (USACE) proposed Portsmouth Harbor and Piscataqua River Upper Turning Basin Expansion Navigation Improvement Project in New Hampshire and Maine. We concur with your determination that the proposed action is not likely to adversely affect any species listed by NOAA's National Marine Fisheries Service (NMFS) under the ESA. Our supporting analysis is provided below.

Proposed Project

The project will require the dredging of approximately 728,000 cubic yards (cy) of mostly coarse sand and gravel from the Piscataqua River in Maine and New Hampshire in order to widen the upper turning basin from 800 feet to approximately 1,200 feet and to a depth of 35 feet mean lower low water (MLLW). In addition to the gravel and sand to be removed with a dredge, approximately 25,200 cy of bedrock ledge will need to be removed. The widening of the turning basin will allow vessels up to 800 feet in length to make a 180- degree tug-assisted turn without the risk of grounding. According to the U.S. Coast Guard, approximately 75-125 deep draft vessels executed such a maneuver last year (personal communication, USCG, 2013).

The dredging will be accomplished using a mechanical dredge; the ledge removal will likely require explosive demolition (blasting). The dredged material (gravelly sand) will be used beneficially as nourishment at four near shore areas off beaches in Wells, Maine; and Salisbury, Newbury, and Newburyport, Massachusetts. The demolished ledge (rock) will be disposed of at an offshore site managed by you and located within the three nautical mile limit of the territorial sea, northeast of the Isle of Shoals. The offshore disposal site is in water that averages over 300 feet deep. In addition to the material removed during the improvement project, approximately 7,800 cy of material could be removed during maintenance dredging of the existing turning basin and channel which could occur concurrently if the spoil meets the suitability requirement for placement at the near shore placement sites. Testing of the maintenance dredge material for suitability for placement in these near shore areas would occur prior to commencement of the dredging action. All other maintenance dredge material removed from the turning basin within the last several decades has been clean sandy material.

The USACE will incorporate all applicable best management practices (BMPs) to minimize negative effects of the proposed dredging and disposal. Further, the USACE will reduce the potential for adverse effects of blasting by developing and adhering to a blasting plan that includes detailed design information on each charge (e.g., type of explosive and detonation velocity, type of blasting technique used, borehole dimensions, spacing, charge weights, delay intervals, method of initiation, and noise/pressure reduction techniques). The blasting plan will be submitted to us no later than 30 days prior to the first detonation

Measures to minimize potential negative impacts of blasting will include:
1. Stemming and decking of individual charges;
2. Staggered (delayed) detonation of charges in a sequential blasting circuit;
3. Blasting during periods of slack tide;
4. Prohibiting blasting during the passage of large fish e. g., Atlantic sturgeon, schools of fish, or in the presence of marine mammals, unless human safety is a concern; and
5. Require the presence of fisheries and marine mammal observers.

In order to monitor and record the acoustic effects of your actions, as well as confirming the effectiveness of your blast pressure minimization measures, you will monitor sound pressure levels during blasting operations. USACE will develop an acoustic monitoring plan for recording blast effects that will be submitted to us for review, no later than 30 days prior to any planned detonation. The acoustic monitoring will consist of a series of hydrophones and a digital recorder capable of operating at a minimum of 3,000 samples per second for a minimum of one second, with an adjustable trigger level, and a range of at least 30 psi. Assuming the blast pressure will span the entire river, a minimum of two monitoring sites will be utilized: one upstream and one downstream with each hydrophone located approximately 1,500 feet from the sound source. During blasting, both stations would be required to simultaneously record the resulting sound pressure level. During blasting, you will provide us with daily acoustic monitoring reports via email or fax to verify that your blast pressure and ensonified area calculations are correct which will also reflect the effectiveness of your minimization techniques.

It is anticipated that all dredging, blasting, and disposal activities will take about six months to complete and is planned to be done during the period from mid-October to mid-April. The spoil material will be moved to the disposal sites and released throughout the projected time line as scows are adequately loaded. The precise ledge areas and demolition times will be further refined after subsurface explorations are completed. The final blasting and effects minimization plans must be submitted to us no later than 30 days prior to the first detonation. Blasting could commence in mid-Oct, but must be completed no later than March 31st of the following year.

In order to avoid vessel interactions with federally protected whales while enroute to, or returning from the Isles of Shoals disposal site, the spoil disposal vessels will have a dedicated whale lookout, and may not approach North Atlantic right whales within 500 yards. The approach distance to all other whales is no closer than 100 yards (50 CFR Parts 217 and 222). Any whale should be treated as a right whale unless the whale is positively identified as another whale species. Further, vessels will use courses and speeds as appropriate, yet navigationally prudent, to avoid a collision with a whale, and, if necessary, reduce speed to the minimum at which the vessel can be kept on course, or come to a complete stop. For detailed guidance, see http://www.nero.noaa.gov/Protected/mmp/viewing/approaching/

NMFS Listed Species in the Action Area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR§402.02). For this project, the action area includes the project footprint as well as the underwater area where effects of dredging (*i.e.*, the expected increase in suspended sediment levels which may persist for nearly 5,000-feet downstream) and blasting (*i.e.*, the anticipated blast radius that will likely extend across the river to both banks, as well as upstream and downstream for nearly 1500 feet) will be experienced. The action area also includes the approximately 20-30 mile tug and scow transit route from the dredge site to the disposal sites, as well as the five individual disposal sites where the elevated levels of turbidity may extend 1,900 feet from each disposal site.

Shortnose Sturgeon

Federally endangered shortnose sturgeon *(Acipenser brevirostrum)* occur along the U.S. Atlantic coast. It is thought that shortnose sturgeon were once historically abundant in the Piscataqua River; however, the river does not currently support a known spawning population of shortnose sturgeon. Available information indicates that shortnose sturgeon making coastal migrations within the Gulf of Maine *(i.e.,* between the Merrimack and Kennebec Rivers) make at least occasional short visits to Great Bay. Species presence in Great Bay was recently confirmed through the detection of four tagged shortnose sturgeon by acoustic receivers placed in Great Bay (Micah Kieffer, USGS, personal communication, 2013). Habitat within the area to be dredged appears to be consistent with shortnose sturgeon foraging habitat; given that, combined with the detection of sturgeon in the Bay, it is reasonable to expect that at least some individual shortnose sturgeon will be present in the river from the spring through the fall and may be engaged in foraging. Detections in the Bay indicate that individual sturgeon may be spending several hours to a few weeks in the area during this time period; however, the limited number of receivers and their arrangement in the Bay makes any assessment of sturgeon presence in the main stem river or proximity to the dredging and blasting difficult.

Based upon the best available information, including the detection of tagged shortnose sturgeon in Great Bay and the type of habitat available in the turning basin, we expect occasional transient shortnose sturgeon will be present in the area where dredging and blasting will occur. Based on seasonal migration and behavior patterns, the presence of shortnose sturgeon in the action area is expected to be limited to the time of year when water temperatures are above 50°F (10°C) (*i.e.*, outside of the usual overwinter period). However, on November 7, 2010, a shortnose sturgeon was detected in Great Bay approximately 4 miles for the dredge site where the water temperature was 47.7°F (08.7°C). Therefore, we expect shortnose sturgeon to be present in the dredging/blasting area between early May and early November (water temperature data obtained at: (http://neracoos.org/datatools/realtime/quick_history?platform=GREAT_BAY). Based on these data, the potential for exposure of shortnose sturgeon to effects of dredging and blasting exists from the onset of dredging activities in mid October through early November.

Atlantic Sturgeon

Five DPSs of Atlantic sturgeon are listed under the ESA: the Gulf of Maine DPS is listed as threatened and the New York Bight, Chesapeake Bay, South Atlantic and Carolina DPSs are listed as endangered. The marine range of all five DPSs extends along the Atlantic coast from Canada to Cape Canaveral, Florida. The action area is within the range of all five DPSs.

One Atlantic sturgeon, originally tagged in New York Harbor, was detected on acoustic receivers in Great Bay (June 2012). The best available information indicates that suitable habitat for Atlantic sturgeon spawning and rearing does not occur in the lower Piscataqua River because of relatively high salinities. Therefore, no spawning adults or early life stages are likely to occur in the action area. With suitable forage present in the turning basin, we would expect that occasional subadult Atlantic sturgeon could be present in the River while foraging between the spring and fall. The action area has not been identified as an overwintering area for Atlantic sturgeon; however, because subadult Atlantic sturgeon are known to overwinter outside of their natal rivers, it is possible that a limited number of subadult Atlantic sturgeon will be present in the river during the winter months. We expect the presence of Atlantic sturgeon in the Piscataqua River to be limited to times of the year when water temperatures are higher than 10°C (*i.e.*, May – Nov., as noted above).

Adult Atlantic sturgeon do not overwinter exclusively in riverine habitats; they are often found foraging during the winter in near shore marine water at depths less than 250 ft (Colette and Klein-MacPhee 2002). Therefore, Atlantic sturgeon may be found foraging at depths similar to those found at the near shore disposal sites and along the tug-scow transit route. Atlantic sturgeon presence at the Isles of Shoal Disposal Site where water depths exceed 300 ft is unlikely.

Sea Turtles

Three species of listed sea turtle species occur in New England waters during the warmer months, generally when water temperatures are greater than 11°C. The sea turtles in these waters are typically small juveniles with the most abundant being the federally endangered leatherback *(Dermochelys coriacea),* federally threatened loggerhead *(Caretta caretta)* and federally endangered Kemp's ridley *(Lepidochelys kempi)* sea turtles. Kemp's ridleys are rare in waters north of Massachusetts and only leatherback or loggerhead sea turtles are likely to occur in coastal New Hampshire and Maine waters. Sea turtles move into waters of the Gulf of Maine from their southern wintering grounds in late June/July and most sea turtles move south from these waters by the first week in November. The highest numbers of sea turtles are present in these waters between July and October each year.

As marine reptiles, listed sea turtles are not likely to occur at the riverine dredge/blast site. All project activities will occur between mid-October and early May. During the time period when the proposed turning basin improvement activities will likely occur (Oct-Mar), the ocean water temperature will likely preclude loggerhead and Kemp's ridley sea turtle's presence in the action area. However, since leatherback sea turtles can tolerate colder water than other similar species they may occur near the marine disposal sites, but their presence is discountable due to their pelagic nature. Therefore, we conclude that no sea turtles will be exposed to the effects of the proposed action.

Whales

Federally endangered North Atlantic right (*Eubalaena glacialis*), humpback (*Megaptera novaeangliae*), and fin (*Balaenoptera physalus*) whales are found seasonally off the coast of Maine and New Hampshire and are known to occur near the Isle of Shoals. North Atlantic right whales are likely to occur in these waters between November and April, while humpback and fin whales are likely to occur between March and November. While other species of whales, such as sei (*Balaenoptera borealis*) and sperm (*Physter macrocephalus*) whales are also seasonally present in New England waters, these species are not known to occur in the action area; thus, sei and sperm whales will not be exposed to any effects of the proposed action.

Decades of migration data collected on Atlantic right whales indicates that the species occurs in the action area during the proposed work period from mid-October to mid-April, but none have been spotted within three miles of the Isle of Shoals disposal site in over 30 years (data accessed from http://www.nefsc.noaa.gov/psb/surveys/).

Although tracking data for fin and humpback whales is lacking, individuals have been reported in the Gulf of Maine during the proposed work period. Because of these sightings and the highly migratory nature of the species, we conclude that fin and humpback whales may also occur in the action area.

Effects of the Action

Below, we consider the effects of dredging, disposal of dredged material, blasting, and disposal of demolished rock on listed species. This analysis relies on the adherence to the conditions and full implementation of the effect minimization measures listed above, as we consider these to be part of the proposed action

Dredging

A mechanical bucket dredge will be used to remove sediments and to remove loose rock after blasting. If dredging occurs in October, a small number of shortnose and/ or Atlantic sturgeon may be occasionally present in the action area. Therefore, we are considering the potential for a small number of shortnose and/or Atlantic sturgeon to be exposed to effects of dredging in the mid October – early November time period. We consider the potential for individuals from both sturgeon species to be captured in the dredge bucket, the effects of increased turbidity and suspended sediment from dredging, and the effects of dredging on potential sturgeon prey items. Beyond early November, shortnose sturgeon presence in the action area is extremely unlikely due to water temperature as explained above.

Capture in the Dredge Bucket

Bucket dredging entails lowering the open bucket through the water column, closing the bucket after impact on the bottom (whereby dredging up the material to be removed), lifting the bucket up through the water column, and emptying the contents of the bucket into a barge. Aquatic species can however be captured in dredge buckets, and may be injured or killed from entrapment in the bucket or from burial in sediment during dredging and/or when sediment and the trapped organism are deposited into the dredge scow.

In rare occurrences, sturgeon have been captured in dredge buckets and placed in scows. The USACE has reported four incidences of sturgeon captured in dredge buckets along the U.S. East Coast since 1990. One of these incidents occurred in the Cape Fear River, North Carolina and the other three were at the Bath Iron Works facility in the Kennebec River, Maine. No sturgeon have ever been observed during dredging operations in the Piscataqua River action area. Based on all available evidence, the risk of capture in a mechanical dredge is low due to the slow speed at which the bucket moves and the relatively small area of the bottom it interacts with at any one time. Atlantic and shortnose sturgeon are highly mobile and it is anticipated that they will be able to avoid the dredge bucket in nearly all instances. The potential for capture is further reduced by the transient use of the area by Atlantic and shortnose sturgeon and the presumably small number of these fish in the action area at any given time. The action area is not a known overwintering site for shortnose sturgeon. Considering the relatively low probability that either sturgeon species will be present when and where dredging will occur and the equally low likelihood that an individual sturgeon would be captured in a slow moving dredge bucket, it is extremely unlikely that any Atlantic or shortnose sturgeon will be captured, injured or killed during dredging activities.

Turbidity Associated with Mechanical Dredging
The proposed dredging will cause a temporary increase in the amount of turbidity in the action area; however, the suspended sediment is expected to settle out of the water column within a few hours and any increase in turbidity will be short term. Turbidity levels associated with these sediment plumes typically range from 26-350 mg/L with the highest levels detected immediately adjacent to the dredge bucket and concentrations decreasing with greater distance from the dredge (USACE 2007; Anchor Environmental 2003). The size of a sediment plume is influenced by many local factors such as the composition of the dredged material (gravel vs. silt) and the velocity of any moving water. The maximum distance reported in literature for a sediment plume resulting from dredging operations is 4,921 feet (1,500 meters), which occurred in an area with very strong tidal currents (USACE 2007). The direction of the sediment plume and its extent will also be affected by the ebb and flow of the tide.

Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). The studies reviewed by Burton demonstrated lethal effects to fish at concentrations of 580.0 mg/L to 700,000.0 mg/L depending on species. Studies with striped bass adults showed that pre-spawners did not avoid concentrations of 954.0 to 1,920.0 mg/L to reach spawning sites (Summerfelt and Mosier 1976; Combs 1979 *in* Burton 1993). While there have been no directed studies on the effects of total suspended solids (TSS) on Atlantic sturgeon, subadults and adult sturgeon are often documented in turbid water and Dadswell (1984) reports that sturgeon are more active under lowered light conditions, such as those in turbid waters. As such, Atlantic sturgeon are assumed to be as least as tolerant to suspended sediment as other estuarine fish such as striped bass.

Fish eggs and larvae can be buried or smothered as suspended solids settle out of the water column. Because no early life stages of Atlantic or shortnose sturgeon occur in the action area, none will be exposed to any increase in total suspended solids (TSS). TSS is most likely to affect subadult or adult Atlantic or shortnose sturgeon if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting their benthic prey. As Atlantic and shortnose sturgeon are highly mobile they are likely to be able to avoid any sediment plume and any effect on their movements or behavior is likely to be insignificant. Additionally, the TSS levels expected (26-350 mg/L depending on site specific conditions during dredging) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical; see summary of scientific literature in Burton 1993) and benthic communities (390.0 mg/L (EPA 1986)); therefore, adverse effects to sturgeon are unlikely. Based on this information, it is likely that the effects of the re-suspension of sediment and an increase in turbidity resulting from dredging operations will be insignificant.

Effects on Prey

As noted above, Atlantic and shortnose sturgeon occur infrequently in the action area; however, they are most likely to occur where suitable forage (benthic invertebrates or submerged aquatic vegetation (SAV) is present.

Images of mapped eelgrass beds available from the Maine Office of GIS, and the New Hampshire Department of Environmental Services from 2006, 2010, and 2012 all indicate that eelgrass beds have been or are currently present within 1,500 feet up and/or downstream of the existing turning basin. Research conducted by the University of New Hampshire (UNH) suggests that new eelgrass beds are returning to the Piscataqua River in the vicinity of the turning basin. A new eelgrass bed of approximately 1.6 acres appeared in the Piscataqua River turning basin during 2012, near Adlington Creek on the Maine side of the river (Short 2013). Additionally, a New Hampshire Estuaries Survey conducted by the UNH Zoology Department and Jackson Estuarine Laboratory in 2006 evaluated the habitat on the Maine side of the turning basin near Mast Cove. The study concluded that the shallow water coupled with silty sand and eel grass beds provided "optimal habitat" for soft shell clams (*Mya arenaria*) (Grizzle 2006). Based on this information, we expect that suitable forage for sturgeon is present in the area where dredging and blasting will occur.

Dredging can affect sturgeon by reducing prey species through the alteration of the existing biotic assemblages. Some reduction in the amount of prey items upon which shortnose and Atlantic sturgeon forage is expected because of the superficial removal of accumulated sediment, but the dredging action will not result in the permanent removal of forage items as the area will continue to accrete sediment and prey species will re-colonize the area following the disturbance.

The blasting and rock removal required for the turning basin expansion will, by design, alter the habitat and lower approximately 20 acres of river bottom to a depth of 35 feet mean lower low water (MLLW) whereby making the new habitat unsuitable for some prey items, such as soft shell clams.

Because the area affected by dredging and blasting does not currently support significant amounts of benthic resources upon which shortnose and Atlantic sturgeon forage, we have determined that any effects of the turning basin expansion to the sturgeon prey base will be insignificant.

Blasting

The use of explosive demolitions underwater produces a pressure wave that radiates outward from the detonation site. The typical pressure wave from an explosion consists of an instantaneous increase to the peak pressure, followed by a slower (but still very fast) logarithmic decay to below ambient hydrostatic pressure (Wright and Hopky 1998). The strength of the wave depends on the type and amount of explosives, the manner and depth at which the charges are placed, and the proximity of the detonation to the rock/water interface. As burn rates (detonation velocity) differ for explosive types, so too does the corresponding pressure wave. A slower burning explosive, such as trinitrotoluene, (TNT) "pushes" the substrate and generates a reduced pressure wave compared to a faster burning explosive such as C-4 or a water- gel emulsion that "shatters" the substrate and produces a much stronger pressure wave (personal conversation, US Army, EOD 2012). High explosives have an abrupt rise time, short duration, and a much greater negative pressure than do slower burning explosives. The rapid pressure changes and resulting damage to the swim bladder may be the causative factor of mortality in fish exposed to high explosive pressure waveforms (Keeven and Hempen 1997).

As sound waves propagate from a source, such as explosions, transmission loss occurs resulting in the attenuation of pressure waves as the distance from the sound source increases. Transmission loss and attenuation for a specific site depends on water depth, temperature, salinity, tidal exchange, substrate composition, bathymetric profile, and scattering due to air bubbles or suspended sediment (Transit Link Consultants, 2008). However, when explosives are surrounded by a specific media, *i.e.* rock, at detonation, the shock wave propagates and is attenuated at a specific rate. As the pressure wave passes through the rock/water interface, the propagation and attenuation rates change due to the different impedance created by the change in media, namely water. As a result, the land/water boundary should be considered the "source", and future calculations should be based on those levels- not on a continuation of the original shock wave (Oriard 2002). When the pressure wave travels into a new medium with different impedance, a fraction of the energy will be reflected and another fraction will be transmitted (Persson *et al.* 1994).

Effects of Blasting on Listed Species

As explained above, the only listed species that has the potential to be exposed to blasting effects are the occasional Atlantic or shortnose sturgeon. There have been numerous studies that have assessed the direct impact of underwater blasting on fish (e.g., Teleki and Chamberlain 1978; Wiley *et al.* 1981; Burton 1994; Moser 1999). While none of the studies have focused on Atlantic sturgeon, the results demonstrate that blasting can have an adverse impact on fish. Teleki and Chamberlain (1978) found that several physical and biological variables were the principal components in determining the magnitude of the blasting effect on fish. The primary physical components in determining blast effects include detonation velocity, density of material to be blasted, and charge weight; while the biological variables include fish shape, size, weight, and swim bladder development, as well as location of fish in the water column (depth).

It is the extreme pressure oscillations created by the detonation that causes a rapid contraction and over-extension of the swim bladder as pressure gradients change; this results in internal damage and/or mortality to species of fish (Wiley *et al.* 1981). Most blast injuries to fish involve damage to air or gas containing organs, such as swim bladders. Fish with swim bladders, such as sturgeon, are more susceptible to barotrauma. During exposure to explosive shock waves, the swim bladder oscillates and may rupture, in turn causing hemorrhage in surrounding organs resulting in death (Wiley *et al.* 1981). If blasting detonations are undertaken at one time (*i.e.*, not set up to be delayed), fish cannot recover from these large pressure oscillations, resulting in internal injuries (e.g., swim bladder ruptures) that may result in death.

Lethal threshold peak pressure levels for a variety of marine fish species exposed to open water (unconfined) dynamite blasts have been suggested by Hubbs and Rechnitzer (1952). These thresholds varied from 40 pounds per square inch (psi) to 70 psi, the former being the more conservative in estimating mortality in fishes (Hempen *et al.* 2007; Keevin 1995; USACE 2004). The waveform of mortality for this value was established from an open-water testing program and not from confined shots, which are known to reduce the pressure waves of detonations[1]. Keevin (1995) found no mortality or internal damage to bluegill exposed to a high explosive at pressures at or below 60 psi. Similarly, Yelverton *et al.* (1975) measured the impulse pressures resulting in 1%, 50%, and 99% mortality in large carp. The result of this study showed 1%, 50%, and 99% mortality at 35.1 pounds per square inch-milliseconds (psi-ms), 49.5 psi-ms, and 69.7 psi-ms, respectively. Although this criteria is generally conservative for many non-listed species under the ESA, based on these studies, we believe that the 40 psi threshold may not avoid mortality or serious injury for small size classes of listed fish species, especially eggs, fry, and juveniles that are vulnerable at much lower thresholds of injury than adults, but may overestimate ranges for larger individuals. As noted above, the only sturgeon in the action area would be subadults or adults, which are at least 76 cm in length. Therefore, we expect the 40 psi threshold would overestimate the potential for injury or mortality to listed sturgeon in the action area (that is, we would not expect injury or mortality to result from exposure to blast pressures of 40 psi).

Effects of blasting on shortnose sturgeon have been examined and will serve as the best available information on potential effects of blasting on Atlantic sturgeon. Test blasting was conducted in Wilmington Harbor, North Carolina, in December 1998 and January 1999 in order to adequately assess the impacts of blasting on shortnose sturgeon and the size of the LDI area (the lethal distance from the blast where 1% of the fish died). As explained by Moser (1999), the test blasting consisted of 32-33 blasts (3 rows of 10 to 11 blast holes per row with each hole and row 10 feet apart), about 53-62 lbs (24 to 28 kg) of explosives per hole, stemming each hole with angular rock, and an approximate 25 msec delay after each blast. Total explosives detonated during the test equaled nearly 2000 lbs (900 kg). During test blasting, 50 hatchery reared juvenile striped bass and shortnose sturgeon were placed in 0.25" plastic mesh cylinder cages (2 feet in diameter by 3 feet long) 3 feet from the bottom (worst case scenario for blast pressure as confirmed by test blast pressure results) at 35, 70, 140, 280, and 560 feet upstream and downstream of the blast location.

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[1] The 40 psi criterion suggested by Hubbs and Rechnitzer (1952) is an estimate of 50 % mortality, rather than the onset of mortality (i.e., 1 % mortality) or threshold where no mortality is observed (Baker 2008).

Results of the study indicated that there was a low survival rate for both species of fish located 35 feet from the detonation site; however, at distances of 70 feet, caged fish showed no sign of hemorrhage or swim bladder damage, although two fish exhibited extended intestines, which may have been caused by the blast. At distances at, and beyond 140 feet, there was no difference in survival or impulse pressure. In addition, necropsy results indicated that shortnose sturgeon juveniles were less seriously impacted by test blasting than were the juvenile striped bass. It is believed, therefore, that survival rates for shortnose sturgeon would have been higher than striped bass following blasting treatments, even within the 35-foot distance of the blast area (*i.e.*, 88% of shortnose sturgeon would have survived versus 34% of the striped bass; Moser 1999)[2]. Moser (1999) stipulated that shortnose sturgeon may be less susceptible and less sensitive to blasting effects due to the fact that the swim bladder in shortnose sturgeon is connected to the esophagus, allowing gas to be expelled rapidly without damage to the swimbladder (*i.e.*, physostomus).

As established above, only occasional Atlantic or shortnose sturgeon are likely to be present in the Piscataqua River during the time of year when blasting will occur. However, because of the blasting techniques described above, *i.e.*, decking, stemming, and delayed detonation, the increase in underwater noise and pressure will be reduced. By applying the same calculations that were used in the recent Boston Harbor demolitions project, you determined that at distances of more than 1,500 feet from the blast site, peak pressures will be below 23 psi and underwater noise levels will be less than 111 dB re µPa (Mark Habel, Program Manager, USACE, personal communication, January 2014). Based on the Moser (1999) studies, peak pressure levels at, or below, 75.6 psi, and peak impulse levels at or below 18.4 psi-msec will cause no injury or mortality to sturgeon.

The use of sonar to scan the area prior to blasting will ensure that no blasting occurs when large fish, *i.e.*, sturgeon, would be close enough to the detonation to be exposed to potentially injurious pressure levels (< 1,500 feet). Any sturgeon would be far enough away from the blast such that effects would be limited to a startle or swimming away from the blast site. As such, we do not anticipate any Atlantic or shortnose sturgeon to be exposed to pressure levels which could result in injury or mortality. Further, the sonar that will be used to scan the area operates at a frequency outside the hearing threshold of sturgeon, so there will be no effects to Atlantic or shortnose sturgeon from the use of sonar.

The blast pressure will likely span the entire river, and impede Atlantic sturgeon from normal foraging or migratory behavior. However, due to the very short duration of the blast (less than 7 seconds), we expect this behavioral disturbance to be brief and that pre-disturbance behaviors would quickly resume (Mark Habel, Program Manager, USACE, personal communication, January 2014).

Disposal of Dredged Material and Demolished Rock

The disposal of the coarse grained sand and gravel dredged from the Piscataqua River will occur at four (4) near shore disposal sites, including: Wells, Maine, and in Massachusetts at Salisbury

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[2] After 24 hrs of the blast treatments, fish were necropsied.

Beach, Newbury, and Newburyport. All of the near shore disposal sites are located approximately 30 miles from the Piscataqua River Turning Basin. In addition, the Isle of Shoals-N site which will be used for the rock disposal is located approximately 20 miles offshore, east-southeast of the dredging area. Since all of these disposal areas are located between the Kennebec River and the Merrimack River, any sturgeon or whales migrating between these two general areas could be exposed to effects of disposal activities.

Nearshore Beach Nourishment
Near shore spoil disposal is often referred to as "beach nourishment". During beach nourishment operations, the dredged substrate is re-suspended in the water column as it is released and settles to the sea floor. This generally results in a sediment plume in the water, typically radiating from the disposal site and decreasing in concentration as sediment falls out of the water column and as distance increases from the disposal site. During the discharge of sediment at a near shore disposal site, suspended sediment levels have been reported as high as 500 mg/L within 75 meters of the disposal vessel and decreasing to background levels (*i.e.*, 15.0-100.0 mg/L depending on location) within 300-2,000 meters (USACE 1983). For this project, any associated sediment plume will be localized because of the lentic nature of the receiving waterbody, and will be temporary because the dredged material is mostly clean sand and gravel which will settle quickly.

The effects of coarse grained sand and gravel disposal on listed species also includes burial by and/or direct contact with spoil material when the material is released and it descends through the water column. Studies conducted on sub-adult white sturgeon *(Acipenser transmontanus)* at spoil disposal areas in the lower Columbia River of Washington concluded that movement rates, depths occupied, and diel movement patterns changed little during disposal activities (Parsley *et al.* 2011). The lack of change suggests that natural behaviors were not significantly altered during and immediately after hopper dredge disposal operations. It is assumed that Atlantic sturgeon would be similarly unaffected, being similar species. Based on this and the best available information, the effects of beach nourishment to Atlantic sturgeon will be insignificant. Furthermore, whales are not anticipated at the near shore disposal sites due to the restrictive water depth; therefore, the effects of beach nourishment to whales in the action area are discountable.

Demolished Rock Disposal
Blasted rock from the turning basin is to be disposed of offshore at the Isle of Shoals- North (IOS-N) disposal area where the water depth often exceeds 250 feet. The effects of demolished rock disposal on listed species include direct contact with spoil material as well as an increase in turbidity.

The TSS levels expected for debris (rock) disposal (10.0 to 120.0 mg/L) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical; see summary of scientific literature in Burton 1993) and benthic communities (390.0 mg/L (EPA 1986)).

Atlantic sturgeon have been detected by acoustic receivers (GoMOOS buoy B01) in the vicinity of the Isle of Shoals. Since deployment of this buoy in 2005, only nine individual Atlantic

sturgeon have been detected in its vicinity. The most detections occurred in the spring (March 2010) with one detection in mid June 2009. Considering these were single detections and that adult Atlantic sturgeon rarely forage in water deeper than 240 feet (75 m) (Colette and Klein-MacPhee 2002), the detections suggests individuals migrating through the area. No other tagged fish have been detected at the GoMOOS buoy deployed in the vicinity of IOS-N.
Tracking data indicates that Atlantic right, fin, and humpback whales may occur in the action year-round; however , the time of year when the disposal action will occur and corresponding ocean temperature suggests that it is extremely unlikely that whales will be present in the action area.

Based on the conditions emplaced to protect whales identified above, the unlikely event that any whales would be in the action area because of water temperature, and the solely migratory use of the IOS-N by Atlantic sturgeon, we conclude that any effects to Atlantic sturgeon or listed whales from the disposal of blasted ledge from the Piscataqua River turning basin are discountable.

Habitat Alteration

Marine growth at the four nearshore disposal sites and the one offshore site at the Isles of Shoals-North (IOS-N) will likely consist of benthic and epi-benthic organisms; primarily polychaete worms, clams, and crustaceans in low density. Due to depths at the IOS site (>200 ft) no SAV is known to grow, but may occur at the nearshore locations.

The nearshore sites were selected for spoil deposition because of existing beach erosion and the beneficial effects of beach nourishment. Nearshore disposal of gravel and sand will result in temporary disturbance or suffocation of benthic organisms that may serve as sturgeon prey. However, the native faunae of a sandy beach are primarily burrowing species that are well adapted to the constantly changing and relatively stressful environment (NRC 1995). Based on this and the best available information, we conclude that any effects on Atlantic sturgeon from habitat alteration, *i.e.*, beach nourishment at the four nearshore sites are discountable.

The offshore disposal site at Isles of Shoals-North (IOS-N) is situated in over 250 feet of water and has been used intermittently as a Regional Disposal Site for over 35 years. The habitat in the offshore disposal area consists of rocky outcrops but is penetrated by several valleys containing soft sediment. We have concluded that any effects to Atlantic sturgeon from habitat alteration due to rock disposal will be insignificant because the IOS-N disposal area is not heavily relied upon as a foraging site.

Turbidity

During the discharge of sediment at an in-water disposal site, suspended sediment levels have been reported as high as 500 mg/L within 75 meters of the disposal vessel and decreasing to background levels *(i.e.*, 15.0-100.0 mg/L depending on location) within 300-2,000 meters (USACE 1983). Turbidity levels associated with rock disposal is expected to be only slightly elevated above background levels (USACE 2007; Anchor Environmental 2003).

While the increase in suspended sediments may cause Atlantic sturgeon or listed whales to slightly alter their normal movements, any change in behavior is likely to be insignificant as it will only involve minor movements to alter their course out of the sediment plume.

Based on this and the research discussed above, any increase in suspended sediment resulting from spoil disposal is not likely to induce significant behavioral changes, or otherwise adversely affect Atlantic sturgeon or protected whales.

Vessel Interactions

The factors relevant to determining the risk to Atlantic sturgeon from vessel strikes are currently unknown, but they may be related to size and speed of the vessels, navigational clearance (*i.e.,* depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of Atlantic sturgeon in the area (e.g., foraging, migrating, etc.). It is important to note that vessel strikes have only been identified as a significant concern in the Delaware and James Rivers and current thinking suggests that there may be unique submerged topographic features in these riverine areas (e.g., potentially narrow migration corridors combined with shallow/narrow river channels) that increase the risk of interactions between vessels and Atlantic sturgeon. These types of restrictive submerged topographic features are not present in the Piscataqua River, thus the risk of vessel strikes are not considered to be a significant threat to Atlantic sturgeon.

Finback whales are the most often reported species hit by ocean going vessels, followed by humpback, then North Atlantic right whales (Jensen and Silber 2003). However, based on the low density of whales anticipated near the Isles of Shoals and the precautionary measures required of the disposal vessels, we conclude that an interaction between a scow or tug and listed species is discountable.

Conclusion

Based on the analysis that all effects of the proposed project will be insignificant or discountable, we concur with your determination that the proposed Portsmouth Harbor and Piscataqua River Upper Turning Basin Expansion Navigation Improvement Project is not likely to adversely affect any listed species under our jurisdiction. Therefore, no further consultation pursuant to section 7 of the ESA is required.

Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, reinitiation would be required. Should you have any questions about this correspondence please contact Max Tritt at (207) 866-3756 or by e-mail (max.tritt@noaa.gov).

Coordination between NMFS' Habitat Conservation Division and your office regarding effects of the action on Essential Fish Habitat (EFH) and NOAA Trust Resources considered under the

Fish and Wildlife Coordination Act is still ongoing. Please contact Mike Johnson at (978) 281-9130 or mike.r.johnson@noaa.gov for further information on the status of the EFH consultation.

I look forward to continuing to work with you and your staff as this action moves forward.

Sincerely,

for John K. Bullard
Regional Administrator

EC: Murray-Brown, Madley, Tritt - F/NER3
Boelke, Johnson – F/NER4
Rogers, Habel – USACE NE

File Code: H:\Section 7 Team\Section 7\Non-Fisheries\ACOE\Informal\2014\New England District\Portsmouth Harbor and Piscataqua River Upper Turning Basin Expansion Navigation Improvement Project, Portsmouth, NH.

PCTS NER-2013-10570

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MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

PAUL R. LEPAGE
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

January 3, 2014

Ms. Kate Atwood
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

Project: MHPC# 1630-13 – Portsmouth Harbor; proposed navigation improvement project
Town: Eliot, ME

Dear Ms. Atwood:

In response to your recent request, I have reviewed the information received December 12, 2013 to continue consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Based on the information submitted, I have concluded that there will be **no historic properties affected** by the proposed undertaking, as defined by Section 106.

Please contact Robin Reed of our staff if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
Deputy State Historic Preservation Officer

PHONE: (207) 287-2132
FAX: (207) 287-2335

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

Re: Portsmouth Harbor and Piscataqua River
Navigation Improvement Project, NH

December 11, 2013

Mr. John R. Kennelly
Chief of Planning
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

This letter responds to your correspondence, dated September 4, 2013, regarding a study proposal for the Portsmouth Harbor and Piscataqua River federal navigation improvement project. Specifically, you requested review of the proposal in accordance with the Fish and Wildlife Coordination Act and section 7 of the Endangered Species Act. Our comments are provided pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 662, *et seq.*) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531, *et seq.*).

Our comments apply only to the New Hampshire and Massachusetts portions of the project. We understand that you are coordinating with the Fish and Wildlife Service's Maine Field Office regarding the proposed nearshore placement site located in Wells, Maine.

The existing federal navigation project includes two turning basins and a 35-foot-deep, 400-foot-wide channel which extends from Portsmouth Harbor at river mile 2.6, upstream to river mile 8.8. The purpose of the project is to increase the width of the upper turning basin from 850 feet wide to 1,200 feet wide at the current depth of 35 feet in order to improve the efficiency and safety of vessels that utilize the basin. The widening would be accomplished by mechanical dredging and would generate approximately 720,000 cubic yards of sand and gravel. In addition, there is bedrock that may need to be drilled and blasted. The bedrock will generate about 16,000 cubic yards of material. The dredge material would be placed nearshore in the communities of Newbury, Newburyport and Salisbury, Massachusetts.

Endangered Species Act Comments

Based on information currently available to us, no federally listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area. Preparation of a Biological Assessment or further consultation with us under section 7 of the Endangered Species Act is not required. No further Endangered Species Act coordination is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Fish and Wildlife Coordination Act Comments

Based on our review of the information provided, we have determined that placement of the dredge material in the proposed nearshore sites will have only minimal effects on fish and wildlife resources in the project area. This determination does not preclude future evaluation and recommendations by the U.S. Fish and Wildlife Service should project conditions change.

Thank you for your continued coordination. Please contact Maria Tur of this office at (603) 223-2541, extension 12, if we can be of further assistance.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

December 9, 2013

Engineering/Planning Division
Evaluation Branch

John Bullard
Northeast Regional Administrator
NOAA Fisheries
Northeast Regional Office
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Dear Mr. Bullard:

This letter is to conclude informal consultation under Section 7 of the Endangered Species Act (ESA) concerning the potential effects to listed species that could occur from the proposed Portsmouth Harbor and Piscataqua River Upper Turning Basin Expansion Navigation Improvement Project, in New Hampshire, and Maine. The project will require the dredging of approximately 728,000 cubic yards (cy) of mostly coarse sand and gravel in the Piscataqua River in Maine, and New Hampshire, in order to widen the upper turning basin from 800 feet to approximately 1,200 feet at a depth of 35 feet mean lower low water (MLLW). In addition, approximately 25,200 cy of bedrock ledge will need to be removed. The dredging will be accomplished using a mechanical dredge, with the ledge removal likely requiring blasting. The dredged material will be beneficially used as nourishment by placement at four nearshore areas off beaches in Wells, Maine; and Salisbury, Newbury and Newburyport, Massachusetts. The ledge rock removed will be placed at an ocean site located seaward of the three nautical mile limit of the territorial sea in Federal waters, just northeast of the Isle of Shoals (IOS-N, see Figure 1). This site is in water approximately 250 to 310 feet deep. The widening of the turning basin will allow vessels up to 800 feet in length to turn without the risk of grounding.

In addition to the material described that would be removed as part of the improvement project, approximately 7,800 cy of maintenance material within the existing turning basin limits and channel upstream of Frankfort Island could be removed concurrently if it meets the suitability requirement for placement at the nearshore placement sites. Testing of the maintenance material for suitability for placement in these nearshore areas would occur in the next project phase (Design Phase). All other maintenance material removed from the river over the several decades since the 35-foot deepening has been clean sandy material. It is anticipated that construction will take about six months to complete and is planned to be done during the months of mid-October to mid-April with all blasting completed no later than March 31 in the year that funding becomes available.

Please recall your letter of November 15, 2013 as well as letters from Peter Colosi (September 2, 2011) and from Louis Chariella (May 27, 2008) from your agency, concerning this project and its potential effects to listed species. As noted in your letters, several species protected under the ESA may be present in the proposed dredging and disposal areas at some time during the year and could be affected by the proposed project. These include the Federally endangered shortnose sturgeon (*Acipenser brevirostrum*), as well as the possibility of four Distinct Population Segments (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) which are listed as endangered (New York Bight, Chesapeake Bay, Carolina, and South Atlantic) and one DPS of Atlantic sturgeon listed as threatened (Gulf of Maine). Also, as stated in your letter of September 2, 2011, seaward migrating juvenile Gulf of Maine (GOM) DPS Atlantic salmon (*Salmo salar*) (listed as Federally endangered) have been recorded by acoustic telemetry moving southward toward the vicinity of the proposed Isles of Shoals Disposal area (IOS-N). In your letter of November 15, 2013, you state that consultation under Section 7 of the ESA would be required for this project, and that we should submit an effects assessment on listed species and mitigation strategies with our request for consultation.

The information presented in the following pages constitutes our assessment of effects which we believe will sufficiently show that the proposed navigation improvement project may affect, but not likely adversely affect the Federally endangered shortnose sturgeon; the Federally endangered Atlantic Bight DPS, Chesapeake Bay DPS, Carolina DPS, South Atlantic DPS, and the Federally threatened Gulf of Maine DPS of Atlantic sturgeon; the Federally endangered GOM DPS of Atlantic salmon; as well as listed whales or sea turtles that may occur in the vicinities of the proposed dredging and disposal areas. If you need any further information you may contact Ms. Catherine Rogers at catherine.j.rogers@usace.army.mil or phone (978) 318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

To: Catherine Rogers, Army Corps of Engineers, New England District
696 Virgina Road
Concord, MA 01742

From: Melissa Coppola, NH Natural Heritage Bureau
Date: 12/4/2013 (valid for one year from this date)
Re: Review by NH Natural Heritage Bureau
NHB File ID: NHB13-3615 Town: Newington Location: Piscataqua River
Description: The Federally preferred project would widen the exiting 800-wide turning basin located at the upstream end of the Piscataqua river federal navigation channel to 1200 feet and a depth of 35 ft MLLW plus two feet of overdepth. Approximately 728,000 cy of coarse grained and gravelly material and approximately 25,200 cy of rock would be removed. All material would be removed by a mechanical dredge and take between five to eight months to complete Material would be removed between the months of approximately November through March to protect biological resources. Material would be disposed at aquatic sites outside of NH state borders.
cc: Kim Tuttle

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Natural Community	**State[1]**	**Federal**	**Notes**
Sparsely vegetated intertidal system	--	--	Threats to these communities are primarily alterations to the hydrology of the wetland (such as alterations that might affect the sheet flow of tidal waters across the intertidal flat) and increased input of nutrients and pollutants in storm runoff.
Subtidal system	--	--	

Plant species	**State[1]**	**Federal**	**Notes**
prolific yellow-flowered knotweed (*Polygonum ramosissimum ssp. prolificum*)*	E	--	Threats to estuarine plants are primarily alterations to the hydrology of the wetland, such as ditching or tidal restrictions that might affect the sheet flow of tidal waters across the intertidal flat, activities that eliminate plants, and increased input of nutrients and pollutants in storm runoff.

Vertebrate species	**State[1]**	**Federal**	**Notes**
Henslow's Sparrow (*Ammodramus henslowii*)*	--	--	Contact the NH Fish & Game Dept (see below).

[1] Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

Memo

NH NATURAL HERITAGE BUREAU
NHB DATACHECK RESULTS LETTER

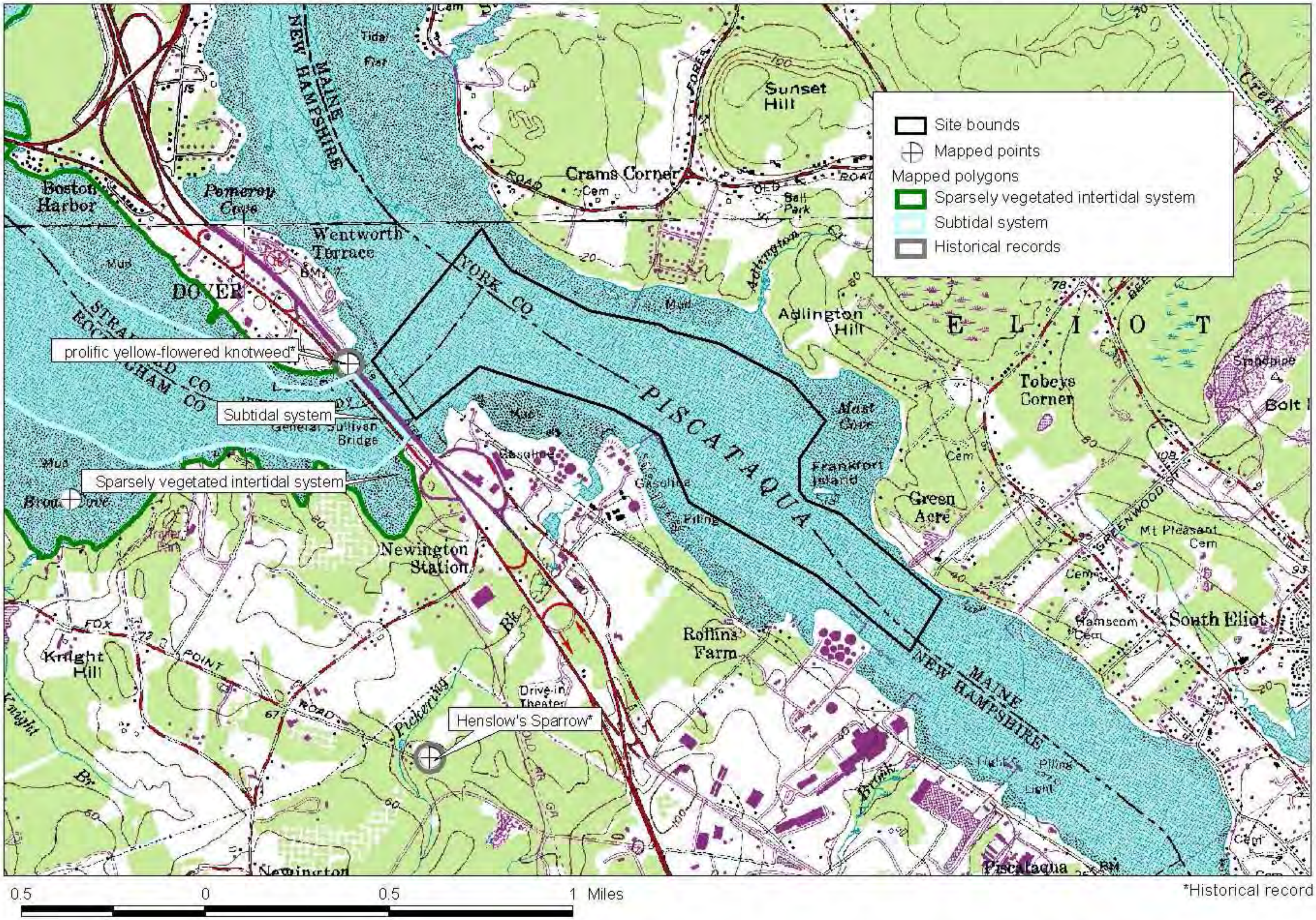
Contact for all animal reviews: Kim Tuttle, NH F&G, (603) 271-6544.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

NH NATURAL HERITAGE BUREAU

Known locations of rare species and exemplary natural communities

Note: Mapped locations are not always exact. Occurrences that are not in the vicinity of the project are not shown.



*Historical record

Valid for one year from this date: 04 Dec 2013

New Hampshire Natural Heritage Bureau - System Record

Sparsely vegetated intertidal system

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Rare or uncommon

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: Extensive ***intertidal flats*** that are exposed daily at low tide, bordered in places by ***intertidal rocky shore*** and ***coastal shoreline strand/swale*** communities.
General Area: 2010: Borders **salt marsh system** landward and **subtidal system** seaward.
General Comments:
Management Comments:

Location

Survey Site Name: Great Bay
Managed By: Moody Point Open Space

County:	Rockingham	USGS quad(s):	Newmarket (4307018)
Town(s):	Newington	Lat, Long:	430651N, 0705032W
Size:	3589.5 acres	Elevation:	

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Occurs throughout Great Bay from the mouths of its tributaries, through Little Bay, to the confluence with the Piscataqua River.

Dates documented

First reported:	1997-06-23	Last reported:	2010-10-13

New Hampshire Natural Heritage Bureau - System Record

Subtidal system

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Rare or uncommon

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: Channels and bay bottoms that vary in width from a few feet to almost a mile across, covered by water even at low tide. Patches of subtidal ***eelgrass bed*** occur at the edge of the adjacent **sparsely vegetated intertidal system**.
General Area: 2010: Borders a **sparsely vegetated intertidal system**.
General Comments:
Management Comments:

Location

Survey Site Name: Great Bay
Managed By: Portsmouth Country Club

County:	Rockingham	USGS quad(s):	Portsmouth (4307017)
Town(s):	Newington	Lat, Long:	430431N, 0705256W
Size:	3207.7 acres	Elevation:	

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Occurs throughout the Great Bay estuary, from the upper todal reaches of tributary streams to the confluence of the bay with the Piscataqua River.

Dates documented

First reported:	1997-06-17	Last reported:	2010-10-13

New Hampshire Natural Heritage Bureau - Plant Record

prolific yellow-flowered knotweed (*Polygonum ramosissimum ssp. prolificum*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Apparently secure but with cause for concern
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1955: No details.
General Area:
General Comments:
Management Comments:

Location

Survey Site Name: Hilton State Park
Managed By:

County:	Strafford	USGS quad(s):	Portsmouth (4307017)
Town(s):	Dover	Lat, Long:	430710N, 0704938W
Size:	2.8 acres	Elevation:	5 feet

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Dover. Hilton State Park.

Dates documented

First reported: Last reported: 1955

New Hampshire Natural Heritage Bureau - Animal Record

Henslow's Sparrow (*Ammodramus henslowii*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Apparently secure but with cause for concern
State:	Not listed	State:	Not ranked (need more information)

Description at this Location

Conservation Rank:	Historical records only - current condition unknown.
Comments on Rank:	Destroyed.
Detailed Description:	1983: Singing male observed on suitable habitat beginning in May by Tom Butler. Recorded and photographed (on 1 June 1983) by L. Master, Tom Butler, Connie Casas and others. BIRD PRESENT 5/24 TO 6/5.
General Area:	1983: Old field, wet along edges, with timothy, orchard grass, curly dock, asters, goldenrods, dandelions, cow vetch, common buttercup, yarrow, ragged-robin, bluegrass, Daucus.
General Comments:	
Management Comments:	

Location

Survey Site Name: Fox Point Road
Managed By:

County:	Rockingham	USGS quad(s):	Portsmouth (4307017)
Town(s):	Newington	Lat, Long:	430614N, 0704923W
Size:	2.8 acres	Elevation:	50 feet

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: From Rte. 4/16 at Newington Station, take Nimble Hill Road ca. 0.75 miles south to Fox Point Road. Field just east northeast of cul-de-sac at east end of Fox Point Road, 0.4 mile east of blinking light.

Dates documented

First reported:	1983	Last reported:	1983-06-01

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-EP-PN 20 November 2013

MEMORANDUM FOR RIT, North Atlantic Division, U.S. Army Corps of Engineers, (CECW-NAD, Ms. Michele Gomez), 441 G Street NW, Washington, DC 20314-1000

SUBJECT: Request an AFB Conference be Scheduled for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, Navigation Improvement Feasibility Study

1. The purpose of this memo is to request that an AFB conference be scheduled for mid February 2014 for the subject study. This P2 milestone is currently scheduled for 21 February 2014. The draft Feasibility Report, Environmental Assessment (EA) and supporting appendices are complete and under District QC review. NAE has initiated coordination with the Deep Draft Navigation PCX for ATR and economic model certification. Completion of the ATR and submission of documentation for AFB review are scheduled for late December 2013. Pending successful completion of the AFB documentation (PGM), we will be requesting concurrent approval to release the draft Feasibility Report and EA for public review.

2. Enclosed for your information are the current fact sheet for the study, and the draft Executive Summary from the Feasibility Report.

3. If there are any questions, please contact the Project Manager, Richard Heidebrecht, at 978- 318-8513, or John Kennelly, Planning Branch Chief, at 978-318-8513.

Sincerely,

SCOTT E. ACONE, P.E.
a Chief, Engineering/Planning Division

Enclosures

Copy Furnished:
Paul Sabalis, CENAD-PD-CS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

November 18, 2013

John Kennelly, Chief of Planning
U.S. Army Corps of Engineers
New England District
Engineering/Planning Division
696 Virginia Road
Concord, Massachusetts 01742-2751

Dear Mr. Kennelly:

Thank you for your letter dated October 15, 2013, requesting the U.S. Environmental Protection Agency (EPA) to review and comment on the amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, navigation improvement project, pursuant to its responsibilities under the Clean Water Act, Marine Protection, Research, and Sanctuaries Act, Clean Air Act, and National Environmental Policy Act.

EPA has reviewed the various NEPA documents and other information on this project and strongly supports your efforts to beneficially use the sand and gravel to nourish beaches in Maine and Massachusetts, and the rock for upland public works projects in New Hampshire.

Please contact Ms. Olga A Guza of my staff at (603) 818-9788 if you have any questions or require additional information.

Sincerely,

Melville P. Coté, Jr.

Melville P. Coté, Jr., Manager
Ocean and Coastal Protection Unit

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

NOV 15 2013

Mr. John R. Kennelly
Chief of Planning
Engineering/Planning Division, Evaluation Branch
New England District, US Army Corp of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: Technical Assistance for Portsmouth Harbor and Piscataqua River Navigation Project Improvement, New Hampshire and Maine.

Dear Mr. Kennelly:

We have reviewed your September 4, 2013 request for comments regarding the proposed improvements to the Portsmouth Harbor and Piscataqua River Navigation Channel and Turning Basin. As proposed, the project would include the widening of the upper turning basin from 850 feet to approximately 1,200 feet at the current depth of -35 feet mean lower low water (MLLW). The project would require dredging up to 720,000 cubic yards (cy) of mostly coarse sand and gravel, and the removal of nearly 16,00 cy of bedrock (ledge). While the dredging would be accomplished by using a mechanical dredge, the ledge removal would likely require blasting. The dredging operations are expected to take 4-6 months with the blasting to take another 1-2 months for completion. As proposed, the dredge material would be used for beach nourishment and to combat shoreline erosion at two different locations in Maine and in Massachusetts. The demolished ledge would be moved to the New Hampshire State Terminal in Portsmouth and stored until used for future public projects.

NMFS Listed Species and Critical Habitat in the Action Area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR §402.02). For this project, the action area includes the in-river project footprint, the disposal transit routes, and the coastal disposal sites, as well as the underwater areas where effects of the action (e.g., increase in suspended sediment, underwater noise/vibration levels) will be experienced.

Shortnose Sturgeon

Federally endangered shortnose sturgeon *(Acipenser brevirostrum)* occur along the U.S. Atlantic coast. It is thought that shortnose sturgeon were once historically abundant in the Piscataqua River; however, the river does not currently support a known spawning population of shortnose sturgeon. Available information indicates that shortnose sturgeon making coastal migrations within the Gulf of Maine (*i.e.*, between the Merrimack and Kennebec Rivers) make at least occasional short visits to Great Bay. Species presence was recently confirmed through the detection of four tagged shortnose sturgeon by acoustic receivers placed in Great Bay (Micah Kieffer, personal conversation, 2013). Based on the pattern of detections, it is thought that shortnose sturgeon visit Great Bay at least during the spring and fall. Detections in the Bay indicate that individual sturgeon may be spending several hours to a few weeks in the area; however, the limited number of receivers and their arrangement in the Bay makes any assessment of sturgeon presence in the river or in proximity to the dredging and blasting area difficult. Habitat within the area to be dredged appears to be consistent with shortnose sturgeon foraging habitat; given that, combined with the detection of sturgeon in the Bay, it is reasonable to expect that at least some individual shortnose sturgeon will be present in the river from the spring through the fall and may be engaged in foraging. There is no recent targeted study investigating shortnose sturgeon habitat use and behavior in the Piscataqua River. Based upon the life history characteristics of shortnose sturgeon, the Piscataqua River could serve as an overwintering area. However, current detections in Great Bay have not indicated shortnose sturgeon overwintering behavior. It is our understanding that the U.S. Navy may be pursuing the placement of additional receivers in the river which may provide more information on the presence of shortnose sturgeon in the river in the future.

Atlantic Sturgeon

Four Distinct Population Segments (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) are listed as endangered (New York Bight, Chesapeake Bay, Carolina, and South Atlantic) and one DPS is listed as threatened (Gulf of Maine) under the ESA (77 FR 5880 and 77 FR 5914). The marine range for all five DPSs includes all marine waters, plus coastal bays and estuaries, from Labrador Inlet, Labrador, Canada to Cape Canaveral, FL. The action area is within the range of all five DPSs; however, individuals in this area are most likely to originate from the GOM or NYB DPS.

Like shortnose sturgeon, the available information on the presence of Atlantic sturgeon in the Piscataqua River is extremely limited and is based only on the detection of Atlantic sturgeon by acoustic receivers in Great Bay. An Atlantic sturgeon tagged and released in the Merrimack River was detected by telemetry receivers in the Great Bay as recently as June 2012. The best available information indicates that suitable habitat for Atlantic sturgeon spawning and rearing does not occur in the lower Piscataqua River because of relatively high salinities. If suitable forage was present, we expect that occasional subadult Atlantic sturgeon could be present in the River while foraging between the spring and fall. Because of the lack of spawning and rearing habitat, the action area should only be considered a migratory corridor for both sturgeon species; but, since Atlantic sturgeon do not overwinter in their natal streams they may occur in the action area regardless of season or time of year.

Sea Turtles

Four species of listed sea turtles occur off the New England coast in warmer months, generally when water temperatures are greater than 15°C. The sea turtles in these waters include the threatened Northwest Atlantic (NWA) Distinct Population Segment (DPS) of loggerhead sea turtles (*Caretta caretta*), endangered Kemp's ridley (*Lepidochelys kempi*) green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea)* sea turtles). Sea turtles move into these waters from their southern wintering grounds in June; most sea turtles head south by the first week in November. The highest numbers of sea turtles are present in these waters between June and October each year. While sea turtles do not occur in the area where dredging and blasting will occur, individuals may be present at the offshore disposal sites or along the transit routes.

While listed whales occur in the offshore waters of New Hampshire and Maine, due to the riverine nature of the dredging and demolition sites, the inshore location of the fill sites, and the water depth of the likely transit routes in between, no listed whales are expected to occur in the action area.

Preliminary Comments on the Proposed Project
As noted above, several species as threatened or endangered have the potential to be present in the action area and could be exposed to effects of the proposed action. Below, we offer comments on issues that should be considered in the NEPA documentation you are developing for this project. It appears that the proposed action may affect listed species; as such, section 7 consultation will be necessary. The issues addressed below should be considered in your effects assessment and mitigation strategies that you will submit along with your request for consultation.

Dredging
You will need to consider the potential for shortnose and Atlantic sturgeon to be captured in the bucket dredge. Factors to be assessed include the duration of dredging and the likelihood of individual sturgeon to be in the area being dredging during dredging activities. Projects such as dredging, blasting, spoils redistribution, and beach nourishment all disturb the substrate which can lead to a variety of impacts on fishery resources, including:

a) displacing benthic organisms during dredging and after disposal;
b) interference with respiration;
c) decreased feeding in finfish and invertebrates;
d) temporary dispersal of benthic prey;
e) burial of habitat that serves as foraging and shelter sites;
f) potential burial of demersal and benthic species;
g) interrupted or delayed migration; and
h) mortality of species at vulnerable life stages, such as eggs, larvae, and juveniles.

TSS are most likely to affect sturgeon if a plume causes a barrier to normal behaviors or if a thick sediment layer settles on the bottom affecting their prey. Your NEPA documentation and assessment of effects to listed species should consider all of the issues above. Additionally, while the proposed dredging is expected to take several months to complete, the suspended sediment is likely to persist throughout each working day. While the river is nearly 3,000 feet wide at the upper turning basin, two miles downstream it narrows to under 700 feet at Atlantic Heights near the I-95 Bridge; the impact assessment must consider how far downstream the sediment plume will extend, how persistent it will be and what impact it may have on individuals present in this narrower region of the river.

Transport of Dredged Material
As described above, dredged material will likely be transported from dredge site in the Piscataqua River to inshore disposal sites in Maine and Massachusetts. Both disposal sites are approximately 25-30 miles from the dredge location. The spoil transport will result in some additional vessel traffic within the action area. Your NEPA and section 7 consultation documentation should include an estimate of the number of vessels to be used and the approximate number of trips between the dredge site and the disposal site as well as the duration and frequency of those trips. You should also include information on the speed of vessels traveling to and from the disposal site. We recommend during the summer months that a lookout be posted to alert the

captain of any marine mammals or sea turtles visible on the surface so that appropriate measures (*i.e.*, avoidance, reducing speeds) can be taken to minimize the risk of interactions with these animals.

Demolition Noise

The use of explosives has the potential to result in injury or mortality of fish. Shortnose and Atlantic sturgeon within 500 feet of a detonation resulting in peak pressures of 120 psi and average pressure of 70 psi, would be exposed to noise and pressure levels that could cause adverse effects (see Moser 1999; Teleki and Chamberlain 1978; and Wiley *et al.* 1981). Based on studies completed by Moser (1999), peak pressure levels at, or below, 75.6 psi, and peak impulse levels at or below 18.4 psi-msec, will cause no injury or mortality to species of sturgeon, including Atlantic and shortnose sturgeon. We recommend that you design the blasting project to observe the above mentioned thresholds.

Additionally, we suggest the following mitigation techniques be used to facilitate the reduction of sound pressure:

1. Stemming and decking of individual charges;
2. Staggered detonation of charges in a sequential blasting circuit; and
3. Blasting during periods of slack tide and within a confined bubble curtain

In 2012, we completed consultation with you on the effects of dredging and blasting in Boston Harbor. The Biological Assessment you prepared for that project and our letter concluding section 7 consultation for that project provide extensive background information on the effects of dredging, blasting and in-water disposal on NMFS listed species and should serve as good references as you prepare the environmental documentation for the Piscataqua River project.

At this time, we do not have adequate information on the seasonal use of the Piscataqua River by listed species to provide a time of year restriction or recommend a time of year when project effects to listed species could be minimized.

Conclusion

Based on the preliminary information that you provided us, we believe that the Portsmouth Harbor and Piscataqua River Navigation Project Improvement may affect listed species under our jurisdiction, specifically Atlantic and/or shortnose sturgeon. We look forward to working with you as the project moves forward. My staff is available to meet with you to discuss impacts of the project on listed species. It is my understanding that NMFS Habitat Conservation Division has discussed this project with you and will continue coordination once an Essential Fish Habitat assessment is provided. As project plans develop and new information becomes available that could influence the basis for this assessment, or if you have any questions or concerns about these comments, please contact Max Tritt in our Maine Field Office at (207) 866-3756 or max.tritt@noaa.gov.

Sincerely,

Mary A. Colligan
Assistance Regional Administrator

File Code: Sec. 7 ACOE; Technical Assistance for Portsmouth Harbor and Piscataqua River Navigation Project Improvement, New Hampshire and Maine.

References

Kieffer, M., USGS, personal communication, 2011; 2013.

Moser, M. 1999. Cape Fear River Blast Mitigation Tests: Results of Caged Fish Necropsies. CZR, Inc.

Teleki, G., and A. Chamberlain. 1978. Acute effects of underwater construction blasting on fishes in Long Point Bay, Lake Erie. Journal of the Fisheries Research Board of Canada 35:1191-1198.

Wiley, M. L., J. B. Gaspin, and J. F. Goertner. 1981. Effects of underwater explosions on fish with a dynamical model to predict fish kill. Ocean Science and Engineering 6:223-284.

Commonwealth of Massachusetts

Division of Marine Fisheries

251 Causeway Street, Suite 400
Boston, Massachusetts 02114
(617)626-1520
fax (617)626-1509

Paul J. Diodati
Director

Deval Patrick
Governor
Richard K. Sullivan, Jr.
Secretary
Mary B. Griffin
Commissioner

November 14, 2013

Ms. Catherine J. Rogers
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

Dear Ms. Rogers:

The Division of Marine Fisheries (*MarineFisheries*) has reviewed the request for comments by the U.S. Army Corps of Engineers (USACE) for the Portsmouth Harbor and Piscataqua River Navigation improvement project and dredge material disposal. The proposed project includes near-shore dredged material disposal in Massachusetts to contribute to beach nourishment in Newbury, Newburyport and Salisbury. The material is course to medium sand and the proposed Massachusetts receiving sites are currently medium to fine sands. It is expected that 360,000 yd^3 of material would be divided between the three Massachusetts communities.

The nearshore disposal sites are mapped habitat for surf clams (*Spisula solidissima*). Surf clams routinely burry themselves to ½ inch below the sediment surface. Within the temperature range from 45 degrees to 72 degrees the clams are active and would be able to dig themselves out if burial exceeds the preferred ½ inch above the top of the shell (Ropes 1980). A layer of ½ to 2 inches +/- of sediment over a large area would have minimal impact. However, if material is dumped quickly in deep piles, if temperatures are outside of the range stated above, or if sediments are significantly courser grain size than the existing conditions, there would be a greater impact from burial and clams may not recover. We recommend that the disposal design take into consideration the above parameters, to minimize impacts to fisheries. We request more information as to the method of disposal and the expected depth of sediment when it is available and would like to review this with the Corps.

Thank you for considering our comments. Please contact Tay Evans of my staff at 978-282-0308 x. 168 if you have any questions about our review.

Sincerely,

Paul J Diodati

Paul J. Diodati

cc
K. Ford DMF
T. Evans, DMF
K. Ostrikis, DMF
B. Boeri
K. Chin

PD/te/sd

Reference:

Ropes, J. W.1980. Biological and Fisheries Data on Surf Clam. NOAA Tech. Ser. Rep. No 24.

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

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RC.54954

October 8, 2013

Engineering/Planning Division
Evaluation Branch

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

CONCURRENCE. Brona Simon
11/12/13
BRONA SIMON
STATE HISTORIC
PRESERVATION OFFICER
MASSACHUSETTS
HISTORICAL COMMISSION

Dear Ms. Simon:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing an Environmental Assessment for a proposed navigation improvement project for the Portsmouth Harbor and Piscataqua River in Eliot, Maine (Attachments 1 and 2). As a result of the formulation of alternatives for this project, NAE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion. The communities in Massachusetts are Newbury, Newburyport, and Salisbury, where shoreline erosion is currently occurring. We would like your comments on the placement of sand at these three nearshore sites.

NAE coordinated with communities along the coastlines of Maine, Massachusetts, and New Hampshire, regarding beneficial use opportunities for the dredged material from the navigation improvement project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. Three of these communities are in Massachusetts. Grain size analysis showed that the dredged material is coarse to medium sands, while the Massachusetts nearshore sites were medium to fine sands. Approximately 360,000 cubic yards will be divided between the three Massachusetts communities. The proposed locations are shown on Attachment 3.

NAE believes that there will be no historic properties affected during the proposed placement of dredged material at the nearshore areas. These areas are in a highly active environment within the littoral zone. It is anticipated that sand placed at these three locations will eventually wash landward to nourish the adjacent beaches. Any historic properties within these areas would have already been damaged or destroyed due to water and wave action. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

John R. Kennelly
Chief of Planning

Attachments

Similar Letter Sent (with attachments):

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

From: Rogers, Catherine J NAE
To: Heidebrecht, Richard W NAE; Habel, Mark L NAE
Subject: FW: NH CZM Response - Updated Coordination - Piscataqua River/Portsmouth Harbor Turning Basin Improvement Project (UNCLASSIFIED)
Date: Thursday, November 07, 2013 6:19:19 PM

Classification: UNCLASSIFIED
Caveats: NONE

FYI

Thanks.

Catherine J. Rogers, Ecologist
U.S. Army Corps of Engineers
696 Virginia Rd
Concord, MA 01742
Phone: (978) 318-8231
Fax: (978)318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Williams, Chris [mailto:Christian.Williams@des.nh.gov]
Sent: Monday, November 04, 2013 8:42 AM
To: Rogers, Catherine J NAE
Subject: NH CZM Response - Updated Coordination - Piscataqua River/Portsmouth Harbor Turning Basin Improvement Project (UNCLASSIFIED)

Hi Cathy,

As Chair of the NH Dredge Management Task Force, I've been able to follow this project closely for the past seven years. On behalf of the NH Coastal Program, I don't have any comments in response to the September 4th letter referenced in your email below.

Please let me know if you have any further questions.

Chris

Christian Williams
Acting Manager
New Hampshire Coastal Program
Pease Field Office
222 International Drive, Suite 175
Portsmouth, NH 03801
Phone: (603) 559-0025
Fax: (603) 559-1510
Email: Christian.Williams@des.nh.gov

-----Original Message-----
From: Rogers, Catherine J NAE [mailto:Catherine.J.Rogers@usace.army.mil]

Sent: Monday, October 28, 2013 6:09 PM
To: Mike R Johnson - NOAA Federal; tom_chapman@fws.gov; Zicari, Laury; Williams, Chris; Stewart, Harry; douglas.grout@wildlife.nh.gov; Boeri, Robert (ENV); (Kathryn.Ford@state.ma.us); Todd Burrowes (todd.burrowes@maine.gov); mick.kuhns@maine.gov;

patrick.keliher@maine.gov; Dickson, Stephen M.
Cc: Rogers, Catherine J NAE; Heidebrecht, Richard W NAE
Subject: Updated Coordination - Piscataqua River/Portsmouth Harbor Turning Basin Improvement Project (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Hi all,

Sorry to make this a mass email, but I wanted to catch up with everyone to see if we will be getting a response to our request for comments on the above project very soon. We had sent a letter out requesting comments on September 4, 2013. We would like to finalize our Feasibility Report/EA so we can send it out for agency technical review as soon as possible, but need agency input.

Can you send a letter with comments as soon as possible?

If you have any questions or comments please let me or the study manager Dick Heidebrecht (in cc: line) know.

(If I have the wrong person for your agency, please pass onto the right person).

Thanks.

Catherine J. Rogers, Ecologist
U.S. Army Corps of Engineers
696 Virginia Rd
Concord, MA 01742
Phone: (978) 318-8231
Fax: (978)318-8560
catherine.j.rogers@usace.army.mil

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

From: Rogers, Catherine J NAE
To: Heidebrecht, Richard W NAE; Habel, Mark L NAE
Subject: FW: NMFS Response - Updated Coordination - Piscataqua River/Portsmouth Harbor Turning Basin Improvement Project (UNCLASSIFIED)
Date: Thursday, November 07, 2013 6:19:42 PM

Classification: UNCLASSIFIED
Caveats: NONE

FYI

Thanks.

Catherine J. Rogers, Ecologist
U.S. Army Corps of Engineers
696 Virginia Rd
Concord, MA 01742
Phone: (978) 318-8231
Fax: (978)318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Mike R Johnson - NOAA Federal [mailto:mike.r.johnson@noaa.gov]
Sent: Friday, November 01, 2013 2:33 PM
To: Rogers, Catherine J NAE
Cc: tom_chapman@fws.gov; Zicari, Laury; Williams, Chris; harry.stewart@des.nh.gov; douglas.grout@wildlife.nh.gov; Boeri, Robert (ENV); (Kathryn.Ford@state.ma.us); Todd Burrowes (todd.burrowes@maine.gov); mick.kuhns@maine.gov; patrick.keliher@maine.gov; Dickson, Stephen M.; Heidebrecht, Richard W NAE; Christopher Boelke - NOAA Federal
Subject: NMFS Response - Updated Coordination - Piscataqua River/Portsmouth Harbor Turning Basin Improvement Project (UNCLASSIFIED)

Cathy,

I have looked over the information from your September 4, 2013 letter, regarding the amendments for the Portsmouth Harbor and Piscataqua River Navigation Improvement project. The amendments include alternatives for disposing of the dredged material in the nearshore areas off beaches in Wells, Maine, and Newbury, Newburyport, and Salisbury, Massachusetts. Regarding these alternatives, Attachments 5 and 6 with your letter indicates that surveys of the nearshore were conducted, and those surveys included video and sidescan sonar, SAV and depth. Although Attachment 4 provides summaries of the grain size of sediment collected in these areas, I did not see information regarding the other surveys. We recommend that the draft EA include a discussion of the results of these other surveys, including a description of the benthic habitats, and the fish and invertebrates identified within the disposal areas. Upon review of this information in the draft EA, will will provide comments and conservation recommendations, as appropriate, regarding the disposal alternatives.

Regarding other aspects of the proposed improvement project, we will review the draft EA and EFH assessment and provide comments and conservation recommendations upon receipt of those reports.

Thanks,

Mike

On Mon, Oct 28, 2013 at 6:09 PM, Rogers, Catherine J NAE <Catherine.J.Rogers@usace.army.mil> wrote:

Classification: UNCLASSIFIED
Caveats: NONE

Hi all,

Sorry to make this a mass email, but I wanted to catch up with everyone to see if we will be getting a response to our request for comments on the above project very soon. We had sent a letter out requesting comments on September 4, 2013. We would like to finalize our Feasibility Report/EA so we can send it out for agency technical review as soon as possible, but need agency input.

Can you send a letter with comments as soon as possible?

If you have any questions or comments please let me or the study manager Dick Heidebrecht (in cc: line) know.

(If I have the wrong person for your agency, please pass onto the right person).

Thanks.

Catherine J. Rogers, Ecologist
U.S. Army Corps of Engineers
696 Virginia Rd
Concord, MA 01742
Phone: (978) 318-8231 <tel:%28978%29%20318-8231>
Fax: (978)318-8560 <tel:%28978%29318-8560>
catherine.j.rogers@usace.army.mil

Classification: UNCLASSIFIED
Caveats: NONE

--

Michael R. Johnson

Habitat Conservation Division

NOAA Fisheries

U.S. Department of Commerce

Northeast Regional Office
55 Great Republic Drive
Gloucester, MA 01930
978-281-9130
mike.r.johnson@noaa.gov

<https://lh6.googleusercontent.com/pRYs5-pllxGWFD8vB_uenU70kEWF09TSzG92lCN9jhth_T2gUvODn1-QsEK_KOO8bD2q8mXkreCdMsdEyb89wAg3B_PKC39aAbTRcfOF6kITVALlwSw>

Web

www.nmfs.noaa.gov <http://www.nmfs.noaa.gov>

Facebook

www.facebook.com/usnoaafisheriesgov <http://www.facebook.com/usnoaafisheriesgov>

Twitter

www.twitter.com/noaafisheries <http://www.twitter.com/noaafisheries>

YouTube

www.youtube.com/usnoaafisheriesgov <http://www.youtube.com/usnoaafisheriesgov>

Classification: UNCLASSIFIED
Caveats: NONE

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 30, 2013

Engineering/Planning Division
Evaluation Branch

Ms. Elizabeth H. Muzzey
Director and State Historic Preservation Officer
New Hampshire Division of Historic Resources
State Historic Preservation Office
19 Pillsbury Street
Concord, New Hampshire 03301-3570

Dear Ms. Muzzey:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing a Feasibility Report and Environmental Assessment for a proposed navigation improvement project for the Portsmouth Harbor and Piscataqua River mainly in Eliot, Maine (Attachment 1). This ongoing study was initiated in 2008, but has proceeded slowly due to the need to address numerous disposal alternatives.

Approximately 960 square feet of the proposed navigation improvement project, which consists of widening the existing turning basin, is actually in New Hampshire state waters. We believe that there will be no impacts to historic resources in New Hampshire. This letter is being sent as a courtesy as well as to provide you with a copy of the marine archaeological survey for the proposed project that was completed in 2009. No targets with the potential to be post-contact or pre-contact period archaeological deposits were identified, and no additional archaeological investigations were required.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

John R. Kennelly
Chief of Planning

Attachment

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 29, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Earle G. Shettleworth, Jr.
Director and State Historic Preservation Officer
55 Capitol Street
65 State House Station
Augusta, Maine 04333-0065

Dear Mr. Shettleworth:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing a Feasibility Study and Environmental Assessment for a proposed navigation improvement project for the Portsmouth Harbor and Piscataqua River mainly in Eliot, Maine (Attachment 1). We would like your comments on the proposed navigation improvement project and the placement of sand at a nearshore site off Wells, Maine.

The existing Federal navigation project includes a 35-foot deep channel, generally 400 feet (ft) wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project includes two 35-foot Mean Lower Low Water (MLLW) turning basins; a 950-foot wide turning basin located upstream of Boiling Rock and a 800-foot wide turning basin located at the upstream end of the Federal channel (Attachment 2). The current width of the upper turning basin causes major safety concerns for liquid petroleum gas cryo-tankers and other large bulk cargo vessels. As the two upper terminals rely on this turning basin to turn larger vessels, these safety concerns limit the existing and future uses of these terminals.

The purpose of the subject study is to determine the feasibility of improving the existing Portsmouth Harbor Federal navigation project by increasing the width of the upper turning basin. To improve the efficiency and safety of vessels utilizing the upper turning basin, several alternative widths were evaluated. Studies included engineering feasibility, economic justification, design optimization, environmental acceptability and cultural resource impact. Based on these studies, it was determined that the best plan for improving safety and efficiency was widening the upper turning basin from about 800 feet to a width of 1,200 feet at the current 35-foot depth.

Widening the turning basin to 1,200 feet would involve the dredging of about 720,000 cubic yards of mostly sand and gravel, and removal of about 22,000 cubic yards of bedrock. Subsurface investigations of the area determined that the material is hard packed sandy, glacial till with some gravel. A boring into the bedrock indicates that it is likely that the rock will need to be drilled and blasted. Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months with an additional one to two months for removal of the bedrock to design depth.

In 2008, the USACE contractor, PAL, completed a remote sensing archaeological survey of the proposed navigation improvement project, i.e., basin widening. The archaeological work was conducted to identify and document any remote sensing target areas with potential to be significant archaeological deposits (i.e., shipwrecks) or intact paleosols with archaeological sensitivity for containing pre-contact sites within the project area. The remote sensing survey consisted of archival research and field investigation using differential GPS, high frequency side-scan sonar, a cesium-vapor marine magnetometer, and a seismic sub-bottom profiler to acquire 100 percent coverage within the proposed navigation improvement area along a series of parallel surveyed track lines spaced 50 feet apart.

Systematic, multidisciplinary archival research, remote sensing archaeological field survey, and geotechnical data analysis of the Piscataqua River navigation improvement project area documented no targets with potential to be National Register-eligible post-contact archaeological deposits. No areas of buried paleosols with archaeological sensitivity for potentially containing pre-contact period archaeological deposits were identified. No additional archaeological investigations were recommended within the navigation improvement project area. The report was completed in January 2009 (enclosed). NAE concurs with the report's negative conclusions.

NAE coordinated with communities along the coastlines of Maine, Massachusetts, and New Hampshire, regarding beneficial use opportunities for the dredged material from the navigation improvement project. Since the dredged material is predominantly sand, four communities expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. One community, Wells is in Maine (Attachment 1). Grain size analysis showed that the dredged material is coarse to medium sands, while the Maine nearshore site is predominantly fine sands. Approximately 360,000 cubic yards will be placed at the Wells, Maine nearshore site (Attachment 3).

NAE believes that there will be no historic properties affected during the proposed placement of dredged material at the Wells nearshore area. This area is a highly active environment within the littoral zone. It is anticipated that sand placed at this location will eventually wash landward to nourish the adjacent beach. Any historic properties within this area would have already been damaged or destroyed due to water and wave action. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Similar Letter Sent (with enclosure):
Chris Sockalexis, THPO
Cultural and Historic Preservation Program
Penobscot Nation
6 River Road
Indian Island Reservation
Old Town, Maine 04468

Donald Soctomah, THPO
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
P.O. Box 301
Princeton, Maine 04668

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 29, 2013

Engineering/Planning Division
Evaluation Branch

Chris Sockalexis, THPO
Cultural and Historic Preservation Program
Penobscot Nation
6 River Road
Indian Island Reservation
Old Town, Maine 04468

Dear Mr. Sockalexis:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing a Feasibility Study and Environmental Assessment for a proposed navigation improvement project for the Portsmouth Harbor and Piscataqua River mainly in Eliot, Maine (Attachment 1). We would like your comments on the proposed navigation improvement project and the placement of sand at a nearshore site off Wells, Maine.

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Widening the turning basin to 1,200 feet would involve the dredging of about 720,000 cubic yards of mostly sand and gravel, and removal of about 22,000 cubic yards of bedrock. Subsurface investigations of the area determined that the material is hard packed sandy, glacial till with some gravel. A boring into the bedrock indicates that it is likely that the rock will need to be drilled and blasted. Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months with an additional one to two months for removal of the bedrock to design depth.

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Systematic, multidisciplinary archival research, remote sensing archaeological field survey, and geotechnical data analysis of the Piscataqua River navigation improvement project area documented no targets with potential to be National Register-eligible post-contact archaeological deposits. No areas of buried paleosols with archaeological sensitivity for potentially containing pre-contact period archaeological deposits were identified. No additional archaeological investigations were recommended within the navigation improvement project area. The report was completed in January 2009 (enclosed). NAE concurs with the report's negative conclusions.

NAE coordinated with communities along the coastlines of Maine, Massachusetts, and New Hampshire, regarding beneficial use opportunities for the dredged material from the navigation improvement project. Since the dredged material is predominantly sand, four communities expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. One community, Wells is in Maine (Attachment 1). Grain size analysis showed that the dredged material is coarse to medium sands, while the Maine nearshore site is predominantly fine sands. Approximately 360,000 cubic yards will be placed at the Wells, Maine nearshore site (Attachment 3).

NAE believes that there will be no historic properties affected during the proposed placement of dredged material at the Wells nearshore area. This area is a highly active environment within the littoral zone. It is anticipated that sand placed at this location will eventually wash landward to nourish the adjacent beach. Any historic properties within this area would have already been damaged or destroyed due to water and wave action. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Similar Letter Sent (with enclosure):
Mr. Earle G. Shettleworth, Jr.
Director and State Historic Preservation Officer
55 Capitol Street
65 State House Station
Augusta, Maine 04333-0065

Donald Soctomah, THPO
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
P.O. Box 301
Princeton, Maine 04668

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 29, 2013

Engineering/Planning Division
Evaluation Branch

Donald Soctomah, Tribal Historic Preservation Officer
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
P.O. Box 301
Princeton, Maine 04668

Dear Mr. Soctomah:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing a Feasibility Study and Environmental Assessment for a proposed navigation improvement project for the Portsmouth Harbor and Piscataqua River mainly in Eliot, Maine (Attachment 1). We would like your comments on the proposed navigation improvement project and the placement of sand at a nearshore site off Wells, Maine.

The existing Federal navigation project includes a 35-foot deep channel, generally 400 feet (ft) wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project includes two 35-foot Mean Lower Low Water (MLLW) turning basins; a 950-foot wide turning basin located upstream of Boiling Rock and a 800-foot wide turning basin located at the upstream end of the Federal channel (Attachment 2). The current width of the upper turning basin causes major safety concerns for liquid petroleum gas cryo-tankers and other large bulk cargo vessels. As the two upper terminals rely on this turning basin to turn larger vessels, these safety concerns limit the existing and future uses of these terminals.

The purpose of the subject study is to determine the feasibility of improving the existing Portsmouth Harbor Federal navigation project by increasing the width of the upper turning basin. To improve the efficiency and safety of vessels utilizing the upper turning basin, several alternative widths were evaluated. Studies included engineering feasibility, economic justification, design optimization, environmental acceptability and cultural resource impact. Based on these studies, it was determined that the best plan for improving safety and efficiency was widening the upper turning basin from about 800 feet to a width of 1,200 feet at the current 35-foot depth.

Widening the turning basin to 1,200 feet would involve the dredging of about 720,000 cubic yards of mostly sand and gravel, and removal of about 22,000 cubic yards of bedrock. Subsurface investigations of the area determined that the material is hard packed sandy, glacial till with some gravel. A boring into the bedrock indicates that it is likely that the rock will need to be drilled and blasted. Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months with an additional one to two months for removal of the bedrock to design depth.

In 2008, the USACE contractor, PAL, completed a remote sensing archaeological survey of the proposed navigation improvement project, i.e., basin widening. The archaeological work was conducted to identify and document any remote sensing target areas with potential to be significant archaeological deposits (i.e., shipwrecks) or intact paleosols with archaeological sensitivity for containing pre-contact sites within the project area. The remote sensing survey consisted of archival research and field investigation using differential GPS, high frequency side-scan sonar, a cesium-vapor marine magnetometer, and a seismic sub-bottom profiler to acquire 100 percent coverage within the proposed navigation improvement area along a series of parallel surveyed track lines spaced 50 feet apart.

Systematic, multidisciplinary archival research, remote sensing archaeological field survey, and geotechnical data analysis of the Piscataqua River navigation improvement project area documented no targets with potential to be National Register-eligible post-contact archaeological deposits. No areas of buried paleosols with archaeological sensitivity for potentially containing pre-contact period archaeological deposits were identified. No additional archaeological investigations were recommended within the navigation improvement project area. The report was completed in January 2009 (enclosed). NAE concurs with the report's negative conclusions.

NAE coordinated with communities along the coastlines of Maine, Massachusetts, and New Hampshire, regarding beneficial use opportunities for the dredged material from the navigation improvement project. Since the dredged material is predominantly sand, four communities expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. One community, Wells is in Maine (Attachment 1). Grain size analysis showed that the dredged material is coarse to medium sands, while the Maine nearshore site is predominantly fine sands. Approximately 360,000 cubic yards will be placed at the Wells, Maine nearshore site (Attachment 3).

NAE believes that there will be no historic properties affected during the proposed placement of dredged material at the Wells nearshore area. This area is a highly active environment within the littoral zone. It is anticipated that sand placed at this location will eventually wash landward to nourish the adjacent beach. Any historic properties within this area would have already been damaged or destroyed due to water and wave action. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

John R. Kennelly
Chief of Planning

Similar Letter Sent (with enclosure):
Mr. Earle G. Shettleworth, Jr.
Director and State Historic Preservation Officer
55 Capitol Street
65 State House Station
Augusta, Maine 04333-0065

Chris Sockalexis, THPO
Cultural and Historic Preservation Program
Penobscot Nation
6 River Road
Indian Island Reservation
Old Town, Maine 04468

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 24, 2013

Mr. Louis A. Chiarella
United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region
55 Great Republic Drive
Gloucester, MA 01930-2276

Dear Mr. Chiarella:

Thank you for your October 21, 2013 letter to Colonel Samaris in which you requested a 30-day extension of the comment period for all actions provided to your agency for review under the Magnuson-Stevens Act and Section 404 of the Clean Water Act during the lapse in appropriation.

My staff will continue to work diligently with your staff to fulfill the requirements of the Magnuson-Stevens Act and Section 404 of the Clean Water Act. Among the Regulatory Division pending Public Notices, the South Essex Sewerage District project is highly time sensitive as there is potential for the existing pipe to fail and cause unacceptable harm to the aquatic environment. The original comment period was fifteen days and it expires on October 25, 2013. NOAA staff has been coordinating expeditiously by email so we anticipate receiving final comments by that date. My staff will continue to work with NOAA staff to develop appropriate permit conditions to minimize and mitigate impacts to the aquatic resources.

Regulatory staff will also coordinate all other project schedules with you on a case-by-case basis. There are only a few individual permit applications that were out on public notice during the lapse in appropriation and we request that you let us know whether additional review time is needed for any of those individual activities. If necessary, we may be able to provide additional time up to the length of the lapse (16 days).

In addition, Civil Works projects, especially Sandy related activities, still need to maintain their schedules. Please coordinate with the applicable project team to define any delays.

We look forward to working with you on these projects. Please contact me at 978-318-8330 for questions related to Regulatory activities and William Hubbard at 978-318-8552 for questions related to Civil Works project reviews.

Sincerely,

JMcCarthy

Jennifer McCarthy
Chief, Regulatory Division

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 15, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Melvin P. Cote, Manager
Water Quality Unit
U.S. Environmental Protection Agency
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

Dear Mr. Cote:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

The existing Federal navigation project includes a 35-foot deep channel, generally 400 feet wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project includes two 35-foot deep MLLW turning basins; a 950-foot wide turning basin located upstream of Boiling Rock, and a 850-foot wide turning basin located at the upstream end of the Federal channel (Attachment 2). The current width of the upper turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. As the two upper terminals rely on this turning basin to turn larger vessels, these safety concerns limit the existing and future uses of these terminals.

The purpose of the subject study is to determine the feasibility of improving the existing Portsmouth Harbor Federal navigation project by increasing the width of the upper turning basin. To improve the efficiency and safety of vessels utilizing the upper turning basin, several alternative widths were evaluated. Studies included engineering feasibility, economic justification, design optimization, environmental acceptability and cultural resource impact.

Based on these studies, it was determined that the best plan for improving safety and efficiency was widening the upper turning basin from about 850 feet to a width of 1,200 feet at the current 35-foot depth.

Widening the turning basin to 1,200 feet would involve the dredging of about 720,000 cubic yards of mostly sand and gravel, and removal of about 16,000 cubic yards of bedrock. Subsurface investigations of the area determined that the material is hard packed sandy glacial till with some gravel (Attachment 3). A boring into the bedrock indicates that it is likely that the rock will need to be drilled and blasted. Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months with an additional one to two months for removal of the bedrock to design depth.

The USACE coordinated with communities along the coastlines of Maine, Massachusetts and New Hampshire regarding beneficial use opportunities for the dredged material from the project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. These communities are Wells, Maine and Newbury, Newburyport and Salisbury in Massachusetts where shoreline erosion is currently occurring. Grain size analysis showed that the dredged material is course to medium sands, while the Massachusetts nearshore sites were medium to fine sands and the Maine nearshore site is predominantly fine sands (Attachment 4). Based on coordination with these communities, it is anticipated that the 720,000 cubic yards of dredged material would be divided between the states of Maine and Massachusetts, with 360,000 cubic yards going to Wells, Maine and the remaining 360,000 cubic yards being divided between the three Massachusetts communities. The proposed locations of nearshore placement areas are shown on Attachments 5 and 6. Excavated rock will be off loaded at the New Hampshire State Terminal along the Piscataqua River and used for upland public works projects.

It is requested that written comments under the authority for the Clean Water Act, Marine Protection, Research, and Sanctuaries Act, the Clean Air Act, and the National Environmental Policy Act be provided no later than 30 days from the date of this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

Mark Habel
for John R. Kennelly
Chief of Planning

Enclosures

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 8, 2013

Engineering/Planning Division
Evaluation Branch

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

Dear Ms. Simon:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing an Environmental Assessment for a proposed navigation improvement project for the Portsmouth Harbor and Piscataqua River in Eliot, Maine (Attachments 1 and 2). As a result of the formulation of alternatives for this project, NAE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion. The communities in Massachusetts are Newbury, Newburyport, and Salisbury, where shoreline erosion is currently occurring. We would like your comments on the placement of sand at these three nearshore sites.

NAE coordinated with communities along the coastlines of Maine, Massachusetts, and New Hampshire, regarding beneficial use opportunities for the dredged material from the navigation improvement project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. Three of these communities are in Massachusetts. Grain size analysis showed that the dredged material is coarse to medium sands, while the Massachusetts nearshore sites were medium to fine sands. Approximately 360,000 cubic yards will be divided between the three Massachusetts communities. The proposed locations are shown on Attachment 3.

NAE believes that there will be no historic properties affected during the proposed placement of dredged material at the nearshore areas. These areas are in a highly active environment within the littoral zone. It is anticipated that sand placed at these three locations will eventually wash landward to nourish the adjacent beaches. Any historic properties within these areas would have already been damaged or destroyed due to water and wave action. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

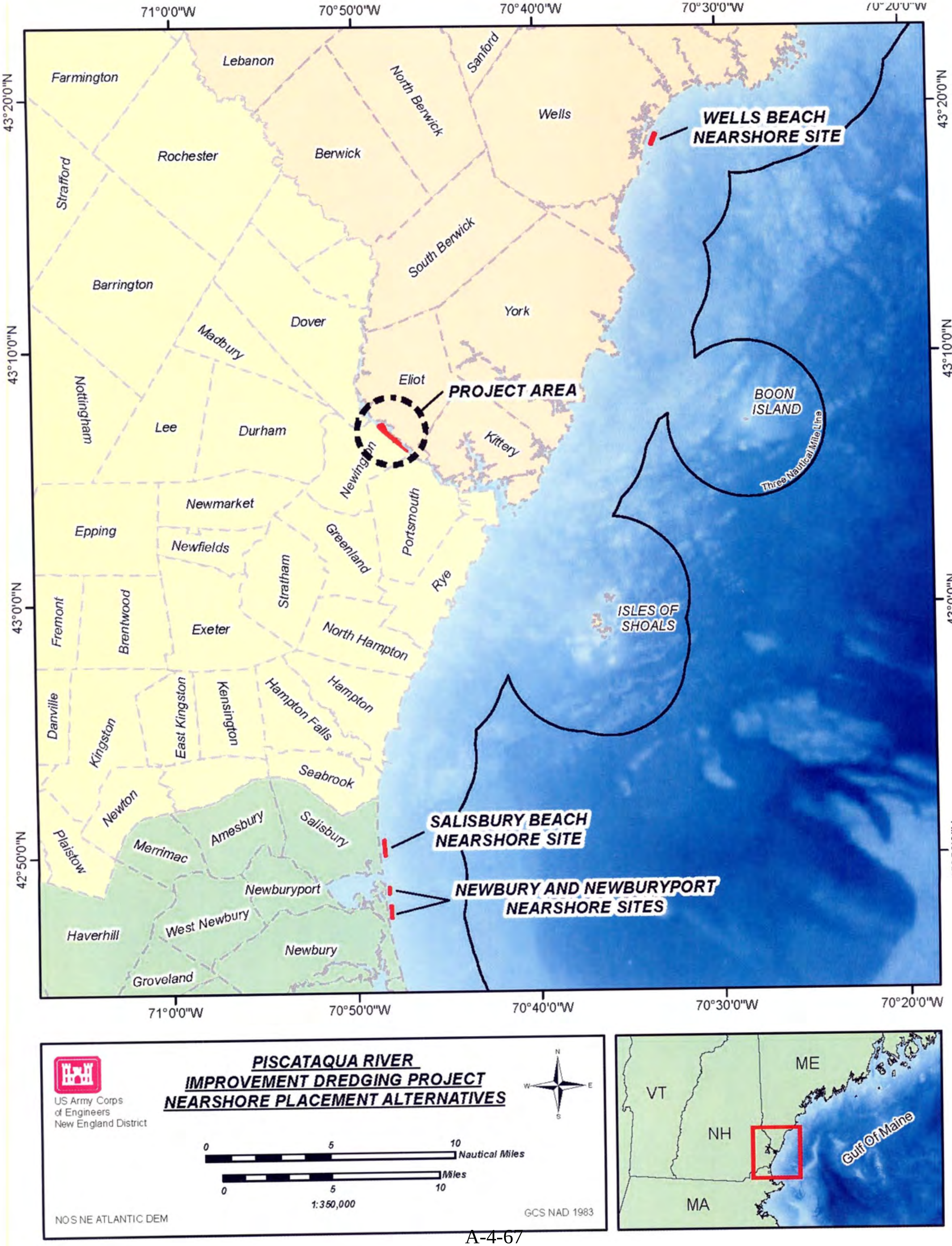
John R. Kennelly
Chief of Planning

Attachments

Similar Letter Sent (with attachments):

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

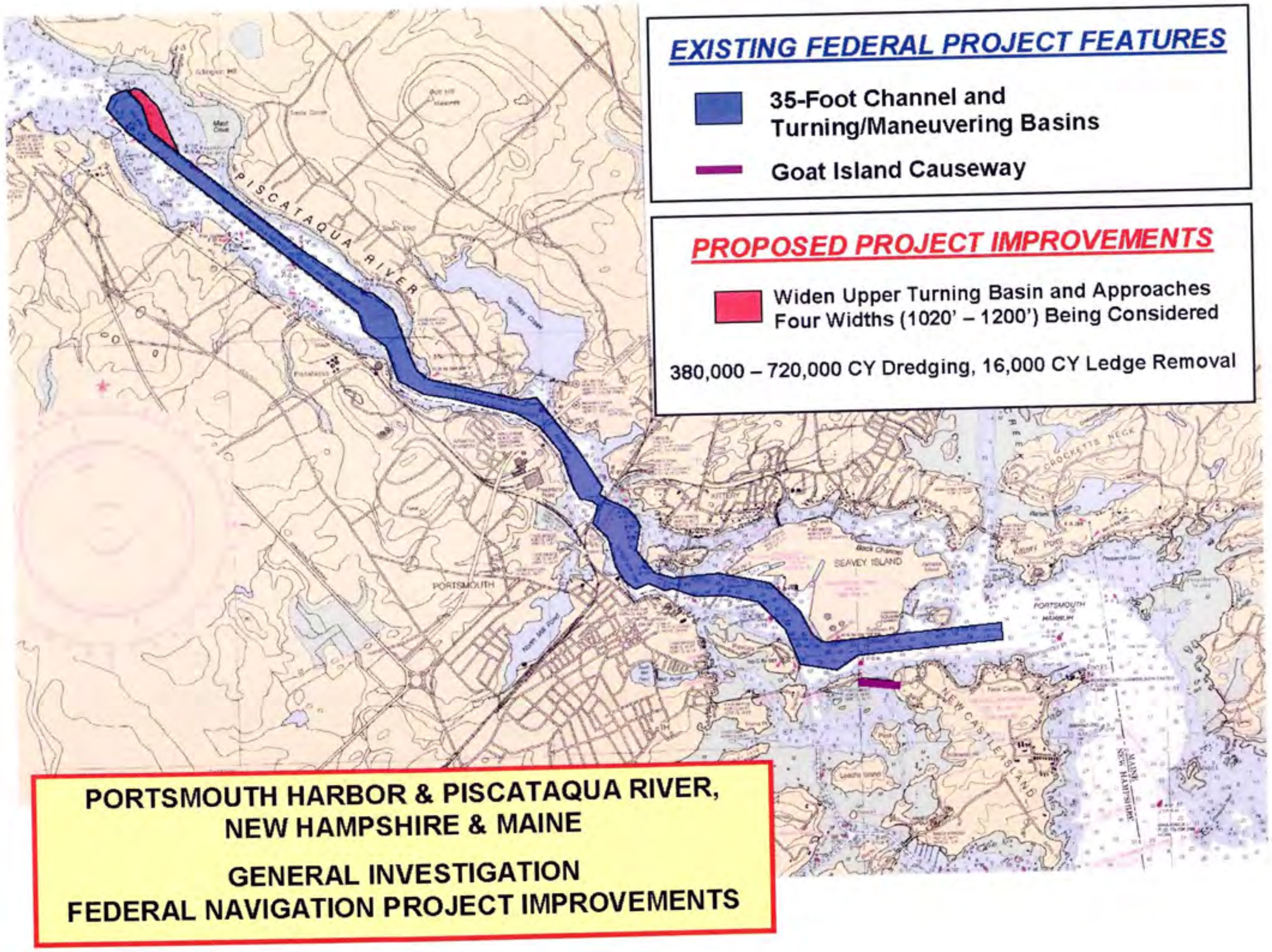


PISCATAQUA RIVER IMPROVEMENT DREDGING PROJECT NEARSHORE PLACEMENT ALTERNATIVES

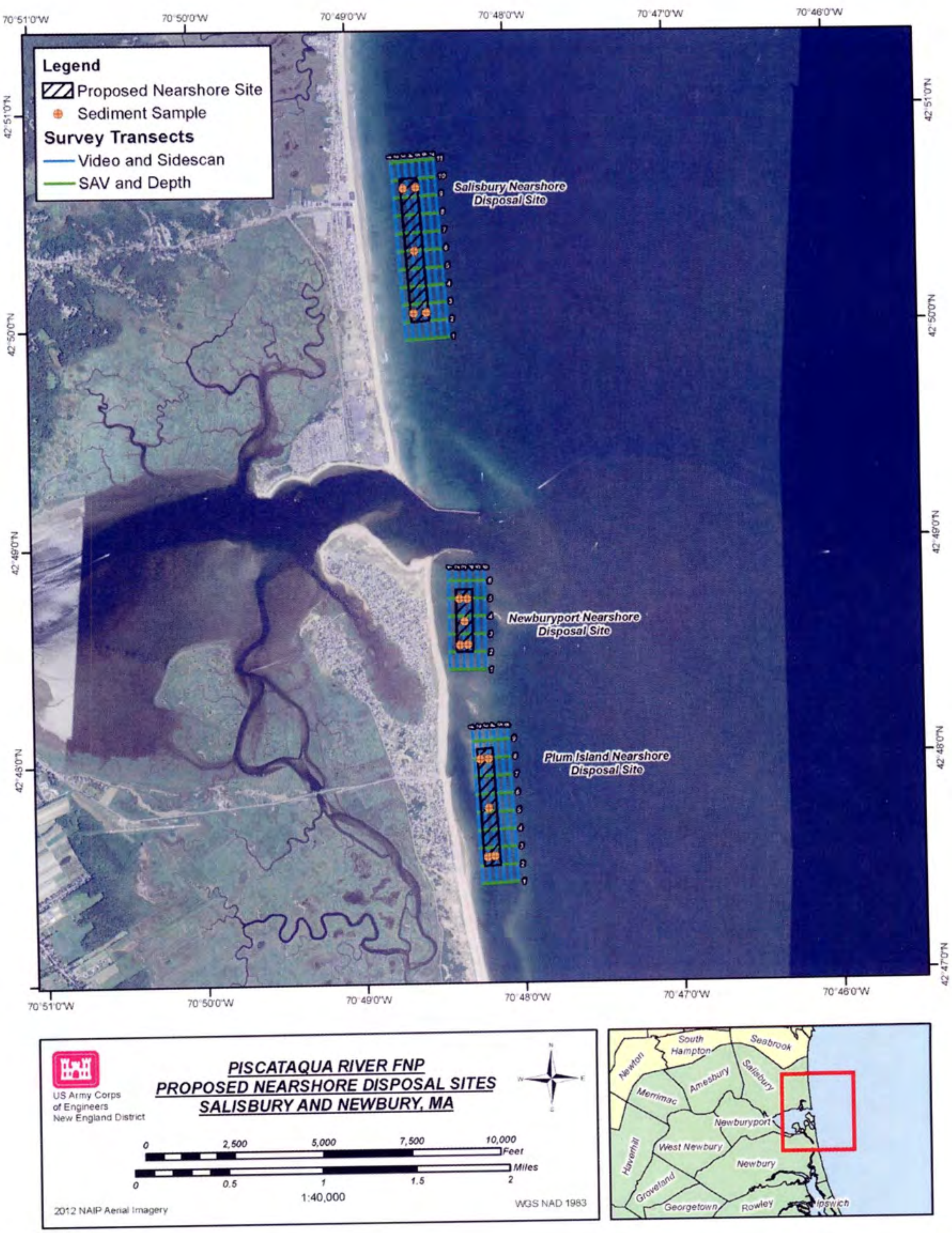
US Army Corps of Engineers
New England District

NOS NE ATLANTIC DEM

GCS NAD 1983



Attachment 2 – Location of Federal channel and turning basin



Attachment 3: Proposed nearshore placement sites in Massachusetts

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 8, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

Dear Mr. Mastone:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing an Environmental Assessment for a proposed navigation improvement project for the Portsmouth Harbor and Piscataqua River in Eliot, Maine (Attachments 1 and 2). As a result of the formulation of alternatives for this project, NAE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion. The communities in Massachusetts are Newbury, Newburyport, and Salisbury, where shoreline erosion is currently occurring. We would like your comments on the placement of sand at these three nearshore sites.

NAE coordinated with communities along the coastlines of Maine, Massachusetts, and New Hampshire, regarding beneficial use opportunities for the dredged material from the navigation improvement project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. Three of these communities are in Massachusetts. Grain size analysis showed that the dredged material is coarse to medium sands, while the Massachusetts nearshore sites were medium to fine sands. Approximately 360,000 cubic yards will be divided between the three Massachusetts communities. The proposed locations are shown on Attachment 3.

NAE believes that there will be no historic properties affected during the proposed placement of dredged material at the nearshore areas. These areas are in a highly active environment within the littoral zone. It is anticipated that sand placed at these three locations will eventually wash landward to nourish the adjacent beaches. Any historic properties within these areas would have already been damaged or destroyed due to water and wave action. We would appreciate your concurrence.

If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

John R. Kennelly
Chief of Planning

Attachments

Similar Letter Sent (with attachments):

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

DEPARTMENT OF DEFENSE UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

October 8, 2013

Engineering/Planning Division
Evaluation Branch

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Dear Ms. Washington:

The U.S. Army Corps of Engineers, New England District (NAE), is preparing an Environmental Assessment for a proposed navigation improvement project for the Portsmouth Harbor and Piscataqua River in Eliot, Maine (Attachments 1 and 2). As a result of the formulation of alternatives for this project, NAE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion. The communities in Massachusetts are Newbury, Newburyport, and Salisbury, where shoreline erosion is currently occurring. We would like your comments on the placement of sand at these three nearshore sites.

NAE coordinated with communities along the coastlines of Maine, Massachusetts, and New Hampshire, regarding beneficial use opportunities for the dredged material from the navigation improvement project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. Three of these communities are in Massachusetts. Grain size analysis showed that the dredged material is coarse to medium sands, while the Massachusetts nearshore sites were medium to fine sands. Approximately 360,000 cubic yards will be divided between the three Massachusetts communities. The proposed locations are shown on Attachment 3.

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If you have any questions, please contact Ms. Kate Atwood, NAE staff archaeologist at (978) 318-8537.

Sincerely,

John R. Kennelly
Chief of Planning

Attachments

Similar Letter Sent (with attachments):

Ms. Brona Simon, Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

Mr. Victor Mastone, Director
Massachusetts Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2199

From: Dickson, Stephen M. <Stephen.M.Dickson@maine.gov>
Sent: Wednesday, October 02, 2013 12:29 PM
To: Green, Robert
Cc: Burrowes, Todd; Slovinsky, Peter A; Jon Carter
Subject: RE: Wells- Nearshore Sand Placement of Sand from the Piscataqua River Navigation Improvement Project

Hi Bob,

These are the three topics I am currently focused on and likely to be in the US Army Corps of Engineers' Environmental Assessment (EA). To me, the last topic has the largest unknown factors and might be valuable to have it presented thoroughly in the EA.

Location
Based on the Corps' bathymetry and disposal site map, the location looks just right. I have no adjustments to it and am glad that it can come that close to shore. Town Manager Jon Carter said people asked for sand south of Casino Point at Crescent Beach. I believe Crescent Beach will receive some sand from this nourishment because some sand from a previous harbor dredge with disposal on Wells Beach moved south and was visible in the form of two onshore-migrating sand bars in that beach segment afterwards. The gain in Crescent Beach, based on my visual observation at the time, was about a foot. I expect both nearshore and intertidal sand can move south from the disposal area and bypass Casino Point to benefit more length of beach than just what is immediately ashore of the disposal site. As we all know too well, some of the sand will also move in the direction of the jetty and the harbor entrance.

Grain Size
Wells Beach has a mix of grain sizes from fine sand to pebbles and cobbles so, in my opinion, the sand and gravel components of sediment dredged from the Piscataqua River are suitable. I think the coarser sand grain size is okay in that location if it adds to the intertidal beach. A slightly coarser sand on the beach would help it stay in place longer and erode more slowly – a benefit to the volume of sand on the beach profile – providing more wave energy dissipation farther away from seawalls and houses.

The exact match of grain sizes at the disposal location is not a concern to me because it is a dispersal site and the ocean will redistribute the various grain sizes to locations that match. For example, gravel may move to the upper beach profile and add to that which already exists there.

There is some sediment in the Piscataqua River that is muddy (e.g. boring B-5) and probably too muddy for disposal near the beach. I hope the EA describes how the material will be handled to avoid turbidity in the nearshore water column. Perhaps the Isle of Shoals North site or an upland location can be used for disposal of the muddy sediment and minimize water quality impacts.

Wave Shoaling and Sand Dispersal
I suspect there will be some temporary changes in wave action offshore of the beach and possibly coming ashore; however, I am not in a position to quantify them. Wave modeling may not be necessary if the relief of the disposal mound is low or any altered wave action is offshore and does not result in a significant increase at the frontal dune and seawalls.

The topics I am still wondering about are related to the disposal mound thickness: (a) how it may affect wave action and (b) how long it might remain raised affecting shoaling waves. The Corps estimates the full Piscataqua River project could take four to six months. It would be helpful to know over what months and what duration disposal offshore in Wells would happen since dispersal may begin immediately after placement. The rate of sand volume coming from the Piscataqua River versus the rate of sand volume dispersed will determine the size and impacts the mound has.

Measuring the Wells nearshore disposal site off Figure 6 provided by the Corps, it appears that the disposal site is 600′ x 3,000′ or 200,000 yd^2 in area. Disposal of 360,000 yd^3 of sediment would result in a nominal 5.4′ of thickness if evenly placed over that footprint and it did not disperse. This would be on top of the bottom that is between the 10′ and 18′ deep on Figure 6 (although the datum is not in the legend it is probably MLLW). The shoal might produce a new, but temporary, surf break also. Delineating the disposal site for mariners as a shoal until it is no longer shallow would be important from a practical standpoint more than from an environmental one.

Shoaling waves have the ability to move sand and gravel ashore. So if the mound focuses waves in and around itself for a brief period of time, that is expected and would be fine. I do not expect any long-term alteration of wave shoaling along Wells Beach since dispersal will result in more even bathymetric contours. If the mound is predicted to result in surf concentrated in certain stretches of the shoreline, I wonder if there could be a second disposal site used off of Drakes Island Beach. Erosion there has been chronic and that beach could benefit from a nearshore site as well. Was there a reason that a site near Drakes Island is not being used (or perhaps I overlooked a map)?

By my simple estimate, if all the new sediment left the disposal site and moved shoreward of the 10′ contour, then the beach profile would rise by about 1′ along Wells Beach and the crescent beach to the south. If some of the new sand remained at the disposal site or moved offshore, then the overall beach aggradation would be (conceptually) less than a foot.

Wave action is likely to concentrate a disproportionate amount of the sand in the upper beach profile in the location geologists call the berm (at and above the mean high water line) so the thickness there would possibly be higher than a foot. The larger the gain in the upper profile, the larger the dry beach width will be, and the larger the recreational space there will be. The seasonal berm absorbs a lot of winter storm wave energy so berm growth helps protect frontal dune homes.

The sand and gravel that infilled the Piscataqua River during or at the end of the last Ice Age has the potential to have a very beneficial use at Wells Beach today. I look forward to working with all interested parties on this effort.

Steve

Stephen M. Dickson, Ph.D.
Marine Geologist, Maine Geological Survey
Division of Geology, Natural Areas and Coastal Resources
Maine Department of Agriculture, Conservation and Forestry
93 State House Station, Augusta, ME 04333-0093
www.maine.gov/doc/nrimc/mgs/mgs.htm
207-287-7174
Physical Address: Williams Pavillion,
17 Elkins La., Augusta ME 04330

From: Green, Robert
Sent: Wednesday, October 02, 2013 9:12 AM
To: Dickson, Stephen M.
Subject: RE: Wells- Nearshore Sand Placement

I meant to ask, is there any particular issue you have with the proposal that needs to be examined in their environmental assessment?

Bob.

From: Rogers, Catherine J NAE
To: Habel, Mark L NAE
Subject: FW: MA State Listed Species - Portsmouth Harbor and Piscataqua River Navigation Project (NH & ME) (UNCLASSIFIED)
Date: Thursday, October 31, 2013 11:12:31 AM

Classification: UNCLASSIFIED
Caveats: NONE

Thanks.

Catherine J. Rogers, Ecologist
U.S. Army Corps of Engineers
696 Virginia Rd
Concord, MA 01742
Phone: (978) 318-8231
Fax: (978)318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Coman, Amy (MISC) [mailto:amy.coman@state.ma.us]
Sent: Wednesday, October 02, 2013 3:58 PM
To: Rogers, Catherine J NAE
Cc: Glorioso, Lauren (FWE)
Subject: MA State Listed Species - Portsmouth Harbor and Piscataqua River Navigation Project (NH & ME)

Dear Ms. Catherine Rogers,

The Natural Heritage & Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries & Wildlife has reviewed the September 4, 2013 letter from John R. Kennelly, Chief of Planning, concerning the amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project and would like to provide the following comments.

The proposed nearshore disposal of 360,000 cubic yards of dredged material in the vicinity of Newbury, Newburyport and Salisbury will occur within the foraging habitat of the Least Tern (Sternula antillarum) and Common Tern (Sterna hirundo), and is in close proximity to breeding habitat for Piping Plover (Charadrius melodus). Both tern species are state-listed as “Special Concern” and the Piping Plover is state-listed as “Threatened”. Please note that the Piping Plover is also federally protected as “Threatened” pursuant to the U.S. Endangered Species Act (ESA, 50 CFR 17.11).

Based on the information provided, the NHESP does not anticipate impacts to state-listed species associated with the nearshore disposal of the 360,000 cy of dredged material. Please note, however, if alternative disposal sites are considered (e.g. on-shore), they must be reviewed and may be subject to certain restrictions (e.g. timing restrictions, etc.).

We appreciate the opportunity to comment on this project at this time and if you have any questions regarding this letter please feel free to contact me.

Sincerely,

Amy Coman-Hoenig

Endangered Species Review Biologist ¦Natural Heritage & Endangered Species Program¦MA Division of Fisheries & Wildlife ¦ADDRESS - 100 Hartwell Street, Suite 230 West Boylston, MA 01583¦tel: 508.389.6364 ¦fax: 508.389.7890 ¦www.mass.gov/nhesp

NOTE – I expect to start maternity leave in early October. Emily Holt (508-389-6385) or Lauren Glorioso (508-389-6361), Endangered Species Review Assistants, are the best NHESP contacts for inquiries at this time.

Classification: UNCLASSIFIED
Caveats: NONE

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. John K. Bullard
NOAA Fisheries Service
Northeast Regional Office
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Dear Mr. Bullard:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

The existing Federal navigation project includes a 35-foot deep channel, generally 400 feet wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project includes two 35-foot deep MLLW turning basins; a 950-foot wide turning basin located upstream of Boiling Rock, and a 850-foot wide turning basin located at the upstream end of the Federal channel (Attachment 2). The current width of the upper turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. As the two upper terminals rely on this turning basin to turn larger vessels, these safety concerns limit the existing and future uses of these terminals.

The purpose of the subject study is to determine the feasibility of improving the existing Portsmouth Harbor Federal navigation project by increasing the width of the upper turning basin. To improve the efficiency and safety of vessels utilizing the upper turning basin, several alternative widths were evaluated. Studies included engineering feasibility, economic

justification, design optimization, environmental acceptability and cultural resource impact. Based on these studies, it was determined that the best plan for improving safety and efficiency was widening the upper turning basin from about 850 feet to a width of 1,200 feet at the current 35-foot depth.

Widening the turning basin to 1,200 feet would involve the dredging of about 720,000 cubic yards of mostly sand and gravel, and removal of about 16,000 cubic yards of bedrock. Subsurface investigations of the area determined that the material is hard packed sandy glacial till with some gravel (Attachment 3). A boring into the bedrock indicates that it is likely that the rock will need to be drilled and blasted. Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months with an additional one to two months for removal of the bedrock to design depth.

The USACE coordinated with communities along the coastlines of Maine, Massachusetts and New Hampshire regarding beneficial use opportunities for the dredged material from the project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. These communities are Wells, Maine and Newbury, Newburyport and Salisbury in Massachusetts where shoreline erosion is currently occurring. Grain size analysis showed that the dredged material is course to medium sands, while the Massachusetts nearshore sites were medium to fine sands and the Maine nearshore site is predominantly fine sands (Attachment 4). Based on coordination with these communities, it is anticipated that the 720,000 cubic yards of dredged material would be divided between the states of Maine and Massachusetts, with 360,000 cubic yards going to Wells, Maine and the remaining 360,000 cubic yards being divided between the three Massachusetts communities. The proposed locations of nearshore placement areas are shown on Attachments 5 and 6. Excavated rock will be off loaded at the New Hampshire State Terminal along the Piscataqua River and used for upland public works projects.

It is requested that written comments under the Fish and Wildlife Coordination Act, and initial consultation under the Endangered Species Act be provided no later than 30 days from the date this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

Copy Furnished:

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Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
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September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Tom Chapman
US Fish and Wildlife Service
70 Commercial St., Suite 300
Concord, New Hampshire 03301

Dear Mr. Chapman:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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I am requesting that you review the enclosed information and provide the Corps with comments as required under the Fish and Wildlife Coordination Act and the Endangered Species Act. I would appreciate your comments within 30 days of this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

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Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

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September 4, 2013

Engineering/Planning Division
Evaluation Branch

Ms. Laury Zicari
U.S. Fish and Wildlife Service
Ecological Services
Maine Field Office
17 Godfrey Drive, Suite 2
Orono, Maine 04473

Dear Ms. Zicari:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

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Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

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September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Chris Williams, Federal Consistency Coordinator
New Hampshire Coastal Program
Department of Environmental Services
Pease Field Office
222 International Drive, Suite 175
Portsmouth, New Hampshire 03801

Dear Mr. Williams:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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It is requested that written comments under the Coastal Zone Management Act and other pertinent authorities or policies be provided within 30 days from the date of this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

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Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

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September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Harry T. Stewart, Director
Water Division
New Hampshire Department of Environmental Services
29 Hazen Drive, P.O. Box 95
Concord, New Hampshire 03302-0095

Dear Mr. Stewart:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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It is requested that written comments be provided no later than 30 days from the date of this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

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Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

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September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Douglas Grout
Chief, Marine Division
NH Fish & Game Department
225 Main Street
Durham, New Hampshire 03824

Dear Mr. Grout:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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Sincerely,

John R. Kennelly
Chief of Planning

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Pease Development Authority
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September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Robert Boeri
Project Review Coordinator
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2138

Dear Mr. Boeri:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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John R. Kennelly
Chief of Planning

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Evaluation Branch

Ms. Rachel Freed
Wetlands and Waterways Program
MassDEP – Northeast Region Office
205B Lowell Street
Wilmington, Massachusetts 01887

Dear Ms. Freed:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

The existing Federal navigation project includes a 35-foot deep channel, generally 400 feet wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project includes two 35-foot deep MLLW turning basins; a 950-foot wide turning basin located upstream of Boiling Rock, and a 850-foot wide turning basin located at the upstream end of the Federal channel (Attachment 2). The current width of the upper turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. As the two upper terminals rely on this turning basin to turn larger vessels, these safety concerns limit the existing and future uses of these terminals.

The purpose of the subject study is to determine the feasibility of improving the existing Portsmouth Harbor Federal navigation project by increasing the width of the upper turning basin. To improve the efficiency and safety of vessels utilizing the upper turning basin, several alternative widths were evaluated. Studies included engineering feasibility, economic justification, design optimization, environmental acceptability and cultural resource impact.

Based on these studies, it was determined that the best plan for improving safety and efficiency was widening the upper turning basin from about 850 feet to a width of 1,200 feet at the current 35-foot depth.

Widening the turning basin to 1,200 feet would involve the dredging of about 720,000 cubic yards of mostly sand and gravel, and removal of about 16,000 cubic yards of bedrock. Subsurface investigations of the area determined that the material is hard packed sandy glacial till with some gravel (Attachment 3). A boring into the bedrock indicates that it is likely that the rock will need to be drilled and blasted. Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months with an additional one to two months for removal of the bedrock to design depth.

The USACE coordinated with communities along the coastlines of Maine, Massachusetts and New Hampshire regarding beneficial use opportunities for the dredged material from the project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. These communities are Wells, Maine and Newbury, Newburyport and Salisbury in Massachusetts where shoreline erosion is currently occurring. Grain size analysis showed that the dredged material is course to medium sands, while the Massachusetts nearshore sites were medium to fine sands and the Maine nearshore site is predominantly fine sands (Attachment 4). Based on coordination with these communities, it is anticipated that the 720,000 cubic yards of dredged material would be divided between the states of Maine and Massachusetts, with 360,000 cubic yards going to Wells, Maine and the remaining 360,000 cubic yards being divided between the three Massachusetts communities. The proposed locations of nearshore placement areas are shown on Attachments 5 and 6. Excavated rock will be off loaded at the New Hampshire State Terminal along the Piscataqua River and used for upland public works projects.

It is requested that written comments be provided no later than 30 days from the date of this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Paul J. Diodati, Director
Massachusetts Energy & Environmental Affairs
Division of Marine Fisheries
100 Cambridge Street, Suite 900
Boston, MA 02114

Dear Mr. Diodati:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

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Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

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September 4, 2013

Engineering/Planning Division
Evaluation Branch

Ms. Eileen Feeney
Massachusetts Division of Marine Fisheries
1213 Purchase Street, 3rd Floor
New Bedford, Massachusetts 02740

Dear Ms. Feeney:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

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Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

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NEW ENGLAND DISTRICT
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CONCORD MA 01742-2751

September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Tom French
Assistant Director
Massachusetts Division of Fisheries & Wildlife
100 Hartwell St, Suite 230
West Boylston, Massachusetts 01583

Dear Mr. French:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

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US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
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CONCORD MA 01742-2751

September 4, 2013

Engineering/Planning Division
Evaluation Branch

Ms. Martha Freeman, Director
Maine State Planning Office
184 State Street
Augusta, Maine 04333

Dear Ms. Freeman:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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It is requested that written comments under the Coastal Zone Management Act and other pertinent authorities or policies be provided within 30 days from the date of this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

Copy Furnished:

Mr. Todd Burrowes
Maine Coastal Program
State Planning Office
38 State House Station
Augusta, Maine 04333-0038

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

September 4, 2013

Engineering/Planning Division
Evaluation Branch

Ms. Patricia Aho, Commissioner
Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

Dear Ms. Aho:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

September 4, 2013

Engineering/Planning Division
Evaluation Branch

Mr. George Lapointe, Commissioner
Department of Marine Resources
21 State House Station
Augusta, Maine 04333-0021

Dear Mr. Lapointe:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

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Sincerely,

John R. Kennelly
Chief of Planning

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Pease Development Authority
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NEW ENGLAND DISTRICT
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CONCORD MA 01742-2751

September 4, 2013

Engineering/Planning Division
Evaluation Branch

Stephen Dickson
Maine Geological Survey
93 State House Station
Augusta, Maine 04333

Dear Mr. Dickson:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

The existing Federal navigation project includes a 35-foot deep channel, generally 400 feet wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project includes two 35-foot deep MLLW turning basins; a 950-foot wide turning basin located upstream of Boiling Rock, and a 850-foot wide turning basin located at the upstream end of the Federal channel (Attachment 2). The current width of the upper turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. As the two upper terminals rely on this turning basin to turn larger vessels, these safety concerns limit the existing and future uses of these terminals.

The purpose of the subject study is to determine the feasibility of improving the existing Portsmouth Harbor Federal navigation project by increasing the width of the upper turning basin. To improve the efficiency and safety of vessels utilizing the upper turning basin, several alternative widths were evaluated. Studies included engineering feasibility, economic justification, design optimization, environmental acceptability and cultural resource impact. Based on these studies, it was determined that the best plan for improving safety and efficiency

was widening the upper turning basin from about 850 feet to a width of 1,200 feet at the current 35-foot depth.

Widening the turning basin to 1,200 feet would involve the dredging of about 720,000 cubic yards of mostly sand and gravel, and removal of about 16,000 cubic yards of bedrock. Subsurface investigations of the area determined that the material is hard packed sandy glacial till with some gravel (Attachment 3). A boring into the bedrock indicates that it is likely that the rock will need to be drilled and blasted. Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months with an additional one to two months for removal of the bedrock to design depth.

The USACE coordinated with communities along the coastlines of Maine, Massachusetts and New Hampshire regarding beneficial use opportunities for the dredged material from the project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. These communities are Wells, Maine and Newbury, Newburyport and Salisbury in Massachusetts where shoreline erosion is currently occurring. Grain size analysis showed that the dredged material is course to medium sands, while the Massachusetts nearshore sites were medium to fine sands and the Maine nearshore site is predominantly fine sands (Attachment 4). Based on coordination with these communities, it is anticipated that the 720,000 cubic yards of dredged material would be divided between the states of Maine and Massachusetts, with 360,000 cubic yards going to Wells, Maine and the remaining 360,000 cubic yards being divided between the three Massachusetts communities. The proposed locations of nearshore placement areas are shown on Attachments 5 and 6. Excavated rock will be off loaded at the New Hampshire State Terminal along the Piscataqua River and used for upland public works projects.

It is requested that written comments be provided no later than 30 days from the date of this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

September 3, 2013

Engineering/Planning Division
Evaluation Branch

Mr. Melvin P. Cote, Manager
Water Quality Unit
U.S. Environmental Protection Agency
1 Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Dear Mr. Cote:

The purpose of this letter is to solicit your comments on an amended proposal for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement project. In a letter dated April 22, 2008, the U.S. Army Corps of Engineers (USACE) requested comments on the original feasibility study proposal which included the widening of the existing Federal navigation channel and several options for dredged material disposal, including, beneficial use. Alternatives considered included the Cape Arundel disposal site located off of Cape Arundel, Maine; the Isle of Shoals disposal site outside Portsmouth Harbor; beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches; riverine disposal and upland disposal. As a result of the continued formulation of alternatives for this project, the USACE has evaluated requests by a number of local communities to have the material placed in nearshore areas to stabilize adjacent beaches experiencing erosion (Attachment 1). We are requesting your comments on these additional alternatives to assist in our evaluation as part of the draft Environmental Assessment for this project.

The existing Federal navigation project includes a 35-foot deep channel, generally 400 feet wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project includes two 35-foot deep MLLW turning basins; a 950-foot wide turning basin located upstream of Boiling Rock, and a 850-foot wide turning basin located at the upstream end of the Federal channel (Attachment 2). The current width of the upper turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. As the two upper terminals rely on this turning basin to turn larger vessels, these safety concerns limit the existing and future uses of these terminals.

The purpose of the subject study is to determine the feasibility of improving the existing Portsmouth Harbor Federal navigation project by increasing the width of the upper turning basin. To improve the efficiency and safety of vessels utilizing the upper turning basin, several alternative widths were evaluated. Studies included engineering feasibility, economic justification, design optimization, environmental acceptability and cultural resource impact.

Based on these studies, it was determined that the best plan for improving safety and efficiency was widening the upper turning basin from about 850 feet to a width of 1,200 feet at the current 35-foot depth.

Widening the turning basin to 1,200 feet would involve the dredging of about 720,000 cubic yards of mostly sand and gravel, and removal of about 16,000 cubic yards of bedrock. Subsurface investigations of the area determined that the material is hard packed sandy glacial till with some gravel (Attachment 3). A boring into the bedrock indicates that it is likely that the rock will need to be drilled and blasted. Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months with an additional one to two months for removal of the bedrock to design depth.

The USACE coordinated with communities along the coastlines of Maine, Massachusetts and New Hampshire regarding beneficial use opportunities for the dredged material from the project. Since the dredged material is predominantly sand, four communities have expressed an interest in having this material placed in their nearshore areas where it will act as a feeder berm for adjacent beaches. These communities are Wells, Maine and Newbury, Newburyport and Salisbury in Massachusetts where shoreline erosion is currently occurring. Grain size analysis showed that the dredged material is course to medium sands, while the Massachusetts nearshore sites were medium to fine sands and the Maine nearshore site is predominantly fine sands (Attachment 4). Based on coordination with these communities, it is anticipated that the 720,000 cubic yards of dredged material would be divided between the states of Maine and Massachusetts, with 360,000 cubic yards going to Wells, Maine and the remaining 360,000 cubic yards being divided between the three Massachusetts communities. The proposed locations of nearshore placement areas are shown on Attachments 5 and 6. Excavated rock will be off loaded at the New Hampshire State Terminal along the Piscataqua River and used for upland public works projects.

It is requested that written comments under the authority for the Clean Water Act, Marine Protection, Research, and Sanctuaries Act, the Clean Air Act, and the National Environmental Policy Act be provided no later than 30 days from the date of this letter. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

CITY OF NEWBURYPORT
OFFICE OF PLANNING AND DEVELOPMENT
60 PLEASANT STREET • P.O. BOX 550
NEWBURYPORT, MA 01950
(978) 465-4400 • (978) 465-4452 (FAX)

DONNA D. HOLADAY
MAYOR

February 25, 2013

Mark L. Habel
Chief of Navigation, Northeast Region
USACE, New England District
696 Virginia Road
Concord, MA 01742

Dear Mr. Habel,

We have been in contact with Mr. Heidebrecht at ACOE regarding the project to improve the Piscataqua River by dredging and removing 720,000 CY of sand that the ACOE believes is clean and compatible with our beaches. The sand is slated to be disposed of in the ocean north of the Isles of Shoals, but is available for beneficial near shore placement if the approximately $2 per CY extra cost of transport is borne by a non-Federal sponsor. Based on the suitability of the sand, cost of transportation and Newburyport's dire need for a source of sand to nourish Plum Island's eroding beach and dune system, we believe this is an opportunity that we cannot afford to miss.

As you know the ocean beaches in Newbury, Newburyport and Salisbury, Massachusetts are suffering severe and damaging erosion. In recent years two houses have been lost on Plum Island; several have undergone significant damage in the past few months; and many more are threatened. Public infrastructure, including the recently installed water and sewer lines, is also at risk from continued beach and dune erosion.

As a member of the Merrimack River Beach Alliance (MRBA), The City of Newburyport has been working cooperatively with representatives from Newbury, Salisbury and relevant state and federal agencies on appropriate methods to protect our sensitive coastal beaches. We cooperated fully with the USACE on the recent Merrimack River dredging and beach replenishment project that placed sand on the beaches north of Plum Island Center and near the south end of Salisbury Beach. The project was highly beneficial, but much more sand is needed to help protect the homes, businesses and infrastructure on our beaches.

This is to inform you that the City of Newburyport is requesting that the ACOE make available all of the sand that is dredged in the Portsmouth Harbor improvement project for near shore placement off Plum Island and Salisbury Beach. The City of Newburyport already has a Beach Management Plan in place, approved by the Massachusetts DEP and Newburyport Conservation Commission, which allows the nourishment of our beach with compatible sand, when necessary. In addition, we are confident that the necessary funds for transport of the sand will be available from a non-federal sponsor. Near shore disposal sites have already been identified and permitted off both beaches, so there should be no problem getting any additional necessary permits.

Please keep us informed of progress on the Piscataqua River project.

Sincerely,

Donna D Holaday

Donna D. Holaday
Mayor

Cc: Representative Michael A. Costello
Senator Kathleen O'Connor Ives
Senator Bruce Tarr
Tracy Blais, Newbury Town Administrator
Neil Harrington, Salisbury Town Manager

Received in envelope that
was post marked on 21 September 2012

Mr. John R. Kennelly
Chief of Planning
Engineering and Planning Division
Evaluation Branch

Dear Mr. Kennelly:

First of all may I apologize for the late submission of this letter regarding the dredged material hopefully coming from the Piscataqua River turn basin project. My job here in Kittery as Harbormaster began in early April. The Kittery Town Manager had not been hired much before me and as a result I had heard of this application for material interest at a dredge meeting a couple of weeks ago. The proposed breakwater improvement at Pepperrell Cove in Kittery Maine would be an excellent place to dispose of the ledge material. The benefits of this placement are threefold; one, it provides the Cove with much needed surge protection which will protect not only water craft but the federally funded pier improvements already underway. Two, it provides a nearby location for the barges to dump and keeps them from having to go offshore and three; we would be able to accept all of the ledge material excavated from the project.

The enclosed application is sponsored and submitted by The Town of Kittery Port Authority. The purpose is to construct a breakwater across the Southerly side of Kittery's Pepperrell Cove to protect the Harbor from Southerly storms and tidal surges.
This will facilitate appropriate development of the harbor's maritime infrastructure and extend its operating season.

Kittery's Pepperrell Cove provides moorage and dock facilities for commercial and recreational vessels. The Town and Port Authority are currently involved in studies to upgrade the Cove's maritime infrastructure (piers, floats, mooring system and wharf) to facilitate increased utilization of the Cove as a harbor for fishing, commercial, and recreational vessels and as a harbor of refuge. This is expected to provide increased employment, business, and municipal revenues for the area. The studies are funded by Grants from the State of Maine and matching Town funds.

Pepperrell Cove has limited natural protection against tidal surges, wave action and storms from the South and South East. This limits the use of the Cove at times of severe weather, particularly in early spring, late fall and winter. Vessels and floats have to be moved from the Cove to safer anchorages or even hauled when heavy weather is forecast. The cost to fishermen (in terms of lost income and cost of alternative berthing) and to the Town is considerable. Other commercial and recreational vessels incur similar costs.

In winter, the winds and tidal surges render the Cove largely unusable for docking and moorage. Mooring floats and pier floats are removed and maritime activity comes to a standstill. Fishermen that operate through the winter must move to other harbors.

Storms (including hurricanes) often cause damage to the shoreline and the maritime infrastructure causing the Town to incur maintenance and replacement costs. .

The Cove currently provides a total of 254 moorings. 30 of these are used by fishing vessels and 11 by other types of commercial vessels. 213 moorings are used by recreational vessels or are available as transient moorings. It is expected that the envisioned breakwater would enable the mooring field to be reconfigured with an increase of 30% in the number of moorings. Pepperrell Cove is the most convenient and readily accessible (from the sea) harbor in the Piscataquis water shed. The protection, increased length of operating season, improved shoreline facilities and increased mooring capacity afforded by the proposed breakwater is expected to increase maritime activity in the area.

We very much look forward to hearing from the Corps of Engineers as to the next step in the process and any other documentation you may need to help us achieve a very important safety measure for our community

Sincerely,

Michael Blake

Michael Blake
Kittery Maine Harbormaster
200 Rogers Rd
Kittery Maine
03904

STATE OF NEW HAMPSHIRE
DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT
OFFICE of the COMMISSIONER
172 Pembroke Road P.O. Box 1856 Concord, New Hampshire 03302-1856

GEORGE M. BALD
Commissioner

603-271-2411
FAX: 603-271-2629
george.bald@dred.state.nh.us

August 1, 2012

John R. Kennelly, Chief of Planning
Richard Heidebrecht, Study Manager
Department of Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, New Hampshire and Maine.

Dear Sirs:

This letter shall serve to indicate that the State of New Hampshire, Department of Resources and Economic Development (NH DRED) has an interest in receiving dredged material from the above referenced project.

We have three proposed locations for near shore disposal of the dredged material:

1. Wallis Sands State Beach, Rye, NH
2. Jenness State Beach, Rye, NH
3. North Hampton State Beach, North Hampton, NH

Based on your Table 2, "Cost Comparison of Aquatic Dredged Material Disposal Alternatives," we do not believe any of these sites would incur delivery costs for near shore disposal. We are aware, however, that NH DRED may have to separately contract for ancillary dredging to move dredged material from the near shore disposal sites to our beaches and we accept that those costs would be borne entirely by NH DRED. However DRED is not obligating itself to move the material from the near shore disposal sites.

Our initial estimate is that we could accept between 50,000 and 100,000 cubic yards of dredged materials at each of the three proposed sites. These estimates can be refined when the feasibility of the project is established.

We are obliged to make the point that NH DRED will not make the final decision to receive dredged materials from the Portsmouth Harbor and Piscataqua River project before holding a public hearing or hearings to receive input from concerned citizens on the project. NH DRED will also be looking for testing of a sufficient sampling of dredged material to conclude that there is no significant danger of polluted materials or toxins being included in the dredged materials to be delivered to our sites.

We are hopeful that this project may provide NH DRED with an opportunity to replenish sand beaches at three of our seacoast state parks. We look forward to working with the Corps of Engineers in the coming months to make the project become reality.

Sincerely,

for

George M. Bald
Commissioner

GMB:TM:lc

Town of Salisbury
5 Beach Road
Salisbury, Massachusetts 01952

Neil J. Harrington
Town Manager

July 30, 2012

Mr. John R. Kennelly
Dept. of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742

Dear Mr. Kennelly,

The Town of Salisbury appreciates being afforded the opportunity to evaluate the possibility of receiving dredged material from the proposed Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project.

Salisbury Beach, which is owned by the Commonwealth of Massachusetts and maintained by the Department of Conservation and Recreation, is one of the most popular state parks in the State, with a thriving year-round population and a large influx of tourists and visitors during the summer months. When contemplating importing of material to nourish the beach, it is very important for the Town to take into consideration the health of the beach for environmental and recreational interests. In Section VI of DCR's Salisbury Beach State Park Barrier Beach Management Plan (Resource Area Management and Protection), accepted by the Town in 2008, compatible grain size for dune nourishment is discussed and includes a gradation specification for offsite sourcing of material. The Town uses this specification when considering a proposal for importation of sand to the beach.

The Town's Conservation Agent has reviewed the soil boring logs which you provided to us and also has attended a meeting at Pease Tradeport in Portsmouth, New Hampshire, hosted by the Army Corps, where a sample of the dredge material was presented. From the samples that were shown at the meeting in Portsmouth and the information contained in the boring logs, it appears that the material is not compatible with Salisbury Beach sand. The dredged material contains greater amounts of large gravel and fine silty material than would be compatible with

(978) 465-2310 Fax: (978) 462-4176 e-mail: nharrington@salisburyma.gov

Salisbury Beach, which consists mainly of coarse to medium sand with small percentages of gravel and fine sand. In an emergency situation, we would accept material with slightly more amounts of large gravel to staunch an erosion problem, but the fine silty sand would exacerbate erosion and never would be acceptable. Thus, the dredged material from Portsmouth Harbor in the Piscataqua River does not appear to meet the Town's standards for Salisbury Beach.

Thank you for the opportunity to investigate the possibility of receiving dredged material from the proposed Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project. We look forward to working with the Corps on future similar opportunities if and when they arise. If you would like to discuss the Town's decision, please feel free to contact me at (978) 462-8232, ext. 101.

Sincerely,

Neil J. Harrington

Neil J. Harrington
Town Manager

cc: Board of Selectmen
Conservation Agent

Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

Voice: 207-646-5113
Fax: 207-646-2935
TDD: 207-646-7892
E-mail: jcarter@wellstown.org

July 13, 2012

Mr. John R. Kennelly
Chief of Planning
Department of the Army
New England District, Corps of Engineers
896 Virginia Road
Concord, MA 01742-2751

Re; Dredge Materials from Piscatiqua River- Turning Basin Project

Dear Mr. Kennelly:

I am in receipt of your recent letter referencing a commitment by the Town of Wells to receive the dredge materials from the Portsmouth, NH Turning Basin Project. The Town is extremely interested in the sand and know when placed near shore it will assist in the community's beach replenishment efforts. We are concerned that the stated price for Wells of $4 a CY has increased from the $2 a CY that we understood would be the price. In speaking with Richard Heidebrecht, Study Manager, on July 11, 2012, he indicated a review of the cost and dumping site(s) will be undertaken in the near future with the possibility of the price lowering.

The Town has requested Dr. Stephen Dixon of the Maine Geologic Survey to review the amount of materials the Wells system might be able to reasonably handle. He is presently offshore on the EPA Vessel mapping the ocean bottom along the Maine Coast. He has agreed to undertake this analysis as soon as his schedule allows.

The Town would respond to you that if the materials were available to Wells at approximately $2 per CY vs. $4 per CY, we would be extremely interested and <u>continue</u> to raise the funds necessary to acquire the dredge materials for placement near shore along the Wells Coastline. Depending on the results of Dr. Dixon's analysis, we would request at this time up to the 700,000 CYs at $2 CY.

If we should receive Dr. Dixon's report prior to August 3, 2012, I will update our letter to you accordingly.

Regards,

Jonathan L. Carter
Town Manager

cc: Mr. Heidebrecht
Board of Selectmen
Maine Delegation

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 5, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Jonathan L. Carter, Town Manager
Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

Dear Mr. Carter:

The U.S. Army Corps of Engineers, New England District has received your letter dated March 13, 2012 indicating extreme interest in obtaining the entire quantity of material dredged from the Portsmouth Harbor and Piscataqua River, New Hampshire, and Maine navigation improvement study. Your letter also indicated that you are working with Maine Geological Survey to determine the area necessary to accommodate the approximate amount of 720,000 cy of material at a nearshore disposal site.

For our planning purposes, we are requesting a written response no later than August 3, 2012 that you are capable of meeting the financial responsibilities associated with the increased cost to deliver dredged material to a nearshore site of your choice, the proposed location(s) for nearshore disposal, and any physical and biological information that is available to describe current conditions at the proposed nearshore disposal site(s) for the Environmental Assessment. Please note that since Congressional authorization will be required to construct the project, it could be several years before the material would be available for nearshore disposal.

A request has also been sent recently to the State of Massachusetts and to towns in Maine and New Hampshire that have previously expressed an interest in this dredged material for beach nourishment. If multiple parties express an interest, the Corps will schedule a meeting with all interested parties to determine an equitable distribution of this material.

Any questions or comments can be addressed to Mr. Richard Heidebrecht, study manager, at (978) 318-8513 or richard.w.heidebrecht@usace.army.mil, and/or Ms. Catherine Rogers, ecologist, at (978) 318-8231 or catherine.j.rogers@usace.army.mil.

Sincerely,

Richard Heidebrecht

for John R. Kennelly
Chief of Planning

Enclosures

Similar Letters Sent to:

Mr. Robert Markel, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

Mr. Fred A. Mayo III, Harbormaster
Town of Ogunquit
23 School Street
P.O. Box 875
Ogunquit, Maine 03907

Mr. Michael Magnant, Town Administrator
Town of Rye
10 Central Road
Rye, New Hampshire 03870

Mr. Neil Harrington, Town Manager
Town of Salisbury
Town Hall
5 Beach Road
Salisbury, Massachusetts 01952

Tracy Blais, Town Administrator
Newbury Town Hall
25 High Road
Newbury, Massachusetts 01951

Honorable Donna D. Holaday
Mayor of Newburyport
60 Pleasant Street
Newburyport, Massachusetts 01950

James M. McKenna, Town Manager
Winthrop Town Hall
1 Metcalf Square
Winthrop, Massachusetts 02152

Copy Furnished:

Kathleen Leyden, Director
Maine Coastal Program
19 Union Street
38 State House Station
Augusta, Maine 04333

Todd Burrowes, Policy Development Specialist
Maine Coastal Program
19 Union Street
38 State House Station
Augusta, Maine 04333

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 5, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Edward M. Lambert Jr., Commissioner
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2104

Dear Mr. Lambert:

The U.S. Army Corps of Engineers, New England District (Corps) is writing this letter to determine your interest in receiving dredged material for beach nourishment from the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, New Hampshire and Maine. The Corps, in partnership with the New Hampshire Pease Development Authority, is conducting a feasibility study to determine the extent of Federal interest in widening the upper turning basin along the Piscataqua River. As shown on the enclosed map, several widths are being considered as part of the feasibility study. Widening the upper turning basin from its current 800 foot width to widths ranging from 1020 feet to a maximum of about 1200 feet would require the removal of between 370,000 and 720,000 cubic yards (cy) of material and approximately 16,000 cy of rock. Subsurface explorations have shown that the unconsolidated material is hard packed sandy glacial till mixed with some gravel (see the enclosed grain size table and boring logs for grain size results; boring log locations are located on the enclosed map). Following design optimization of the turning basin dimensions, we will refine the quantity of dredged material that would require removal.

The Corps' policy is to recommend the least costly, environmentally acceptable method of construction, including the disposal of dredged material. The Corps has determined that ocean disposal would be the least costly dredged material disposal method. A likely suitable ocean disposal site has been identified which is located about ten miles east of the Portsmouth Harbor entrance and north of the Isles of Shoals in Federal waters about 300 feet deep. However, under Corps policy it is preferable to use dredged material in a beneficial manner whenever possible. Due to the large amount of material to be removed, and its suitability for beneficial uses, we are making efforts to identify parties that may have an interest in using this material for beach nourishment. However, the difference in cost between ocean disposal north of the Isle of Shoals and potential nearshore disposal sites would need to be borne by the interested party (non-Federal participant). A table prepared for an interagency meeting conducted in May 2010 which compared the costs between disposal at the ocean site and nearshore disposal sites located in Maine, New Hampshire, and Massachusetts is enclosed for your information. Please note that these costs are estimates to be used for planning purposes only and will be updated as the project is further refined.

We are requesting a written response no later than August 3, 2012 if you have a strong interest in the nearshore disposal of material dredged from the widening of the Portsmouth Harbor turning basin in the Piscataqua River. If no response is received by this date, then we will conclude that there is no interest. If interested, your letter should state that you are capable of meeting the financial responsibilities associated with any increased cost to deliver dredged material to a nearshore site of your choice. We also request that the following information be provided in your letter: the amount of material you would be willing to accept, the proposed location(s) for nearshore disposal, and all physical and biological information that is available to describe current conditions at the proposed nearshore disposal site(s) for the Environmental Assessment. Please note that since Congressional authorization will be required to construct the project, it could be several years before the material would be available for nearshore disposal.

If multiple parties express an interest, the Corps will schedule a meeting with all interested parties to determine an equitable distribution of this material.

Any questions or comments can be addressed to Mr. Richard Heidebrecht, study manager, at (978) 318-8513 or richard.w.heidebrecht@usace.army.mil, and/or Ms. Catherine Rogers, ecologist, at (978) 318-8231 or catherine.j.rogers@usace.army.mil.

Sincerely,

Richard Heidebrecht

for John R. Kennelly
Chief of Planning

Enclosures

Similar Letters Sent to:

Mr. Jonathan L. Carter, Town Manager
Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

Mr. Robert Markel, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

Mr. Fred A. Mayo III, Harbormaster
Town of Ogunquit
23 School Street
P.O. Box 875
Ogunquit, Maine 03907

Mr. Michael Magnant, Town Administrator
Town of Rye
10 Central Road
Rye, New Hampshire 03870

Mr. Neil Harrington, Town Manager
Town of Salisbury
Town Hall
5 Beach Road
Salisbury, Massachusetts 01952

Tracy Blais, Town Administrator
Newbury Town Hall
25 High Road
Newbury, Massachusetts 01951

Honorable Donna D. Holaday
Mayor of Newburyport
60 Pleasant Street
Newburyport, Massachusetts 01950

James M. McKenna, Town Manager
Winthrop Town Hall
1 Metcalf Square
Winthrop, Massachusetts 02152

Copy Furnished:

Mr. Joseph R. Orfant, Bureau Chief
Planning and Resource Protection
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2104

Robert Boeri, Dredging Coordinator
Massachusetts Coastal Zone Management
Executive Office of Energy and Environmental Affairs
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2104

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 5, 2012

Engineering/Planning Division
Evaluation Branch

James M. McKenna, Town Manager
Winthrop Town Hall
1 Metcalf Square
Winthrop, Massachusetts 02152

Dear Mr. McKenna:

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Sincerely,

Richard Heidebrecht
for John R. Kennelly
Chief of Planning

Enclosures

Similar Letters Sent to:

Mr. Jonathan L. Carter, Town Manager
Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

Mr. Robert Markel, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

Mr. Fred A. Mayo III, Harbormaster
Town of Ogunquit
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Newbury Town Hall
25 High Road
Newbury, Massachusetts 01951

Honorable Donna D. Holaday
Mayor of Newburyport
60 Pleasant Street
Newburyport, Massachusetts 01950

Mr. Edward M. Lambert Jr., Commissioner
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2104

Copy Furnished:

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Mr. Joseph R. Orfant, Bureau Chief
Planning and Resource Protection
Department of Conservation and Recreation
251 Causeway Street, Suite 900

Robert Boeri, Dredging Coordinator
Massachusetts Coastal Zone Management
Executive Office of Energy and Environmental Affairs
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Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 5, 2012

Engineering/Planning Division
Evaluation Branch

Honorable Donna D. Holaday
Mayor of Newburyport
60 Pleasant Street
Newburyport, Massachusetts 01950

Dear Mayor Holaday:

The U.S. Army Corps of Engineers, New England District (Corps) is writing this letter to determine your interest in receiving dredged material for beach nourishment from the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, New Hampshire, and Maine. The Corps, in partnership with the New Hampshire Pease Development Authority, is conducting a feasibility study to determine the extent of Federal interest in widening the upper turning basin along the Piscataqua River. As shown on the enclosed map, several widths are being considered as part of the feasibility study. Widening the upper turning basin from its current 800 foot width to widths ranging from 1020 feet to a maximum of about 1200 feet would require the removal of between 370,000 and 720,000 cubic yards (cy) of material and approximately 16,000 cy of rock. Subsurface explorations have shown that the unconsolidated material is hard packed sandy glacial till mixed with some gravel (see the enclosed grain size table and boring logs for grain size results; boring log locations are located on the enclosed map). Following design optimization of the turning basin dimensions, we will refine the quantity of dredged material that would require removal.

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Sincerely,

Richard Heidebrecht
for John R. Kennelly
Chief of Planning

Enclosures

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Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 5, 2012

Engineering/Planning Division
Evaluation Branch

Tracy Blais, Town Administrator
Newbury Town Hall
25 High Road
Newbury, Massachusetts 01951

Dear Mr. Blais:

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Sincerely,

Richard Heidebrecht
for John R. Kennelly
Chief of Planning

Enclosures

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Mr. Jonathan L. Carter, Town Manager
Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 5, 2012

Engineering/Planning Division
Evaluation Branch

Kathleen Leyden, Director
Maine Coastal Program
19 Union Street
38 State House Station
Augusta, Maine 04333

Dear Ms. Leyden:

The U.S. Army Corps of Engineers, New England District (Corps) is writing this letter to determine your interest in receiving dredged material for beach nourishment from the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, New Hampshire, and Maine. The Corps, in partnership with the New Hampshire Pease Development Authority, is conducting a feasibility study to determine the extent of Federal interest in widening the upper turning basin along the Piscataqua River. As shown on the enclosed map, several widths are being considered as part of the feasibility study. Widening the upper turning basin from its current 800 foot width to widths ranging from 1020 feet to a maximum of about 1200 feet would require the removal of between 370,000 and 720,000 cubic yards (cy) of material and approximately 16,000 cy of rock. Subsurface explorations have shown that the unconsolidated material is hard packed sandy glacial till mixed with some gravel (see the enclosed grain size table and boring logs for grain size results; boring log locations are located on the enclosed map). Following design optimization of the turning basin dimensions, we will refine the quantity of dredged material that would require removal.

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Sincerely,

Richard Heidebrecht

for John R. Kennelly
Chief of Planning

Enclosures

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Mr. Jonathan L. Carter, Town Manager
Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

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Town of Kittery
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James M. McKenna, Town Manager
Winthrop Town Hall
1 Metcalf Square
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Copy Furnished:

Todd Burrowes, Policy Development Specialist
Maine Coastal Program
19 Union Street
38 State House Station
Augusta, Maine 04333

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 5, 2012

Engineering/Planning Division
Evaluation Branch

George Bald, Commissioner
New Hampshire Department of Resources and Economic Development
172 Pembroke Road
P.O. Box 1856
Concord, New Hampshire 03302-1856

Dear Mr. Bald:

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for John R. Kennelly
Chief of Planning

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James M. McKenna, Town Manager
Winthrop Town Hall
1 Metcalf Square
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Copy Furnished:

Thomas Mansfield, Department Architect
Division of Parks and Recreation
172 Pembroke Road
P.O. Box 1856
Concord, New Hampshire 03302-1856

Christian Williams, Federal Consistency Coordinator
New Hampshire Coastal Program
Department of Environmental Services
222 International Drive, Suite 175
Pease Tradeport
Portsmouth, New Hampshire 03801

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
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REPLY TO
ATTENTION OF

July 3, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Robert Markel, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

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Chief of Planning

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38 State House Station
Augusta, Maine 04333

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 3, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Neil Harrington, Town Manager
Town of Salisbury
Town Hall
5 Beach Road
Salisbury, Massachusetts 01952

Dear Mr. Harrington:

The U.S. Army Corps of Engineers, New England District (Corps) is writing this letter to determine your interest in receiving dredged material for beach nourishment from the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, New Hampshire and Maine. The Corps, in partnership with the New Hampshire Pease Development Authority, is conducting a feasibility study to determine the extent of Federal interest in widening the upper turning basin along the Piscataqua River. As shown on the attached map, several widths are being considered as part of the feasibility study. Widening the upper turning basin from its current 800 foot width to widths ranging from 1020 feet to a maximum of about 1200 feet would require the removal of between 370,000 and 720,000 cubic yards (cy) of material and approximately 16,000 cy of rock. Subsurface explorations have shown that the unconsolidated material is hard packed sandy glacial till mixed with some gravel (see the attached grain size table and boring logs for grain size results; boring log locations are located on the attached map). Following design optimization of the turning basin dimensions, we will refine the quantity of dredged material that would require removal.

The Corps' policy is to recommend the least costly, environmentally acceptable method of construction, including the disposal of dredged material. The Corps has determined that ocean disposal would be the least costly dredged material disposal method. A likely suitable ocean disposal site has been identified which is located about ten miles east of the Portsmouth Harbor entrance and north of the Isles of Shoals in Federal waters about 300 feet deep. However, under Corps policy it is preferable to use dredged material in a beneficial manner whenever possible. Due to the large amount of material to be removed, and its suitability for beneficial uses, we are making efforts to identify parties that may have an interest in using this material for beach nourishment. However, the difference in cost between ocean disposal north of the Isle of Shoals and potential nearshore disposal sites would need to be borne by the interested party (non-Federal participant). A table prepared for an interagency meeting conducted in May 2010 which compared the costs between disposal at the ocean site and nearshore disposal sites located in Maine, New Hampshire and Massachusetts is attached for your information. Please note that these costs are estimates to be used for planning purposes only and will be updated as the project is further refined.

We are requesting a written response no later than August 3, 2012 if you have a strong interest in the nearshore disposal of material dredged from the widening of the Portsmouth Harbor turning basin in the Piscataqua River. If no response is received by this date, then we will conclude that there is no interest. If interested, your letter should state that you are capable of meeting the financial responsibilities associated with any increased cost to deliver dredged material to a nearshore site of your choice. We also request that the following information be provided in your letter: the amount of material you would be willing to accept, the proposed location(s) for nearshore disposal, and all physical and biological information that is available to describe current conditions at the proposed nearshore disposal site(s) for the Environmental Assessment. Please note that since Congressional authorization will be required to construct the project, it could be several years before the material would be available for nearshore disposal.

If multiple parties express an interest, the Corps will schedule a meeting with all interested parties to determine an equitable distribution of this material.

Any questions or comments can be addressed to Mr. Richard Heidebrecht, study manager, at (978) 318-8513 or richard.w.heidebrecht@usace.army.mil, and/or Ms. Catherine Rogers, ecologist, at (978) 318-8231 or catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Similar Letters Sent to:

Mr. Jonathan L. Carter, Town Manager
Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

Mr. Robert Markel, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

Mr. Fred A. Mayo III, Harbormaster
Town of Ogunquit
23 School Street
P.O. Box 875
Ogunquit, Maine 03907

Mr. Michael Magnant, Town Administrator
Town of Rye
10 Central Road
Rye, New Hampshire 03870

Tracy Blais, Town Administrator
Newbury Town Hall
25 High Road
Newbury, Massachusetts 01951

Donna D. Holaday, Mayor
Newburyport Office of the Mayor
60 Pleasant Street
Newburyport, Massachusetts 01950

James M. McKenna, Town Manager
Winthrop Town Hall
1 Metcalf Square
Winthrop, Massachusetts 02152

Mr. Edward M. Lambert Jr., Commissioner
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2104

Copy Furnished:

Mr. Edward M. Lambert Jr., Commissioner
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2104

Mr. Joseph R. Orfant, Bureau Chief
Planning and Resource Protection
Department of Conservation and Recreation
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2104

Robert Boeri, Dredging Coordinator
Massachusetts Coastal Zone Management
Executive Office of Energy and Environmental Affairs
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2104

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 3, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Michael Magnant, Town Administrator
Town of Rye
10 Central Road
Rye, New Hampshire 03870

Dear Mr. Magnant:

The U.S. Army Corps of Engineers, New England District (Corps) is writing this letter to determine your interest in receiving dredged material for beach nourishment from the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, New Hampshire and Maine. The Corps, in partnership with the New Hampshire Pease Development Authority, is conducting a feasibility study to determine the extent of Federal interest in widening the upper turning basin along the Piscataqua River. As shown on the attached map, several widths are being considered as part of the feasibility study. Widening the upper turning basin from its current 800 foot width to widths ranging from 1,020 feet to a maximum of about 1200 feet would require the removal of between 370,000 and 720,000 cubic yards (cy) of material and approximately 16,000 cy of rock. Subsurface explorations have shown that the unconsolidated material is hard packed sandy glacial till mixed with some gravel (see the attached grain size table and boring logs for grain size results; boring log locations are located on the attached map). Following design optimization of the turning basin dimensions, we will refine the quantity of dredged material that would require removal.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Similar Letters Sent to:

Mr. Jonathan L. Carter, Town Manager
Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

Mr. Robert Markel, Town Manager
Town of Kittery
200 Rogers Road Extension
Kittery, Maine 03904

Mr. Fred A. Mayo III, Harbormaster
Town of Ogunquit
23 School Street
P.O. Box 875
Ogunquit, Maine 03907

Mr. Neil Harrington, Town Manager
Town of Salisbury
Town Hall
5 Beach Road
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Tracy Blais, Town Administrator
Newbury Town Hall
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Newburyport Office of the Mayor
60 Pleasant Street
Newburyport, Massachusetts 01950

James M. McKenna, Town Manager
Winthrop Town Hall
1 Metcalf Square
Winthrop, Massachusetts 02152

Copy Furnished:

George Bald, Commissioner
New Hampshire Department of Resources and Economic Development
172 Pembroke Road
P.O. Box 1856
Concord, New Hampshire 03302-1856

Thomas Mansfield, Department Architect
Division of Parks and Recreation
172 Pembroke Road
P.O. Box 1856
Concord, New Hampshire 03302-1856

Christian Williams, Federal Consistency Coordinator
New Hampshire Coastal Program
Department of Environmental Services
222 International Drive, Suite 175
Pease Tradeport
Portsmouth, New Hampshire 03801

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
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REPLY TO
ATTENTION OF

July 3, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Fred A. Mayo III, Harbormaster
Town of Ogunquit
23 School Street
P.O. Box 875
Ogunquit, Maine 03907

Dear Mr. Mayo:

The U.S. Army Corps of Engineers, New England District (Corps) is writing this letter to determine your interest in the receipt of dredged material from the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, New Hampshire and Maine for beach nourishment. This past March you had expressed in interest in whether or not the Town could receive any of the sand made available from this project for beaches in Ogunquit.

The Corps, in partnership with the New Hampshire Pease Development Authority, is conducting a feasibility study to determine the extent of Federal interest in widening the upper turning basin along the Piscataqua River. As shown on the attached map, several widths are being considered as part of the feasibility study. Widening the upper turning basin from its current 800 foot width to widths ranging from 1,020 feet to a maximum of about 1200 feet would require the removal of between 370,000 and 720,000 cubic yards (cy) of material and approximately 16,000 cy of rock. Subsurface explorations have shown that the unconsolidated material is hard packed sandy glacial till mixed with some gravel (see the attached grain size table and boring logs for grain size results; boring log locations are located on the attached map). Following design optimization of the turning basin dimensions, we will refine the quantity of dredged material that would require removal.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

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Wells, Maine 04090

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Newburyport Office of the Mayor
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James M. McKenna, Town Manager
Winthrop Town Hall
1 Metcalf Square
Winthrop, Massachusetts 02152

Copy Furnished:

Kathleen Leyden, Director
Maine Coastal Program
19 Union Street
38 State House Station
Augusta, Maine 04333

Todd Burrowes, Policy Development Specialist
Maine Coastal Program
19 Union Street
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Geno Marconi, Director
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Portsmouth, New Hampshire 03802

Office of the Town Manager
P.O. Box 398
Wells, Maine 04090

Voice: 207-646-5113
Fax: 207-646-2935
TDD: 207-646-7892
E-mail: jcarter@wellstown.org

March 13, 2012

Colonel Charles P. Samaris
District Commander
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

Re: Wells Harbor and Requests

Dear Colonel Samaris:

I am writing on behalf of the Wells Board of Selectmen on several issues which involve Wells Harbor and its Beaches. First and foremost we have had a long and rewarding relationship with the New England District and its Navigation Division, Ed O'Donnell and Mark Habel, along with their staffs. The Town wishes to thank them and you for the quick and successful work in achieving the FY'12 funding authorization for the *USS Currituck* availability this spring to undertake an emergency safety dredge in our Federal Channel.

The Town of Wells would like to go on record with the Army Corps that it is extremely interested in obtaining the dredge sand from the proposed Portsmouth Harbor & Piscatiqua River Turning Basin Widening Project. Wells is presently working with Maine Geologic to determine quantity maximization, but at this time would request the Town as a placeholder in receiving the higher volume potential of 700,000 CYs for delivery and disposal near shore to Wells Beach for beach nourishment purposes. Necessary local funding will be arranged and appropriated to compensate for the sand as needed.

Finally, the Town of Wells has worked for decades to achieve two full dredges of the Federal Channel with the return of the sand to our beaches. It has been successful in 2000 and now State of Maine permits have been granted for another full dredge with our local funding match appropriated and pending Congressional Budget authorization. Unfortunately, we did not receive FY'13 funding recommendation in the Budget and would like to request that if any FY'13 projects fail to move forward, Wells is shovel ready and waiting! However, we would greatly appreciate consideration for FY'14 funding.

On behalf of the Board of Selectmen, we would extend an invitation to visit our community and the project sight at your convenience.

Thank you and the District employees for all you do in Maine and New England and for the Country.

Sincerely,

Jonathan L. Carter
Town Manager

cc: BOS
Federal Delegation
Harbor Master
✓Mark Habel
Ed O'Donnell

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

September 7, 2011

Cathy Rodgers
Evaluation Branch
Engineering/Planning Division
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Ms. Rogers:

This letter is in response to a letter from John Kennelly dated July 22, 2011, requesting that EPA review information provided by the U.S. Army Corps of Engineers (Corps) on potential disposal sites for dredged material from the Piscataqua River Federal Navigation Project. Specifically, the Corps is seeking EPA's concurrence with its determination that the "Isle of Shoals-North" (IOS-N) site is "likely selectable" as an alternative disposal site for the Piscataqua River FNP on a "one-time use" basis.

Based on our review of the available information and data from the IOS-N site, some of which was collected during surveys aboard EPA's *OSV Bold* in 2010, EPA concurs that this site is "likely selectable" for one-time use for disposal of dredged material from the Piscataqua River FNP turning basin. Please feel free to contact me at (617) 918-1553 or Olga Guza of my staff at (603) 818-9788 if you have any questions.

Sincerely,

Melville P. Cote, Jr.

Melville P. Coté, Jr., Manager
Ocean and Coastal Protection Unit

Toll Free • 1-888-372-7341
Internet Address (URL) • http://www.epa.gov/region1

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

SEP 2 2011

John R. Kennelly
Chief of Planning
New England District
Army Corps of Engineers
696 Virginia Rd.
Concord, MA 01742-2751

Dear Mr. Kennelly:

This responds to your July 22, 2011, letter regarding the identification of a potential alternative ocean disposal site for dredged material generated from the turning basin at the upper end of the Piscataqua River Federal Navigation Project in New Hampshire and Maine. An alternative ocean disposal site is being sought by the Army Corps of Engineers (ACOE) since the historic Isle of Shoals (IOS-H) site, which was last used around 1980, has been shown to currently be a very productive fishing ground.

The alternative site being considered is about five miles north of the IOS-H site and about 10 miles east of the Portsmouth Harbor entrance which you have identified as IOS-N. This new site is within Federal waters approximately 300 feet deep. Results from side scan data show that the substrate at the IOS-N site is smooth, uniform and composed of fine grained material. The ACOE's benthic survey has concluded that the study area is physically homogeneous and inhabited by a limited benthic invertebrate community. Species richness and density are also low relative to other areas. Grain size data have confirmed that the site is approximately 95% to 79% fine material.

Based upon the surveys conducted you have requested that we concur that the IOS-N site is "likely selectable" as a dredge material disposal site under the Marine Protection, Research, and Sanctuaries Act (MPRSA) regulatory criteria for minimizing fisheries impacts under 40 CFR 228.5(a) and (b) and 228.6 (2) and (8). In addition you note that any actual site selection would require additional studies and a formal selection document and process with additional agency coordination.

We have reviewed the information supplied with your request and have preliminarily determined that that proposed alternative dredge material disposal site (IOS-N) may be a more favorable selection for minimizing impacts to living marine resources than the historic IOS-H site. However, we will not be able to provide more definitive recommendations or advice until we complete our consultation requirements under the Magnuson-Stevens Fisheries Conservation and Management Act (MSA), and the Endangered Species Act (ESA).

Essential Fish Habitat:
In order to initiate an Essential Fish Habitat (EFH) consultation under the MSA you must provide us with an EFH Assessment as required pursuant to 50 CFR 600.920.

The required contents of an EFH Assessment includes: 1) a description of the action; 2) an analysis of the potential adverse effects of the action on EFH and the managed species; 3) the ACOE's conclusions regarding the effects of the action on EFH; and 4) proposed mitigation, if applicable. Other information that should be contained in the EFH Assessment, if appropriate, includes: 1) the results of on-site inspections to evaluate the habitat and site-specific effects; 2) the views of recognized experts on the habitat or the species that may be affected; 3) a review of pertinent literature and related information; and 4) an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Protected Resources
Federally listed shortnose sturgeon (*Acipenser brevirostrum*), Atlantic salmon (*Salmo salar*), and several species of listed whales and sea turtles may occur in the vicinity of the potential disposal site during the time proposed for disposal of the dredged material generated from the turning basin. Marine mammals such as seals and porpoises may also be seasonally present in the project area during the time proposed for disposal of the dredged material generated from the turning basin.

Shortnose sturgeon occur along the U.S. Atlantic coast within several large river systems in the vicinity of the Piscataqua River that support reproduction of shortnose sturgeon populations (e.g., below the first dam in the Merrimack, Kennebec and Androscoggin Rivers). Shortnose sturgeon distribution in waters off the coast of New Hampshire is not well understood or documented. Historically, it is thought that shortnose sturgeon were once abundant in the Piscataqua River, though there are few records of sturgeon captures, none of which distinguish between Atlantic and shortnose sturgeon. More recently, telemetry data has indicated that there is a potential for migrating individual shortnose sturgeon to be present in the nearshore areas of the Gulf of Maine, and occasional shortnose sturgeon may be present in the lower Piscataqua River.

Since 2005, information on the distribution and movements from a variety of acoustically tagged fish (e.g., shortnose sturgeon, Atlantic salmon and Atlantic sturgeon), are available from acoustic receivers which have been deployed throughout the Gulf of Maine as part of the Gulf of Maine Ocean Observing System/ GoMOOS system (Figure 1). For example, hundreds of juvenile Atlantic salmon smolts are tagged annually from the Penobscot River and the Bay of Fundy, Canada. Additionally, starting in 2006, approximately 20-30 adult shortnose sturgeon captured annually in the Penobscot River have been fitted with acoustic tags. Furthermore, Atlantic sturgeon are also being fitted with acoustic transmitters when captured in the Penobscot, Kennebec and Saco rivers. Since 2005, the GoMOOS acoustic receivers, with a detection range of approximately 0.6 mile, have made over 10,000 detections of acoustic tags. These detections were from over 100 different individual acoustic tags from many species of marine fish. The majority of detections from implanted salmon smolts occurred at buoy F01 located in Penobscot Bay, the watershed where most smolt tagging occurs (UMaine 2011). Twenty of the tags detected were implanted in salmon smolts; three from the Bay of Fundy and 17 from smolts stocked in the Penobscot River (UMaine 2011). This data also shows some tagged Atlantic salmon may disperse in a southerly direction when leaving Penobscot Bay prior to heading offshore to northern waters off Greenland. Acoustically tagged Atlantic salmon smolts from the Penobscot River were detected by GoMOOS buoys as far south as E01. The closest buoy to the potential project disposal site is B01 (lat: 43° 10.84′N – lon: 070° 25.66′W) just north of Isle of Shoals off Portsmouth harbor (Figure 1). Since deployment of this buoy in 2005, only nine individual Atlantic sturgeon where detected in the vicinity. Most detections occurred in the spring (March 2010) with one detection in mid June 2009; these were single detections possibly indicating individuals migrating through the area. No tagged shortnose sturgeon or Atlantic salmon have been detected at the GoMOOS buoy B01 deployed in the vicinity of the potential project disposal site IOS-N.

It is clear from recent telemetry data that both Atlantic salmon and shortnose sturgeon tagged in the Merrimack, Kennebec, and Penobscot rivers undertake significant coastal migrations moving between freshwater systems and marine waters. Telemetry data also indicate that shortnose sturgeon utilize smaller coastal river systems during these migrations. Based on this data, combined with what is known generally about Atlantic salmon and shortnose sturgeon behavior, Atlantic salmon and shortnose sturgeon may be migrating near the project disposal area and therefore any effects on these species from disposal activities occurring at the disposal site would need to be examined.

Three species of listed sea turtle species occur in New England waters during the warmer months, generally when water temperatures are greater than 15°C. The sea turtles in these waters are typically small juveniles with the most abundant being the federally endangered leatherback (*Dermochelys coriacea*), federally threatened loggerhead (*Caretta caretta*) and federally endangered Kemp's ridley (*Lepidochelys kempi*) sea turtles; however, Kemp's ridleys are rare in waters north of Massachusetts and only leatherback or loggerhead sea turtles are likely to occur in coastal New Hampshire and Maine waters. Sea turtles move into waters of the Gulf of Maine from their southern wintering grounds in late June/July and most sea turtles move south from these waters by the first week in November. The highest numbers of sea turtles are present in these waters between July and October each year.

Depths at the disposal site are approximately 300 feet. While this depth does not preclude sea turtles from occurring at the site, sea turtles are unlikely to be foraging at these depths and are likely to be using the area for resting during periods of migration and any use of the disposal area by sea turtles is likely to be transient. Sea turtles may also occur seasonally along the vessel transit route while migrating, resting or foraging.

Listed whales also occur in the waters off the coast of Maine. In the disposal area, North Atlantic right whales (*Eubalaena glacialis*) as well as occasional humpback whales (*Megaptera novaeangliae*) and fin whales (*Balaenoptera physalus*) could be present.

Since listed sea turtles and whales may be present in the active area, effects of the proposed action on these species should be examined.

On October 6, 2010, NMFS proposed to list four distinct population segments (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus)* as endangered and one DPS, the Gulf of Maine (GOM) DPS, as threatened (75 FR 61872; 75 FR 61890). The GOM DPS of Atlantic sturgeon includes the following: all anadromous Atlantic sturgeon whose range occurs in watersheds from the Maine/Canadian border and extending southward to include all associated watersheds draining into the Gulf of Maine as far south as Chatham, MA, as well as wherever these fish occur in coastal bays and estuaries and the marine environment. Within this range, Atlantic sturgeon have been documented in the following rivers: Penobscot, Kennebec, Androscoggin, Sheepscot, Saco, Piscataqua, and Merrimack. The marine range of Atlantic sturgeon from all five DPSs extends from the Bay of Fundy, Canada to the Saint Johns River, FL. The proposed action falls within the geographic range of the 5 DPSs of Atlantic sturgeon that have been proposed for listing.

Once a species is proposed for listing the conference provisions of the ESA may apply. If Atlantic sturgeon were in the project area when disposal operations were occurring they would be exposed to increases in suspended sediment. As Atlantic sturgeon are benthic foragers, disposal operations may also affect foraging; however, given the depth of the site foraging in the area is likely to be uncommon.

We encourage you to continue to work with our Protected Resources Division as project plans are developed to determine if a consultation pursuant to Section 7 of the ESA is necessary regarding potential effects to any of the listed species noted above. Any questions regarding impacts of the proposed action on NMFS listed species should be directed to Dave Bean at (207) 866-4172. Any questions regarding effects to marine mammals that are not ESA listed (e.g., seals and porpoises), should be directed to NMFS Office of Protected Resources, Permits, Conservation and Education Division at (301) 427-8400. All other questions or concerns should be directed to Lou Chiarella in the Habitat Conservation Division at (978) 281-9277.

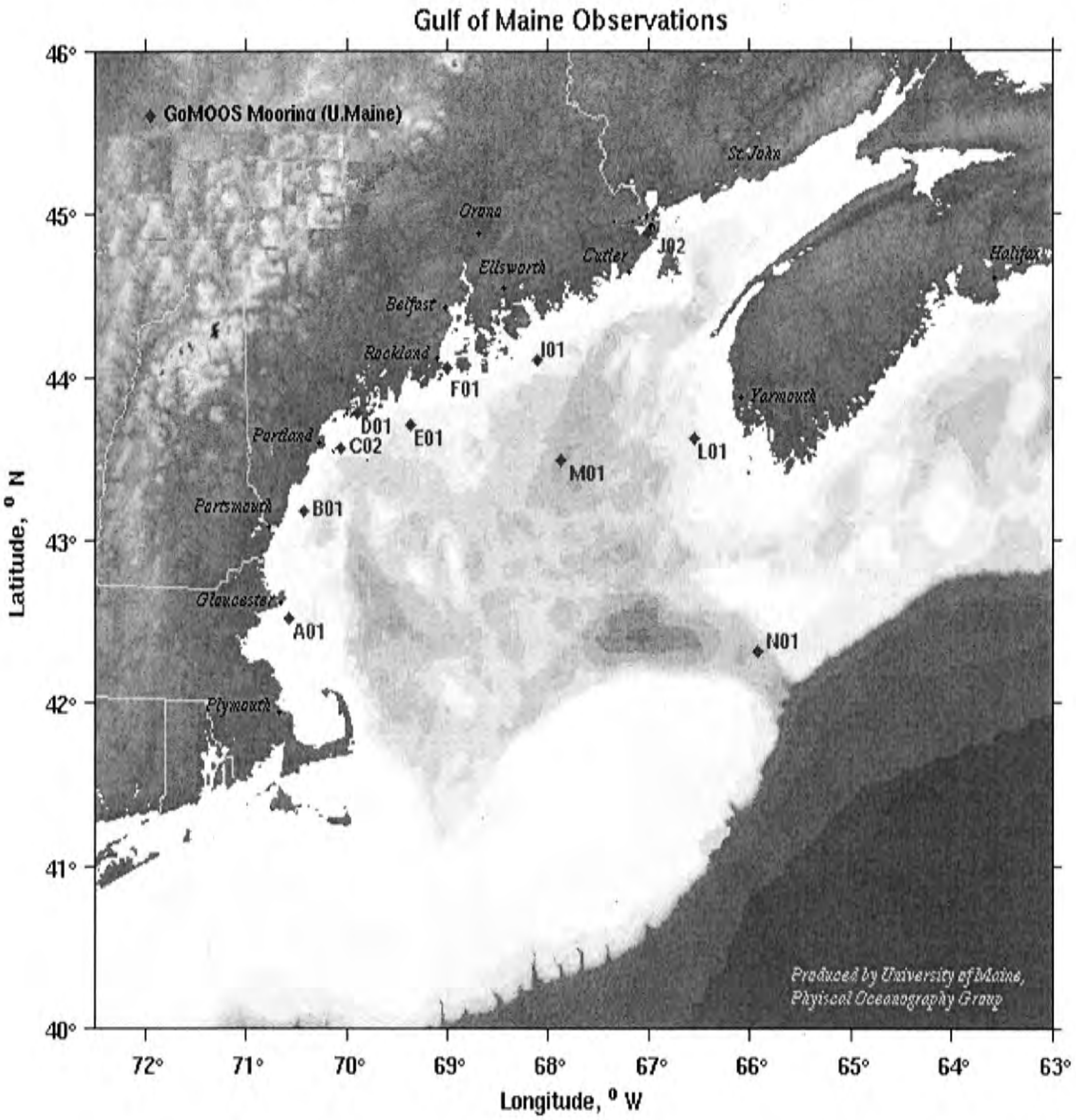
Sincerely,

Peter D. Colosi

Peter D. Colosi
Assistant Regional Administrator
For Habitat Conservation

cc: Colligan, PRD
Mel Cote, EPA Region 1

Figure 1 Location of Gulf of Maine Observation Buoys (GoMOOS)



DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 22, 2011

Engineering/Planning Division
Evaluation Branch

Mr. Lou Chiarella
NOAA Fisheries
One Blackburn Drive
Gloucester, Massachusetts 01930-2298

Dear Mr. Chiarella:

Staff from the U.S. Army Corps of Engineers, New England District (Corps) and the U.S. Environmental Protection Agency (EPA), Region 1, met with staff from the National Marine Fisheries Service (NMFS) in Gloucester, Massachusetts on April 14, 2010 to discuss the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. In particular, the purpose of the meeting was to discuss potential alternative ocean disposal sites for the sandy material to be dredged from the proposed widening of the turning basin at the upper end of the Piscataqua River Federal Navigation Project. Previous attempts by the Corps to identify suitable nearshore disposal areas to nourish nearby beaches in Rye, New Hampshire and York, Maine, were met with local opposition. Consequently, there is a need to look for alternative dredged material disposal site(s) for this material.

Dredged material from the Portsmouth Harbor and other New Hampshire harbors was disposed at the historic Isle of Shoals (IOS-H) site until about 1980. The IOS-H site sits astride the three-mile territorial sea limit with majority of the site located within New Hampshire State waters. Since this site has been previously disturbed, the Corps examined the use of the IOS-H site for disposal of the Portsmouth Harbor Navigation Improvement Project material. However, your office believed that this site may now be a productive fisheries site and did not advocate its continued use. You offered to contact your commercial fisheries source(s) to confirm that this was the case, and a subsequent email from you dated May 13, 2010 confirmed from your commercial industry source that "the historic IOS site has a bottom that is very complex. The predominant substrate is mud but there are numerous rock outcroppings, both ledge and boulder fields that rise 30 to 50 feet above the prevailing bottom. The site is a prime area for different species including lobsters, cod, greysole, dabs and blackbacks. The area is also frequented in the warmer months by all the pelagic species. It is an important fishing ground for lobstermen and the recreational fleet." Based upon this characterization, NMFS would not consider the feasibility of the IOS-H site as a disposal site.

NMFS proposed at the meeting, instead, to locate a disposal site north of the historic IOS site (IOS-H) since your office believed this new area would be less biologically productive. During our meeting, EPA encouraged locating a new proposed disposal site outside State waters and entirely within Federal waters. As a result of this discussion, an alternative dredged material disposal site was identified in an area about five miles north of the IOS-H site, and about 10 miles east of the Portsmouth Harbor entrance (see the enclosed Figure). The new site, identified as IOS-N, is located outside the territorial sea limit (within Federal waters) in water 300 feet deep.

Data was collected from the IOS-N (and the IOS-H for comparison) to determine if the IOS-N site would be "likely selectable" under the Marine Protection, Research and Sanctuaries Act (MPRSA) criteria for dredged material disposal site selection. Side-scan data was collected in July 2010 from the U.S. EPA OSV "BOLD" for both the IOS-H site and the IOS-N site. Benthic and grain size data were collected separately by the Corps from the IOS-N site only in November 2010.

Results from the side scan data show that the substrate at the IOS-N site is smooth, uniform and composed of fine-grained material, while the IOS-H site contains ridges and other deposits of hard material (rocks, ledge and/or boulders). In addition, the side scan data indicated that fish trawl marks noted at the IOS-N during the survey are historic (oxidized), indicating that the site is not currently actively fished. The IOS-H site was being actively fished for lobster, with numerous trap lines visible, while only a few trap lines were evident at IOS-N. The IOS-N benthic report summarizes that "the study area is physically homogeneous and inhabited by a limited benthic invertebrate community. Richness, at the species and higher taxonomic levels, and density are low relative to both more inshore and more offshore habitats." Grain size data confirmed that the site is fine-grained as seven of the nine samples collected contained more than 95% fines and the remaining two samples contained more than 79% fines. The results of this data collection are enclosed for your information.

The above results support NMFS initial appraisal that the area north of the historic IOS disposal site, marked as IOS-N, is less productive and "likely selectable" as a one-time use for disposal of dredged material from the Piscataqua River turning basin. The addition of a mound(s) of sandy material at the site, may, actually increase the biological diversity by increasing the diversity of the bottom substrate and topography. Based on the enclosed information, the Corps would like to request NMFS concurrence that the IOS-N site is "likely selectable" as a dredged material disposal site under MPRSA regulatory criteria for minimizing fisheries impacts under 40 CFR 228.5 (a) and (b), and 228.6 (2) and (8).

Any actual site selection would require additional studies and a formal selection document and process with additional agency coordination. There are a number of communities and agencies in Maine and Massachusetts that have expressed a willingness to accept and fund the difference in transportation cost to acquire the Portsmouth material for beach nourishment projects. Identification of the IOS-N site as "likely selectable" will provide a baseline for measuring the difference in haul costs for these beneficial use projects to receive the dredged material.

Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil, or to Mr. Richard Heidebrecht, the project manager, at (978) 318-8513 or the following email address: richard.w.heidebrecht@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Mr. Mel Cote, Supervisor
Ocean and Coastal Protection Unit
U.S. Environmental Protection Agency
Mail Code: OEP06-1
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

EMAILED TO:
Olga Guza, U.S. EPA, Region 1 (guza-pabst.olga@epa.gov)

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 22, 2011

Engineering/Planning Division
Evaluation Branch

Mr. Mel Cote, Supervisor
Ocean and Coastal Protection Unit
U.S. Environmental Protection Agency
Mail Code: OEP06-1
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

Dear Mr. Cote:

Staff from the U.S. Army Corps of Engineers, New England District (Corps) and the U.S. Environmental Protection Agency (EPA), Region 1 met with staff from the National Marine Fisheries Service (NMFS) at their office in Gloucester, Massachusetts, on April 14, 2010 to discuss the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine Navigation Improvement Project. In particular, the purpose of the meeting was to discuss potential alternative ocean disposal sites for the sandy material to be dredged from the proposed widening of the turning basin at the upper end of the Piscataqua River Federal navigation channel. Previous attempts by the Corps to identify suitable nearshore disposal areas to nourish nearby beaches in Rye, New Hampshire and York, Maine, were met with local opposition. Consequently, there is a need to look for alternative dredged material disposal site(s) for this material.

Dredged material from Portsmouth Harbor and other New Hampshire harbors had been disposed at the historic Isle of Shoals (IOS-H) disposal site until about 1980. The IOS-H site sits astride the three-mile territorial sea limit with the majority of the site located within New Hampshire State waters. Since this site has been previously disturbed, the Corps examined the IOS-H site for disposal of the Portsmouth Harbor Navigation Improvement Project material. However, NMFS believed that this site may now be a productive fisheries site and did not advocate its continued use. NMFS offered to contact their commercial fisheries source(s) to confirm that this was the case. A subsequent email from NMFS dated May 13, 2010 confirmed from their commercial industry source that "the historic IOS site has a bottom that is very complex. The predominant substrate is mud but there are numerous rock outcroppings, both ledge and boulder fields that rise 30 to 50 feet above the prevailing bottom. The site is a prime area for different species including lobsters, cod, greysole, dabs and blackbacks. The area is also frequented in the warmer months by all the pelagic species. It is an important fishing ground for lobstermen and the recreational fleet." Based upon this characterization, NMFS would not consider the IOS-H site a feasible disposal site.

NMFS proposed at the meeting, instead, to locate a disposal site north of the historic IOS site (IOS-H) since staff from NMFS believed this new area would be less biologically productive. During our meeting staff from your office encouraged locating a new proposed disposal site outside State waters and entirely within Federal waters. As a result of this discussion, an alternative dredged material disposal site was identified in an area about five miles north of the IOS-H site, and about 10 miles east of the Portsmouth Harbor entrance (see the enclosed Figure). The new site, identified as IOS-N, is located in 300 feet of water outside the territorial sea limit (within Federal waters).

Data was collected from the IOS-N (and the IOS-H for comparison) to determine if the IOS-N site would be "likely selectable" under the Marine Protection, Research and Sanctuaries Act (MPRSA) criteria for dredged material disposal site selection. Side-scan data was collected in July 2010 from the U.S. EPA OSV "BOLD" for both the IOS-H site and the IOS-N site. Benthic and grain size data were collected separately by the Corps from the IOS-N site only in November 2010.

Results from the side scan data show that the substrate from the IOS-N site is smooth, uniform and composed of fine-grained material, while the IOS-H site contains ridges and other deposits of hard material (rocks, ledge and/or boulders). In addition, the side scan data indicated that fish trawl marks noted at the IOS-N during the survey are historic (oxidized), indicating that the site is not currently actively fished. The IOS-H site was being actively fished for lobster, with numerous trap lines visible, while only a few trap lines were evident at IOS-N. The benthic report for the IOS-N summarizes the site as "the study area is physically homogeneous and inhabited by a limited benthic invertebrate community. Richness, at the species and higher taxonomic levels, and density are low relative to both more inshore and more offshore habitats." Grain size data confirmed that the site is fine-grained as seven of the nine samples collected contained more than 95% fines and the remaining two samples contained more than 79% fines. The results of this data collection are enclosed for your information.

The above results support NMFS initial appraisal that the area north of the historic IOS disposal site, marked as IOS-N, is less productive and "likely selectable" as a one-time use for disposal of dredged material from the Piscataqua River turning basin. The addition of a mound(s) of sandy material at the site, may, actually increase the biological diversity by increasing the diversity of the bottom substrate and topography. We have requested NMFS concurrence that the IOS-N site is "likely selectable" as a dredged material disposal site under MPRSA regulatory criteria for minimizing fisheries impacts under 40 CFR 228.5 (a) and (b), and 228.6 (2) and (8). We are also requesting that your office concur that the IOS-N would be "likely selectable" under the general and specific criteria for selection of sites in 40 CFR 228.5 and 228.6 respectively. See the enclosed appendix for additional information under each MPRSA criteria.

Any actual site selection would require additional studies and a formal selection document and process with additional agency coordination. There are a number of communities and agencies in Maine and Massachusetts that have expressed a willingness to accept and fund the difference in transportation cost to acquire the Portsmouth material for beach nourishment projects. Identification of the IOS-N site as "likely selectable" will provide a baseline for measuring the difference in haul costs for these beneficial use projects to receive the dredged material.

Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil, or to Mr. Richard Heidebrecht, the project manager, at (978) 318-8513 or the following email address: richard.w.heidebrecht@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

EMAILED TO: Olga Guza, U.S. EPA, Region 1 (guza-pabst.olga@epa.gov)

5981

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

5/5/11

April 27, 2011

REPLY TO
ATTENTION OF

Engineering/Planning Division
Planning Branch

ZZ940FY2011 / 7035B-940

Approved $4,000.00 Harbor Dredge Pier Maint Fund
5/11/11
5-10-11

Mr. Geno Marconi
Director, Division of Ports and Harbors
Pease Development Authority
Post Office Box 369
Portsmouth, New Hampshire 03802

Dear Mr. Marconi:

The purpose of this letter is to request the final non-Federal cost sharing payment under our existing Feasibility Cost Sharing Agreement (FCSA) for feasibility study efforts for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project. Under this agreement, dated June 12, 2006, study efforts are cost shared on a 50/50 basis. This final payment is in the amount of $4,000. The following table outlines PDA's previous payments and this payment under this FCSA.

NH PDA Payments	Payment Due Date	Amount ($)
1st Payment provided to Corps	Received August 28, 2006	25,000
2nd Payment provided to Corps	Received May 22, 2007	120,000
3rd Payment provided to Corps	Received March 18, 2008	148,000
4th Payment provided to the Corps	Received July 8, 2009	78,000
Remaining Payment	May 15, 2011	4,000
Total Estimated Non-Federal Share (PDA)		375,000

As you are aware, we have encountered significant opposition to near shore placement of dredged material within a reasonable haul distance from the mouth of the Piscataqua River, and are evaluating alternate disposal options that include the potential use of a new ocean disposal site northeast of the Isles of Shoals. As discussed, the additional costs associated with these studies, and expanded internal Corps review requirements mandated by Congress in the Water Resources Development Act of 2007 and implemented in recent Corps guidance, will require an amendment to the existing FCSA. The estimated total cost for these additional tasks is $180,000 to be cost shared on a 50/50 basis. An amendment to the FCSA to cover this increase in scope and study cost will be provided shortly.

The final check under the existing agreement should be made payable to "FAO, USAED, New England District" and sent to the attention of the program manager, Mr. Mark Habel, at the above address. If you have any questions regarding the study or require additional information, please call me at (978) 318-8505 or Mr. Richard Heidebrecht of my staff at (978) 318-8513.

Sincerely,

John R. Kennelly
Chief of Planning

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF

CEMP-NAD

FEB 8 2011

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, North Atlantic Division (ATTN: CENAD-DE)

SUBJECT: Request for Independent External Peer Review (IEPR) Exclusion for Portsmouth Harbor & Piscataqua River, NH.

1. HQUSACE has reviewed the IEPR exclusion request for the Portsmouth Harbor & Piscataqua River, NH Project. Based on applicable laws and policy, this project study is not subject to peer review as it does not meet any of the mandatory requirements. The project has a cost estimate of less than $45 million; does not represent a threat to health and safety; is not controversial; and has not had a request for IEPR from the Governor of an affected State or the head of a Federal or state agency.

2. Approval of the exclusion request was based on the following information. The existing project consists of a 35-foot deep and 400-foot wide channel for a distance of about six miles, with two turning basins. The proposed project consists of expanding the upper-most turning basin from 800 feet to between 1000 and 1200 feet. The formulation of this project is not based on novel methods and does not present complex challenges for interpretation or conclusions that are likely to change prevailing practices. Precedent-setting methods or models were not used in the evaluation. The total cost ranges from $10-14 million. No significant adverse environment impacts are expected from the dredging and disposal and an Environmental Impact Statement (EIS) is not required.

3. Questions or concerns should be directed to Mr. Peter Luisa, Deputy Chief, North Atlantic Division Regional Integration Team, at 202-761-5782.

FOR THE COMMANDER:

STEVEN L. STOCKTON, P.E.
Director of Civil Works

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

CENAE-EP-P

25 August 2010

MEMORANDUM THRU Commander, U.S. Army Engineer Division, North Atlantic, ATTN: CENAD-PD-CID-S (Joseph Forcina), 302 General Lee Avenue, Fort Hamilton Military Community, Brooklyn, New York 11252

FOR HQUSACE (CECW-P/Tab Brown), 441G Street NW, Washington DC 20314

SUBJECT: Request for exclusion from Type I IEPR for Portsmouth Harbor and Piscataqua River, New Hampshire, Navigation Improvement Feasibility Study and Environmental Assessment.

1. The Water Resources Development Act of 2007 Section 2034, requires independent external peer review (IEPR) of studies under conditions as specified in the Act and as described in EC 1165-2-209. The purpose of this memorandum is to request exclusion from Type I IEPR for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, Navigation Improvement Feasibility Study and Environmental Assessment (Study). See Attachment A for a description of the project. The Review Plan approved by North Atlantic Division on 11 January 2008 and coordinated with the Deep Draft Navigation PCX did not include IEPR due to the limited scope, size, and routine nature of the improvement project. The approved Review Plan is in accordance with EC 1165-2-209 dated 31 January 2010, but a specific exclusion from IEPR by HQUSACE is now required.

2. EC 1165-2-209, Paragraph 11.d. (1) states that TYPE 1 IEPR is mandatory if any of the factors (a) to (d) are true. These factors are evaluated below and do not trigger a mandatory IEPR.

a. Significant threat to human life: The Portsmouth Harbor and Piscataqua River Navigation Improvement Project does not present a significant threat to human life.

b. Where the estimated total project cost including mitigation costs is greater than $45M: The estimated Portsmouth Harbor and Piscataqua River Navigation Improvement Project Cost is less than $15 million.

c. Where there is a request for IEPR by a Governor of an affected State: The Governors of New Hampshire and Maine have not requested a peer review by independent experts. The State of New Hampshire is the project Sponsor and agencies of both States are represented on the Project Delivery Team.

d. Where the DCW or the Chief of Engineers determined that the project is controversial due to significant public dispute over either the size, nature or effects of the project or the economic or environmental costs or benefits of the project: The Portsmouth Harbor and Piscataqua River Navigation Improvement Feasibility project is a routine dredging project to expand a single existing turning basin that is part of the existing Federal project, from 800 feet to 1200 feet wide, at the existing 35-foot MLLW depth. Expanding the turning basin will ease navigation operations for ships calling at the existing terminals, resulting in benefits in transportation cost savings. The improvement project involves removal of up to 720,000 cubic yards of clean sandy dredged material which will be beneficially used. The project does not require an EIS.

3. EC 1165-2-209, Paragraph 11.d. (3) states that WRDA 2007 Section 2034 permits project studies to be excluded from IEPR under certain circumstances where none of the mandatory triggers noted above are met and (b) is for an activity for which there is ample experience within the USACE and industry to treat the activity as routine and has minimal life safety risk. The Portsmouth project is a routine dredging project and will not include any novel or precedent setting assessments. The improvement project involves widening a single existing turning basin feature of the existing Federal navigation project. The economic benefits methodology and calculations are routine and straightforward. Life safety is not a significant issue either during construction or as a result of a recommendation to improve navigation through the Harbor.

4. Recommendation: New England District recommends that the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, Navigation Improvement Feasibility Study and Environmental Assessment be excluded from Independent External Peer Review.

5. New England District requests review and endorsement of this recommendation by the North Atlantic Division and transmittal to HQUSACE for final decision.

6. If further information is needed, please contact Mr. John Kennelly, Chief, Planning Branch at (978) 318-8505 or Mr. Richard Heidebrecht, Study Manager, at (978) 318-8513.

FOR THE COMMANDER:

Encl

ANTHONY T. MACKOS, P.E.
Acting Chief, Engineering/Planning Division

Attachment A
Portsmouth Harbor and Piscataqua River
New Hampshire and Maine
Feasibility Study/ Environmental Assessment for Navigation Improvement

1. Project: The purpose of this study is to determine the feasibility of modifying the existing Federal navigation project on the Piscataqua River to increase the width of the upper Turning Basin. This study was directed by Section 437 of the Water Resources Development Act of 2000.

2. Location of Project: The Piscataqua River forms a portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the river, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal project includes a 35-foot deep channel, 400 feet wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project also included widening the bends at Henderson Point, Gangway Rock, Badgers Island, the Maine-New Hampshire Interstate Bridge and Boiling Rock, a 950-foot wide turning basin upstream of Boiling Rock, and an 800-foot wide turning basin at the upstream end of the Federal channel.

3. Project Description: This study will investigate widening the existing 800-foot turning basin to a width of between 1000 and 1200 feet. The existing width of the turning basin causes major safety concerns for bulk shippers, limits tidal navigation of the river, and limits the existing and future use of the terminals. All aspects of Federal interest, including engineering feasibility, economic justification, design optimization, environmental acceptability and cultural resource impact, are being analyzed in detail during the feasibility study.

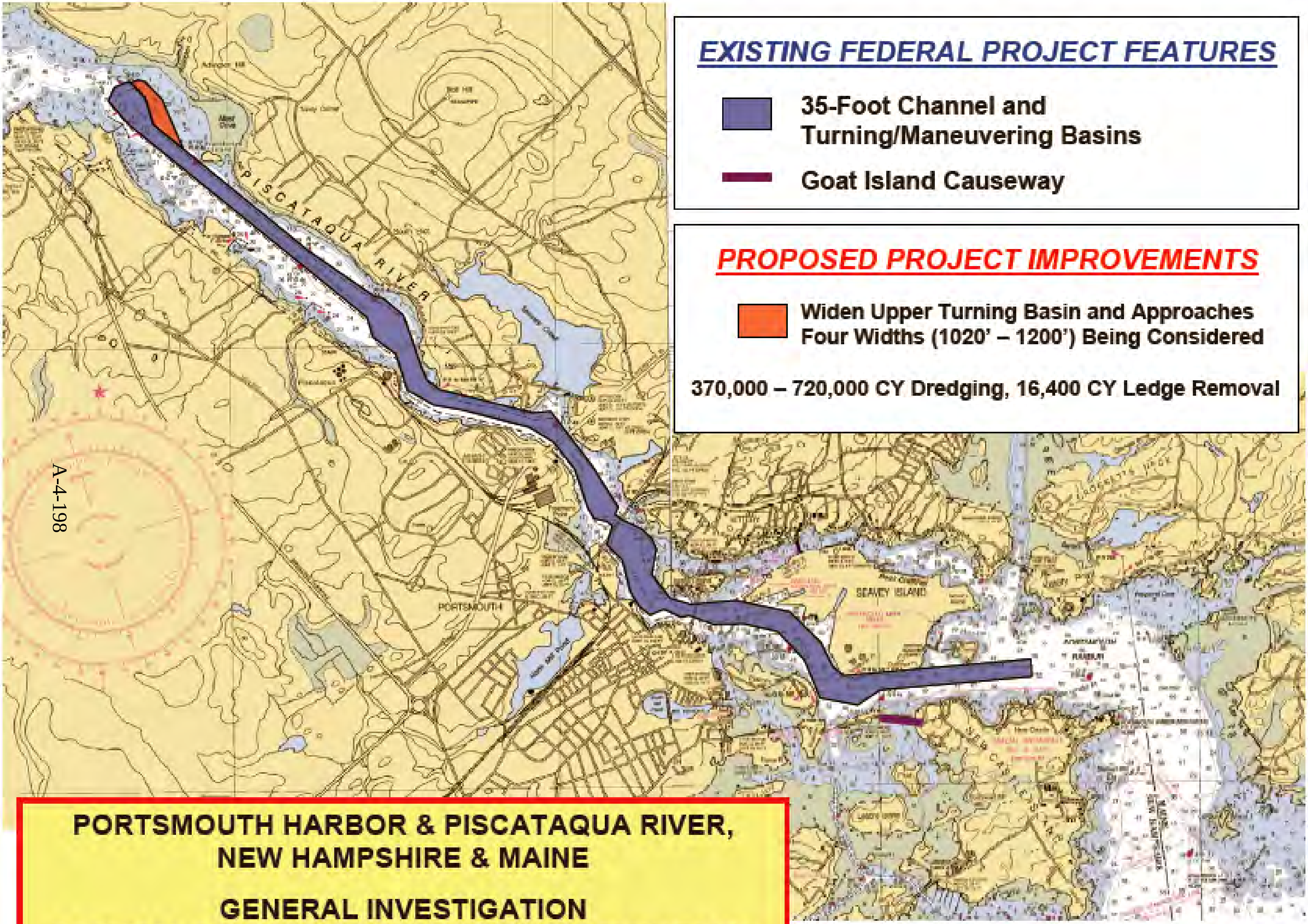
4. Sponsor: The New Hampshire Pease Development Authority, Division of Ports and Harbors (NHPDA) is the study sponsor.

5. Schedule: The Corps will continue the feasibility-level study into Fiscal Year 2010 with completion in FY 2011. Current efforts include: coordination with New Hampshire and Maine officials to identify sites for placement of dredged material for beneficial use; final evaluation of alternatives and selection of a recommended plan; and preparation of a final report and environmental assessment.

6. Costs: The Feasibility Study is cost shared 50/50 with the NHPDA and is estimated to cost about $750,000. A Feasibility Cost Sharing Agreement was executed with NHPDA in June 2006, and study funds have been provided as required to conduct feasibility scope investigations. Design and construction is estimated to cost between $10 and $14 Million dollars.

PORTSMOUTH HARBOR & PISCATAQUA RIVER, NEW HAMPSHIRE & MAINE

GENERAL INVESTIGATION
FEDERAL NAVIGATION PROJECT IMPROVEMENTS



EXISTING FEDERAL PROJECT FEATURES

- 🟦 35-Foot Channel and Turning/Maneuvering Basins
- ▬ Goat Island Causeway

PROPOSED PROJECT IMPROVEMENTS

- 🟧 Widen Upper Turning Basin and Approaches Four Widths (1020' – 1200') Being Considered

370,000 – 720,000 CY Dredging, 16,400 CY Ledge Removal

Heidebrecht, Richard W NAE

From: Heidebrecht, Richard W NAE
Sent: Thursday, May 06, 2010 1:44 PM
To: 'charles.gilboy@mail.house.gov'; 'Guza-Pabst.Olga@epa.gov'; 'carol.henderson@wildlife.nh.gov'; 'sarah_holmes@shaheen.senate.gov'; 'mjuliano@dot.state.nh.us'; 'matt_leahy@gregg.senate.gov'; 'g.marconi@peasedev.org'; 'mary.power@des.nh.gov'; 'tom_prasol@gregg.senate.gov'; 'frank.richardson@des.nh.gov'; 't.shattuck@peasedev.org'; 'brian.warburton@dred.state.nh.us'; 'christian.williams@des.nh.gov'; 'Jonathan Carter (jcarter@kitteryme.org)'; 'Lou.Chiarella@noaa.gov'; 'Cote.Mel@epamail.epa.gov'; 'Dickson, Stephen M.'; 'tdiers@des.state.nh.us'; 'Robert Foley (rfoley@coleharrison.com)'; 'kathryn.glenn@state.ma.us'; 'kathleen.leyden@maine.gov'; 'Lucey, Frederick (HOU)'; 'George McCabe (george.mccabe@mail.house.gov)'; 'conscom@townofnewbury.org'; 'mreilly@cityofnewburyport.com'; 'Russo, Vincent'; 'Silva, Raul (DCR)'; 'Peter_Morin@snowe.senate.gov'; 'Bobby_Reynolds@collins.senate.gov'; 'jackie.potter@mail.house.gov'; 'Todd Burrowes (todd.burrowes@maine.gov)'; 'robert.green@maine.gov'; 'Brian.Swan@maine.gov'; 'Orfant, Joe (DCR)'; 'conservation@salisburyma.gov'; 'jack_richard@scottbrown.senate.gov'; 'Gary.Davis@state.ma.us'; 'Deerin.Babb-Brott@state.ma.us'; 'nharrington@salisburyma.gov'; 'Bruce.Tarr@state.ma.us'; 'Cynthia.Lewis@state.ma.us'; 'Steven.Baddour@state.ma.us'; 'Rep.MichaelCostello@hou.State.MA.US'; 'robert.boeri@state.ma.us'; 'joe@storyfarms.com'; 'Gary Barrett (gary.barrett@mail.house.gov)'; Rogers, Catherine J NAE; 'jenna.flynn@noaa.gov'; Habel, Mark L NAE
Cc: Mackay, Joseph B NAE; Kennelly, John R NAE
Subject: Portsmouth Harbor, Coordination Meeting to Discuss Dredged Material (sand and rock)

Good afternoon,

The purpose of the e-mail is to invite you or your representative(s) to attend a meeting to discuss the Portsmouth Harbor Navigation Improvement Study and options for beneficial reuse of the material that will be excavated to widen the upper turning basin.

As most of you are aware, the Corps is evaluating the feasibility of widening the upper turning basin at Portsmouth Harbor. The New Hampshire Division of Ports and Harbors is the project Sponsor, but all the improvement dredging is on the Maine side of the channel. The project will generate between 370,000 and 720,000 cubic yards of sandy material, depending on the final basin width chosen. The earliest construction would be in Fiscal Year 2013 and is dependent on project authorization by Congress through a Water Resources Development Act.

The material to be dredged is a glacial outwash/moraine deposit of clean sand, with some gravel mixed in. Attempts to find beaches within an economical haul distance (10 miles from the harbor entrance) have been stymied by public misperception in York and Rye that any material from Portsmouth is contaminated. The Corps and the other Federal agencies would still like to avoid just placing the material in the ocean off NH, and are looking to see if other Agencies and Towns in MA and ME would be interested in having the material placed in the feeder bars off their beaches or made available for other projects, and if they would be willing to pay the extra cost to haul the material beyond the 10-mile distance.

To provide an opportunity for the Corps to present project information, NHDES has agreed to host a meeting at their office in Portsmouth, NH. Available dates for the meeting are May 20 (afternoon only), and May 21, 24, 25 and 26. Please indicate which date(s) work best for you as soon as possible, so that I can lock in a date/time for the meeting. The date that best fits the majority of respondents will be selected.

At the meeting we will present project information, a timeline, cost estimates for transport to various sites, the grain size data, and have samples of the material available for examination. The Corps needs to forward a report on this project to our Washington

Headquarters this summer, and wants to have any State agency or municipality interested and willing to pay for the sand on record in that report. As we have had requests from legislative officials to find an equitable distribution of the sand, this will also be discussed at the meeting.

If you have any questions regarding this meeting, please don't hesitate to contact me by e-mail or at the telephone number listed below.

Thank you,
Dick H.

Richard W. Heidebrecht, P.E.
Project Manager
New England District
Corps of Engineers
696 Virginia Road
Concord, MA 01742
tel: 978-318-8513
fax: 978-318-8080

From: Guza-Pabst.Olga@epamail.epa.gov
To: Heidebrecht, Richard W NAE
Cc: Rogers, Catherine J NAE; cwilliams@des.state.nh.us; Geno Marconi; Nimeskern, Phillip W NAE; robert.green@maine.gov
Subject: Re: Portsmouth Harbor 2nd Suitability Determination (SD)
Date: Thursday, August 27, 2009 10:57:47 AM

I concur with the 2nd SD as written.

Olga Guza
Environmental Scientist
USEPA Region 1
Boston, MA
Telephone - 617-918-1542
Fax 617-918-0542

"Heidebrecht,
Richard W NAE"
<Richard.W.Heidebrecht@usace.army.mil>

08/26/2009 05:27 PM

To
<robert.green@maine.gov>, Olga Guza-Pabst/R1/USEPA/US@EPA, "Geno Marconi" <g.marconi@peasedev.org>, <cwilliams@des.state.nh.us>

cc
"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>, "Nimeskern, Phillip W NAE" <Phillip.W.Nimeskern@usace.army.mil>

Subject
Portsmouth Harbor 2nd Suitability Determination (SD)

All,

Attached is the final SD for your information.

Thanks,
Dick H.

Richard W. Heidebrecht, P.E.
Project Manager
New England District
Corps of Engineers
696 Virginia Road
Concord, MA 01742

CENAE–R-PT 19 August 2009

MEMORANDUM THRU:

Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch

FOR: Richard Heidebrecht, Project Manager, CENAE-EP-PP

SUBJECT: Second Suitability Determination for the Piscataqua River Federal Navigation Improvement Project (General Investigations), Newington, New Hampshire and Eliot, Maine.

1. **Project Description:**

The CENAE is proposing to dredge an area of **between 7 and 16 acres** in the **Piscataqua River** to enlarge the existing 35' deep MLLW turning basin at the upstream end of the Federal Navigation Project (FNP), near the Sprague Energy River Road Terminal. This will produce a volume in the range of approximately **270,000 to 630,000 cu. yds**. of material, depending on the navigation improvement alternative selected. Rock ledge was encountered at one boring location, B6, at a depth of -33' deep MLLW. Based on boring and seismic data, a small amount of rock (<10,000 cy) will need to be excavated and disposed of. This material is proposed to be mechanically dredged and disposed of at the Cape Arundel Disposal Site (**CADS**), the Wallis Sands Beach Disposal Site (**WSBDS**) or the Isles of Shoals Disposal Site (**ISDS**).

2. **Summary:**

This memorandum addresses compliance with the regulatory evaluation and testing requirements of 40 CFR 227.13 for unconfined open water disposal at an open ocean disposal site. This evaluation confirms that sufficient information was obtained to properly evaluate the suitability of this material for open water disposal under the guidelines and finds the sediments in the vicinity of samples 1 through 22 suitable for disposal at CADS, WSBDS or ISDS. When these conclusions are combined with the conclusions of the first Suitability Determination, dated 21 April 2009, I find that all material proposed for dredging described above is suitable for open ocean disposal.

You should note that the CADS will be closed on 10 January 2010 and will not be available for disposal of dredged material after that date. In addition, disposal at ISDS may require a Site Selection Process, which may be time consuming. The EPA favors beneficial reuse disposal at WSBDS.

3. **Sampling and Analysis:**

A sampling plan for this project was prepared on 16 August 2007. The plan called for nine cores to be taken from the project area. However, this sampling plan was not implemented because test borings were made throughout the project area as a part of the geotechnical survey. Sediment samples were taken from the borings and analyzed for sediment grain size.

A suitability determination was prepared based on this data on 21 April 2009. It found the northern section of the proposed project unsuitable for unconfined disposal as proposed based upon the grain size of the single sample in this area. That sample, B-5, is predominately silt/clay, unlike the rest of the samples, and did not meet the exclusion from further testing at 227.13 (b)(1). You opted to extensively sample the northern section and analyze the samples for grain size to delineate the area of fine grained sediment.

You, Cathy Rogers, Ben Loyd and I prepared a sampling and analysis plan for the northern part of the project. I later discussed this plan with Olga Guza, U.S. EPA, who had no objections. A grid of 22 locations around the stations B-5 and B-6 from the previous testing effort was developed.

A crew from CENAE did the sampling using a Van Veen grab. They were unable to obtain any samples from 6 of the 22 locations, despite taking 5 attempts per location. These stations appeared to the sampling crew to be rocky sediment or rock outcrops. The remaining samples were analyzed for grain size by GeoTesting Express. The results are tabulated on the attached table. Sample 16 was located close to core B-5.

4. **Ocean Dumping Act Regulatory Requirements:**

The disposal of sediments below mean low water in the Bigelow Bight is regulated according to both Section 103 of the Ocean Disposal Act and Section 404 of the Clean Water Act.

§227.13 Dredged Materials.

(a) This paragraph defines dredged materials and does not give any criteria for the evaluation of sediments.

(b) This paragraph states that proposed dredged material which meets the criteria in one of the following three paragraphs is environmentally acceptable for ocean disposal without further testing.

(b)(1) Dredged material that is predominately sand, gravel, rock, or any other naturally occurring bottom material with particle size greater than silt and is found in areas of high current or wave energy can be disposed of in a 103 site without further testing. This portion of the Piscataqua River is well known for its fast tidal currents. The NOAA-predicted tidal currents for this portion of the Piscataqua River from 15 July to 11 August 2009 varied from 2.0

knots (103 cm/second) to 4.1 knots (211 cm/second). As the material from the samples is predominately sand and gravel (0% to 31.3% fines), it does meet this exclusion and can be disposed of as proposed. See the attached table for sediment details.

(b)(2) Dredged material that is proposed for beach nourishment and is predominantly sand, gravel, or shell with grain sizes similar to the receiving beaches can be disposed of without further testing. As the material from the sample is predominately sand and is proposed for subtidal beach disposal at Wallis Sands Beach, it does meet this exclusion if disposed of at WSBDS.

(b)(3) When the dredged material is substantially the same as that at the disposal site and the dredged material is taken from a site far removed from known sources of pollution, it can be disposed of without further testing. This project's material does not meet this exclusion.

(c) This paragraph states that if the dredged material does not meet the criteria of paragraph b above, it must undergo further testing of the liquid, suspended particulate and solid phases before it can be considered acceptable for ocean disposal. This section does not apply to this portion of this project, as the material meets the criteria in paragraph b (1) above.

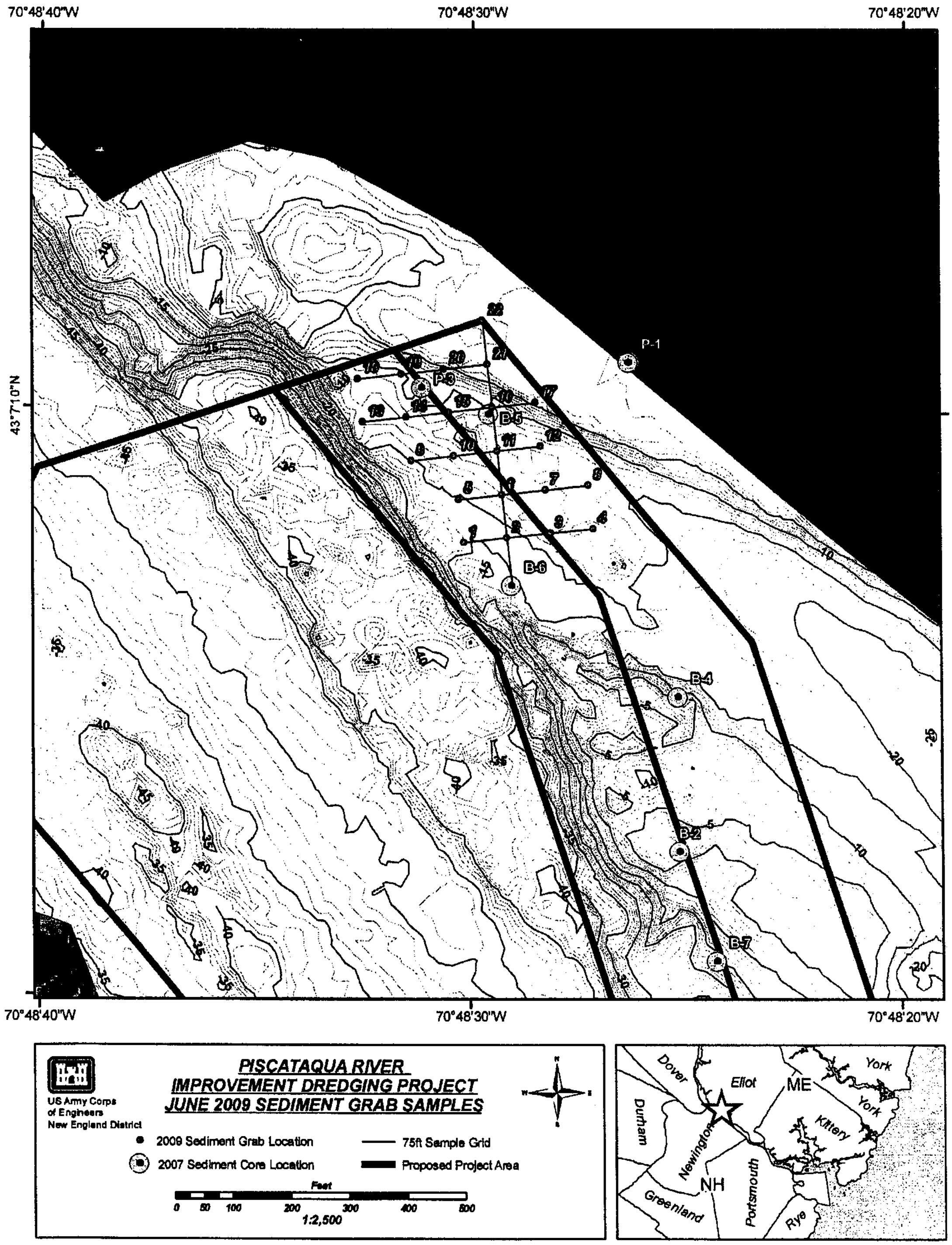
(d) This subsection discusses the choice of the liquid phase analytes and does not give any criteria for the evaluation of sediments.

5. Copies of the above mentioned data and of the draft suitability determination were sent to the Maine and New Hampshire DEPs, US EPA, and US F&WS for their review. The US F&WS responded to say that they had no comment on the determination. The EPA discussed the SD with me and gave their concurrence with the recommendation that this SD include current velocities.

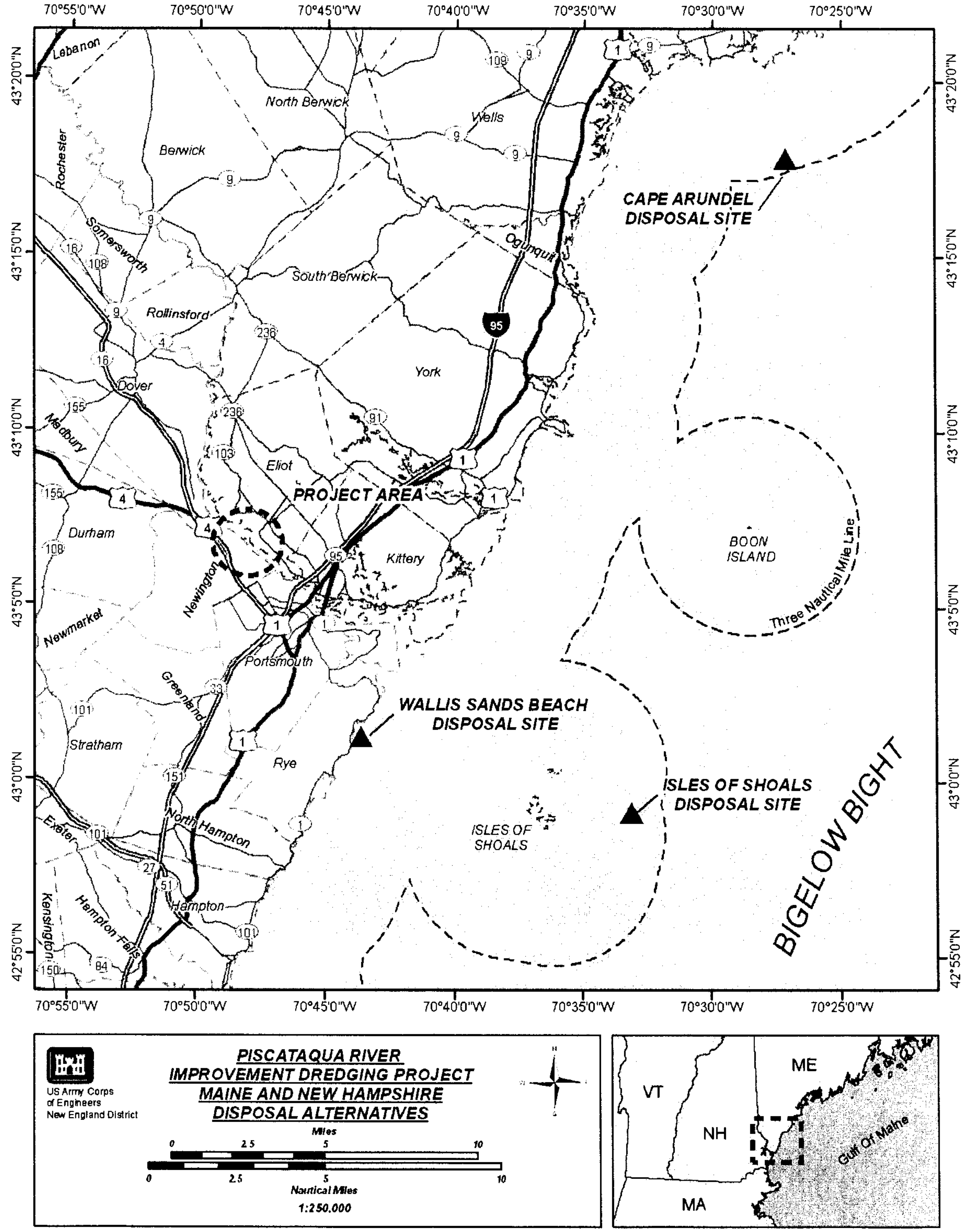
6. If you have any questions, please contact me at (978) 318-8660.

Phillip Nimeskern
PHILLIP NIMESKERN
Project Manager,
Marine Analysis Section

Grab Location	Water Depth	% Gravel	% Sand	% Silt & Clay
1	20	No sample		
2	18.5	No sample		
3	17.7	78.0	20.7	1.3
4	10	No sample		
5	19	45.9	53.3	0.8
6	19	1.1	67.6	31.3
7	17.4	14.4	76.9	8.7
8	18.9	No sample		
9	20.1	57.0	42.1	0.9
10	15.7	41.0	58.1	0.9
11	16.4	-	92.9	7.1
12	18.5	67.0	31.0	2.0
13	16.3	No sample		
14	14.6	11.8	85.4	2.8
15	16.6	82.1	16.9	1.0
16	17.9	0.8	90.2	9.0
17	12.5	5.7	83.4	10.9
18	15	36.8	61.5	1.7
19	7	60.9	33.5	5.6
20	10	No sample		
21	6.4	3.1	78.4	18.5
22	8	5.5	87.0	7.5


70°48'40"W
70°48'30"W
70°48'20"W
43°7'10"N
P-1
P-3
B-5
B-6
B-4
B-2
B-7
PISCATAQUA RIVER
IMPROVEMENT DREDGING PROJECT
JUNE 2009 SEDIMENT GRAB SAMPLES
US Army Corps of Engineers New England District
2009 Sediment Grab Location
2007 Sediment Core Location
75ft Sample Grid
Proposed Project Area
Feet
0 50 100 200 300 400 500
1:2,500
N
S
E
W
Dover
Eliot
ME
York
York
Kittery
Durham
Newington
NH
Portsmouth
Greenland
Rye

SUBJECT: Second Suitability Determination for Piscataqua River Federal Navigation Project, Newington, New Hampshire and Eliot, Maine.



From: Rogers, Catherine J NAE
To: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: FW: FW: Portsmouth, draft 2nd SD coordination
Date: Tuesday, August 18, 2009 11:26:10 AM

FYI.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Wende_Mahaney@fws.gov [mailto:Wende_Mahaney@fws.gov]
Sent: Wednesday, August 12, 2009 1:50 PM
To: Rogers, Catherine J NAE
Cc: Maria_Tur@fws.gov
Subject: Re: FW: Portsmouth, draft 2nd SD coordination

Catherine: The Maine Field Office has no comments on this suitability determination due to other workload priorities at this time. Not sure if you are also coordinating with our New England Field Office, since part of this project is in New Hampshire.

Thanks, Wende

>>>
Wende S. Mahaney, Fish and Wildlife Biologist U.S. Fish and Wildlife Service
1168 Main Street
Old Town, ME 04468
Phone: (207) 827-5938, Ext. 20
Fax: (207) 827-6099
Cellular: (207) 944-2991
Inactive hide details for "Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

08/05/2009 02:15 PM

To

<wende_mahaney@fws.gov>

cc

Subject

FW: Portsmouth, draft 2nd SD coordination

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560 catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Rogers, Catherine J NAE
Sent: Wednesday, August 05, 2009 12:31 PM
To: 'Olga Guza (guza-pabst.olga@epa.gov)'; 'wende_mahaney@mail.fws.gov'; 'cwilliams@des.state.nh.us'; 'robert.green@maine.gov'
Cc: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE; Rogers, Catherine J NAE
Subject: FW: Portsmouth, draft 2nd SD coordination

All,

Please find attached the draft Suitability Determination for the Piscataqua River Navigation Improvement Project. Please provide comments/concurrence within the next 10 days. Please contact Phil at x660 or Dick at x513.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560 catherine.j.rogers@usace.army.mil [attachment "Portsmouth - Draft 2nd SD Coordination Memo.pdf" deleted by Wende Mahaney/R5/FWS/DOI] [attachment "Piscataqua FNP 2nd SD (2).doc" deleted by Wende Mahaney/R5/FWS/DOI]

CENAE–R-PT 21 April 2009

MEMORANDUM THRU:

Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch

FOR: Richard Heidebrecht, Project Manager, CENAE-EP-PP

SUBJECT: Suitability Determination for the Piscataqua River Federal Navigation Improvement Project (General Investigations), Newington, New Hampshire and Eliot, Maine.

1. **Project Description:**

The CENAE is proposing to dredge an area of **between 7 and 16 acres** in the **Piscataqua River** to enlarge the existing 35' deep MLLW turning basin at the upstream end of the Federal Navigation Project (FNP), near the Sprague Energy River Road Terminal. This will produce a volume in the range of approximately **270,000 to 630,000 cu. yds**. of material, depending on the navigation improvement alternative selected. Rock ledge was encountered at one boring location, B6, at a depth of -33' deep MLLW. Based on boring and seismic data, a small amount of rock (<10,000 cy) would need to be excavated and disposed of. This material is proposed to be mechanically dredged and disposed of at the Cape Arundel Disposal Site (**CADS**), the Wallis Sands Beach Disposal Site (**WSBDS**) or the Isles of Shoals Disposal Site (**ISDS**).

A sampling plan for this project was prepared on 16 August 2007. The plan called for nine cores to be taken from the project area. However, this sampling plan was not implemented because test borings were made throughout the project area as a part of the geotechnical survey. Sediment samples were taken from the borings and analyzed for sediment grain size. This suitability determination is based on this data.

2. **Summary:**

This memorandum addresses compliance with the regulatory evaluation and testing requirements of 40 CFR 227.13 for unconfined open water disposal at an open ocean disposal site. This evaluation confirms that sufficient information was obtained to properly evaluate the suitability of this material for open water disposal under the guidelines and finds the sandy sediments in the vicinity of cores B-1, B-2, B-3, B-4, B-6, B-7, and B-8 suitable for disposal at CADS, WSBDS or ISDS. The sediment in the vicinity of core B-5 is predominantly silt/clay and I cannot find it suitable for open ocean disposal at CADS, WSBDS or ISDS at this tier.

You should note that the CADS will be closed on 10 January 2010 and will not be available for disposal of dredged material after that date. In addition, disposal at ISDS may require a Site Selection Process, which may be time consuming. The EPA favors beneficial reuse disposal at WSBDS.

3. **Ocean Dumping Act Regulatory Requirements:**

The disposal of sediments below mean low water in the Bigelow Bight is regulated according to both Section 103 of the Ocean Disposal Act and Section 404 of the Clean Water Act.

§227.13 Dredged Materials.

(a) This paragraph defines dredged materials and does not give any criteria for the evaluation of sediments.

(b) This paragraph states that proposed dredged material which meets the criteria in one of the following three paragraphs is environmentally acceptable for ocean disposal without further testing.

(b)(1) Dredged material that is predominately sand, gravel, rock, or any other naturally occurring bottom material with particle size greater than silt and is found in areas of high current or wave energy can be disposed of in a 103 site without further testing. This portion of the Piscataqua River is well known for its fast tidal currents. As the material from Cores B-1, B-2, B-3, B-4, B-6, B-7, and B-8 is predominately sand and gravel (5.7% to 14.5% fines), it does meet this exclusion and can be disposed of as proposed. See the attached table for details.

Test borings were taken in September and November 2007. These borings parallel those of the 2007 SAP. Samples from these borings were analyzed for sediment grain size in May 2008. There were not enough sample recovered from all layers in all cores or for all cores (i.e. B3 and B6), for grain size analysis. However, the boring logs show that the cores B-1, B-2, B-3, B-4, B-6, B-7, and B-8 have surficial and underlying layers of sand and gravel. The grain size analyses support these observations. The sole exception is core B-5, which is predominately silt/clay to a depth of 10 feet below the sediment surface.

(b)(2) Dredged material that is proposed for beach nourishment and is predominantly sand gravel or shell with grain sizes similar to the receiving beaches can be disposed of without further testing. As the material from cores B-1, B-2, B-3, B-4, B-6, B-7, and B-8 is predominately sand and is proposed for subtidal beach disposal at Wallis Sands Beach, it does meet this exclusion if disposed of at WSBDS.

(b)(3) When the dredged material is substantially the same as that at the disposal site and the dredged material is taken from a site far removed from known sources of pollution, it can be disposed of without further testing. This project's material does not meet this exclusion.

(c) This paragraph states that if the dredged material does not meet the criteria of paragraph b above, it must undergo further testing of the liquid, suspended particulate and solid phases before it can be considered acceptable for ocean disposal. This section applies in part to this project, as the material from core B-5 doesn't meet any of the criteria in paragraph b above. Further analysis or alternate disposal should be considered for the material in the vicinity of core B-5. This section does not apply to the rest of this project, as the material meets the criteria in paragraph b (1) above.

(d) This subsection discusses the choice of the liquid phase analytes and does not give any criteria for the evaluation of sediments.

4. Copies of the above mentioned data and of the draft suitability determination were sent to the Maine and New Hampshire DEP, US EPA, and US F&WS for their review. The EPA responded to say that they concur with the determination but thought the CADS and ISDS should be removed from the SD and the WSBDS should be a favored disposal site. No response was received from the F&WS within the 10-day response period so their concurrence may be assumed.

5. If you have any questions, please contact me at (978) 318-8660.

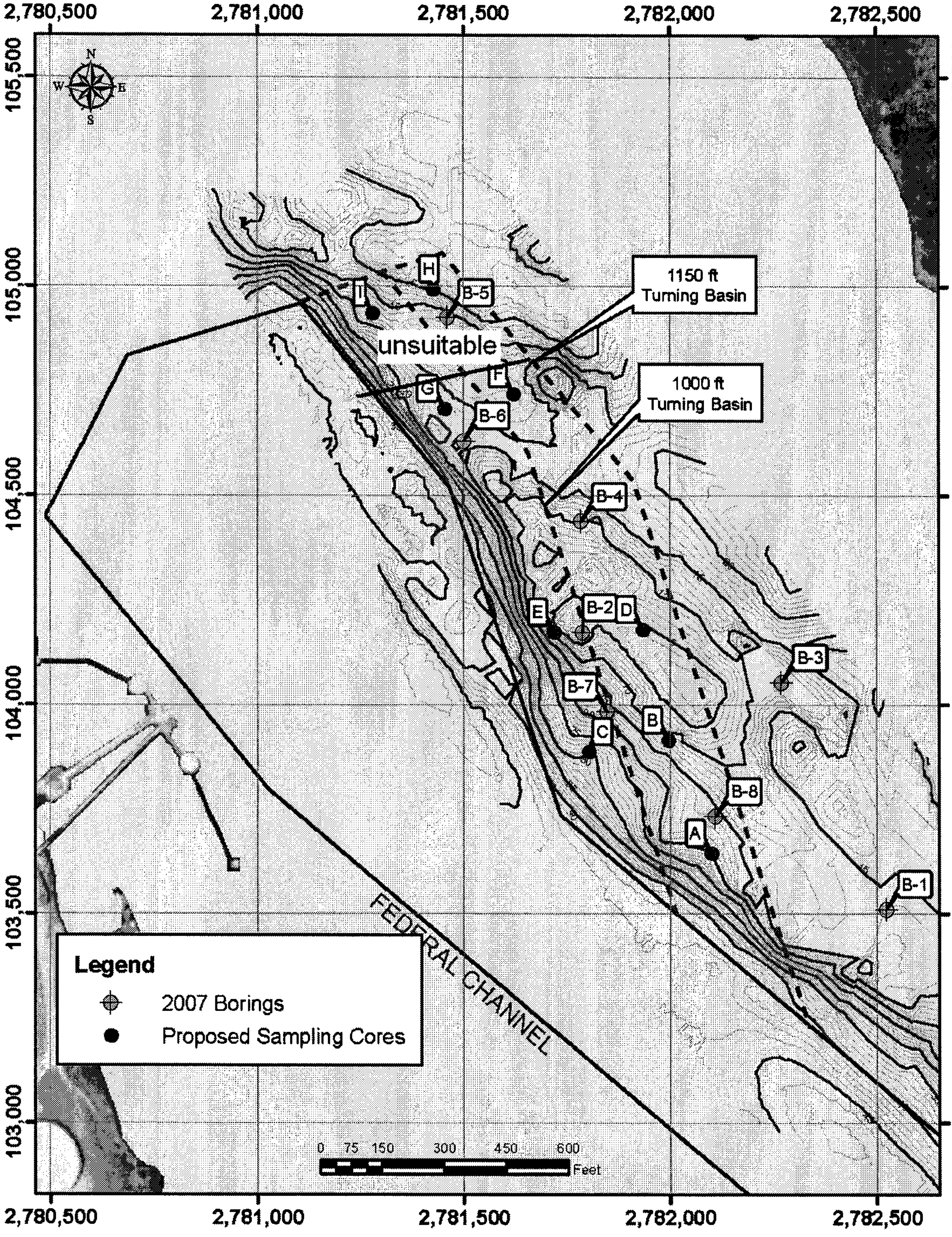
Phillip Nimeskern

PHILLIP NIMESKERN
Project Manager,
Marine Analysis Section

Boring location/ Depth below riverbed	Elevation below MLLW in feet	% gravel	% sand	% silt & clay
B-1 (20-22')	33.0 – 35.0	1.5	89.9	8.6
B-2 (10-12')	13.0 – 15.0	1.0	90.4	8.6
B-4 (15-17')	18.0 – 20.0	1.7	83.8	14.5
B-5 (0-2')	14.5 – 16.5	0.0	5.7	94.3
B-5 (10-11.8')	24.5 – 26.3	13.4	45.1	41.5
B-7 (0-2')	19.0 – 21.0	0.03	89.1	10.6
B-7 (5-7')	24.0 – 26.0	2.5	84.2	13.3
B-7 (10-12')	29.0 – 31.0	16.2	76.5	7.3
B-8 (0-2')	18.0 – 20.0	13.5	76.5	10.0
B-8 (5-7')	23.0 – 25.0	19.4	74.9	5.7

Note: Not enough material was recovered from borings B3 and B6 to perform grain size analysis.

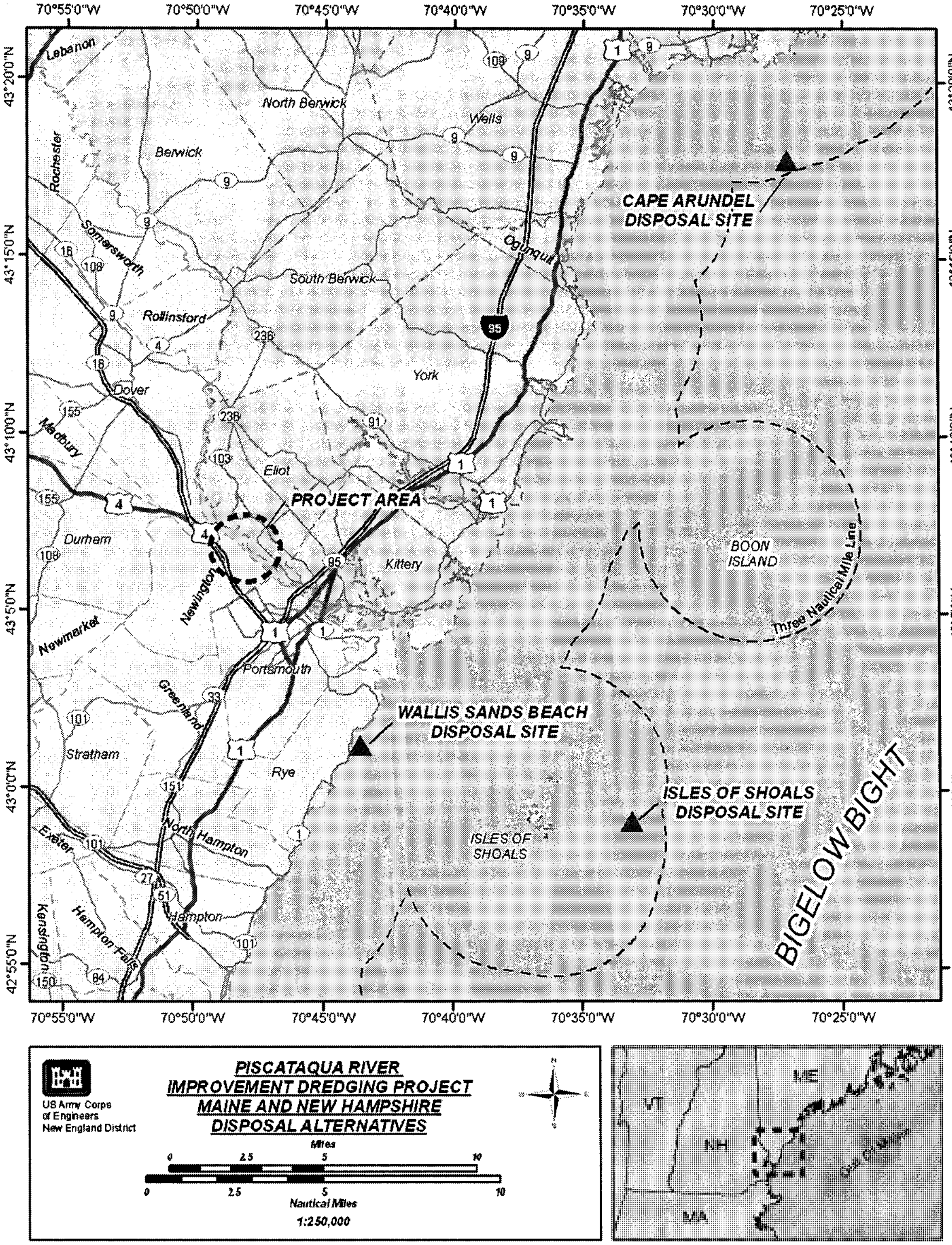
SUBJECT: Suitability Determination for Piscataqua River Federal Navigation Project, Newington, New Hampshire.



Portsmouth Harbor, Piscataqua River
Portsmouth, NH
Locations of 2007 Borings
River Bottom Contours shown in ft, MLLW

Revised 03/24/2009
piscataqua_2400.mxd

SUBJECT: Suitability Determination for Piscataqua River Federal Navigation Project, Newington, New Hampshire.



From: Guza-Pabst.Olga@epamail.epa.gov
To: Rogers, Catherine J NAE
Cc: Rogers, Catherine J NAE; Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: RE: Piscataqua River FNP
Date: Tuesday, April 21, 2009 11:41:20 AM

You stated it correctly.

Olga Guza
Environmental Scientist
USEPA Region 1
Boston, MA
Telephone - 617-918-1542
Fax 617-918-0542

"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>
04/21/2009 11:39 AM

To
"Nimeskern, Phillip W NAE" <Phillip.W.Nimeskern@usace.army.mil>

cc
"Heidebrecht, Richard W NAE" <Richard.W.Heidebrecht@usace.army.mil>, Olga Guza-Pabst/R1/USEPA/US@EPA, "Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

Subject
RE: Piscataqua River FNP

Phil,

I just spoke with Olga and she has the following comments on above subject
(Olga correct me if I misstate anything):

1) CADS is closing January 2010, so it is not a viable option and should not
be included in the memo. I suggest putting that statement in the SD as a
reference why it is not discussed.
2) Any disposal at the Isle of Shoals Site will require a Site Selection
Process, which can be quite lengthy.
3) Placement of the sandy material on Wallis Sands Beach as beneficial reuse

is favored.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Rogers, Catherine J NAE
Sent: Friday, April 17, 2009 4:37 PM
To: 'Guza-Pabst.Olga@epamail.epa.gov'
Cc: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: FW: Piscataqua River FNP
Importance: High

Hi Olga,

Just wanted to make sure you didn't have any comments before Phil finalizes
his suitability determination.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Rogers, Catherine J NAE
Sent: Friday, March 27, 2009 1:59 PM
To: 'Wende_Mahaney@mail.fwa.gov'; 'Guza-Pabst.Olga@epamail.epa.gov';
'cwilliams@des.state.nh.us'; 'Robert.Green@maine.gov'
Cc: Rogers, Catherine J NAE; Heidebrecht, Richard W NAE; Nimeskern, Phillip W
NAE
Subject: FW: Piscataqua River FNP

All,

Please find attached the draft suitability determination for the Piscataqua
River Federal Navigation Improvement Project. Questions can be addressed to
Phill, the PM-Dick Heidebrecht, or myself.

Please provide any comments by COB April 10th.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers

From:	Habel, Mark L NAE
To:	Habel, Mark L NAE
Subject:	FW: Response to Piscataqua River Navigation Improvement Project Draft Suitability Determination (UNCLASSIFIED)
Date:	Friday, October 25, 2013 7:58:19 AM

Classification: UNCLASSIFIED
Caveats: NONE

From: Williams, Chris [mailto:Christian.Williams@des.nh.gov]
Sent: Thursday, April 09, 2009 2:00 PM
To: Heidebrecht, Richard W NAE
Cc: Rogers, Catherine J NAE; guza-pabst.olga@epa.gov; t.shattuck@peasedev.org; douglas.grout@wildlife.nh.gov; todd.burrowes@maine.gov; Diers, Ted
Subject: Response to Piscataqua River Navigation Improvement Project Draft Suitability Determination

Hello Dick,

The New Hampshire Coastal Program (NHCP) has received the U.S. Army Corps of Engineers' (ACOE's) Memorandum ("Memorandum") regarding the draft Suitability Determination for the Piscataqua River Federal Navigation Improvement Project (FNIP) in Newington, New Hampshire and Eliot, Maine. The Memorandum describes the approximate volume and nature of the material that will be dredged to enlarge the existing uppermost turning basin in the Piscataqua River. It also lists three potential sites for the disposal of the majority of the dredged material: 1) Cape Arundel Disposal Site (CADS); 2) Isles of Shoals Disposal Site (ISDS); and 3) Wallis Sands Beach Disposal Site.

The NHCP has concerns with proposed use of CADS for the placement of the material for the Piscataqua River FNIP. As you know, use of CADS is scheduled to end in January 2010, even though construction of the Piscataqua River FNIP is not likely to begin until 2012, at the earliest. Furthermore, even if CADS were to remain open after January 2010, the estimated minimum volume of material produced by the project, 270,000 yd^3, exceeds the ACOE's estimated remaining capacity at CADS of 200,000 yd^3. For these reasons, the NHCP finds that CADS does not appear to be a practicable alternative for disposal of the material from the project. Moreover, neither does the ISDS. It is the understanding of the NHCP that the ISDS, which has not been used since 1971, is closed. Evidence to support this can be found in the 1994 report prepared for the ACOE entitled A Dredged Material Management Study for Coastal Maine and New Hampshire, which states "Currently, disposal of dredged materials is not allowed at the Isles of Shoals." Further evidence can be found in the 1999 document entitled Dredging in New Hampshire, prepared by the NHCP, which states that the Isles of Shoals Disposal Site is "…no longer active…" This is likely the reason why the ISDS is not listed in ACOE's Ocean Disposal Database nor identified as part of the ACOE's Disposal Area Monitoring System program.

Based on the information above, the NHCP recommends that the ACOE address the feasibility of utilizing alternative disposal locations to CADS and the ISDS. Grain size information provided in the Memorandum indicates that the majority of the material found at the project site is sand. While subtidal disposal off the beach at Wallis Sands State Park may be a practicable alternative for this material, are there other beaches in the region that could benefit from the addition of sand from the project? There are a number of beaches here in New Hampshire, as well as in York, Ogunquit and Wells, Maine, located closer to the project site than CADS, for which beach nourishment may be a practicable alternative. Similarly, it appears that practicable alternatives may exist to hauling the estimated amount of rock (< 10,000 yd^3) produced by the project to CADS or the ISDS. One such alternative involves the beneficial use of the rock to create an artificial reef to add structure to existing sandy/silty areas outside the federal navigation channel of the Piscataqua River or offshore. The NHCP has discussed this alternative with the New Hampshire Fish & Game Department (NHF&G) and recommends further consultation with NHF&G regarding this issue. With regard to the predominantly silt and clay material found in the vicinity of core B-5, the NHCP recommends reviewing potential upland disposal options. For example, there may be a need for this type of material from one or more of the municipalities (in New Hampshire and/or Maine) located along the Piscataqua River. The NHCP recognizes that the practicability of a particular upland disposal location will likely depend, in part, on the amount of material available. Once the ACOE determines the estimated amount of silt and clay material to be produced by the project, the NHCP would be glad to assist with efforts to identify potential users of this material.

Finally, as you are probably aware, the NHCP and the Pease Development Authority Division of Ports and Harbors have developed a Regional Dredged Material Management Plan (DMMP) aimed at addressing the future dredged material disposal needs of New Hampshire and southern Maine. The DMMP is comprised of an Ocean Disposal Site Designation Study and a Comprehensive Upland Dredge Material Disposal Study. The DMMP is a priority for the state of New Hampshire, and we have requested a Congressional appropriation for it in the ACOE's FY 2010 budget. Should monies be made available for the DMMP in FY2010, the ACOE could begin the scoping process for the environmental impact statement needed to formally designate CADS and consider alternative offshore disposal sites. This exercise, along with efforts to initiate the feasibility phase of the New Hampshire Comprehensive Upland Dredge Material Disposal Study, would help inform the decision-making process for identifying practicable disposal sites for the dredge material from the Piscataqua River FNIP.

The NHCP appreciates the opportunity to comment on the above-referenced memorandum. Please feel free to contact me should you have any questions.

Chris

Christian Williams

Federal Consistency Coordinator

NH Coastal Program

Pease Field Office

50 International Drive, Suite 200

Portsmouth, NH 03801

Phone: (603) 559-0025

Fax: (603) 559-1510

Classification: UNCLASSIFIED
Caveats: NONE

From:	Rogers, Catherine J NAE
To:	Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject:	FW: FW: Piscataqua River FNP
Date:	Monday, March 30, 2009 9:26:27 AM

Another one.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Wende_Mahaney@fws.gov [mailto:Wende_Mahaney@fws.gov]
Sent: Monday, March 30, 2009 8:19 AM
To: Rogers, Catherine J NAE
Cc: Maria_Tur@fws.gov
Subject: Re: FW: Piscataqua River FNP

Catherine: The Maine Field Office has no comments on the draft suitability determination in terms of resource impacts in Maine waters.

Thanks, Wende

>>
Wende S. Mahaney, Fish and Wildlife Biologist U.S. Fish and Wildlife Service
1168 Main Street
Old Town, ME 04468
Phone: (207) 827-5938, Ext. 20
Fax: (207) 827-6099
Cellular: (207) 944-2991
Inactive hide details for Maria Tur/R5/FWS/DOIMaria Tur/R5/FWS/DOI

Maria Tur/R5/FWS/DOI

03/27/2009 03:47 PM

To

"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

cc

Wende Mahaney/R5/FWS/DOI@FWS

Subject

Re: FW: Piscataqua River FNPWende Mahaney

From: Rogers, Catherine J NAE
To: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: FW: Piscataqua River FNP
Date: Monday, March 30, 2009 9:24:18 AM

Good to go for Maine.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Green, Robert [mailto:Robert.Green@maine.gov]
Sent: Monday, March 30, 2009 8:59 AM
To: Rogers, Catherine J NAE
Subject: RE: Piscataqua River FNP

Good morning,

The DEP has no comment on the draft suitability determination.

Bob.

Robert L. Green, Jr., Project Manager
Division of Land Resource Regulation
Bureau of Land and Water Quality
tel: 207-822-6350
fax: 207-822-6303

-----Original Message-----
From: Rogers, Catherine J NAE [mailto:Catherine.J.Rogers@usace.army.mil]

Sent: Friday, March 27, 2009 1:59 PM
To: Wende_Mahaney@mail.fwa.gov; Guza-Pabst.Olga@epamail.epa.gov; cwilliams@des.state.nh.us; Green, Robert
Cc: Rogers, Catherine J NAE; Heidebrecht, Richard W NAE; Nimeskern, Phillip W NAE
Subject: FW: Piscataqua River FNP

All,

Please find attached the draft suitability determination for the Piscataqua River Federal Navigation Improvement Project. Questions can be addressed to Phill, the PM-Dick Heidebrecht, or myself.

Please provide any comments by COB April 10th.

Thanks,
Catherine J. Rogers
Environmental Resources Section

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930

MAY 27 2008

John R. Kennelly
Chief, Planning Division
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: Portsmouth Harbor and Piscataqua River, New Hampshire and Maine Navigation Improvement Study

Dear Mr. Kennelly:

The National Marine Fisheries Service (NMFS) has received your letter dated April 22, 2008 regarding the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine Navigation Improvement Study. According to your letter, the proposed study involves the feasibility of modifying the existing federal navigation channel for Portsmouth Harbor by increasing the width of the upper turning basin from about 850 feet up to 1,250 feet. The proposed widening of the upper turning basin is to address safety concerns for liquid petroleum gas cryotankers and other large bulk cargo vessels, as well as limitations for the existing and future use of the terminals.

Your letter provided notification to NMFS of an initial meeting scheduled for May 13, 2008 at the New Hampshire Coastal Program Office in Portsmouth, NH to discuss the proposed project and various alternatives under consideration. NMFS staff attended that meeting and provided some preliminary comments to assist the Army Corps of Engineers (ACOE) in developing the necessary environmental reviews for the project, including an essential fish habitat (EFH) assessment. In addition, your letter requested NMFS provide written comments under the Fish and Wildlife Coordination Act (FWCA) and Magnuson-Stevens Fishery Conservation and Management Act (MSA), and initial consultation under the Endangered Species Act (ESA) no later than 15 days after the initial site meeting on May 13, 2008. Please be advised that the preparation of an EFH assessment by the ACOE is required prior to initiation of consultation with NMFS under the MSA. Further information pertaining to consultations under the MSA, FWCA, and ESA is provided below.

Essential Fish Habitat and Fish and Wildlife Coordination Act
The MSA and the FWCA require federal agencies to consult with one another on projects such as this. Insofar as a project involves EFH, as this project does, this process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure. NMFS believes that this project may result in adverse impacts on EFH and other NMFS trust resources, but, unfortunately, our ability to assess potential impacts on EFH and associated marine resources is being complicated by a lack of

information. Specifically, NMFS has not received an EFH assessment as is required pursuant to 50 CFR 600.920.

The required contents of an EFH assessment include: 1) a description of the action; 2) an analysis of the potential adverse effects of the action on EFH and the managed species; 3) the ACOE's conclusions regarding the effects of the action on EFH; and 4) proposed mitigation, if applicable. Other information that should be contained in the EFH assessment, if appropriate, includes: 1) the results of on-site inspections to evaluate the habitat and site-specific effects; 2) the views of recognized experts on the habitat or the species that may be affected; 3) a review of pertinent literature and related information; and 4) an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Fishery Resources

The Piscataqua River and Portsmouth Harbor serve as habitat for a variety of federally managed fishery resources managed under federal fishery management plans (FMP's) by the New England Fishery Management Council (NEFMC) and the Mid-Atlantic Fishery Management Council (MAFMC). This area has been identified as EFH for several species managed by the NEFMC and MAFMC, including all life history stages of Atlantic cod, pollock, red hake, white hake, winter and windowpane flounder, Atlantic halibut, Atlantic sea scallop, juvenile and adult Atlantic salmon and bluefish and larvae, juvenile and adult Atlantic sea herring. This area also serves as habitat for a number of anadromous fishery resources, including blueback herring, alewife, American shad, rainbow smelt, striped bass, and American eel. These diadromous species are present in the Piscataqua River and in the vicinity of the Portsmouth Harbor during spawning migrations. A number of recreationally and commercially important invertebrates are also found in the Piscataqua River and Portsmouth Harbor, including American lobster, American oyster, eastern oyster, softshell clam, and blue mussel. These species are also important forage base for a number of federally managed species, and, in the case of shellfish, provide important benthic habitats for these species.

Eelgrass

In addition to the marine and estuarine resources discussed above, eelgrass beds have been identified in the area of the proposed turning basin widening. Compared to historic distribution and biomass, eelgrass in the Piscataqua River has been declining steadily, with significant losses over the past decade (Short 2007). Causes for the declines in eelgrass beds in the Great Bay Estuary and the Piscataqua River have been attributed to reduced water clarity, which is believed to be a result of increased sediment and nutrient loading, siltation from dredging, and cumulative impacts in the watershed. Geographic Information System (GIS) data indicated the presence of eelgrass beds in shallow areas along the entire northern extent of the turning basin in 1996, with much reduced coverage in recent years. These data suggest eelgrass may currently exist within, or adjacent to, the proposed footprint of the project. Eelgrass beds have also been mapped down-river of the turning basin, and measures should be taken to avoid direct and indirect impacts on beds within the Piscataqua River caused by dredging, anchoring, and suspended sediments from the proposed project. A current and thorough eelgrass survey is needed to determine the extent of eelgrass that presently exists in the area. In addition, while some of the shallow portions of the river in the turning basin may not currently contain eelgrass beds, these areas represent historic eelgrass beds that may return or may be restored if water clarity in the watershed improves. Consequently, new dredging in shallow areas of the river should be avoided to the extent possible.

Removal of Rock Ledge

According to your letter, the material to be removed in the proposed project includes hard sandy till and rock ledge. According to the discussions at the May 13, 2008 meeting, the characterization of the rock ledge and how the material will be removed has not been determined at this time. Characterization of the rock ledge and methods for removal should be completed prior to the EFH assessment in order for NMFS to provide appropriate conservation recommendations. The removal of rock ledge by blasting during the Boston Harbor Maintenance Dredging Project in 2007 resulted in thousands of fish, including blueback herring, alewife, menhaden, and cunner being killed. These mortalities occurred despite the use of a number of best management practices during blasting operations. We understand the ACOE is planning to convene an interagency underwater blasting technical workgroup in order to develop a blasting plan for future Boston Harbor dredging projects. The results of this technical workgroup will be critical in establishing blasting protocols and environmental protection measures for the proposed Portsmouth Harbor and Piscataqua River Navigation Improvement Study, should blasting be required.

Because the Piscataqua River and Portsmouth Harbor support a number of federally managed species and diadromous species, dredging and blasting (if required) should be restricted to the winter work window. The Piscataqua River serves as winter flounder spawning habitat, as well as a migratory corridor for individuals spawning in the Great Bay and other areas of the estuary. Diadromous species, such as blueback herring and alewife, utilize the Piscataqua River as a migratory corridor to reach spawning habitats in the upper reaches of the watershed. As such, a no-dredge work window from March 15 to November 15 will likely be necessary to protect the spawning and egg development habitat of these species.

Disposal Alternatives

According to your letter, the alternatives for dredged material disposal include Cape Arundel Disposal Site near Cape Arundel, Maine, the Isle of Shoals located outside Portsmouth Harbor, beach nourishment at Wallis Sands Beach, Rye Beach, and/or other suitable beaches, riverine disposal, and upland disposal. As you may know, the Cape Arundel Disposal Site is very near its maximum capacity and is planned for closure around 2010. Consequently, this disposal site may not be available for this proposed project. In addition, the in-river disposal alternative may not be the least damaging practicable alternative. In-river disposal elevates the suspended sediment loads within the river compared to dredging alone, and can increase the detrimental effects to aquatic organisms. In particular, elevated suspended sediment loads over the winter months may adversely affect eelgrass beds during a time when the plants have limited energy reserves and reduced levels of energy production through photosynthesis (F. Short, personal communication). Furthermore, there is some evidence that in-river disposal for past dredging activities conducted down-river of the proposed project has exacerbated the shoaling in that section of the river, resulting in more frequent need to dredge (Bilgili et al. 1996).

Endangered Species Act

No species listed by NMFS under the Endangered Species Act (ESA) of 1973, as amended, are known to occur in the Piscataqua River. While listed whales and sea turtles occur seasonally off the coast of New Hampshire, the occurrence of any of these species in Portsmouth Harbor is extremely unlikely. As such, no consultation pursuant to Section 7 of the ESA is necessary for the proposed project. Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law, and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. Should you have any questions regarding Section 7 consultation, please contact Julie Crocker in NMFS' Protected Resources Division (PRD) at (978)281-9300 x6530.

Technical Assistance for Candidate Species

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) are distributed along the entire East Coast of the United States and have been designated a Candidate Species by NMFS. The best available scientific information indicates that historically the Piscataqua River may have supported a spawning population of Atlantic sturgeon. In 1990, a large gravid female Atlantic sturgeon was captured in a small mesh gill-net at the head of tide in the Salmon Falls River, which is a tributary to the Piscataqua (Atlantic Sturgeon Status Review Team, 2007). The Great Bay estuary system continues to serve as a foraging area for subadults, and evidence suggests that adults may make forays up the Piscataqua River. As a candidate species, Atlantic sturgeon receive no substantive or procedural protection under the ESA; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on Atlantic sturgeon from any proposed project. In 2006, NMFS initiated a status review for this species to determine if listing as threatened or endangered under the ESA is warranted. NMFS is currently considering the information presented in the new Status Review to determine if any listing action pursuant to the ESA is warranted at this time. If it is determined that listing is warranted, a final rule listing the species could be published within a year from the date of publication of the listing determination or proposed rule. The Status Review report is available at: *http://www.nero.noaa.gov/prot_res/CandidateSpeciesProgram/AtlSturgeonStatusReviewReport.pdf*. Should you have any questions regarding Atlantic sturgeon, please contact Kim Damon-Randall in NMFS' PRD at (978)281-9300 x6535.

Conclusions
We appreciate the opportunity to provide these preliminary comments, and we look forward to receiving your EFH assessment for the proposed project. If you have any questions regarding EFH or FWCA consultation, please contact Michael Johnson at 978-281-9130. For questions regarding ESA consultation, please contact Julie Crocker or Kim Damon-Randall.

Sincerely,

Louis A. Chiarella

Louis A. Chiarella
New England Field Office Supervisor
for Habitat Conservation

cc: Olga Guza, US EPA
Catherine Rogers, ACOE
Mary Colligan, PRD
Bruce Smith, NHFGD
Ted Diers, NH DES Coastal Program

References

Atlantic Sturgeon Status Review Team. 2007. Status Review of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Report to National Marine Fisheries Service, Northeast Regional Office. February 23, 2007. 174 pp.

Bilgili A, Swift MR, Celikkol B. 1996. Shoal formation in the Piscataqua River, New Hampshire. Estuaries 19(3): 518-525.

Short F. 2007. Eelgrass distribution in the Great Bay Estuary, 2005. Final Report to the New Hampshire Estuaries Project. 6 pp.

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Melvin P. Cote, Manager
Water Quality Unit
U.S. Environmental Protection Agency
1 Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Dear Mr. Cote:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

The purpose of this study is to determine the feasibility of modifying the existing Federal navigation project for Portsmouth Harbor by increasing the width of the upper turning basin from about 850 feet up to a width of 1,250 feet at the same current turning basin depth. The existing width of the turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. The current turning basin also limits the existing and future use of the terminals. Two alternate locations for a turning basin have been examined, they include:

a. a turning basin upstream of the current Federal navigation project, at the confluence of Great/Little Bay with the Piscataqua River and,

b. a location downstream and southwest of the current turning basin.

See the enclosed figure for these turning basin locations. These turning basin areas are not preferred due to the more difficult vessel turning and maneuvering required for their use, and the greater amounts of ledge removal.

Preliminary quantity estimates indicate that widening the existing turning basin from a minimum of 1,000 feet to a maximum of 1,250 feet would require the removal of between 270,000 cubic yards to over 800,000 cubic yards of mostly sand and gravel, with a small amount of rock ledge. Studies are underway to determine the likely design vessels, vessel turning requirements, and the impacts of wind and currents on the turning basin design. Following design optimization of basin dimensions, we plan to refine the quantity of ordinary dredged material and ledge that would require removal. Borings and sediment sampling indicate the non-rock material is composed primarily of hard sandy till. Beneficial use opportunities for this material and the rock will be examined with Maine and New Hampshire. Alternatives considered for disposal of the sandy dredged material include the Cape Arundel disposal site located off of Cape Arundel, Maine, the Isle of Shoals disposal site outside Portsmouth Harbor, beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches, riverine disposal and upland disposal. Beneficial reuse of the rock ledge will also be considered.

The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the authority for the Clean Water Act, Marine Protection, Research, and Sanctuaries Act, the Clean Air Act, and the National Environmental Policy Act be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Ms. Patricia Kurkul
NOAA Fisheries
One Blackburn Drive
Gloucester, Massachusetts 01930-2298

Dear Ms. Kurkul:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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a. a turning basin upstream of the current Federal navigation project, at the confluence of Great/Little Bay with the Piscataqua River and,

b. a location downstream and southwest of the current turning basin.

See the enclosed figure for these turning basin locations. These turning basin areas are not preferred due to the more difficult vessel turning and maneuvering required for their use, and the greater amounts of ledge removal.

Preliminary quantity estimates indicate that widening the existing turning basin from a minimum of 1,000 feet to a maximum of 1,250 feet would require the removal of between 270,000 cubic yards to over 800,000 cubic yards of mostly sand and gravel, with a small amount of rock ledge. Studies are underway to determine the likely design vessels, vessel turning requirements, and the impacts of wind and currents on the turning basin design. Following design optimization of basin dimensions, we plan to refine the quantity of ordinary dredged material and ledge that would require removal. Borings and sediment sampling indicate the non-rock material is composed primarily of hard sandy till. Beneficial use opportunities for this material and the rock will be examined with Maine and New Hampshire. Alternatives considered for disposal of the sandy dredged material include the Cape Arundel disposal site located off of Cape Arundel, Maine, the Isle of Shoals disposal site outside Portsmouth Harbor, beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches, riverine disposal and upland disposal. Beneficial reuse of the rock ledge will also be considered.

The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the Fish and Wildlife Coordination Act, Essential Fish Habitat consultation under the Magnuson-Stevens Fishery Conservation and Management Act, and initial consultation under the Endangered Species Act be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. William Neidermyer, Federal Activities Coordinator
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

Dear Mr. Neidermyer:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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See the enclosed figure for these turning basin locations. These turning basin areas are not preferred due to the more difficult vessel turning and maneuvering required for their use, and the greater amounts of ledge removal.

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The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that a Planning Aid letter under the Fish and Wildlife Coordination Act, and initial consultation under the Endangered Species Act be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Chris Williams, Federal Consistency Coordinator
New Hampshire Coastal Program
Department of Environmental Services
50 International Drive, Suite 200
Pease Tradeport
Portsmouth, New Hampshire 03801

Dear Mr. Williams:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the Coastal Zone Management Act and other pertinent authorities or policies be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Thomas S. Burack, Commissioner
Department of Environmental Services
29 Hazen Drive, P.O. Box 95
Concord, New Hampshire 03302-0095

Dear Mr. Burack:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

The purpose of this study is to determine the feasibility of modifying the existing Federal navigation project for Portsmouth Harbor by increasing the width of the upper turning basin from about 850 feet up to a width of 1,250 feet at the same current turning basin depth. The existing width of the turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. The current turning basin also limits the existing and future use of the terminals. Two alternate locations for a turning basin have been examined, they include:

a. a turning basin upstream of the current Federal navigation project, at the confluence of Great/Little Bay with the Piscataqua River and,

b. a location downstream and southwest of the current turning basin.

See the enclosed figure for these turning basin locations. These turning basin areas are not preferred due to the more difficult vessel turning and maneuvering required for their use, and the greater amounts of ledge removal.

Preliminary quantity estimates indicate that widening the existing turning basin from a minimum of 1,000 feet to a maximum of 1,250 feet would require the removal of between 270,000 cubic yards to over 800,000 cubic yards of mostly sand and gravel, with a small amount of rock ledge. Studies are underway to determine the likely design vessels, vessel turning requirements, and the impacts of wind and currents on the turning basin design. Following design optimization of basin dimensions, we plan to refine the quantity of ordinary dredged material and ledge that would require removal. Borings and sediment sampling indicate the non-rock material is composed primarily of hard sandy till. Beneficial use opportunities for this material and the rock will be examined with Maine and New Hampshire. Alternatives considered for disposal of the sandy dredged material include the Cape Arundel disposal site located off of Cape Arundel, Maine, the Isle of Shoals disposal site outside Portsmouth Harbor, beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches, riverine disposal and upland disposal. Beneficial reuse of the rock ledge will also be considered.

The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the Fish and Wildlife Coordination Act be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Harry T. Stewart, Director
Water Division
New Hampshire Department of Environmental Services
29 Hazen Drive, P.O. Box 95
Concord, New Hampshire 03302-0095

Dear Mr. Stewart:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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a. a turning basin upstream of the current Federal navigation project, at the confluence of Great/Little Bay with the Piscataqua River and,

b. a location downstream and southwest of the current turning basin.

See the enclosed figure for these turning basin locations. These turning basin areas are not preferred due to the more difficult vessel turning and maneuvering required for their use, and the greater amounts of ledge removal.

Preliminary quantity estimates indicate that widening the existing turning basin from a minimum of 1,000 feet to a maximum of 1,250 feet would require the removal of between 270,000 cubic yards to over 800,000 cubic yards of mostly sand and gravel, with a small amount of rock ledge. Studies are underway to determine the likely design vessels, vessel turning requirements, and the impacts of wind and currents on the turning basin design. Following design optimization of basin dimensions, we plan to refine the quantity of ordinary dredged material and ledge that would require removal. Borings and sediment sampling indicate the non-rock material is composed primarily of hard sandy till. Beneficial use opportunities for this material and the rock will be examined with Maine and New Hampshire. Alternatives considered for disposal of the sandy dredged material include the Cape Arundel disposal site located off of Cape Arundel, Maine, the Isle of Shoals disposal site outside Portsmouth Harbor, beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches, riverine disposal and upland disposal. Beneficial reuse of the rock ledge will also be considered.

The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the Clean Water Act, Clean Air Act, Fish and Wildlife Coordination Act or other pertinent authorities be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Donald S. Clarke, Acting Executive Director
New Hampshire Fish and Game Department
11 Hazen Drive
Concord, New Hampshire 03301

Dear Mr. Clarke:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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Preliminary quantity estimates indicate that widening the existing turning basin from a minimum of 1,000 feet to a maximum of 1,250 feet would require the removal of between 270,000 cubic yards to over 800,000 cubic yards of mostly sand and gravel, with a small amount of rock ledge. Studies are underway to determine the likely design vessels, vessel turning requirements, and the impacts of wind and currents on the turning basin design. Following design optimization of basin dimensions, we plan to refine the quantity of ordinary dredged material and ledge that would require removal. Borings and sediment sampling indicate the non-rock material is composed primarily of hard sandy till. Beneficial use opportunities for this material and the rock will be examined with Maine and New Hampshire. Alternatives considered for disposal of the sandy dredged material include the Cape Arundel disposal site located off of Cape Arundel, Maine, the Isle of Shoals disposal site outside Portsmouth Harbor, beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches, riverine disposal and upland disposal. Beneficial reuse of the rock ledge will also be considered.

The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the Fish and Wildlife Coordination Act or other pertinent authorities be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Dr. Frederick Short, Research Professor
Marine Program
University of New Hampshire
24 Colovos Road
Durham, New Hampshire 03824

Dear Dr. Short:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

Glenn D. Normandeau, Coastal Commissioner
New Hampshire Fish and Game Department
10 Pickering Avenue
Portsmouth, New Hampshire 03801

Stephen J. Nottonson, Rockingham County Commissioner
New Hampshire Fish and Game Department
24 Worthley Road
Derry, New Hampshire 03038

Douglas Grout, Acting Marine Division Chief
Marine Fisheries Division
New Hampshire Fish and Game Department
11 Hazen Drive
Concord, New Hampshire 03301

Steve Perry, Inland Fisheries Division Chief
Inland Fisheries Division
New Hampshire Fish and Game Department
11 Hazen Drive
Concord, New Hampshire 03301

John Kanter, Coordinator
Nongame and Endangered Wildlife Program
New Hampshire Fish and Game Department
11 Hazen Drive
Concord, New Hampshire 03301

Ralph Johnston, Executive Secretary
Region 3 (Southeast New Hampshire/Seacoast)
New Hampshire Fish and Game Department
225 Main Street,
Durham, New Hampshire 03824

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. David P. Littell, Commissioner
Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

Dear Mr. Littell:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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It is requested that written comments under the Clean Water Act, Clean Air Act, Fish and Wildlife Coordination Act or other pertinent authorities be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. George Lapointe, Commissioner
Department of Marine Resources
21 State House Station
Augusta, Maine 04333-0021

Dear Mr. Lapointe:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

The purpose of this study is to determine the feasibility of modifying the existing Federal navigation project for Portsmouth Harbor by increasing the width of the upper turning basin from about 850 feet up to a width of 1,250 feet at the same current turning basin depth. The existing width of the turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. The current turning basin also limits the existing and future use of the terminals. Two alternate locations for a turning basin have been examined, they include:

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The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the Fish and Wildlife Coordination Act be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Roland Martin, Commissioner
Maine Department of Inland Fisheries and Wildlife
284 State Street
41 State House Station
Augusta, Maine 04333-0041

Dear Mr. Martin:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the Fish and Wildlife Coordination Act and a list of State listed species be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Ms. Martha Freeman, Director
Maine State Planning Office
184 State Street
Augusta, Maine 04333

Dear Ms. Freeman:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed.

It is requested that written comments under the Coastal Zone Management Act and other pertinent authorities or policies be provided no later than 15 days after the initial site visit. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Mr. Todd Burrowes
Maine Coastal Program
State Planning Office
38 State House Station
Augusta, Maine 04333-0038

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Thomas Morgan, Town Planner
Town of Newington
205 Nimble Hill Road
Newington, New Hampshire 03801

Dear Mr. Morgan:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

The purpose of this study is to determine the feasibility of modifying the existing Federal navigation project for Portsmouth Harbor by increasing the width of the upper turning basin from about 850 feet up to a width of 1,250 feet at the same current turning basin depth. The existing width of the turning basin causes major safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels. The current turning basin also limits the existing and future use of the terminals. Two alternate locations for a turning basin have been examined, they include:

a. a turning basin upstream of the current Federal navigation project, at the confluence of Great/Little Bay with the Piscataqua River and,

b. a location downstream and southwest of the current turning basin.

See the enclosed figure for these turning basin locations. These turning basin areas are not preferred due to the more difficult vessel turning and maneuvering required for their use, and the greater amounts of ledge removal.

Preliminary quantity estimates indicate that widening the existing turning basin from a minimum of 1,000 feet to a maximum of 1,250 feet would require the removal of between 270,000 cubic yards to over 800,000 cubic yards of mostly sand and gravel, with a small amount of rock ledge. Studies are underway to determine the likely design vessels, vessel turning requirements, and the impacts of wind and currents on the turning basin design. Following design optimization of basin dimensions, we plan to refine the quantity of ordinary dredged material and ledge that would require removal. Borings and sediment sampling indicate the non-rock material is composed primarily of hard sandy till. Beneficial use opportunities for this material and the rock will be examined with Maine and New Hampshire. Alternatives considered for disposal of the sandy dredged material include the Cape Arundel disposal site located off of Cape Arundel, Maine, the Isle of Shoals disposal site outside Portsmouth Harbor, beach nourishment at Wallis Sands Beach, Rye Beach and/or other suitable beaches, riverine disposal and upland disposal. Beneficial reuse of the rock ledge will also be considered.

The initial coordinated site visit will begin at 10:00 am in the New Hampshire Coastal Program Pease Field Office, 50 International Drive in Portsmouth, New Hampshire, on May 13, 2008. Directions are enclosed. The proposed project and alternatives under consideration will be discussed. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231 or the following email address: catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Daniel J. Blanchette, Administrative Assistant
Town of Eliot
1333 State Road
Eliot, Maine 03903

Dear Mr. Blanchette:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 mles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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See the enclosed figure for these turning basin locations. These turning basin areas are not preferred due to the more difficult vessel turning and maneuvering required for their use, and the greater amounts of ledge removal.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 22, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Harold Place, Harbormaster
Town of Eliot
182 Pleasant Street
Eliot, Maine 03903

Dear Mr. Place:

The U.S. Army Corps of Engineers, New England District would like to invite you and/or a member(s) of your staff to participate in a coordinated site visit for the Portsmouth Harbor and Piscataqua River, New Hampshire and Maine navigation improvement study. The Piscataqua River forms the lower portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the Piscataqua River, is about 45 miles northeast of Boston Harbor, Massachusetts, and 37 miles southwest of Portland Harbor, Maine. The existing Federal navigation project includes a 400-foot wide, 35-foot deep mean lower low water (MLLW) navigation channel. This channel extends from deep water in Portsmouth Harbor, from river mile 2.6, upstream to river mile 8.8. The project also includes two 35-foot deep MLLW turning basins; one turning basin 950-foot wide located upstream of Boiling Rock, and a second turning basin 850-foot wide located at the upstream end of the Federal channel. See the enclosed figure for the current authorized navigation project.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
Post Office Box 369
Portsmouth, New Hampshire 03802

PART 5

CORRESPONDENCE RECEIVED DURING PREPARATION AND APPROVAL OF THE RECONNAISSANCE REPORT AND FEASIBILITY COST-SHARING AGREEMENT

PEASE DEVELOPMENT AUTHORITY

360 Corporate Drive, Pease International Tradeport, Portsmouth, NH 03801
(603) 433-6088 Fax: (603) 427-0433 TDD: Relay NH 1-800-735-2964

June 7, 2006

Curtis L. Thalken
Colonel, Corps of Engineers
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: Agreement between The Department of Army and the PDA

Dear Mr. Thalken:

Enclosed please find four (4) original of the Feasibility Cost Sharing Agreement (FCSA) for the Portsmouth Harbor and Piscataque River Navigation for signature. Please sign and return one (1) fully executed original to the Pease Development Authority.

Thank you for your attention to this matter.

Sincerely,

Jessica L Patterson

Jessica L. Patterson
Legal Secretary

:jlp

Enclosures

cc: Mark H. Gardner, Staff Attorney
Geno J. Marconi, Director, Division of Ports & Harbors

CAP 06-015

MICHAEL L. BUCKLEY, CPA
Legislative Budget Assistant
(603) 271-3161
JEFFRY A. PATTISON
Deputy Legislative Budget Assistant
(603) 271-3161

State of New Hampshire
OFFICE OF LEGISLATIVE BUDGET ASSISTANT
State House, Room 102
Concord, New Hampshire 03301

CATHERINE A. PROVENCHER, CPA
Director, Audit Division
(603) 271-2785

06-05-06 A08:37 IN

June 1, 2006

Geno Marconi, Director
Pease Development Authority
Division of Ports and Harbors
P. O. Box 369
Portsmouth, NH 03802-0369

Dear Director Marconi,

The Capital Budget Overview Committee, pursuant to the provisions of RSA 12-G:46, on May 31, 2006 approved the request of the Pease Development Authority, Division of Ports and Harbors to expend up to $375,000 from the Harbor Dredging and Pier Maintenance Fund for the PDA's share of the expense for a project feasibility study for engineering and design associated with expanding the Piscataqua River Turning Basin, as specified in your letter dated May 2, 2006.

Sincerely,

Michael L Buckley

Michael L. Buckley, CPA
Legislative Budget Assistant

MLB/car
Attachment

FAXED 6.5.06
Mark
John

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 26, 2006

Engineering/Planning Division
Planning Branch

Mr. Geno Marconi
Director, Pease Development Authority
Division of Ports and Harbors
P.O. Box 369
Portsmouth, New Hampshire 03802

Dear Mr. Marconi:

Enclosed for your signature are four original copies of the Feasibility Cost Sharing Agreement (FCSA) for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project. Each FCSA includes a copy of the Project Management Plan for the feasibility study. We request you sign but not date the four agreements and return them to this office for my signature. We will return one fully executed copy to you.

We look forward to working with you on this effort. If you have any questions regarding the study or require additional information, please call me at (978) 318-8220 or Ms. Barbara Blumeris of my staff at (978) 318-8737.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Commander

Enclosures

PEASE DEVELOPMENT AUTHORITY

360 Corporate Drive, Pease International Tradeport, Portsmouth, NH 03801
(603) 433-6088 Fax: (603) 427-0433 TDD: Relay NH 1-800-735-2964

February 21, 2006

Ms. Barbara Blumeris,
Project Manager / Planning Branch
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Re: Piscataqua River Navigation Improvement Project Study

Dear Ms. Blumeris:

I have had the opportunity to review the draft agreement in connection with the Piscataqua River Navigation Improvement Project Study which you sent to Geno Marconi. This agreement tracks a nearly identical agreement which Pease Development Authority (PDA)entered into with the US Army Corp of Engineers for Hampton Harbor. However, in the latter agreement PDA and the US Army Corp of Engineers agreed to the inclusion of an additional section which addressed the provision of New Hampshire State law which prohibits agencies of the State from entering into contracts without a corresponding appropriation or continuing appropriation of funds. See Article XI of the Hampton Harbor agreement which I have enclosed for your review.

PDA requests that this language be included in the Piscataqua River Study Project. Kindly give me a call at your convenience so that we my discuss this matter further.

Thank you for your attention to this matter.

Sincerely,

Mark H. Gardner
Staff Attorney

Enclosures

cc w/o enclosures: George M. Bald
Geno Marconi
Leon Kenison

P:\PortAuthority\Dredging\blumerisace022106.wpd

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
GENERAL LEE AVENUE
BROOKLYN, NY 11252-6700

IN REPLY REFER TO

CENAD-NAE/NAU DST (1105-2-10b) 21 October 2004

MEMORANDUM FOR Commander, U.S. Army Engineer District, New England, ATTN: CENAE-EP-P (Attn: Mr. Dulong)

SUBJECT: Portsmouth Harbor and Piscataqua River, New Hampshire and Maine – Navigation Improvement Project – Expedited Reconnaissance Investigation

1. Reference CENAE-EP-P memorandum dated August 31, 2004, subject as above.

2. Based upon staff review of the Section 905 (b) analysis for Portsmouth and Piscataqua River, NAD concurs that a Federal interest in further investigations has been established for the project purpose of navigation. The Section 905 (b) phase of the subject reconnaissance study is therefore approved. The district should prepare a project management plan (PMP) and initiate negotiations with the local Non-Federal sponsor regarding a feasibility cost-sharing aggreement (FCSA) for the cost-shared feasibility phase.

3. For further information, please contact Mr. Peter Doukas of the NAE/NAU DST at 718.765.7068.

Peter Blum

for Joseph R. Vietri
Planning and Policy Community of Practice
Chief, Program Support Division
Programs Directorate

PEASE DEVELOPMENT AUTHORITY

Division of Ports and Harbors
PO Box 369, Portsmouth NH 03802-0369
(603) 436-8500 Fax: (603) 436-2780

September 23, 2004

Mr. John Kennelly
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

The Pease Development Authority Division of Ports and Harbors (PDA-DPH) has received and reviewed the Navigation Improvement Study, Expedited Reconnaissance Report, Section 905 (b) (WRDA86) Analysis, Army Corps of Engineers (ACOE), August, 2004.

PDA-DPH has reviewed the report with the PDA engineering staff and we concur with its findings. At this time, PDA-DPH is expressing its intent to act as the non-federal sponsor for the Navigation Improvement Study. Please send to us the requisite Memorandum of Understanding (MOU) for our review. Execution of the Memorandum of Understanding will require an approval by the PDA Board of Directors.

In the event that PDA-DPH enters into an MOU with ACOE, we are aware that the Division will be responsible for 50% of costs for the Feasibility Study, 35% of the project implementation costs including any necessary dredged material disposal facilities and 100% of the any cost to acquire land, easements, rights of way and/or relocations. The Division is also aware that it will be responsible for obtaining any local or state permits or approvals necessary to construct the project, other than Water Quality Certifications and Coastal Zone Management Consistency Concurrence which are the ACOE's responsibility.

If you require any additional information from us regarding this matter, please feel free to contact me directly.

Sincerely,

Geno J. Marconi
Director, PDA-DPH

Cc: George M. Bald
Leon Kenison
Lynn Marie Hinchee

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

CENAE-EP-P

31 August 2004

MEMORANDUM FOR Commander, U.S. Army Engineer Division, North Atlantic, ATTN: CENAD-ET-P (Mr. Cocchieri), Fort Hamilton Military Community, Bldg 301, Brooklyn, NY 11252

SUBJECT: Portsmouth Harbor and Piscataqua River, New Hampshire and Maine - Navigation Improvement Project - Expedited Reconnaissance Investigation

1. Enclosed for your use are eight (8) copies of the 905(b) Analysis, and Quality Control Report and Certification. A copy of the letter of intent from the non-Federal sponsor, the State of New Hampshire, Pease Development Authority, Division of Ports and Harbors, will be forthcoming. This submittal is in keeping with the current guidance for expedited reconnaissance studies.

2. If you have any questions or require additional information, please contact Mr. Richard Heidebrecht, the study manager, at (978) 318- 8513.

FOR THE COMMANDER:

Encls

DAVID L. DULONG, P.E.
Chief, Engineering/Planning Division

CF: CEMP-NAD (Jeff Groska)

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

May 22, 2003

REPLY TO:
ATTENTION OF:
Engineering/Planning Division
Planning Branch

Honorable Judd Gregg
United States Senate
393 Russell Senate Office Building
Washington, DC 20510-2904

Dear Senator Gregg:

This is in response to your April 18, 2003 letter forwarding a copy of a letter from the Pease Development Authority (PDA), Division of Ports and Harbors describing three dredging related initiatives in New Hampshire including the Portsmouth Harbor and Piscataqua River Federal Navigation Project (FNP). The three State initiatives are a study to expand the turning basin at the head of the deep-draft channel at Portsmouth, a study of in-river dredged material disposal practices at Portsmouth Harbor, and a study of dredged material disposal needs and alternatives for New Hampshire harbors.

Concerning potential improvements to Portsmouth Harbor, the authorized FNP provides for a 35-foot deep channel, 400 feet wide extending from deep water in Portsmouth Harbor, and three 35-foot turning basins. The Water Resources Development Act of 1986, authorized the enlargement of the two lower turning basins and channel reaches to accommodate larger tank ships and bulk cargo carriers. These improvements were completed in 1990. That project did not address widening the upper turning basin and approach channel because of a lack of upstream traffic.

The New Hampshire Division of Ports and Harbors now asserts that upstream traffic has increased, both in terms of numbers of transits, users, and vessels sizes, to warrant another look at widening the turning basin and approaches to the upper portion of the project. The narrowness of the channel and turning basin together with swift and rapidly changing tidal currents limits the times of operation for larger craft. Navigation improvements to the upper reach of Portsmouth Harbor would increase safety and efficiency of harbor operations for larger craft.

Section 437 of the Water Resources Development Act of 2000 (WRDA 2000) authorized a study to determine the feasibility of expanding the turning basin at the head of the 35-foot channel. Funds to initiate a reconnaissance study have not been appropriated. Should funds become available in the future, we would initiate a 12-month expedited section 905(b) reconnaissance study, at full Federal expense, in cooperation with the PDA to evaluate widening the upper reach of the Portsmouth Harbor channel and upper turning basin and approaches at the current depth of 35 feet.

Concerning in-river disposal practices in the Piscataqua River, Mr. Marconi's letter states that disposal of dredged material has been an issue for many years. Historically, maintenance dredging of the 35-foot channel has been required about every 7 years, and typically involves removal of a small quantity of clean sand and cobbles from the upper channel in the vicinity of the Simplex Wire and Cable Company. The last maintenance dredging was performed in 2000 when 7,900 cubic yards of material were removed and placed in a deep spot in the channel about 3,000 feet downstream of the dredging area. Maintenance dredging operations were performed in a similar manner in 1984 and 1991.

New Hampshire state regulatory agencies have, in the past expressed concern with placing material at either of the two previously used riverine disposal sites. Their concern is that material placed at these sites migrates back to the dredging area and contributes to the shoaling in the channel thereby increasing the frequency that dredging is required. We are also familiar with a sand transport study of this area conducted by the University of New Hampshire. We agree that material in a tidally influenced estuarine environment can potentially move upstream from a downstream location. However, during two maintenance-dredging operations prior to 1984 when the dredged material was taken completely out of the river system, the shoaling returned at about the very same frequency. The Corps has found in-river disposal to be the least cost, environmentally suitable dredged material management alternative for future maintenance dredging. We understand the State's concerns and are willing to work with the State to identify other potential cost-effective solutions while continuing to work with them to keep the river maintained.

The Corps has discussed with the State their request for a statewide study of dredged material disposal alternatives and management options for navigation projects. WRDA 2000 also authorized the Corps to undertake this study at a cost of $500,000. However, as with the turning basin study, the authorized funds have not been appropriated to begin this effort. Should funds become available in the future, we would initiate a regional dredged material management study, in cooperation with the PDA, the State Planning Office, and other agencies.

Should you have any additional questions on any of these initiatives, please feel free to contact me at (978) 318-8220, or Mr. John Kennelly of the District's Planning Branch may be reached at (978) 318-8505.

Sincerely,

William [illegible] Deputy District Engineer
for Thomas L. Koning
Colonel, Corps of Engineers
District Engineer

JUDD GREGG
NEW HAMPSHIRE

COMMITTEES:
HEALTH, EDUCATION, LABOR AND PENSIONS, *Chairman*
APPROPRIATIONS
BUDGET

United States Senate
WASHINGTON, DC 20510–2904
(202) 224–3324

OFFICES:

125 NORTH MAIN STREET
CONCORD, NH 03301
(603) 225–7115

41 HOOKSETT ROAD, UNIT 2
MANCHESTER, NH 03104
(603) 622–7979

60 PLEASANT STREET
BERLIN, NH 03570
(603) 752–2604

16 PEASE BOULEVARD
PORTSMOUTH, NH 03801
(603) 431–2171

Reply to:
Portsmouth Office

April 18, 2003

Colonel Thomas L. Koning
District Engineer
U. S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel:

I am writing to forward the enclosed letter I received from the Pease Development Authority Division of Ports and Harbors describing three dredging related initiatives important for the continued prosperity of the State of New Hampshire. Any information you can provide at the present time describing the status of these three projects and funding availability would be greatly appreciated.

Thank you for your time and assistance. I look forward to your response.

Sincerely,

Judd Gregg
U. S. Senator

JG/jc

Enclosure

PEASE DEVELOPMENT AUTHORITY

Division of Ports and Harbors
PO Box 369, Portsmouth NH 03802-0369
(603) 436-8500 Fax: (603) 436-2780

RECEIVED
APR 18 2003

April 14, 2003

Senator Judd Gregg
16 Pease Boulevard
Pease International Tradeport
Portsmouth, NH 03801

Dear Senator Gregg:

As you know, dredging has been and continues to be a subject of great importance to the Division of Ports and Harbors. The need for dredging projects is essential for the prosperity of the State of New Hampshire.

Presently, the Army Corps of Engineers is looking to conduct three projects in the Portsmouth Harbor/Piscataqua River that address dredging issues. The first project involves a condition survey and study of the feasibility to expand the Upper River Turning Basin from 800 feet to 1,000 feet. Ships using this turning basin are up to 739 feet in length and pilots report the Turn Basin has diminished in size to 770 feet.

Disposal of dredge material has been an issue for years which brings me to the second project of conducting a study in estuarine of the disposal of dredge materials. The Corps has been dropping dredge material from the "Simplex Shoal" in a hole 6000 feet down river from the dredge site. This practice has been one of controversy and the Corps and Division would like to put closure to the controversy.

The third project involves an investigation of upland disposal of all dredge material from the state of New Hampshire for which the Water Resource Act of 2000 has allotted $500,000.00.

The Pease Development Authority, Division of Ports and Harbors fully supports the aforementioned projects.

Respectfully,

Geno J. Marconi, Director
PDA-DPH

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX B
PROJECT AUTHORIZATION AND WORK HISTORY

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
PORTSMOUTH, NEW CASTLE AND NEWINGTON, NEW HAMPSHIRE
& KITTERY AND ELLIOT, MAINE
LIST OF AUTHORIZATIONS

Authorization	**Work Authorized & Constructed**	**Construction**
Act of 23 May 1828 & Act of 3 July 1832, 4 Stat. 551, Ch. 153	Removal of Obstructions from the Berwick Branch of the Piscataqua River (Present Day's Salmon Falls River) including Providing a Depth of -6 Feet MHW over Quamplegan Rapids.	FY1828 – FY1833
River & Harbor Act of 3 March 1879	1) Stone breakwater between Goat Island and Great Island, top elevation 2.5 feet MLW, 820 feet long, top width of 10 feet, 2) the removal of Gangway Rock to -20 feet MLW, and 3) removal of the southwest point (the outer 135-feet) of the ledge at Badgers Island to -10 feet MLW. See: Senate Exec. Doc. #29, 45th Congress, 3d Session, 16 January 1879 and House Exec. Doc. #71, 48th Congress, 2nd Session, 7 January 1885	Breakwater completed Sept 1879 – Nov 1880 to +2 feet MLW Gangway rock removal April 1881 – Jan 1888 Badgers Is. removal May 1882 – Fall 1891
River & Harbor Act 19 September 1890	Removal of Pier Rock to -12 feet MLW. See: Annual Report for 1891, Appendix A-21, Page 604 and Annual Report for 1892, Appendix A-20, Page 527	Fall of 1891
Annual Report 1887, Appendix A-13, Page 463	Depth projected for the removal of the ledge at the southeast point of Badger's Island increased to -18 feet MLW. See: Annual Report for 1892, Appendix A-20, Page 527	Fall 1889 – Fall 1891
River & Harbor Act of 3 September 1954	Provide 35-foot channel by removal of ledge at Gangway Rock, Badgers Island, and Boiling Rock, all to -35 Feet MLW. See: House Doc. #556, 82nd Congress, 2nd Session, 30 September 1952	June 1956 – December 1956
River & Harbor Act of 23 October 1962 Design Memorandum 15 April 1964	Widening the 35-foot MLW channel at the bends by the removal of ledge at Henderson Point, Gangway Rock (700 feet), Badgers Island (600 feet), the Interstate Bridge and Boiling Rock (500 Feet), and extending the channel upstream from Boiling Rock at 400 feet wide and -35 feet MLW to a turning	October 1964 – January 1966

	basin at Newington below Great Bay. See: House Doc. #482, 87th Congress, 2nd Session, 16 July 1962	
Water Resources Development Act of 17 November 1986, Section 202(a)	Widening the 35-foot channel by 1) creating an emergency maneuvering area between the two vertical lift bridges by widening the channel from 600 to 1,000 feet, 2) widening, by 100 Feet, the northern limit of the channel adjacent to Badgers Island, 3) widening the southern limit of the channel at Goat Island from 400 to 550 Feet. See: Feasibility Report, April 1983, Revised March 1984, and 25 February 1985, and General Design Memorandum, 22 November 1985	September 1989 – April 1992

PORTSMOUTH BACK CHANNELS AND SAGAMORE CREEK
PORTSMOUTH, NEW CASTLE AND RYE, NEW HAMPSHIRE
LIST OF AUTHORIZATIONS

Authorization	**Work Authorized & Constructed**	**Construction**
Authorized by the Chief of Engineers, 23 December 1965 Under Continuing Authority of Section 107 of the River and Harbor Act of 14 July 1960	1) A channel -6 feet MLW, 100 feet wide from Little Harbor through the Rye-New Castle bridge, then northerly between the mainland and Leach's Island to deep water near Shapleigh Island, 2) A channel 75 feet wide by -6 feet MLW up Sagamore Creek and 3) A 75 foot wide, -6 foot MLW anchorage strip adjacent to the channel in Sagamore Creek. See Detailed Project Report, CAP Section 107, 18 June 1965.	August 1970 – February 1971
Modification Approved Chief of Engineers 18 July 1969	1) Narrow the channel from Little Harbor to the 3-channel junction to 75-feet wide, 2) narrow the channel north from the junction to Shapleigh Island to 60 feet, and 3) elimination of the anchorage and turning areas in Sagamore Creek. See Letter Report, (Back Channels Section 107), 2 July 1969.	August 1970 – February 1971

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
PORTSMOUTH, NEW CASTLE AND NEWINGTON, NEW HAMPSHIRE & KITTERY AND ELLIOT, MAINE
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	**Work Accomplished**	**Quantities**
Sept 1879 – May 1880	Construct Goat Island-Great Island Breakwater	12,200 Long Tons Stone
Aug 1880 – Nov 1880	Complete Goat Island-Great Island Breakwater	2,400 L. Tons Stone
Apr 1881 – Sept 1882	Remove Gangway Rock to –20 Feet	700 cy Rock
May 1882 – Nov 1883	Partly Remove Badgers Is. Ledge to –10 Feet	600 cy Rock
May 1883 – Aug 1884	Continue Removal of Gangway Rock	800 cy Rock
Sept 1884 – June 1886	Continue Removal of Gangway Rock	808 cy Rock
Apr 1887 – Jan 1888	Continue Removal of Gangway Rock to 20 Ft	732 cy Rock
1889 – Fall 1891	Remove Badgers Is. Ledge to –18 Feet	413 cy Rock
Fall 1891	Removal of Pier Rock to –10 Feet	10 cy Rock
June 1956 – Dec 1956	Ledge Removal for 35-Foot Channel	33,500 cy Rock
Oct 1964 – Jan 1966	Improvement - Ledge Removal for 35-Foot Channel Widening	548,321 cy plus 114,067 cy Rock
March 1966	Railroad Engine Moved Outside Channel Limit Upstream of Sarah Long Bridge	- - - -
Jan 1969 – Feb 1969	Maintenance Dredging of 35-Foot Channel	500 cy Estimated
Jan 1970 – Feb 1970	Maintenance Dredging of 35-Foot Channel	23,447 cy
May 1971 – June 1971	Maintenance of Upper 35-Foot Channel	39,160 cy
July 1979 – Sept 1979	Maintenance of Upper 35-Foot Channel	30,000 cy
Late FY 1980	Maintenance of Upper 35-Foot Channel	5,000 cy
FY 1981	Maintenance of Upper 35-Foot Channel	Unknown
March 1984	Maintenance of Upper 35-Foot Channel	Unknown
Sept 1989 – July 1990	Improvement Widening of 35-Foot Channel at Bridges and Badgers Island	310,000 cy plus 145,000 cy Rock

Dec 1991 – Apr 1992	Improvement Widening of 35-Foot Channel at Goat Island	25,000 cy plus 15,000 cy Rock
December 1991	Maintenance of Upper 35-Foot Channel at Simplex Shoal with In-River Disposal	20,100 cy
November 2000	Maintenance of Upper 35-Foot Channel at Simplex Shoal with In-River Disposal	7,900 cy
February 2013	Maintenance of 3 Areas of the Upper 35-Foot Channel including Advanced Maintenance at Simplex Shoal to -42 Feet with In-River Disposal	14,323 cy

PORTSMOUTH BACK CHANNELS AND SAGAMORE CREEK

PORTSMOUTH, NEW CASTLE AND RYE

PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	**Work Accomplished**	**Quantities**
Aug 1970 – Feb 1971	Improvement Dredging of 6-Foot Channels in Back Channel and Sagamore Creek	58,000 cy Plus 3,400 cy Ledge & Hard Material

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
PORTSMOUTH, NEW HAMPSHIRE

NAVIGATION IMPROVEMENT PROJECT

FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

ECONOMIC APPENDIX

APPENDIX C

Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

May 2014

PORTSMOUTH HARBOR AND PISCATAQUA RIVER

NAVIGATION IMPROVEMENT PROJECT FEASIBILITY STUDY

ECONOMIC APPENDIX

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PORTSMOUTH HARBOR AND PISCATAQUA RIVER

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Portsmouth Harbor and Piscataqua River, New Hampshire and Maine
Navigation Improvement Project
Economic Assessment

Methodology

The purpose of this assessment is to evaluate the benefit of navigation improvement in the Piscataqua River and Portsmouth Harbor. Benefit classification is from the National Economic Development Account (NED). Regional economic benefit is not developed in this evaluation. Benefit and cost are made comparable by conversion to average annual equivalents. An interest rate of 3-1/2% as specified in the Federal Register is to be used by Federal agencies in the formulation and evaluation of water and land resource plans for the period 1 October 2013 to 30 September 2014. All cost and benefit are stated at the FY 2014 price level. The project economic life is considered to be 50 years, and the economic base year is FY 2016. The analysis of cost and benefit follows standard U.S. Army Corps of Engineers procedures. The reference document used in the benefit estimation process is ER 1105-2-100, 22 April 2000, Appendix E, Section II, Navigation, E-10, NED Benefit Evaluation Procedures: Transportation, Deep-Draft Navigation.

A plan is considered to be economically feasible if annualized benefit divided by annualized cost is greater than or equal to one. Net benefit, or plan benefit minus plan cost, must be greater than or equal to zero. This report includes an analysis of alternatives and the identification of the plan with the largest net benefit that is labeled the NED plan.

Area Description

The Piscataqua River forms a portion of the state boundary between Maine and New Hampshire. Portsmouth Harbor, located at the mouth of the river, is about 45 miles northeast of Boston Harbor, Massachusetts. The existing Federal project includes a 35-foot deep channel, generally 400 feet wide, extending from deep water in Portsmouth Harbor to a point approximately 6.2 miles upstream. The existing project as modified by WRDA86 also includes: widening the bends at several locations; a 1,000 foot emergency maneuvering area between the Memorial and Maine-New Hampshire lift bridges; channel widening upstream of the Maine-New Hampshire Bridge; a 950-foot wide turning basin upstream of Boiling Rock; and an 800-foot wide turning basin at the head of the project.

Commodity Forecasts

Commodity Flows at Portsmouth Harbor, New Hampshire:

Portsmouth is the only major commercial port in New Hampshire, shipping and receiving approximately 3,047,000 tons of waterborne commerce in 2011. Petroleum products comprise the majority of commodities shipped and received at Portsmouth

Harbor, accounting for 62% of all commodities since 1991. In recent years dry bulk products have shown a significant increase at Portsmouth Harbor. Table C-1 shows the commodity distribution in 2011.

The four most prominent commodities at Portsmouth Harbor are coal, distillate fuel oil, gypsum and non-metal minerals. Table C-2 shows the percentage annual change in commodity flows at Portsmouth Harbor since 1991.

For purposes of this analysis the 2011 commodity tonnage will be held constant through the study period.

Table C-1
Freight Traffic by Commodity
2011

Commodity	Tons (thousands)
Total, All Commodities	3,047
Coal	309
Petroleum Products	1,407
Crude Materials	1,298
All Other Commodites	34

Table C-2
Total Tonnage by Year
1991 to 2011
Portsmouth Harbor

Percent Annual Increase of Commodities at Portsmouth Harbor

Year	Tons (thousands)	Percent Change
2011	3,047	2.80%
2010	2,964	-17.28%
2009	3,583	-6.52%
2008	3,833	-4.79%
2007	4,026	-16.52%
2006	4,823	-8.20%
2005	5,254	9.57%
2004	4,795	-3.54%
2003	4,971	21.01%
2002	4,108	-7.62%
2001	4,447	-0.34%
2000	4,462	-2.06%
1999	4,556	8.63%
1998	4,194	6.07%
1997	3,954	6.63%
1996	3,708	-5.26%
1995	3,914	12.50%
1994	3,479	-5.77%
1993	3,692	-1.23%
1992	3,738	5.68%
1991	3,537	

Table C-3
Vessel Trips by Draft
2011

	Upbound	Downbound
	Foreign	
Total	121	121
38	1	
36	19	
35	31	
34	8	2
33	1	3
32	3	2
31	2	3
30	4	12
29	3	4
28	2	9
27	2	8
26		5
25	7	12
24	5	9
23	5	6
22	4	12
21	3	13
20	4	4
<20	17	17
	Domestic	
Total	54	30
25	1	
24	2	
23	1	
22	1	1
21	18	
20	2	1
<20	29	28

Fleet Forecasts

The fleet currently calling on the upper Piscataqua River in Portsmouth Harbor ranges is length from 420 feet to 747 feet, with most vessels in the 20,000 to 50,000 DWT range. There are currently about 78 vessel visits a year with many shipments originating in the Mediterranean, Northern Europe and North Africa. Fleet trips by sailing draft and flag are shown in Table C-3.

Data published by MARAD (US Department of Transportation, Maritime Administration) for 2006 indicate that there are 474 LNG carries in the world fleet with a capacity of 24,495, 441 deadweight (metric) tons. The bulker fleet contains 6,464 vessels with a deadweight capacity of 370,785,388 metric tons. These are the main types of vessels utilizing the upper turning basin.

For the fleet distribution used in this analysis about 36 % of the fleet has vessels lengths greater than 500 feet in the without project condition. The fleet size is estimated to be 78 vessels all using the turning basin. The fleet distribution by vessel length is shown in Table C-3(b). All these vessel calls are at the two benefiting terminals and all utilize the turning basin. It is anticipated that transition to larger will occur upon completion of the project with benefit accruing in year 1 of the study period.

Table C-3(b)
Fleet Distribution by Vessel Length
Upper Turning Basin Fleet
Piscataqua River
Portsmouth, N H

	Alternative Turning Basin Widths															
Vessel	800 '				1020 '				1120 '				1200 '			
Length	Dom	For	Total	DWT	Dom	For	Total	DWT	Dom	For	Total	DWT	Dom	For	Total	DWT
<= 500 '	28	22	50		28	22	50		28	22	50		28	22	50	
501' - 599'	0	9	9	35000	0	0	0		0	0	0		0	0	0	
600' - 699'	0	12	12	45000	0	14	14	45000	0	0	0		0	0	0	
700' - 800'	0	7	7		0	5	5	45000	0	17	17	45000	0	15	15	60000
> 800'	0	0	0		0	0	0		0	0	0		0	0	0	
Total	28	50	78		28	41	69		28	39	67		28	37	65	

Improvement Plans

The plans under consideration would widen the upper turning basin from the existing 800 feet to 1020 feet, 1120 feet and 1200 feet. A wider turning basin would allow shippers to utilize larger vessels, improve the safety of turning by reducing the probability of grounding, and lower the cost of turning by reducing the number of tugs needed for assistance in turning vessels.

Piscataqua River Improvement Benefit

Vessels utilizing the upper turning basin off load their cargo at two upstream berths. The two berths are owned by Sprague and a third berth owned by the Department of Defense (DOD) is currently not in use. Sprague Energy owns both the Sprague River Road terminal, which it operates, and the Avery Lane Terminal. Sea-3 has an easement to access and operate the Avery Lane Terminal for its propane pipeline which connects its gas tanks on Sea-3 property with the dock. That easement was originally granted to Sea-3’s predecessor, Dorchester Enterprises, and grants a right of way to the terminal as well as over the terminal itself. That easement itself does not have a stated termination date but is instead tied to the terms and conditions of a Dock Agreement which memorializes the two companies (Sprague and Sea-3) shared responsibilities for dock maintenance and operation. The Dock Agreement's termination date is 2079, beyond the 50-year project life, but may be terminated sooner upon the expiration of the useful life of the dock or if any occurrence or event requires a capital improvement of $500,000.00 or more. However, Sea-3 has an Option to Purchase the dock if either of those events come to pass. Sea-3's Option to Purchase is also triggered by Sprague attempting to sell or lease the dock to another entity or if 51% of the Sprague's stock is transferred. The grantee in the easement (Sea-3) has an ownership interest in the property to the extent the Dock Agreement remains in effect. Sea-3 imports liquefied propane gas (LPG). The other shippers using the Sprague facility are Pike Industries (asphalt), Georgia Pacific (gypsum), BCS (caustic soda), Morton (road salt), Baker Commodities (tallow), and Dragon (cement). The products from both of these terminals are destined for local markets. The terminals estimate that most of the tonnage is destined to locations within a 100-mile radius of the port to northern Massachusetts and southern New Hampshire and Maine.

There are three types of benefit evaluated in this study. The first type would be a reduction in transportation cost associated with the economies of scale of utilizing larger vessels and less time in port. The second type would be a reduction in damages as a result of grounding when turning. The third type would be an efficiency achieved in the turning operation as a result to utilizing fewer tug boats to assist in the turn.

Reduction in Transportation Cost

Shippers trade-off the risk of grounding from using larger ships with the gain in economies of scale from using these larger ships. The risk of grounding, and thus damages to vessels, increases with the length of the vessel. However, transportation cost declines with the use of larger ships. In the without project condition shippers are more or less in a state of equilibrium. They have no incentive to increase their utilization of larger ships, as the potential damage from doing so would exceed the reduction in transportation cost from doing so. They have no incentive to utilize smaller ships, as the increase in transportation cost from doing so would exceed the expected grounding damage from the use of these vessels. Widening the turning basin from 800 feet to the proposed widths of 1020, 1120, and 1200 feet would encourage shippers to schedule relatively more of the larger ships. A new equilibrium would likely be established in the with project condition where both the expected damage from groundings and the transportation cost would be lower than in the old equilibrium. Both Sea-3 and the users of the Sprague facility indicate that a greater percentage of their tonnage would be carried on larger ships if the turning basin were widened. These ships are currently in use now at Portsmouth Harbor and it is expected that they would be used more intensively with a wider turning basin.

Shippers were queried as to their type of product, volume of product, vessel size distribution (with and without widening of the turning basin), origin/destination of their shipments, and distribution of shipments by flag (foreign or US). From this basic information transportation costs for both the without and with project condition were developed.

Cost saving is estimated by determining the transportation cost with widening of the turning basin with the transportation cost without widening. Cost saving is the difference between the without and with project transportation cost. This cost is calculated for users of each berth and then aggregated. Arithmetically, the transportation cost is the product of the round-trip distance from origin to destination and the hours per mile, the cost per hour and the number of vessel trips. The number of vessel trips is derived by counting the number of vessel movements needed to carry the projected tonnage. For with project conditions the existing (no growth assumed) tonnage is shifted to longer and larger vessels until all the existing tonnage is accounted for. The result of this process is that existing cargo is carried on fewer vessels resulting in transportation cost saving. The shift in fleet mix can be seen Table C-3(b). Another measure of size is deadweight tonnage (DWT) which is positively correlated with vessel length. The fleet distribution by DWT is also shown in Table C-3(b). There is no change in vessel size class between the 1020 foot alternative and the 1120 foot alternative, but vessels were loaded more intensively allowing for the reduction of two trips. Separate transportation cost was developed for each vessel size in both the without and with project conditions. Hourly vessel operating cost is developed by the Institute for Water Resources (IWR) every few years. The latest estimates for FY 2011 were used in the analysis. IWR develops cost by flag, type and size of vessel. Transportation cost is summed over the number of trips and then put on a per ton basis by dividing by the total tonnage imported by each shipper. The differential cost per ton is then multiplied by total tonnage imported to determine cost savings for each shipper. The reduction in transportation cost between the without project condition and the with project condition is a project benefit. Savings are put on a per ton basis to allow for calculation with tonnage growth. However, no growth is assumed in this evaluation. The primary trade routes are Northern Europe, the Mediterranean and Northern Africa.

It is anticipated that the shippers utilizing vessels in the without project condition that have a ratio of length to existing turning basin width (800’) greater than two-thirds will shift to larger vessels in the with project conditions. This implies vessels that are greater than 533’ in length will be replaced by larger vessels in the with project conditions. This anticipated shift is shown in Table C-3(b) on Page C-5. As the channel depth is not changing there is no anticipated change in operating drafts. The larger vessels will still be light loaded to transiting the channel. Due to air draft restrictions under bridges vessels longer than 800 feet could not be employed.

Transportation costs are estimated for Sprague for the width of the existing turning basin and the three improved widths. These costs are shown in Table C-4 and the transportation costs savings estimated for each improved width are shown in Table C-5.

Table C- 4
Transportation Cost
Sprague
Piscataqua River
Portsmouth NH
($000)

Turn Basin Width	At Sea Cost	In Port Cost	Tidal Delay	Transportation Cost
800	$5,470.7	$928.1	$0.1	$6,398.9
1020	$4,749.8	$709.2	$0.1	$5,459.0
1120	$4,444.3	$701.9	$0.1	$5,146.3
1200	$4,139.3	$704.6	$0.2	$4,844.0

Table C-5
Benefit
Sprague
Piscataqua River
Portsmouth NH
($000)

Turn Basin Width	Transportation Cost Savings			
	At Sea	In Port	Tidal Delay	Total
1020	$720.9	$218.9	$0.0	$939.9
1120	$1,026.4	$226.1	$0.0	$1,252.6
1200	$1,331.4	$223.5	$0.0	$1,554.8

Similar transportation costs and estimated savings are shown for Sea-3 in Table C-6 and Table C-7.

Table C-6
Transportation Cost
Sea-3
Piscataqua River
Portsmouth NH
($000)

Turn Basin Width	At Sea Cost	In Port Cost	Tidal Delay	Transportation Cost
800	$4,660.4	$613.0	$7.0	$5,280.4
1020	$3,710.0	$414.8	$5.7	$4,130.5
1120	$3,842.5	$407.0	$6.0	$4,255.5
1200	$3,558.5	$396.6	$6.6	$3,961.7

Table C-7
Benefit
Sea-3
Piscataqua River
Portsmouth NH
($000)

Turn Basin Width	Transportation Cost Savings			
	At Sea	In Port	Tidal Delay	Total
1020	$950.5	$198.3	$1.2	$1,149.9
1120	$817.9	$206.0	$1.0	$1,024.9
1200	$1,102.0	$216.4	$0.3	$1,318.7

The combined transportation cost savings, or benefits, for both terminals are displayed in Table C-8.

Table C-8
Benefit
Piscataqua River
Portsmouth NH
($000)

Turn Basin Width	Transportation Cost Savings			
	At Sea	In Port	Tidal Delay	Total
1020	$1,671.4	$417.1	$1.2	$2,089.8
1120	$1,844.4	$432.1	$1.0	$2,277.5
1200	$2,433.4	$439.9	$0.3	$2,873.6

For the alternative that would provide a turning basin width of 1020 feet, at sea transportation costs savings would be an estimated $1,671,400 annually due to the economies of scale of utilizing larger ships. In port cost savings are estimated at $417,100 based on each vessel spending on average 24 fewer hours in-port due to the removal of the requirement of daylight for vessel turning. There would be some minor reductions in tidal delay due to fewer vessel trips in the with project conditions given that operating drafts are not expected to change in the with project conditions. Benefits are not smoothly increasing with turning basin width improvements as for some alternatives higher vessel operating associated with larger vessels is not completely offset by the reduction in number of trips. Total transportation cost savings for a turning basin width of 1020 feet are estimated at $2,089,800.

Reduction in Grounding Damages

Of the five groundings, the most costly incident occurred in 1985 where the vessel grounding resulted in damage to the propeller, propeller shaft, and stern tube. Damage to the vessel, towing charges, penalties, and vessel service loss were estimated to be $8,000,000. That loss in the 2014 price level is estimated to be $15,600,000. One other incident resulted in damage to the bulbous bow of the ship of an estimated $250,000 or $313,000 in the 2014 price level. No damage was reported from the other three groundings. The number of groundings and associated damages were obtained from the Portsmouth Pilots.

There were five groundings in the 28 years between 1985 and 2012. With approximately 40 turnings a year for ships greater than 500 feet in length for 28 years, the probability of grounding is 0.00446 (5 divided by 1120). The turnings represent all vessels greater than 500 feet in length using the upper turning basin. The average damage for a grounding is $3,182,600. The annual cumulative probability of a grounding for 28 turns is 0.12. Multiplying the cumulative probability of annually grounding by the average damage per grounding yields the expected without project annual damage of $374,800. Widening the turning basin is expected to reduce the probability of grounding by at least 75 percent resulting in a with project expected grounding damages shown in Table C-9. With a turning basin of 1020 feet the expected damage of grounding would be $66,800 resulting in damages reduced, or a benefit, of $307,900.

The estimated benefit for reduction in grounding damages is shown in Table C-9.

Table C-9
Grounding Damages
Piscataqua River
Portsmouth, NH

Turning Basin Width feet	Number of Turns	Grounding Probability Per Turn Turns	Annual Cumulative Grounding Probability	Average Damage Per Grounding ($000)	Expected Annual Damage ($000)	Expected Annual Benefit ($000)
800	28	0.00446	0.11775	3,182.6	374.8	
1020	19	0.00112	0.02099	3,182.6	66.8	307.9
1120	17	0.00112	0.01880	3,182.6	59.8	314.9
1200	15	0.00112	0.01661	3,182.6	52.9	321.9

Reduction in Turning Cost

In the without project condition three tugs are required to turn larger vessels in the upper turning basin. These larger vessels are greater than 700 feet in length and also loaded vessels greater 600 feet in length. In the with project condition this requirement can be reduced to two tugs. Three hours are required to turn a vessel. The hourly tug cost is estimated to be $666 based on information provided by the terminals. The product of the number of tugs (3), the hourly tug cost, the time required to turn a vessel (3 hours), and the number of annual turnings (19 larger vessels and 62 smaller vessels) results in a without project cost of $349,700. With the project the number of tugs will decrease by one yielding a turning cost of $275,700 and a benefit of $74,000 for the alternative that provides a width of 1020 feet. Due to the economies of scale of using larger vessels, the number of vessel trips is estimated to decline in the with project conditions. The number of tugs required for turning vessels in both with and without project conditions and hourly tug cost was obtained from the Portsmouth Pilots. The derivation of estimated turning costs and benefits are shown in Table C-10. It is not anticipated that turning time will decrease in the with project conditions. However, time in port is likely to decrease as turns will be made on less restrictive conditions. This anticipated cost savings was not estimated.

Table C-10
Turning Costs
Piscataqua River
Portsmouth, NH

Turning Basin Width (feet)	Tug Rate ($/hr)	Turning Time (hours)	No. of Tugs	No. of Turns	Turning Cost ($000)	No. of Tugs	No. of Turns	Turning Cost ($000)	Total Turning Cost ($000)	Turning Benefit ($000)
800	666	3	3	19	113.9	2.0	59.0	235.8	349.7	
1020	666	3	2	19	75.9	2.0	50.0	199.8	275.7	74.0
1120	666	3	2	19	75.9	2.0	48.0	191.8	267.7	82.0
1200	666	3	2	19	75.9	2.0	48.0	191.8	267.7	82.0

Project benefit for transportation cost saving, reduction in damages to vessels, and operation efficiencies are summarized in Table C-11. The total annual benefit for a turning basin width of 1020 feet is $2,471,700.

Table C-11
Project Annual Benefit
Piscataqua River
Portsmouth, N.H.
($000)

	Turning Basin Width, feet				Annual Benefit		
	800	1020	1120	1200	1020	1120	1200
Transportation Cost							
Sea-3	5,280.4	4,130.5	4,255.5	3,961.7	1,149.9	1,024.9	1,318.7
Sprague	6,398.9	5,459.0	5,146.3	4,844.0	939.9	1,252.6	1,554.8
Total	11,679.3	9,589.5	9,401.8	8,805.7	2,089.8	2,277.5	2,873.6
Vessel Damages	374.8	66.8	59.8	52.9	307.9	314.9	321.9
Turning Cost	113.9	75.9	75.9	75.9	74.0	82.0	90.0
Total	12,167.9	9,732.2	9,537.6	8,934.5	2,471.7	2,674.4	3,285.5

MODEL DOCUMENTATION

FOR

ECONOMIC SPREADSHEET MODEL

PORTSMOUTH HARBOR AND PISCATAQUA RIVER

NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT

New England District

Background

Purpose of Model: To estimate vessel transportation costs and savings attributable to widening the upstream turning basin. This data will be used to determine the National Economic Development (NED) benefits for the 50 year period of analysis.

Model Description: This model consists of Excel spreadsheets that detail domestic and foreign vessel movement data and transportation costs and savings.

Contribution to Planning Effort: The information presented in the spreadsheets provide for NED comparisons to various alternatives which were used to recommend a plan and is fully documented in the Feasibility Report.

Description of Input Data: The information used to calculate benefits were derived from data provided by the Waterborne Commerce Statistical Center and by IWR through HQ. Data was also provided by the Portsmouth Port Authority.

Description of Output Data: Outputs are the forecasted levels of tonnage carried by vessels and their associated transportation costs which are used to develop benefits for each alternative.

Capabilities and limitations of the Model: The spreadsheets are limited by study assumptions and the quality of the input data.

Model Development Process: The model was created based on ER 1105-2-100, Appendix E, Section II, Navigation, Paragraph E-10, NED Benefit Evaluation Procedures: Transportation, Deep-Draft Navigation, 22 April 2000.

Technical Quality

Theory: This spreadsheet model uses data from Waterborne Commerce and IWR and accepted procedures from ER 1105-2-100, Deep Draft Navigation to analyze existing commodity movement, to forecast expected traffic and tonnage and to estimate benefits for improvement alternatives.

Description of Worksheets

The following paragraphs describe tabs in the **Sea-3_Update2013** worksheet. Sea-3 is one of two shippers that use the turning basin. The other is Sprague. These two companies receive primarily petroleum products including liquefied natural gas (LNG), gypsum and salt. There is a similar worksheet for Sprague that is not included in the model description as the tabs are the same as those for Sea-3

Domestic tab:

The information in this tab is Waterborne Commerce data for domestic shipments to the terminal used by Sea-3. Waterborne Commerce data is in columns A through AD and AF through AQ. Columns AE and AR through CF are calculations used to generate transportation costs at sea and in port including tidal delay.

Foreign tab:

The information in this tab is Waterborne Commerce data for foreign shipments to the terminal used by Sea-3. Waterborne Commerce data is in columns A through AC and AE. Columns AD and AF through BW are calculations used to estimate transportation cost for each trip represented by a row.

VOC tab:

Vessel operating costs found in EGM 11-05: Deep Draft Operating Costs, are found in this tab.

Summary tab:

In this tab calculations are made for each vessel trip for the without project condition and each of the alternatives. With a macro the spreadsheet is calculated for the without project basin width and each of four improvement widths. Vessels that are considered constrained by the turning basin are replaced by larger vessels under with project conditions. The constraint is assumed to be a vessel with a length that is two-thirds or more the turning basin width. This would eliminate some foreign vessels and almost all domestic vessels.

Tidal Delay tab:

As there is not a tidal chart for Portsmouth Harbor the tidal chart for nearby Boston Harbor is used in the calculation of tidal delay. This is not necessarily a benefit calculation as tidal delay may increase with larger vessels and may be less in the aggregate for with project conditions as it is anticipated that under with project conditions there will be fewer trips to Portsmouth Harbor.

In the worksheet **Piscataqua Econ Feasibility** only three tabs are used in the feasibility analysis. The remaining tabs were used in the Recon analysis.

Efficiencies tab:

This tab calculates the reduced tug boat requirements for the with project conditions. Reduction in tug cost is a project benefit.

Pilots tab:

This tab calculates expected damage from groundings during turns based on historical data on frequency and experienced damage. A judgment is made as to how widening the turning basin will reduce the probability of a vessel grounding and subsequent damage.

Financial tab:

This tab calculates annual project cost for each alternative.

The worksheet **Tables_2013** is linked to **Sea-3_2013**, **Sprague_2013** and **Piscataqua Econ Feasibility** to develop the tables that then copied into the Economics Appendix. The tabs are self explanatory.

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

CECW-P 25 March 2014

MEMORANDUM FOR Director, National Deep Draft Navigation Planning Center of Expertise (DDN-PCX)

SUBJECT: Portsmouth Harbor and Piscataqua River Navigation Improvement Project - Approval of the Economic Spreadsheet Model

The economic spreadsheet model for estimating navigation improvement benefits for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project is approved for use. Adequate technical reviews have been accomplished and the model meets the certification criteria contained in EC 1105-2-412. Documentation of the model and its use must be included in the Feasibility Report. This approval for use is based on the decision of the HQUSACE Model Certification Panel which considered the PCX-DDN assessment of the model. There are no unresolved issues with the model at this time.

APPLICABILITY: This approval for use is limited to the subject feasibility report.

HARRY E. KITCH, P.E.
Deputy Chief, Planning and Policy Division
Directorate of Civil Works

Portsmouth Harbor and Piscataqua River Navigation Project
Model Assessment Criteria

General Questions

1. Is the purpose of the model clearly defined?

The purpose of the model is to estimate vessel transportation costs and savings attributable to enlarging the turning area at the north-eastern end of the Portsmouth Harbor and Piscataqua River Channel. The cost data will be used to determine the National Economic Development (NED) benefits for the fifty year period of analysis, 2017 to 2067.

2. Can the model described achieve the stated purpose?

The model can estimate transportation cost savings attributable to the enlargement of the turning area. The extent to which the model can achieve the stated purpose is constrained by the following simplifying assumptions:

1. There is an assumption of a constant volume of commerce passing through the two terminals that would become accessible by larger vessels as a result of improvement of the turning area. The effect of this assumption is most likely to be an understatement of the project's net benefits.
2. Another assumption made in the benefits calculation is that improvement of the turning area will reduce the frequency of groundings by 75%. There was no ship simulation. The district argues, and the ATR reviewer agreed, that the conditions set forth in EM 1110-2-1613 that trigger the need for a ship simulation are not present. Because there was no ship simulation, there is no way to evaluate the validity or lack of validity of the assumption that the frequency of groundings will fall by 75%. The effect of this assumption on total project benefits is quite small. Even if we assume that the frequency of groundings will not change as a result of the enlargement of the turning area, project benefits would fall by only 9.8%. Conversely if the improvement were to reduce the frequency of groundings by some larger factor, say 90%, then project benefits would increase 2.0%.

Technical Quality

3. Comment on the overall technical quality of the model.

The model is of a relatively simple transportation operation: shipments of bulk materials from a single origin to a single destination using several trips per year by a short list of vessels. The benefits derive from the ability that the carriers would have in the with-project condition to produce this transportation using fewer trips by larger vessels. This is a straightforward substitution effect, which can be estimated by comparing total transportation cost in the without-project condition to total transportation cost in the with-project condition for each alternative examined. This involves, for the most part, simple arithmetic and is a task for which a spreadsheet is extremely well suited. The number of different vessel sizes that could be utilized to produce this transportation is limited by the fact that are air draft constraints (two bridges across the Piscataqua River) that put an upper limit on vessel height, and consequently vessel length. Thus, the number of vessels classes in the relevant fleet and the number of improvement alternatives are sufficiently few that I have been able to reproduce the model results suing a pocket calculator, a pencil and paper.

4. Is the model based on well-established contemporary theory?

a. Is the available science applied correctly?

The idea that underlies this model is that carriers will find it in their profit seeking interest to reduce the opportunity cost of the product they are selling (transportation services) by substituting capital goods better suited to the task as soon as they have the ability to do so. If firms do not act in this way, then the entire theory of the firm built up by the economics profession over the past two centuries is wrong. So yes, the available science is applied correctly.

b. Is the model empirically supported?

This model of firm behavior is so abundantly empirically supported that any firm that acted otherwise would be deemed irrational or corrupt or both.

5. Is the model a realistic representation of the actual system?

Yes. If the kind of substitution that this model contemplates was not a feature of all transportation systems, the U.S. airlines would still be buying and operating DC-3s. The DC-3 is a very efficient airplane in the engineering sense and, in a few markets, it is still sufficiently economically efficient that there are firms in the business of refurbishing them, but in most markets, the quantity of transportation demanded has rendered higher capacity and faster airplanes more economically efficient. This proposed improvement of the Portsmouth Harbor and Piscataqua River Project removes the one physical impediment to using the maritime equivalent of the higher capacity airplane.

6. **Are the analytical requirements of the model properly identified?**

Yes. The analytical requirements of the model are the following:

- Commodity Type
- Forecasted Short Tons

- Vessel Characteristics
- Vessel Operating Costs

- Geographic Location
- Mileage

- Direct Shipment
- Lightering
- Lightening

- Time at Port
- Time at Sea
- Time in Lightering Zone
- Channel Depth

7. Does the model address and properly incorporate the analytical requirements?

Some of the inputs employed by the model include: vessel operating costs, vessel dimensions, loading rates, trade route distances, commodity tonnage forecasts, vessel fleet distributions by route, and distribution of cargo tonnage between routes. Some of the equations employed by the model include: vessel loading and unloading times based on loading rates and cargo weights, time at sea based on distance and speed, maximum cargo capacities based on vessel size and channel depth. The significant analytical requirements appear to be properly identified and incorporated.

8. Are the assumptions clearly identified, valid, and do they support the analytical requirements?

The assumption regarding cargo volume is deliberately made to bias the outcome of the calculations, if at all, against project justification. The assumption regarding the frequency of groundings, as indicated above, accounts for a fairly small fraction of the total benefits, and an alternative assumption that would be clearly superior to the one that was made is not obvious to this writer. It might have been better, in the absence of a ship simulation to assume that the future will be like the past with respect to groundings. Not all information is worth the cost of its production; it is certainly plausible that the cost, in time and money, of performing a ship simulation to improve the estimate of a benefit that is not likely to be large enough to affect which alternative is the one that reasonably maximizes NED benefits is too great to justify doing a ship simulation.

9. Are the formulas used in the model mathematically correct and are the model's computations appropriate and done correctly?

As related in the response to Item 3, it is possible to get the same results using only a pocket calculator and pencil and paper, which is very strong evidence that the arithmetic is correctly done.

10. Comment on the ability of the model to address risk and uncertainty.

The model contains no stochastic elements, so it does not address risk, much less uncertainty. However, it would not be difficult to calculate, for instance, the fall in the volume of cargo that would be required to render the BCR = 1.0.

11. Comment on the ability of the model to calculate benefits for total project life.

Given its assumptions and barring some unforeseen technological development that would render the marine transportation operations used at the two terminals in question obsolete, the model does predict the benefits that would accrue in the with-project condition over the period of analysis. The total project life depends on whether it is adequately maintained in the future, so there is no known end of the project's life.

12. Does the model adequately assess the full range of ecosystem benefits associated with wetlands in this geographic range?

N/A

13. Will the model be useful in capturing and quantifying the full extent of benefits expected to be obtained from anticipated coastal restoration projects?

N/A

System Quality

14. Has the model been sufficiently tested and validated, or do critical errors still exist?

It is not obvious to this writer how this model could be tested. It isn't a time series model, so back casting is not available as a test. Its predictions are all contingent on the occurrence of project construction, so it is not possible to compare the predictions to actual events. The only test, if it even is a test, available at this juncture is to examine its underlying economic logic. As indicated earlier, the underlying economic logic comes from the conventional theory of the firm.

Usability

15. Comment on the model's usability.

The model requires a large number of hard coded inputs. These inputs are already hard-coded into the model in various places. The process of changing some of the assumptions and inputs is simple, only when they are available in drop-down menu cells on the "Inputs and Assumptions" screen, and even then the inputs can only be changed to one of three possible values. Otherwise, most inputs and commodity projections are much more difficult to change.

16. Comment on the availability of the data required by the model.

The data incorporated within the model was obtained from IWR, or from port and industry sources.

17. How easily are model results understood?

Model results are fairly easy to interpret by anyone even slightly familiar with the logic of marine transportation.

18. Comment on how useful the information in the results is for supporting project objectives.

The information in the results of the model is useful for determining project benefits, and estimating transportation cost savings attributable to enlarging the turning area at the upstream (northeastern) end of the Portsmouth Harbor and Piscataqua River Channel. The extent to which one can have confidence in the results is the extent to which one believes that the future will be like the past, and there is no reason that is apparent now to believe that the future will not, at least in this context, be like the past.

19. Is user documentation available, user friendly, and complete?

User documentation is available, but not particularly user friendly.

20. Is the model transparent and do they allow for easy verification of calculations and outputs?

Yes, all equations in cells of the model can easily be traced. All calculations and data are contained in a single file of spreadsheets.

Other General Questions

21. Can the model be adapted to other geographic regions?

The model could be adapted to other regions.

a. If so, how much could the model be modified before review is necessary?

Any modification would require additional review.

22. Is it clear where the model's geographic boundaries fall?

Yes, it is clear that the model pertains only to bulk cargo traffic arriving on vessels that would need to utilize the turning area at the north-eastern end of the Portsmouth Harbor and Piscataqua River Channel.

23. Is the approach to the development and use of the model described clearly enough to allow the approach to be repeated and obtain the same or similar results?

Yes. AS indicated above, this is a straightforward application of the idea of substitution. Even those not at all familiar with the formal economics of production and cost minimization should not have trouble understanding it if they read the Economics Appendix in conjunction with the spreadsheet.

24. Comment on the ability of the model to calculate benefits for total project life.

See response to question 11.

25. Are the applications of the model defensible?

Model applications are defensible, but some items need a closer look. These specific items are included in the Model Certification Review Team Recommendation section.

26. To what extent is best professional judgment used in the model?

Best professional judgment appears to be the source of the assumption that the frequency of groundings will fall by 75% in the with-project condition, compared to the without-project condition.

27. Are error checks built into the model?

There are no error checking features built in to the model.

28. Are USACE policies and procedures related to the model clearly identified?

Yes. The Economics Appendix recites that, "the reference document used in the benefit estimation process is ER 1105-2-100, 22 April 2000, Appendix E, Section II, Navigation, E-10, NED Benefit Evaluation Procedures: Transportation, Deep-Draft Navigation."

29. Does the model properly incorporate USACE policies and accepted procedures?

Yes. It compares the without-project total transportation cost to the with-project total transportation and does so by allowing only one variable (the fleet composition) to change.

30. Is sea level change addressed by the model?

No. The operational issue is the width of the turning area, not channel depth, so sea level rise is not an issue in this case.

a. If yes, is it internal to the model or does it need to be addressed externally?

31. Does the model work using both sensible and non-sensible data (e.g., negative land area)?

Non-sensible data can be used within the model up to a certain point. Zero entries in the parameters section on the "Inputs & Assumptions" can cause errors.

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX D
ENGINEERING DESIGN

NAVIGATION IMPROVEMENT STUDY - TURNING BASIN ALTERNATIVES

Portsmouth Harbor and Piscataqua River, New Hampshire and Maine

10/15/2013

BASIS OF CIVIL DESIGN ANALYSIS

An overview of design assumptions and calculations supporting three turning basin alternatives for the Navigation Improvement study.

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1.0 GENERAL

1.1 PROJECT BACKGROUND

The Piscataqua River forms a portion of the interstate boundary between Maine and New Hampshire (see Figure 1). The existing Federal navigation project includes a 35-foot deep (MLLW) channel, 400-feet wide, and currently extends from deep water in Portsmouth Harbor upstream to just north of the Sprague terminal in Newington, New Hampshire and ends at an existing 35-foot deep by 800-foot wide turning basin.

The purpose of this analysis was to look at three alternatives for three separate turning basins at the end of the existing 35-foot channel near Newington, New Hampshire (see Figure 2) to accommodate larger vessels that use this section of river.

2.0 CIVIL

2.1 SCOPE OF WORK

- Alternative 1 examined three different widening scenarios for the existing 35-foot turning basin (see Sketch 1)

- Alternative 2 examined the addition of a new turning basin downstream of the existing 35-foot turning basin by widening the existing 35-foot channel (see Sketch 2)

- Alternative 3 examined extending the existing 35-foot channel upstream from the existing turning basin and adding a new turning basin at the end of the new extended channel (see Sketch 3)

- The analysis also quantified the amount of dredged material and rock (where applicable) that will be required to be removed for each alternative during construction

2.2 RELEVANT CRITERIA

EM 1110-2-1613, Hydraulic Design of Deep-Draft Navigation Projects, 31 May 2006
EM 1110-2-5025, Dredged and Dredged Material Placement, 25 March 1983

2.3 DESIGN CONDITIONS AND ASSUMPTIONS

The method used to calculate the widths of the existing 35-foot turning basin and the two new turning basins was based on EM 1110-2-1613. For Alternative 1, the three scenarios that were evaluated for widening the existing 35-foot turning basin were 1020 feet, 1120 feet, and 1200 feet. For Alternatives 2 and 3, a width of 1200 feet was used. A value of 250 feet for current drift was used for all alternatives and was based on the original drift value for the existing 800 foot wide turning basin. The maximum turning basin width of 1200 feet was based on a design vessel length of 800 feet and a multiplier of 1.5 for a current velocity of 1.5 knots or less.

The quantities of dredged material to be removed from the areas for Aternatives 1, 2, and 3, as shown on Figures 4 and 5, were based on dredging to a required depth of -35 feet MLLW and include an allowable overdepth of 2 feet to -37 feet MLLW.

The quantities of rock to be removed from areas of Alternative 1, as shown on Figure 4, were based on depths of -37 feet for required depth and -39 feet for overdepth. The elevations of the rock to be removed and the two locations where rock outcrops exist are based on Figure 3. All three scenarios for Alternative 1 required the removal of some quantity of rock. The northerly rock outcrop applied to all three scenarios (1020 feet, 1120, feet, and 1200 feet) whereas the southerly rock outcrop applied only to the 1120 feet and the 1200 feet scenarios. As no detailed data was available for rock outcrops for Alternatives 2 and 3; no quantities of rock requiring removal were quantified or reported. The dredge quantities shown for these alternatives were based on dredging to -37 feet.

2.4 DESIGN CALCULATIONS

The quantities of the dredged material and rock (where applicable) to be removed from the areas of the alternatives were calculated using 3D models developed from soundings, acoustic basement data, and boring data, respectively. The 3D model is an evaluation tool used in Bentley InRoads to compute cut and fill volumes. Cut and fill volumes obtained with this tool are calculated between two triangulated surfaces, or Digital Terrain Models (DTMs), by projecting the triangles from the Existing Surfaces onto the Design Surface and then computing the volume of each of the resultant prismoids. The volume calculated using the Triangle Volume method is the exact mathematical volume between the two selected surfaces. The accuracy of the results of the 3D model is limited only by the accuracy of the DTMs that are used. The volume calculation methodology utilized all available data for the turning basin areas.

2.5 RESULTS

See attached Figures 4 and 5, and Sketches 1, 2, and 3.

2.6 ATTACHMENTS

2.6.1 Figure 1 – Locus Map
2.6.2 Figure 2 – Project Map
2.6.3 Figure 3 – Rock Outcrops in Areas of Alternative 1, Widening of Existing Turning Basin
2.6.4 Figure 4 – Dredged and Rock Quantities for Alternative 1
2.6.5 Figure 5 – Dredged Quantities for Alternative 2 and 3
2.6.6 Sketch 1 – Alternative 1, Widening of Existing Turning Basin
2.6.7 Sketch 2 – Alternative 2, New Turning Basin
2.6.8 Sketch 3 – Alternative 3, New Turning Basin

ATTACHMENTS

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CORPS OF ENGINEERS U. S. ARMY

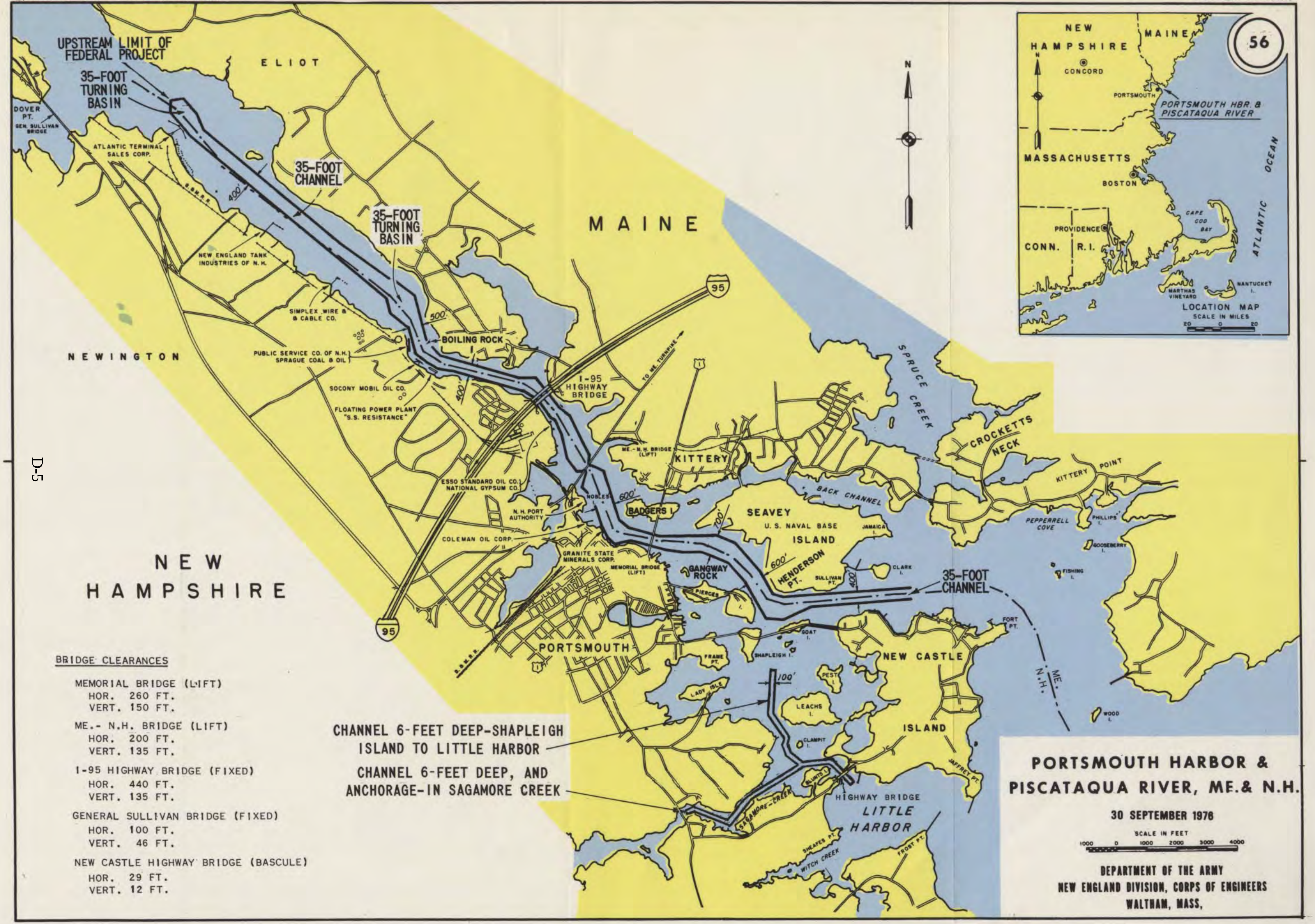
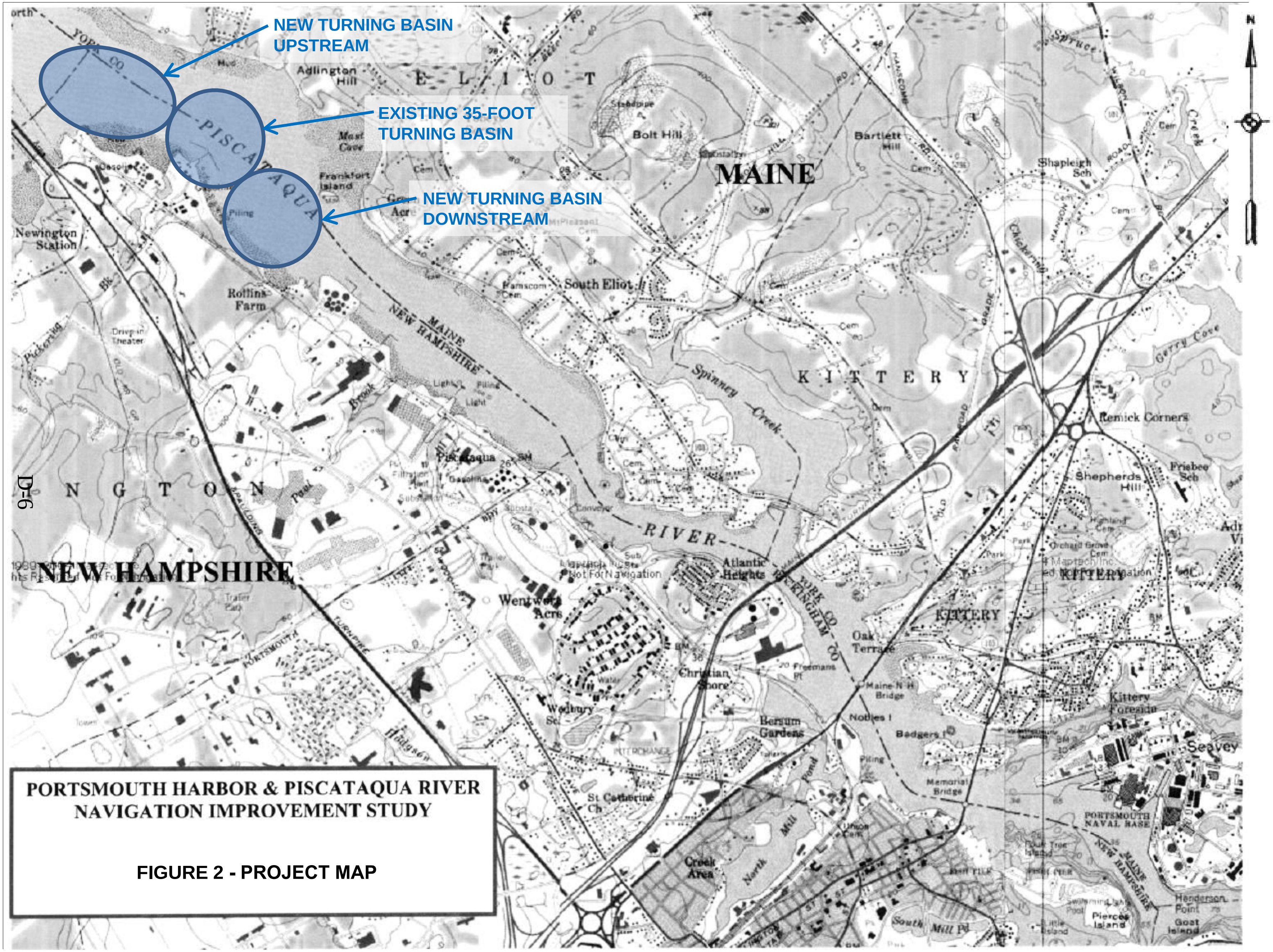


FIGURE 1: LOCUS MAP

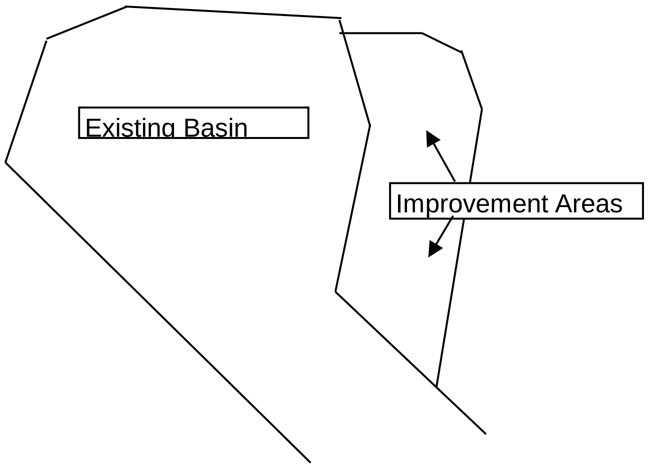


PORTSMOUTH HARBOR & PISCATAQUA RIVER NAVIGATION IMPROVEMENT STUDY

FIGURE 2 - PROJECT MAP

Figure 4 - Dredged and Rock Quantities for Alternative 1
Portsmouth Harbor and Piscataqua River, New Hampshire and Maine

10/24/2013



Rock Quantities:

Improvement Area 1020

Surface		Rock (CY)	Cumul (CY)	Area (SF)
Required (to -35 MLLW)		8,854	8,854	70,660
Req'd Overdepth (to -37 MLLW)		6,050	14,904	92,690
Allow Overdepth (to -39 MLLW)		7,485	22,389	106,800
	Total Rock	22,389		

Improvement Area 1120

Surface		Rock (CY)	Cumul (CY)	Area (SF)
Required (to -35 MLLW)		8,883	8,883	70,660
Req'd Overdepth (to -37 MLLW)		6,123	15,006	93,815
Allow Overdepth (to -39 MLLW)		7,717	22,723	110,174
	Total Rock	22,723		

Improvement Area 1200

Surface		Rock (CY)	Cumul (CY)	Area (SF)
Required (to -35 MLLW)		9,139	9,139	75,710
Req'd Overdepth (to -37 MLLW)		6,777	15,916	109,295
Allow Overdepth (to -39 MLLW)		9,237	25,153	128,987
	Total Rock	25,153		

Dredged Material Quantities (Less the Quantity of Rock):

Improvement Area 1020

Surface	Quantity (CY)	
Required (to -35 MLLW)	340,502	
Overdepth (to -37 MLLW)	44,387	
Total	384,889	
To -20 (MLLW)	94,600	
To -22 (MLLW)	102,600	
Dredged Area:	493,930	SF*
	11.4	Acres**

Improvement Area 1120

Surface	Quantity (CY)	
Required (to -35 MLLW)	519,778	
Overdepth (to -37 MLLW)	53,930	
Total	573,708	
To -20 (MLLW)	157,000	
To -22 (MLLW)	198,300	
Dredged Area:	705,840	SF*
	16.2	Acres**

Improvement Area 1200

Surface	Quantity (CY)	
Required (to -35 MLLW)	661,266	
Overdepth (to -37 MLLW)	66,810	
Total	728,076	
To -20 (MLLW)	205,100	
To -22 (MLLW)	258,200	
Dredged Area:	890,350	SF*
	20.4	Acres**

CY = Cubic Yards
MLLW = Mean Lower Low Water

* Square footage (SF) in US Survey Feet.
** Acres in US Survey Feet

Figure 5 – Dredged Quantities for Alternatives 2 and 3
Portsmouth Harbor and Piscataqua River, New Hampshire and Maine

10/31/2013

Alternative 2 - New Turning Basin

Dredged Material Quantities:

New Turning Basin w/ Ext Channel		
Surface	**Quantity (CY)**	
Required (to -35 MLLW)	542,770	
Overdepth (to -37 MLLW)	100,762	
Total	643,532	
Dredged Area:	1,251,230	SF*
	28.7	Acres**

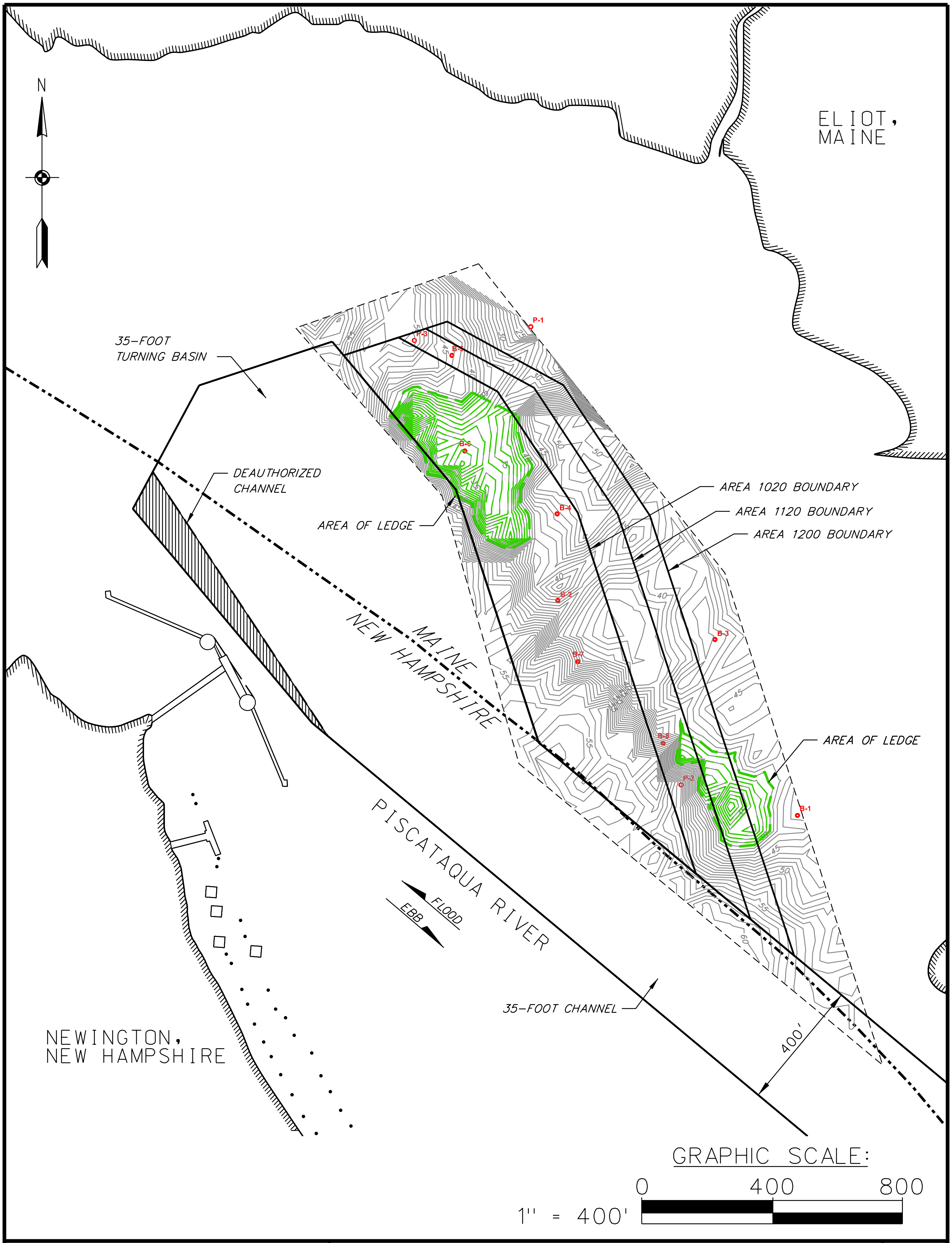
Alternative 3 - New Turning Basin

Dredged Material Quantities:

New Turning Basin w/ Ext Channel		
Surface	**Quantity (CY)**	
Required (to -35 MLLW)	364,130	
Overdepth (to -37 MLLW)	103,606	
Total	467,736	
Dredged Area:	2,737,404	SF*
	62.8	Acres**

CY = Cubic Yards
MLLW = Mean Lower Low Water

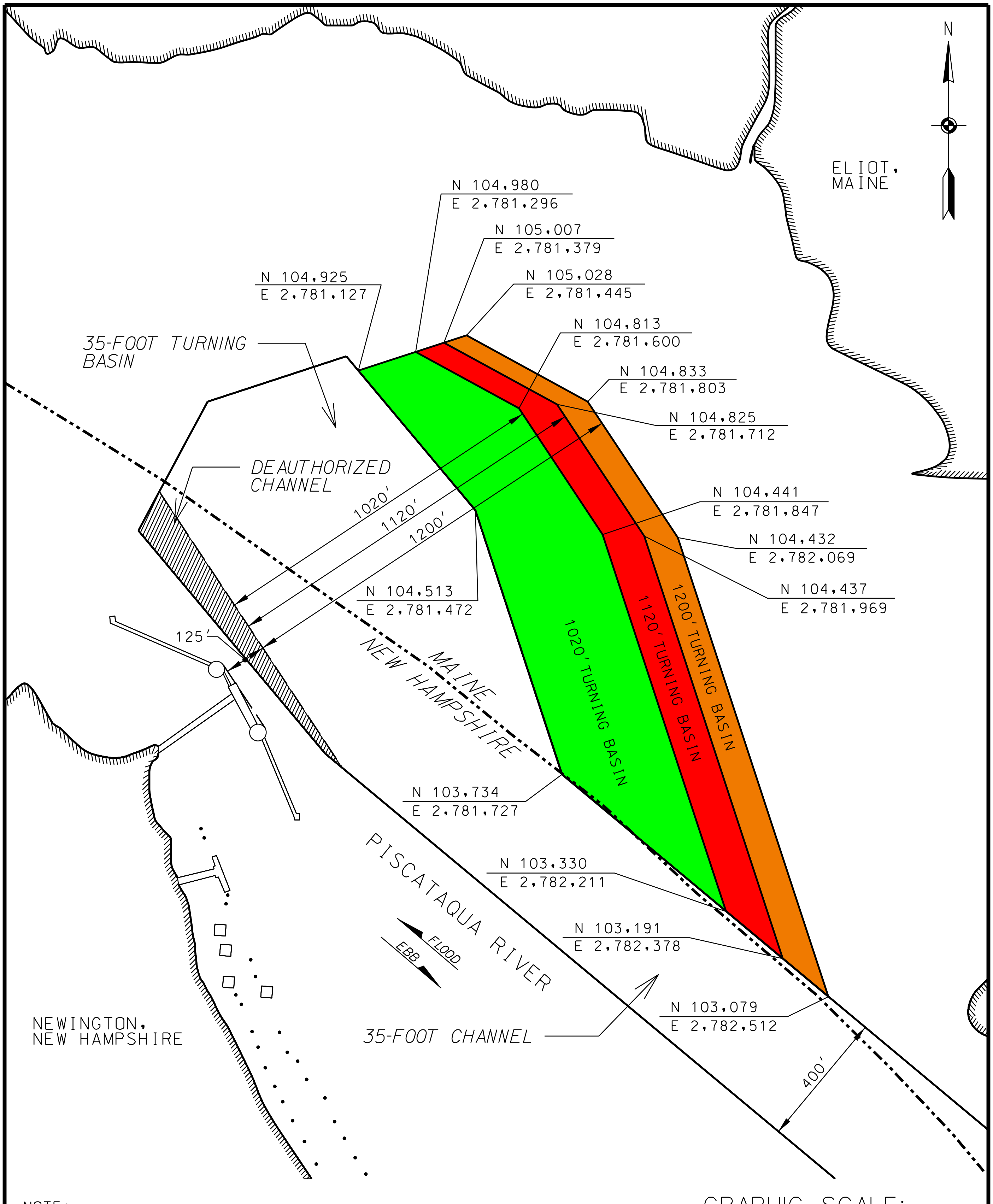
* Square footage (SF) in US Survey Feet.
** Acres in US Survey Feet



DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

PORTSMOUTH HARBOR TURNING BASIN WIDENING PROJECT
FEASIBILITY STUDY
FIGURE 3
ROCK OUTCROPS IN AREAS OF ALTERNATIVE 1
WIDENING OF EXISTING TURNING BASIN

1
1



NOTE:

COORDINATES SHOWN ARE BASED ON THE TRANSVERSE MERCATOR GRID SYSTEM FOR THE STATE OF MAINE (WEST ZONE 1802) AND NAD 1983.

GRAPHIC SCALE:

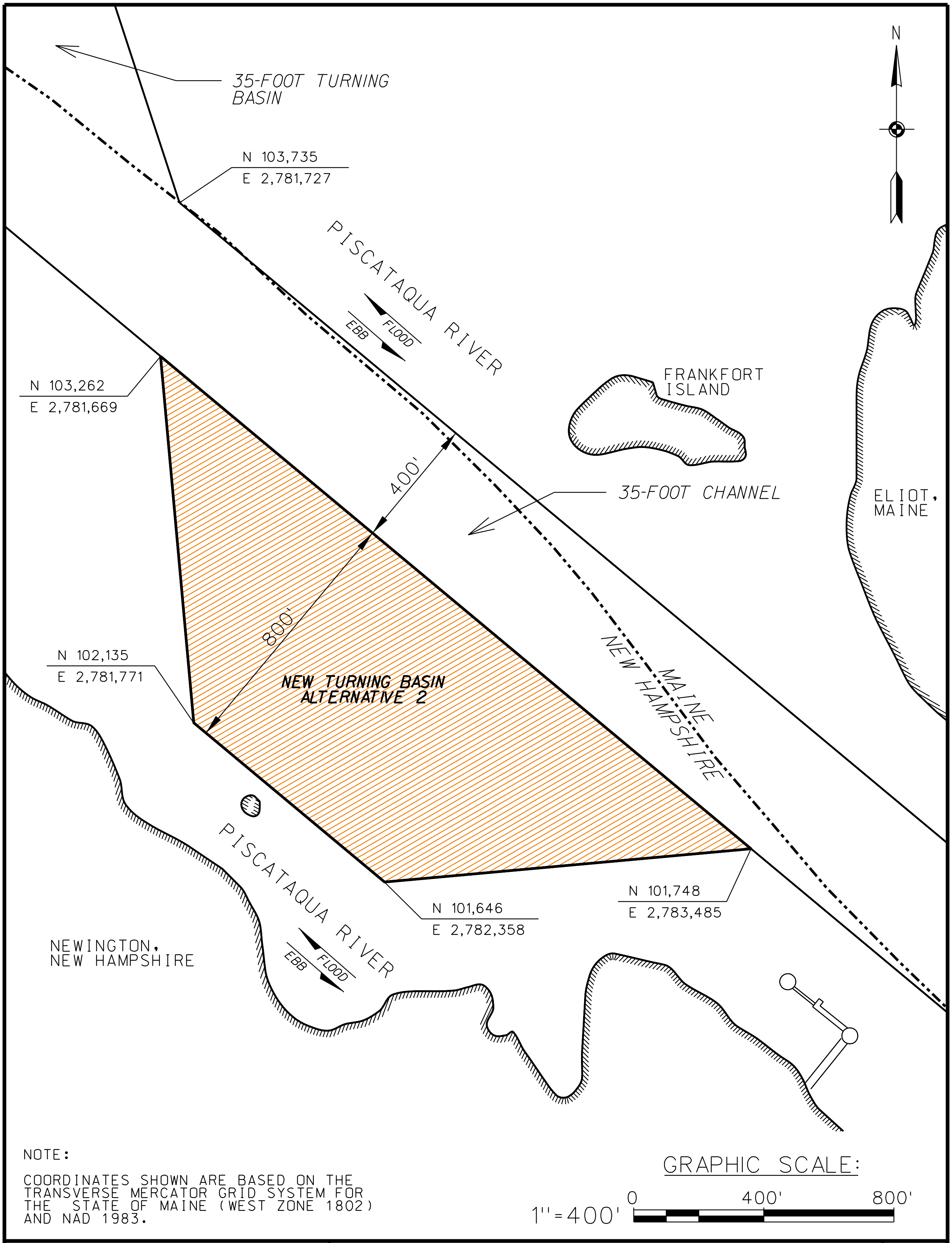
0 400 800

1" = 400'

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

PORTSMOUTH HARBOR TURNING BASIN WIDENING PROJECT
FEASIBILITY STUDY
SKETCH 1
ALTERNATIVE 1
WIDENING OF EXISTING TURNING BASIN

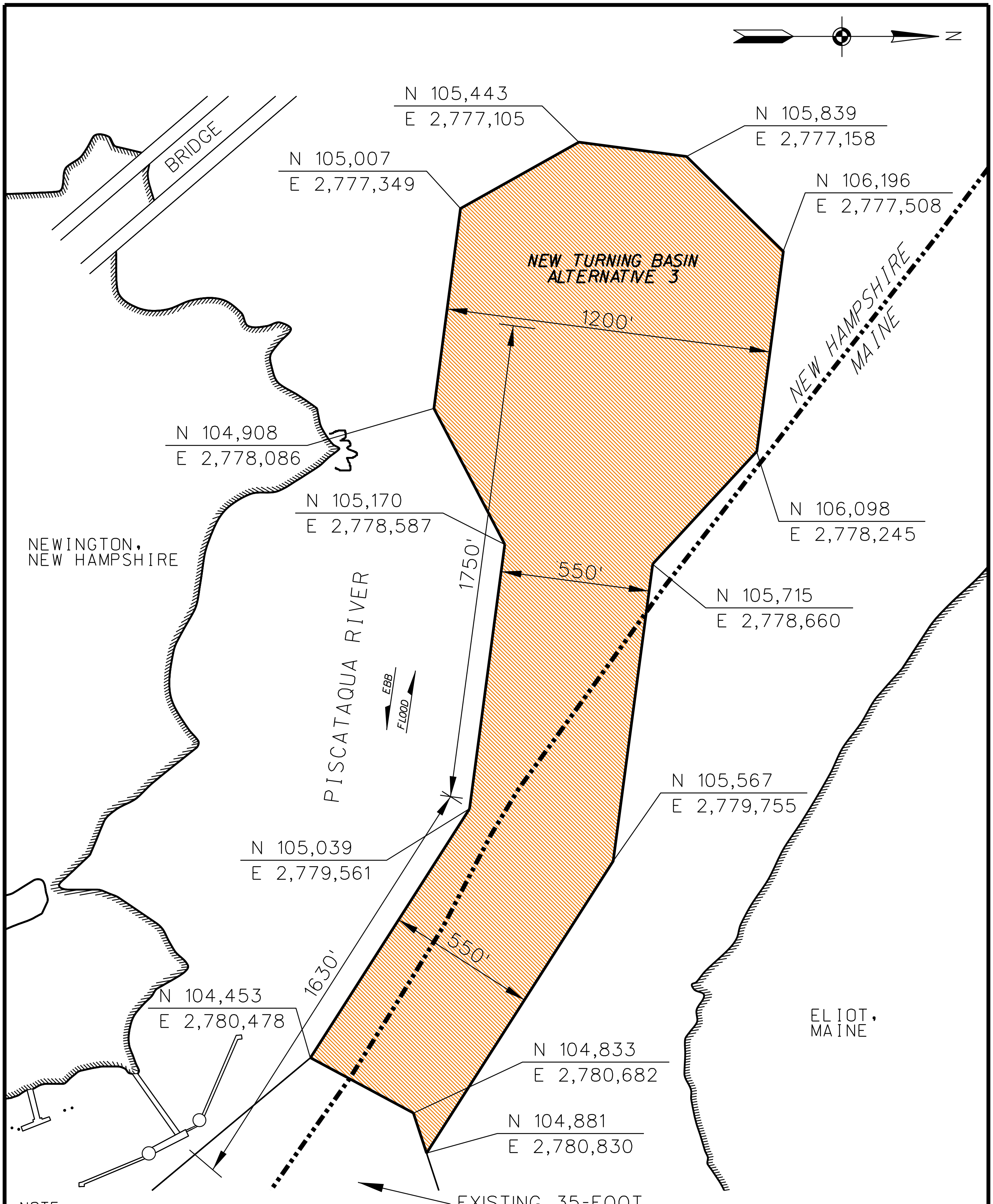
1 / 3



NOTE:

COORDINATES SHOWN ARE BASED ON THE TRANSVERSE MERCATOR GRID SYSTEM FOR THE STATE OF MAINE (WEST ZONE 1802) AND NAD 1983.

DEPARTMENT OF THE ARMY NEW ENGLAND DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS	PORTSMOUTH HARBOR TURNING BASIN WIDENING PROJECT FEASIBILITY STUDY SKETCH 2 ALTERNATIVE 2 NEW TURNING BASIN	2 3



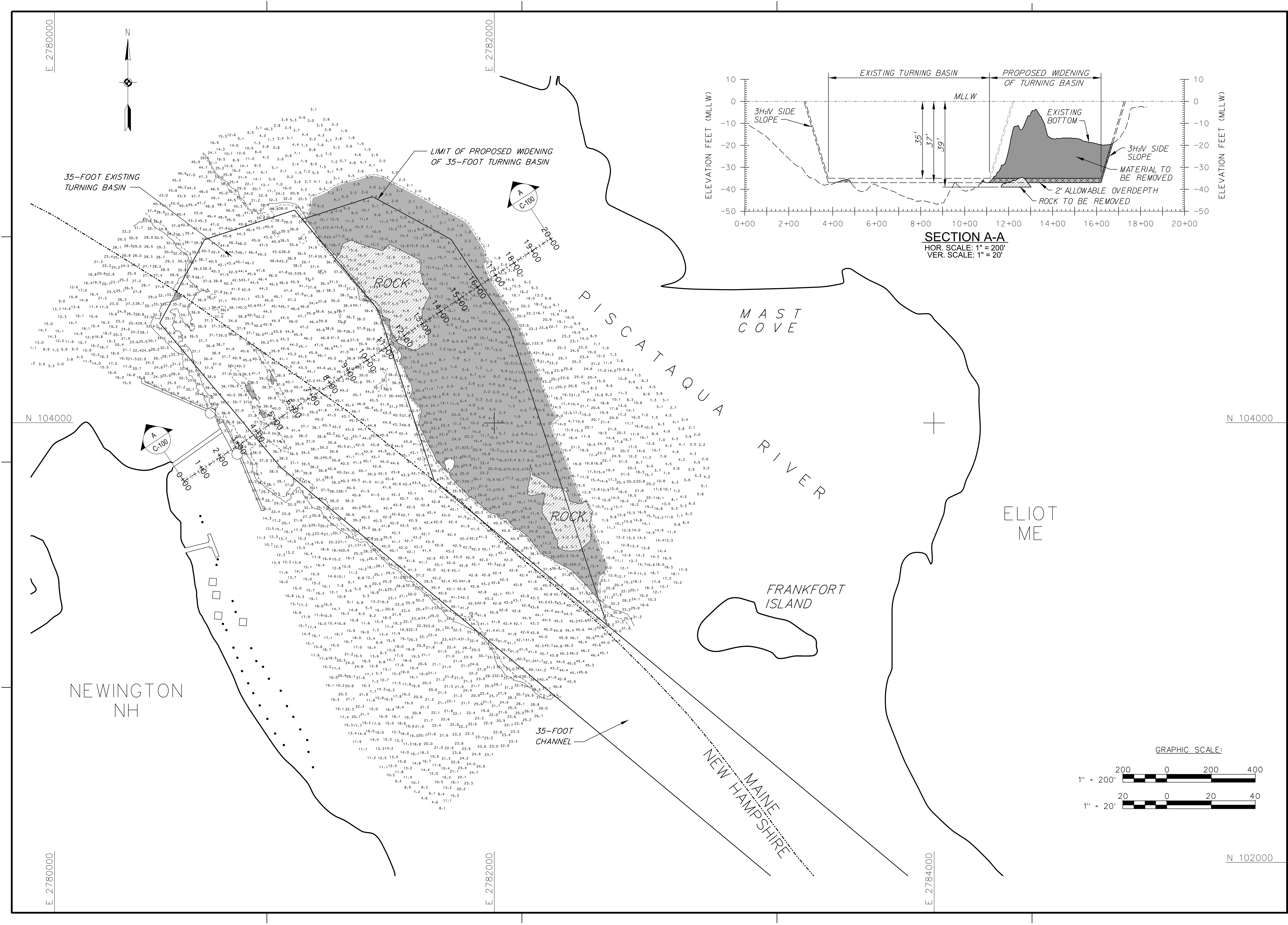
NOTE:

COORDINATES SHOWN ARE BASED ON THE TRANSVERSE MERCATOR GRID SYSTEM FOR THE STATE OF MAINE (WEST ZONE 1802) AND NAD 1983.

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

PORTSMOUTH HARBOR TURNING BASIN WIDENING PROJECT
FEASIBILITY STUDY
SKETCH 3
ALTERNATIVE 3
NEW TURNING BASIN

3/3



SECTION A-A

HOR. SCALE: 1" = 200'
VER. SCALE: 1" = 20'

US Army Corps
of Engineers®
New England
District

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

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

DESIGNED BY: MEG		DATE: MAY 2014
DWN BY: MEG	CKD BY: MET	SOLICITATION NO.:
SUBMITTED BY: MET		CONTRACT NO.:
PLOT SCALE: 1" = 200'	PLOT DATE:	DRAWING CODE:
SIZE: ANSI D	FILE NAME: C-100.dgn	

PORTSMOUTH HARBOR TURNING BASIN WIDENING PROJECT
FEASIBILITY STUDY

SITE PLAN AND SECTION

SHEET
IDENTIFICATION
C-100
SHEET 1 OF 1

Screening Tool

P2#: 109098
PN:
Project Title: Portsmouth Harbor and Piscataqua River Navigation Improvements
Date: 4/2/2014
Filled Out By: Bill Herland/Patty Bolton
Project Manager: Michael Keegan

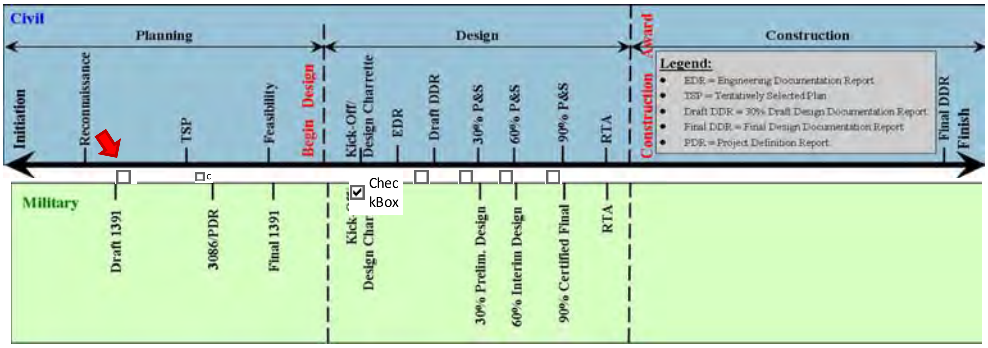
I. Initial Screening Process

Project/Program/Procurement Amount Cost (Ex: PA, Total Authorized Cost, etc...) $ **$23,373,000**

Choose where you plan to do VE

☑ Civil

☐ Military



A) Is the Project/Program/Procurement federally funded?	Yes	☑	No	☐	If No, Check No Further Action, create VMP
B) Is the Corps the design agent?	Yes	☑	No	☐	If No, document design agent compliance with VE requirement on VMP
C) Has a programmatic study been previously executed within the last 3-5 years? Allowed before 35% Design only. (Determines if a Bridge Strategy is an option)	Yes	☐			If Yes, bridge strategy automatically selected on section III of strategy tab
D) Could this be a part of a programmatic study? (Automatically determines Programmatic Strategy)	Yes	☐			If Yes, programmatic strategy automatically selected on section III of strategy tab
E) Are there at least 5 similar studies within the last 3-5 years in the same region? Allowed before 35% Design. Applicable to projects in the $2-$10M range with MSC approval; projects over $10M require HQ Ch. OVE approval (Determines if Scan Strategy is an option)	Yes	☐			If Yes, scan strategy automatically selected on section III of strategy tab as long as design is below 15%. If opportunity to change exists outside of past studies do not toggle yes.
F) Is the project/program/procurement over $10M?	Yes	☑	No	☐	If Yes, proceed to level II or program specific screen
G) Is there a program specific screening tool?	Yes	☐	No	☐	If yes and not pre-flagged as low opportunity, proceed to program specific screen

~~H) Is the project/procurement/program Unique or Standard?~~	~~Standard~~	☐	~~Unique~~	☐		
~~I) Is there an opportunity for beneficial change?~~	~~Limited~~	☐	~~Moderate~~	☐	~~High~~	☐

Decision: **Proceed to Strategy Screening Process** ☑ **Low Opportunity** ☑ **No Further Action** ☐

ERROR-Can't Do Limited Opportunity $10M & Over on a Civil Works Project

~~II. Strategy Screening Process~~ ~~(work with PDT)~~

~~A) Project Specific~~

~~1) Disciplines Involved~~	~~Couple (≤2)~~	☑	~~Few (2-4)~~	☐	~~Several (>4)~~	☐
~~2) Scope – Simple/Complex~~	~~Simple~~	☑	~~Moderate~~	☐	~~Complex~~	☐
~~3) New/Renovate/Addition~~	~~New~~	☐	~~Addition~~	☑	~~Renovation~~	☐
~~4) Based on Standard Design~~	~~Yes~~	☑	~~No~~	☐		
~~5) Based on Standards~~	~~Yes~~	☑	~~No~~	☐		
~~6) Unique or repetitive Type~~	Unique (one of a kind or few like it)	☑	~~Repetitive~~	☑		
~~7) Constraints~~	~~Minimal~~	☑	~~Moderate~~	☐	~~Significant~~	☐
~~8) Single phase/multi-phase~~	~~Single~~	☑	~~Multiple~~	☐		
~~9) Single facility/Multiple~~	~~Single~~	☑	~~Multiple~~	☐		
~~10) Status of Design~~	~~Early~~	☐	~~35%~~	☑	~~65% or later~~	☐

~~B) Stakeholders~~

~~1) Level of PDT Experience~~	~~Limited~~	☑	~~Substantial~~	☐	~~Unknown~~	☐
~~2) Applicability of Team Experience~~	~~Applicable~~	☐	~~Not Applicable~~	☐	~~Unknown~~	☐
~~3) Design Provided by Others~~	~~Yes~~	☐	~~No~~	☑		

~~C) Risk/Opportunity~~

~~1) Confidence in Budget Estimate~~	~~Low~~	☐	~~Moderate~~	☑	~~High~~	☐	~~Unknown~~	☐
~~2) Adequacy of Schedule – Design & Construction~~	~~Adequate~~	☑	~~Moderate~~	☐	~~Tight~~	☐		
~~3) Technical Risk – Design & Construction~~	~~Low~~	☐	~~Moderate~~	☑	~~High~~	☐		
~~4) Opportunity for Beneficial Change~~	~~Low~~	☑	~~Moderate~~	☐	~~High~~	☐		

~~**Complexity Judgement**~~ ~~Assess complexity of overall circumstances (A-C)~~ ~~Low~~ ● ~~Moderate~~ ○ ~~High~~ ○

~~**Narrative:**~~

~~Document rationale on selected complexity on page 3~~

Screening Tool - Narrative

P2#: 109098

Date: 4/2/2014

PN: 0

Filled Out By: Bill Herland/Patty Bolton

Project Title: Portsmouth Harbor and Piscataqua River Navigation Improvements

Project Manager: Michael Keegan

Narrative: (Low Opportunity / Complexity Narrative)

This study of Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, was directed by Section 436 of the Water Resources Development Act of 2000 (P.L. 106-541). The study area is located within the 1st Congressional District of New Hampshire and the 1st Congressional District of Maine.

The existing Federal Navigation Project for Portsmouth Harbor and Piscataqua River consists of a 6.2 mile long navigation channel that is 35-feet deep at mean lower low water, a minimum of 400 feet wide, and extends from deep water at the river's mouth at New Castle, New Hampshire/ Kittery, Maine to the head of deep-draft navigation at Newington, New Hampshire/Eliot, Maine. The existing project also includes widening at several bends and bridge approaches by removal of ledge at; Henderson Point, Gangway Rock, Badgers Island, the U.S. Route 1 Bypass Bridge (Sarah Long Bridge), and Boiling Rock.

The proposed improvement in this study consists solely of modification of a single project feature, the upper turning basin at the head of the 35-foot channel. Under this improvement project the basin would be expanded from its present 800-foot width to 1200 feet. The material is a compact sandy glacial till and rock and will require a mechanical bucket dredge for removal, with the rock likely requiring drilling and blasting. The Federal base plan for disposal is at an ocean site located seaward of the harbor.

The VE study is recommended to be completed during PED to incorporate geotechnical developments thereby providing a VE study based on a updated design.

Beta Version 0.14.3

Value Management Plan

(PMBP REF8023G)

Civil Works: = ☑ **Non Federally/ Host Nation Funded** = ☐ **Agency:** USACE
Military: = ☐ **Project/Program/Procurement Amount Cost** = $23,373,000 **District:**

P2#: 109098
PN: 0
Project Title: Portsmouth Harbor and Piscataqua
Date: 4/2/2014
Filled Out By: Bill Herland/Patty Bolton
Project Manager: Michael Keegan

Goal: (Statement of overall goal of VM/E effort)
Provide value to the project for all stake holders.

Objective: (Specific items of accomplishment that the VM/E effort will achieve as specific to the project)
Develop feasible alternatives to the porject to ensure salient, constructable alternatives are provided to the design team.

Execution - VE Strategy & Level of Effort (Document Decisions from Section I, II & III):

Conduct VE ☐ **Low Opportunity** ☑ **No Further Action** ☐ **Design Agent VE Compliance** ☐
Strategy Decision: **Date of Compliance**

Bridge ☐
Scan ☐
Value Planning (Level 1) ☐
Abbreviated Study (Level 2) ☑
Standard Study (level 3) ☐
Problem Resolution (Level 4) ☐
Programmatic (Level 5) ☐
Functional Review (Level 6) ☐

Single Effort ☑
Multiple efforts ☐
Independent ☐
Integrated ☐
Blended ☐

Preliminary Schedule	
Overall VE Start (ML285, CW285, CW192)	
VE Activity Start	FY 2015
VE Activity Finish	FY 2015
Est. Value Activity Duration	3 days

Strategy Warning: Low Opportunity or No Further Action cannot be selected when a CW project is >$10M

Brief **Narrative:** (Summarize Narrative from Page 3)
The proposed improvement in this study consists solely of modification of a single project feature, the upper turning basin at the head of the 35-foot channel. Under this improvement project the basin would be expanded from its present 800-foot width to 1200 feet. The material is a compact sandy glacial till and rock and will require a mechanical bucket dredge for removal, with the rock likely requiring drilling and blasting. The Federal base plan for disposal is at an ocean site located seaward of the harbor.

The VE study is recommended to be completed during PED to incorporate geotechnical developments thereby providing a VE study based on a updated design.

Preliminary Team & Budget Info

Name	Role/ Discipline	Org Code	Approx Bill Rate	Hrs	USACE- Dist/ AE Firm	Total
	Team Leader		$120	40		$4,800
	VEO		$115	32		$3,680
	Admin Assistant		$100	0		$0
	Contracting		$100	0		$0
	Tech Team #1		$120	24		$2,880
	Tech Team #2		$110	24		$2,640
	Tech Team #3		$100	0		$0
	Tech Team #4		$100	0		$0
	Tech Team #5		$100	0		$0
	Tech Team #6		$100	0		$0
	Cost Estimator		$100	24		$2,400
					Expenses Total (from worksheet) =	$0

Estimated Cost of Value Activity = $16,400

for.
Signature & Date of Project Manager Required

5/28/14
Signature & Date of VEO Required

MSC VPM Signature & Date (Required)

HQ Chief OVE Signature & Date (Required)

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

APPENDIX E

COST ENGINEERING

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Table of Contents

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E.1 COST NARRATIVE

Corps of Engineers cost estimates for planning purposes are prepared in accordance with the following guidance:

- Engineer Technical Letter (ETL) 1110-2-573, Construction Cost Estimating Guide for Civil Works, 30 September 2008
- Engineer Regulation (ER) 1110-1-1300, Cost Engineering Policy and General Requirements, 26 March 1993
- ER 1110-2-1302, Civil Works Cost Engineering, 15 September 2008
- ER 1110-2-1150, Engineering and Design For Civil Works Projects, 31 August 1999
- ER 1105-2-100, Planning Guidance Notebook, 22 April 2000, as amended
- Engineer Manual (EM) 1110-2-1304 (Tables revised 30 March 2007), Civil Works Construction Cost Index System, 31 March 2013
- CECW-CP Memorandum For Distribution, Subject: Initiatives To Improve The Accuracy Of Total Project Costs In Civil Works Feasibility Studies Requiring Congressional Authorization, 19 Sep 2007
- CECW-CE Memorandum For Distribution, Subject: Application of Cost Risk Analysis Methods To Develop Contingencies For Civil Works Total Project Costs, 3 Jul 2007
- Cost and Schedule Risk Analysis Guidance, 17 May 2009

The goals of the cost estimating for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project study are to present a Total Project Cost (construction and non-construction costs) for both the Federal Base Plan and the tentatively recommended (Beneficial Use) plan at the current price level to be used for project justification/authorization and to project costs forward in time for budgeting purposes. In addition, the costing efforts are intended to produce a final product, or cost estimate, that is reliable and accurate and that supports the definition of the Government's and the non-Federal sponsor's obligations. The cost estimating efforts for the study also yielded a series of alternative plan formulation cost estimates for decision making. The final set of plan formulation cost estimates used for plan selection relies on construction feature unit pricing. The cost estimate supporting the National Economic Development (NED) plan (base plan), as well as the beneficial use plan, is prepared in MCACES/MII format. The estimate is supported by the preferred labor, equipment, materials, and crew/production breakdown. A fully funded (escalated for inflation through project completion) cost estimate, the Baseline Cost Estimate or Total Project Cost Summary, has also been developed for both the Federal Base Plan and Beneficial Use Plan. A risk analysis was prepared that addresses the uncertainties in, and sets contingencies for, the Federal Base Plan and Beneficial Use Plan cost items. A discussion of the risk analysis is included at the end of this appendix.

The Portsmouth Harbor and Piscataqua River Navigation Improvement Project consists of widening the upper turning basin from a width of 800 feet to a width of 1200 feet at the authorized depth of -35 MLLW. Approximately 728,100 cubic yards of sand and gravel and approximately 25,300 cubic yards of rock would be removed. The Federal Base Plan consists of disposal of both the sand and gravel and rock to an ocean disposal site referred to as Isle of

Shoals North (IOS-N). However, as four coastal communities (Wells, Newbury, Newburyport, and Salisbury) have indicated their desire for the dredged material (sand only) to be placed in near shore areas to nourish their nearby beaches, a beneficial use plan was also developed. The total project cost established by the Federal Base Plan will determine the portion of the project paid for by the Government. The increased total project cost for the Beneficial Use Plan will be distributed to those four communities based on quantity of material and increased disposal distance from the Isle of Shoals North site.

E.1.1 Recommended Alternative Plans

The NED plan was selected based on the results of Corps planning guidance that specifies the plan that reasonably maximizes net economic benefits consistent with protecting the Nations environment is the selected plan. In this case, widening the existing turning basin to a width of 1200 feet and disposing of dredged material at the IOS-N ocean disposal site was the NED plan and is the Federal base plan that would be selected for implementation. However, as those four coastal communities have indicated their desire for the sand material, the Beneficial Use Plan is selected as the tentatively recommended plan. The Economics Appendix fully describes the plan selection. The scope of work for both the Federal Base Plan and the Beneficial Use Plan was conveyed to the Cost Engineer by the Project Manager and is based on quantities provided by the Civil Section and is summarized in table form in E.2 QUANTITIES. The MCACES/MII cost estimates are based on these quantities. The notes provided in the estimate detail the estimate parameters and assumptions. These include pricing at the Fiscal Year 2014 price level (1 October 2013 – 30 September 2014). The QUANTITIES section also provides values for the two non-selected turning basin sizes (1020' and 1100' wide) for comparison purposes as cost estimates were completed for these cases, but no risk analysis or total project cost summary was prepared.

E.1.2 Construction Cost

The MCACES/MII estimate is based on unit prices and mob/demob sums calculated in CEDEP and in a District-standard Drilling & Blasting spreadsheet. The estimate does not contain any contingency or escalation as they are determined in the risk analysis and total project cost summary processes, respectively. In the past two years NAE has had two dredging projects similar in magnitude to the subject project; both of which were bid on by three large dredging contractors in this area. These three contractors were contacted and confirmed they have the necessary equipment and would likely self-perform the drilling and might only sub out the diving portion, which is a small percentage of the overall drilling & blasting cost. The Drilling & Blasting spreadsheet does not provide a simple breakout of diving costs; therefore the Drilling & Blasting construction costs were placed under the Prime and the risk of a diving subcontractor has been accounted for in the risk analysis.

E.1.3 Non-Construction Cost

Non-construction costs typically include Real Estate, Planning, Engineering and Design (PED), and Construction Management (Supervision and Administration, S&A). It was determined that no real estate is required for this project as the area to be dredged and open water placement areas required for construction are below the ordinary high watermark of the navigable watercourse. Berth access for all equipment would be provided at the State's terminal and are subject to navigation servitude and no credit would be due the non-Federal sponsor for this use.

Planning, Engineering and Design costs are broken down into Preconstruction, Engineering and Design (PED), or preparation of contract plans and specifications and Engineering during Construction (EDC). PED costs were solicited from the Project Manager and the PDT

Construction Management costs were also solicited from the Project Manager and the PDT.

The main report details both cost allocation and cost apportionment for the Federal government and the non-Federal sponsor. Also included in the main report are the non-Federal sponsor's obligations (items of local cooperation).

E.1.4 Plan Formulation Cost Estimates

For the plan formulation cost estimates, dredging and disposal costs for both the Federal Base Plan and Beneficial Use Plan were calculated in CEDEP. Drill and blasting costs for both plans were calculated in a District-standard spreadsheet. The unit prices for each of these major or variable construction elements were entered into MCACES/MII and differentiated each plan by the quantities required to construct the plans. It should be noted that the unit prices derived from the CEDEP spreadsheet are in line with the previous two years of dredging work seen in the New England District. Over this two year period (FY12 and FY13) there have been a total of nine dredging projects of various sizes with an average unit price of approximately [redacted]/cy compared to [redacted]/cy and [redacted]/cy for the Federal Base Plan and Beneficial Use Plan, respectively. This represents a good correlation between historic and these calculated unit prices.

Designs and quantities for each element were provided to the Cost Section by the Civil Section. It should be noted that without additional borings/rock investigations, the Civil Section has assumed a conservative material quantity and the Geology Section has assumed a rock-type that necessitates drill and blast. With additional borings/investigations it is likely that the rock quantity could be lower and the rock type will be one that could be fractured and dredged with a large rock bucket (with no drill and blast necessary).

The plan formulation process for this study involved numerous iterations. Since the costs for the plans were calculated via CEDEP and drill & blast spreadsheets it was fairly simple to adjust each of them accordingly as plan components changed and as plans were added or removed from consideration. Refer to the Economic Analysis section in the Feasibility Report for the final Plan Formulation cost tables.

E.1.5 Construction Schedule

Construction schedules for both the Federal Base Plan and Beneficial Use Plan were prepared by the Cost Engineer. These schedules considered not only durations of individual components but also timing of construction contracts. They are based on multiple crews with shift work and overtime due to the established environmental windows based on lobster and shellfish peak spawning periods. These schedules were used in the generation of the Total Project Cost Summary as well as for the completion of the risk analysis. The construction schedule may change as design of the project proceeds in the plans and specifications phase and then it may change again when the contract is awarded and the contractor provides his/her schedule. Interestingly, the construction schedule does change significantly between the Federal Base Plan and the Beneficial Use Plan as the increased disposal distance and subsequent haul time is mitigated by the increase in scows under the Beneficial Use Plan.

E.1.6 Total Project Cost Summary

The Total Project Cost Summary for both plans includes escalation through project completion. The cost estimates for both plans was prepared with an identified price level date. Inflation factors are used to adjust the pricing to the project schedule. This is known as the Fully Funded Cost Estimate or Total Project Cost Summary. They include all Federal and non-Federal costs including all construction features, Preconstruction Engineering and Design, Construction Management, Contingency, and Inflation.

E.1.7 Risk Management Measures

The PDT identified highly rated concerns in order to evaluate the proper means to mitigate and limit their effect on the project as follows:

- Construction Environmental Concerns – Lobsters and shellfish have historically presented obstacles to dredging. Their spawning periods provide a construction window from approximately the end of October/beginning of November to the end of March/middle of April. Mitigation measures include, but are not limited to, issuing the NTP well in advance of construction start to allow the contractor sufficient time to mob and complete the work.

- Fuel Price Increases - Given that fuel prices are inevitable and unpredictable the team acknowledges the effect on the cost of all work. Mitigation measures are somewhat limited but could include grouping work into larger contracts to allow bulk fuel purchases and scheduling work to occur as soon as possible.

- Drill & Blast Prices – Drill & blast is not a common construction feature and, therefore, background cost data is limited. The drill and blast cost spreadsheet that was used is based on a quote from a marine drill & blast company obtained in 2008 and then escalated to 2010 in that year for a separate project. Costs for most of the explosive-related materials were updated specifically for this project. The remaining costs have been escalated to current dollars utilizing a conservative escalation factor (8.88%) from 2010. Several material items were researched and costs were updated accordingly specifically for this project but not enough resources were allotted to complete this effort. Mitigation measures could include the research and updating of additional factors in the drill & blast spreadsheet currently utilized by the Cost Engineer to provide a more current estimating tool. While the spreadsheet is based on real costs with appropriate escalation, further updating based on current industry pricing would strengthen the spreadsheet and provide a more accurate total drilling and blasting price.

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E.2 QUANTITIES

QUANTITIES

		Sand and Gravel Material					Rock Material		
			Disposal To						Disposal To
Improvement Area		Quantities	Isle of Shoals	Wells	Newbury / Newburyport	Salisbury		Quantities	Isle of Shoals
			100%	50%	37.50%	12.50%			100%
1020-Foot Wide Turning Basin	Required (to -35)	340,502	340,500	170,300	127,700	42,500	Required (to -35)	8,854	8,900
	Overdepth (to -37)	44,387	44,400	22,200	16,700	5,500	Overdepth (to -37)	6,050	13,600
	Total	384,889	384,900	192,500	144,400	48,000	Overdepth (to -39)	7,485	
							Total	22,389	22,500
	Area	*493,930*	*493,930*	*246,965*	*185,224*	*61,741*			
							Area	*106,800*	*106,800*
1120-Foot Wide Turning Basin	Required (to -35)	519,778	519,800	259,900	194,900	65,000	Required (to -35)	8,883	8,900
	Overdepth (to -37)	53,930	53,900	27,000	20,200	6,700	Overdepth (to -37)	6,123	14,000
	Total	573,708	573,700	286,900	215,100	71,700	Overdepth (to -39)	7,717	
							Total	22,723	22,900
	Area	*705,840*	*705,840*	*352,920*	*264,690*	*88,230*			
							Area	*110,174*	*110,174*
1200-Foot Wide Turning Basin	**Required (to -35)**	**661,266**	**661,300**	**330,700**	**248,000**	**82,600**	**Required (to -35)**	**9,139**	**9,200**
	Overdepth (to -37)	**66,810**	**66,800**	**33,400**	**25,100**	**8,300**	**Overdepth (to -37)**	**6,777**	**16,100**
	Total	**728,076**	**728,100**	**364,100**	**273,100**	**90,900**	**Overdepth (to -39)**	**9,237**	
							Total	**25,153**	**25,300**
	Area	***890,350***	***890,350***	***445,175***	***333,881***	***111,294***			
							Area	***128,987***	***128,987***

1) All quantities are in cubic yards and all areas are in square feet
2) All quantities and areas were provided by Civil Section from graphic **Figure 4 - Dredged and Rock Quantities for Alternative 1**, dated 24 October 2013
3) Federal Base Plan consists of the 1200' Turning Basin and Sand and Gravel disposal to Isle of Shoals and Rock disposal to Isle of Shoals
4) Beneficial Use Plan consists of the 1200' Turning Basin and Sand and Gravel disposal to Wells, Newbury/Newburyport, and Salisbury and Rock disposal to Isle of Shoals
5) Material quantities were rounded to nearest 100 cubic yards as standard practice
6) Rock material Overdepth to -37 and Overdepth to -39 quantities combined to enter into CEDEP and Drilling & Blasting spreadsheet

E.3 PLAN FORMULATION COST ESTIMATES
(MCACES Cost Estimate)

Portsmouth Harbor & Piscataqua River Turning Basin Dredging
Portsmouth Harbor & Piscataqua River Federal Navigation Project
Feasibility Estimate

Scope of Work:

The project involves dredging and drilling/blasting operations in the Portsmouth Harbor and Piscataqua River area. The Feasibility Report looked at three improvement areas resulting in three different turning basin sizes; 1020', 1120', and 1200' to a depth of -35' with -2' of overdepth to -37'. The Feasibility Report looked at two different scenarios for sand material disposal; (1) 100% near shore disposal at the Isle of Shoals and (2) 50% near shore disposal at Wells Beach, 37.5% near shore disposal between Newbury & Newburyport Beach, and 12.5% near shore disposal at Salisbury Beach. All disposal will be near-shore to benefit the nearby beaches and slow erosion. There is some estimated amount of rock that will be encountered which will require drilling and blasting and subsequent dredging and disposal to remove. The rock removal is required to -35' with -2' of overdepth to -37' and an additional 2' of overdepth to -39'. The rock is expected to be dredged by the same equipment as the sand with a different, tougher, clamshell and placed on flat-top work barges. The estimate looked at two different scenarios for rock material disposal; (1) near-shore disposal at the Isle of Shoals and (2) disposal and storage upland at the State Pier. Ultimately, the report concluded that the 1200' Turning Basin was favorable. The FEDERAL BASE PLAN consists of IMPROVEMENT AREA 1200' TURNING BASIN with sand and rock disposal both near shore at Isle of Shoals. The BENEFICIAL USE PLAN consists of IMPROVEMENT AREA 1200' TURNING BASIN with sand disposal near shore at Wells, Newbury/Newburyport, and Salisbury and rock disposal near shore at Isle of Shoals. It was also decided that both the FEDERAL BASE PLAN and BENEFICIAL USE PLAN would dispose of the blasted rock material at the Isle of Shoals.

Assumptions:

Dredging costs were calculated using CEDEP spreadsheet and drill and blast costs were calculated using a District-standard drilling & blasting spreadsheet. Unit prices obtained from CEDEP appear reasonable based on the historic dredge project unit price of [redacted]/cy (based on 9 dredging projects in FY12 and FY13). The drill and blast cost spreadsheet that was used is based on a quote from a marine drill & blast company obtained in 2008 and then escalated to 2010 in that year for a separate project. Costs for most of the explosive-related materials were updated specifically for this project. The remaining costs have been escalated to current dollars utilizing a conservative escalation factor (8.88%) from 2010. Several material items were researched and costs were updated accordingly specifically for this project. It is assumed a dredging contractor would be the prime contractor on the job, but would also perform the rock drilling and blasting as well as the rock removal. In the last two years NAE has had two dredging projects of this magnitude both of which were bid on by three large dredging contractors in this area (specifically Great Lakes, Cashman, and Weeks). Cost Engineer spoke with personnel at all three firms who confirmed that they would perform the drilling and might only sub out the diving portion, which is a small percentage of the overall drilling & blasting cost. The drilling & blasting spreadsheet does not provide a simple breakout of diving costs; therefore the d&b has remained under the prime and the risk of a diving subcontractor has been accounted for in the risk analysis. The estimate includes provisions for pilots to accompany the tug captains in order for them to learn to navigate the waters safely (estimate assumed ~9 trips necessary per tug captain). Due to the tides and water levels within the river corridor, there are approximately 9 hours in a 24 hour day (4-5 hours per tide cycle) in which the tugs will not be able to bring scows through. Therefore, the haul time was "set" to at least equal 62.5% of the excavation time by including additional scows and tugs to mitigate this delay. All quanities for sand dredging and rock drill/blast and subsequent dredging were obtained from Civil Section. It should be noted that without additional borings/rock investigations, the Civil Section has assumed a conservative material quantity and the Geology Section has assumed a rock-type that necessitates drill and blast. With additional borings/investigations it is likely that the rock quantity could be lower and the rock type will be one that could be fractured and dredged with a large rock bucket (with no drill and blast necessary).

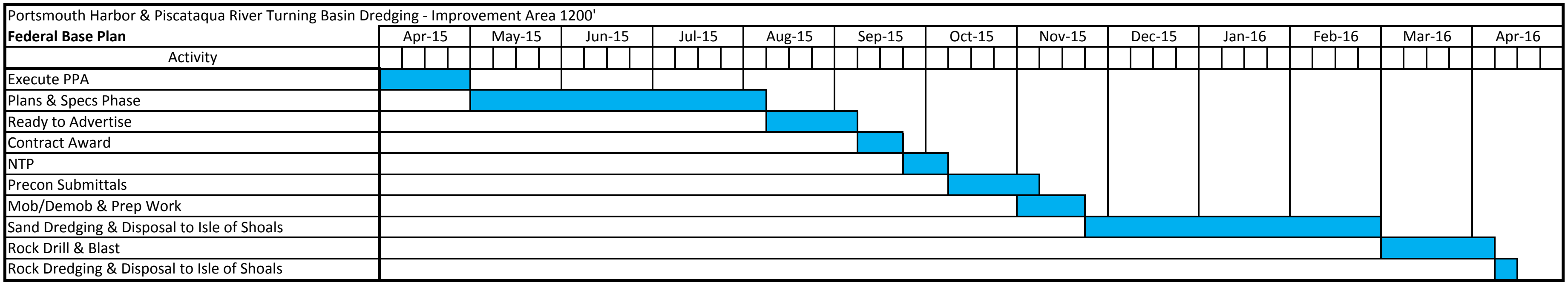
Estimated by	Jeffrey Gaeta
Designed by	Mark Godfrey
Prepared by	Jeffrey Gaeta
Preparation Date	11/4/2013
Effective Date of Pricing	11/4/2013
Estimated Construction Time	150 Days

Date	Author	Note
6/12/2014	JAG	Additional Project Notes:Contractor Level & Markups:OH [redacted]%, Profit [redacted]%, Bond [redacted]% for Prime Contractor (with OH [redacted]%, Profit [redacted]%, Bond [redacted]% on all sub work). The drill and blast work carries the following markups: OH [redacted]%, Profit [redacted]%, Bond [redacted]%. This estimate includes no contingency or escalation.Labor rates obtained from Davis Bacon General Decision Number: NH130003 01/04/2013 NH3 - Heavy Dredging. The Davis Bacon rates were entered into CEDEP. Equipment rates from CEDEP and Drill & Blast spreadsheet were used in respective spreadsheets. Portsmouth Pilots costs obtained from Harbormaster.Acquisition Strategy:Uncertain at this time. Based on the results of final subsurface explorations during PED and final elevations and quantities for rock removal, acquisition strategy for construction will narrow contract options to either unrestricted solicitation, small business set-aside, or negotiated small business.

Description	Quantity	UOM	LaborCost	MatlCost	EQCost	SubBidCost	BareCost	ContractCost	ProjectCost
Project Cost Summary			**72,900.00**	**0.00**	**0.00**	**32,219,189.00**	**32,292,089.00**	**32,292,089.00**	**32,292,089.00**
FEDERAL BASE PLAN - Improvement Area 1200' Turning Basin	**1**	**LS**	**32,400.00**	**0.00**	**0.00**	**15,276,769.00**	**15,309,169.00**	**15,309,169.00**	**15,309,169.00**
Mob & Demob	**1**	**LS**	**0.00**	**0.00**	**0.00**	**1,190,890.00**	**1,190,890.00**	**1,190,890.00**	**1,190,890.00**
Rock - Drill & Blast	**1**	**LS**	**0.00**	**0.00**	**0.00**	**2,441,956.00**	**2,441,956.00**	**2,441,956.00**	**2,441,956.00**
Sand - Dredge & Disposal to Isle of Shoals	**1**	**LS**	**32,400.00**	**0.00**	**0.00**	**10,775,880.00**	**10,808,280.00**	**10,808,280.00**	**10,808,280.00**
Rock - Dredge & Disposal to Isle of Shoals	**1**	**LS**	**0.00**	**0.00**	**0.00**	**868,043.00**	**868,043.00**	**868,043.00**	**868,043.00**
BENEFICIAL USE PLAN - Improvement Area 1200' Turning Basin	**1**	**LS**	**40,500.00**	**0.00**	**0.00**	**16,942,420.00**	**16,982,920.00**	**16,982,920.00**	**16,982,920.00**
Mob & Demob	**1**	**LS**	**0.00**	**0.00**	**0.00**	**1,302,862.00**	**1,302,862.00**	**1,302,862.00**	**1,302,862.00**
Rock - Drill & Blast	**1**	**LS**	**0.00**	**0.00**	**0.00**	**2,441,956.00**	**2,441,956.00**	**2,441,956.00**	**2,441,956.00**
Sand - Dredge & Disposal to Wells, Newbury/Newburyport & Salisbury	**1**	**LS**	**40,500.00**	**0.00**	**0.00**	**12,329,559.00**	**12,370,059.00**	**12,370,059.00**	**12,370,059.00**
Rock - Dredge & Disposal to Isle of Shoals	**1**	**LS**	**0.00**	**0.00**	**0.00**	**868,043.00**	**868,043.00**	**868,043.00**	**868,043.00**

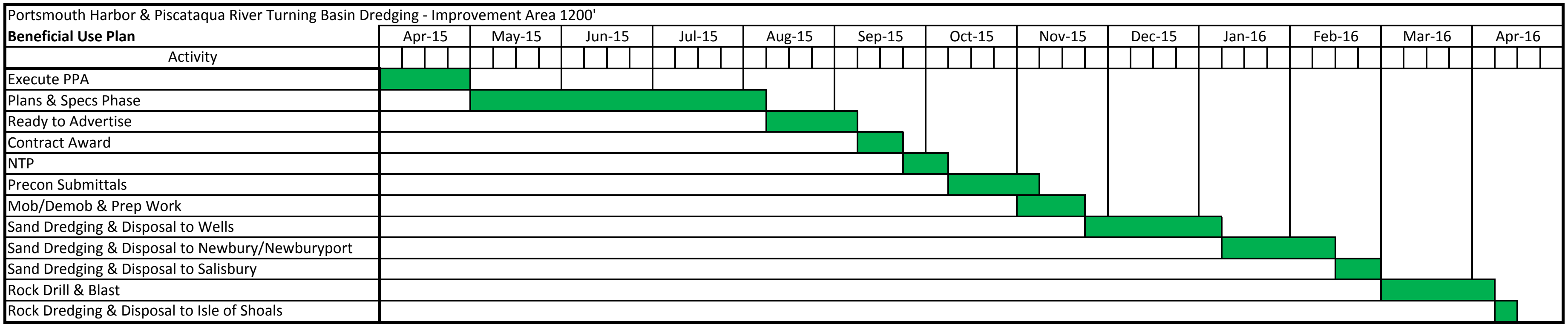
E.4 SCHEDULES

SCHEDULES



Portsmouth Harbor & Piscataqua River Turning Basin Dredging - Improvement Area 1200'

Federal Base Plan	Apr-15				May-15				Jun-15				Jul-15				Aug-15				Sep-15				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16				Mar-16				Apr-16			
Activity																																																				
Execute PPA	🟦	🟦	🟦	🟦																																																
Plans & Specs Phase					🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦																																			
Ready to Advertise																		🟦	🟦	🟦	🟦																															
Contract Award																						🟦	🟦																													
NTP																								🟦	🟦																											
Precon Submittals																										🟦	🟦	🟦	🟦																							
Mob/Demob & Prep Work																													🟦	🟦	🟦																					
Sand Dredging & Disposal to Isle of Shoals																																🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦								
Rock Drill & Blast																																													🟦	🟦	🟦	🟦	🟦			
Rock Dredging & Disposal to Isle of Shoals																																																		🟦		



Portsmouth Harbor & Piscataqua River Turning Basin Dredging - Improvement Area 1200'

Beneficial Use Plan	Apr-15				May-15				Jun-15				Jul-15				Aug-15				Sep-15				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16				Mar-16				Apr-16			
Activity																																																				
Execute PPA	🟩	🟩	🟩	🟩																																																
Plans & Specs Phase					🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩																																			
Ready to Advertise																		🟩	🟩	🟩	🟩																															
Contract Award																						🟩	🟩																													
NTP																								🟩	🟩																											
Precon Submittals																										🟩	🟩	🟩	🟩																							
Mob/Demob & Prep Work																													🟩	🟩	🟩																					
Sand Dredging & Disposal to Wells																																🟩	🟩	🟩	🟩	🟩	🟩															
Sand Dredging & Disposal to Newbury/Newburyport																																						🟩	🟩	🟩	🟩	🟩										
Sand Dredging & Disposal to Salisbury																																											🟩	🟩								
Rock Drill & Blast																																													🟩	🟩	🟩	🟩	🟩			
Rock Dredging & Disposal to Isle of Shoals																																																		🟩		

E.5 RISK AND UNCERTAINTY ANALYSIS

E.5 RISK AND UNCERTAINTY ANALYSIS

An Abbreviated Risk Analysis was conducted according to the procedures outlined in the manual entitled “Cost and Schedule Risk Analysis Process”, dated March 2008.

E.5.1 Risk Analysis Methods

Members of the PDT participated in a cost risk analysis brainstorming session to identify risks associated with Federal Base Plan and tentatively recommended plan (Beneficial Use Plan). The risks were listed in the risk register and evaluated by the team. The Risk Analyses utilized the Moderate Risk category as this is a navigation improvement project to provide additional depth and area to maneuver inside the turning basin. This represents minimal life safety risks. In addition, a majority of costs associated with the project are represented in the dredging sand and rock work features which are standard features in the New England District area where no significant cost fluctuations have occurred or are expected to occur in the near future. Assumptions were made as to the likelihood and impact of each risk item, as well as the probability of occurrence and magnitude of the impact if it were to occur. Adjustments were made to the analysis accordingly and the final contingencies were established. The contingency was applied to each plan estimate in order to obtain the Total Project Cost. The risks between plans were the same due to the disposal method (near-shore disposal using bottom-dump scows) being the same.

E.5.2 Risk Analysis Results

Refer to the Abbreviated Risk Analysis in this report. Both the Federal Base Plan and Beneficial Use Plan, with the appropriate Risk Analysis and Total Project Cost Summary, will undergo Cost Review and Certification by the Walla Walla Mandatory Center of Expertise prior to submittal of the Final Report.

Abbreviated Risk Analysis

Project (less than $40M): **Portsmouth Harbor &Piscataqua River Federal Navigat**
Project Development Stage: **Feasibility (Recommended Plan)**
Risk Category: **Moderate Risk: Typical Project or Possible Life Safety**

**** FEDERAL BASE PLAN ****

Total Construction Contract Cost = **$ 15,309,213**

	CWWBS	Feature of Work	Contract Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0.00%	$ -	$ -
1	12 NAVIGATION, PORTS AND HARBORS	**Mobilization & Demobilization**	**$ 1,190,890**		15.49%	$ 184,514	$ 1,375,403.86
2	12 NAVIGATION, PORTS AND HARBORS	**Drill & Blast**	**$ 2,442,000**		31.02%	$ 757,587	$ 3,199,586.87
3	12 NAVIGATION, PORTS AND HARBORS	**Sand - Dredge & Disposal**	**$ 10,808,280**		19.38%	$ 2,094,570	$ 12,902,849.62
4	12 NAVIGATION, PORTS AND HARBORS	**Rock - Dredge & Disposal**	**$ 868,043**		22.69%	$ 196,992	$ 1,065,034.59
12		**Remaining Construction Items**	**$ -**	*0.0%*	0.00%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	**$ 894,000**		11.52%	$ 102,966	$ 996,965.74
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	**$ 716,000**		15.49%	$ 110,935	$ 826,935.46

Totals				
Real Estate	$ -	0.00%	$ -	$ -
Total Construction Estimate	$ 15,309,213	21.12%	$ 3,233,662	$ 18,542,875
Total Planning, Engineering & Design	$ 894,000	11.52%	$ 102,966	$ 996,966
Total Construction Management	$ 716,000	15.49%	$ 110,935	$ 826,935
Total	$ 16,919,213		$ 3,447,563	$ 20,366,776

Abbreviated Risk Analysis

Project (less than $40M): **Portsmouth Harbor &Piscataqua River Federal Navigat**
Project Development Stage: **Feasibility (Recommended Plan)**
Risk Category: **Moderate Risk: Typical Project or Possible Life Safety**

**** BENEFICIAL USE PLAN ****

Total Construction Contract Cost = **$ 16,982,964**

	CWWBS	Feature of Work	Contract Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	**$ -**		**0.00%**	$ -	$ -
1	**12 NAVIGATION, PORTS AND HARBORS**	**Mobilization & Demobilization**	**$ 1,302,862**		15.49%	$ 201,863	$ 1,504,724.56
2	**12 NAVIGATION, PORTS AND HARBORS**	**Drill & Blast**	**$ 2,442,000**		31.02%	$ 757,587	$ 3,199,586.87
3	**12 NAVIGATION, PORTS AND HARBORS**	**Sand - Dredge & Disposal**	**$ 12,370,059**		19.38%	$ 2,397,232	$ 14,767,290.55
4	**12 NAVIGATION, PORTS AND HARBORS**	**Rock - Dredge & Disposal**	**$ 868,043**		22.69%	$ 196,992	$ 1,065,034.59
12		**Remaining Construction Items**	**$ -**	*0.0%*	0.00%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	**$ 894,000**		11.52%	$ 102,966	$ 996,965.74
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	**$ 716,000**		15.49%	$ 110,935	$ 826,935.46

Totals				
Real Estate	$ -	0.00%	$ -	$ -
Total Construction Estimate	$ 16,982,964	20.92%	$ 3,553,673	$ 20,536,637
Total Planning, Engineering & Design	$ 894,000	11.52%	$ 102,966	$ 996,966
Total Construction Management	$ 716,000	15.49%	$ 110,935	$ 826,935
Total	$ 18,592,964		$ 3,767,574	$ 22,360,538

E.6 TOTAL PROJECT COST SUMMARY

E.6 TOTAL PROJECT COST SUMMARY

The Total Project Cost Summary (TPCS) addresses inflation through project completion (accomplished by escalation to mid-point of construction). The TPCS includes Federal and non-Federal costs for all construction features, PED, and S&A, along with the appropriate contingencies and escalation associated with each of these activities. The TPCS is formatted according to the CWWBS.

The Total Project Cost Summary was prepared using the MCACES/MII cost estimate for the two plans with contingencies set by the Abbreviated Cost Risk Analysis (CRA).

The CRS based total project contingency was applied to the Total Project Cost Summary.

The Estimated Federal Cost was calculated in the Federal Base Plan TPCS at the typical 75%. This figure was carried over and utilized in the Beneficial Use Plan TPCS as the four local towns will pay the difference in disposal costs to their respective communities.

**** TOTAL PROJECT COST SUMMARY ****

Printed:6/12/2014
Page 1 of 2

PROJECT: **Portsmouth Harbor & Piscataqua River Fed Nav Improvement**
PROJECT NO: P2 109098
LOCATION: **Portsmouth, NH [Disposal to IoSN Only (Sand and Rock)]**

DISTRICT: **NAE North Atlantic Division** **PREPARED:** **12/12/2013**
POC: CHIEF, COST ENGINEERING, Patricia H. Bolton
**** FEDERAL BASE PLAN ****

This Estimate reflects the scope and schedule in report: Portsmouth Harbor and Piscataqua River - Final Feasibility Report

Program Year (Budget EC): 2015
Effective Price Level Date: 1 OCT 14

Civil Works Work Breakdown Structure		**ESTIMATED COST**				**PROJECT FIRST COST (Constant Dollar Basis)**				**TOTAL PROJECT COST (FULLY FUNDED)**				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	**TOTAL ($K)**	Spent Thru: 1-Oct-13 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***K***	***L***	***M***	***N***	***O***
12	NAVIGATION PORTS & HARBORS	$15,309	$3,233	21%	$18,543	1.8%	$15,590	$3,293	$18,883	$0		$15,962	$3,371	$19,334
	CONSTRUCTION ESTIMATE TOTALS:	$15,309	$3,233		$18,543	1.8%	$15,590	$3,293	$18,883	$0		$15,962	$3,371	$19,334
01	LANDS AND DAMAGES	$0	$0	-	$0	-	$0	$0	$0	$0		$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN	$894	$103	12%	$997	3.7%	$927	$107	$1,033	$0		$949	$109	$1,059
31	CONSTRUCTION MANAGEMENT	$716	$111	15%	$827	3.7%	$742	$115	$857	$0		$781	$121	$902
	PROJECT COST TOTALS:	$16,919	$3,447	20%	$20,366		$17,259	$3,514	**$20,774**	$0		$17,693	$3,602	$21,295

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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BOLTON.PATRICIA.HAAS.1008970544
Date: [illegible]00

Mandatory by Regulation	CHIEF, COST ENGINEERING, Patricia H. Bolton
Mandatory by Regulation	PROJECT MANAGER, Richard Heidebrecht
Mandatory by Regulation	CHIEF, REAL ESTATE, Joseph M. Redlinger
	CHIEF, PLANNING, John R. Kennelly
	CHIEF, ENGINEERING, Scott E. Acone
	CHIEF, OPERATIONS, Frank J. Fedele
	CHIEF, CONSTRUCTION, Sean C. Dolan
	CHIEF, CONTRACTING, Shiela Winston-Vincuilla
	CHIEF, PM-PB, xxxx
	CHIEF, DPM, William C. Scully

ESTIMATED FEDERAL COST:	**75%**	**$15,971**
ESTIMATED NON-FEDERAL COST:	**25%**	**$5,324**
(FEDERAL BASE PLAN)		
ESTIMATED TOTAL PROJECT COST:		**$21,295**

Filename: FED BASE PLAN - TPCS_PortsmouthPisq_16Dec2013 JGN1.xlsx
TPCS

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: Portsmouth Harbor & Piscataqua River Fed Nav Improvement
LOCATION: Portsmouth, NH [Disposal to IoSN Only (Sand and Rock)]
This Estimate reflects the scope and schedule in report; -

DISTRICT: NAE North Atlantic Division PREPARED: 12/12/2013
POC: CHIEF, COST ENGINEERING, Patricia H. Bolton
**** FEDERAL BASE PLAN ****

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 11/4/2013 Effective Price Level: 4-Nov-2013				Program Year (Budget EC): 2015 Effective Price Level Date: 1 OCT 14								
				RISK BASED										
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 1 or CONTRACT 1													
12	NAVIGATION PORTS & HARBORS	$15,309	$3,233	21%	$18,543	1.8%	$15,590	$3,293	$18,883	2016Q2	2.4%	$15,962	$3,371	$19,334
	#N/A	$0	$0	0%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
	#N/A	$0	$0	0%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
	#N/A	$0	$0	0%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
	#N/A	$0	$0	0%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$15,309	$3,233	21%	**$18,543**		$15,590	$3,293	$18,883			$15,962	$3,371	$19,334
01	LANDS AND DAMAGES	$0	$0	0%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
0.4%	Project Management	$57	$7	12%	$64	3.7%	$59	$7	$66	2015Q3	2.1%	$60	$7	$67
2.8%	Planning & Environmental Compliance	$431	$50	12%	$481	3.7%	$447	$51	$498	2015Q3	2.1%	$456	$53	$509
1.7%	Engineering & Design	$257	$30	12%	$287	3.7%	$266	$31	$297	2015Q3	2.1%	$272	$31	$303
0.2%	Reviews, ATRs, IEPRs, VE	$27	$3	12%	$30	3.7%	$28	$3	$31	2015Q3	2.1%	$29	$3	$32
0.1%	Life Cycle Updates (cost, schedule, risks)	$16	$2	12%	$18	3.7%	$17	$2	$18	2015Q3	2.1%	$17	$2	$19
0.0%	Contracting & Reprographics	$0	$0	12%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
0.7%	Engineering During Construction	$106	$12	12%	$118	3.7%	$110	$13	$123	2016Q2	5.3%	$116	$13	$129
0.0%	Planning During Construction	$0	$0	12%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	12%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
4.0%	Construction Management	$607	$94	15%	$701	3.7%	$629	$97	$727	2016Q2	5.3%	$662	$103	$765
0.0%	Project Operation:	$0	$0	15%	$0	0.0%	$0	$0	$0	0-Jan-1900	0.0%	$0	$0	$0
0.7%	Project Management	$109	$17	15%	$126	3.7%	$113	$18	$130	2016Q2	5.3%	$119	$18	$137
	CONTRACT COST TOTALS:	$16,919	$3,447		**$20,366**		$17,259	$3,514	$20,774			$17,693	$3,602	**$21,295**

Filename: FED BASE PLAN - TPCS_PortsmouthPisq_16Dec2013 JGN.xlsx
TPCS

Printed:12/17/2013
Page 1 of 2

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Portsmouth Harbor & Piscataqua River Fed Nav Improvement
PROJECT NO: P2 109098
LOCATION: Portsmouth, NH [Disposal to Wells, Salisbury, Newbury/Newburyport (Sand), and IoSN (Rock)]

DISTRICT: NAE North Atlantic Division
PREPARED: 12/12/2013
POC: CHIEF, COST ENGINEERING, Patricia H. Bolton
**** BENEFICIAL USE PLAN ****

This Estimate reflects the scope and schedule in report; -

Program Year (Budget EC): 2015
Effective Price Level Date: 1 OCT 14

Civil Works Work Breakdown Structure		**ESTIMATED COST**				**PROJECT FIRST COST (Constant Dollar Basis)**				**TOTAL PROJECT COST (FULLY FUNDED)**				
WBS NUMBER *A*	Civil Works Feature & Sub-Feature Description *B*	COST ($K) *C*	CNTG ($K) *D*	CNTG (%) *E*	TOTAL ($K) *F*	ESC (%) *G*	COST ($K) *H*	CNTG ($K) *I*	**TOTAL ($K)** *J*	Spent Thru: 4-Nov-13 ($K) *K*	*L*	COST ($K) *M*	CNTG ($K) *N*	FULL ($K) *O*
12	NAVIGATION PORTS & HARBORS	$16,983	$3,553	21%	$20,536	1.8%	$17,295	$3,618	$20,913	$0		$17,708	$3,704	$21,412
	CONSTRUCTION ESTIMATE TOTALS:	$16,983	$3,553		$20,536	1.8%	$17,295	$3,618	$20,913	$0		$17,708	$3,704	$21,412
01	LANDS AND DAMAGES	$0	$0	-	$0	-	$0	$0	$0	$0		$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN	$894	$103	12%	$997	3.7%	$927	$107	$1,033	$0		$949	$109	$1,059
31	CONSTRUCTION MANAGEMENT	$716	$111	15%	$827	3.7%	$742	$115	$857	$0		$781	$121	$902
	PROJECT COST TOTALS:	$18,593	$3,767	20%	$22,360		$18,964	$3,840	**$22,803**	$0		$19,438	$3,935	$23,373

Mandatory by Regulation	CHIEF, COST ENGINEERING, Patricia H. Bolton
Mandatory by Regulation	PROJECT MANAGER, Richard Heidebrecht
Mandatory by Regulation	CHIEF, REAL ESTATE, Joseph M. Redlinger
	CHIEF, PLANNING, John R. Kennelly
	CHIEF, ENGINEERING, Scott E. Acone
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	CHIEF, CONSTRUCTION, Sean C. Dolan
	CHIEF, CONTRACTING, Shiela Winston-Vincuilla
	CHIEF, PM-PB, xxxx
	CHIEF, DPM, William C. Scully

ESTIMATED FEDERAL COST:	**1) SEE**	**$15,971**
ESTIMATED NON-FEDERAL COST:	**BELOW**	**$7,402**
(BENEFICIAL USE PLAN)		
ESTIMATED TOTAL PROJECT COST:		**$23,373**

1) The ESTIMATED FEDERAL COST is taken directly from the TPCS - FEDERAL BASE PLAN. Only the ESTIMATED NON-FEDERAL COST is increased under the BENEFICIAL USE PLAN to account for the increased costs associated with disposing of the sand material to the four local communities.

Filename: BEN USE PLAN - TPCS_PortsmouthPisq_16Dec2013 JGN.xlsx
TPCS

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: Portsmouth Harbor & Piscataqua River Fed Nav Improvement
LOCATION: Portsmouth, NH [Disposal to Wells, Salisbury, Newbury/Newburyport (Sand), and IoSN (Rock)]
This Estimate reflects the scope and schedule in report; -

DISTRICT: NAE North Atlantic Division
PREPARED: 12/12/2013
POC: CHIEF, COST ENGINEERING, Patricia H. Bolton
**** BENEFICIAL USE PLAN ****

Civil Works Work Breakdown Structure		**ESTIMATED COST**				**PROJECT FIRST COST (Constant Dollar Basis)**				**TOTAL PROJECT COST (FULLY FUNDED)**				
		Estimate Prepared:			11/4/2013	Program Year (Budget EC):			2015					
		Effective Price Level:			4-Nov-2013	Effective Price Level Date:			1 OCT 14					
				RISK BASED										
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 1 or CONTRACT 1													
12	NAVIGATION PORTS & HARBORS	$16,983	$3,553	21%	$20,536	1.8%	$17,295	$3,618	$20,913	2016Q2	2.4%	$17,708	$3,704	$21,412
	#N/A	$0	$0	0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
	#N/A	$0	$0	0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
	#N/A	$0	$0	0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
	#N/A	$0	$0	0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$16,983	$3,553	21%	**$20,536**		$17,295	$3,618	$20,913			$17,708	$3,704	$21,412
01	LANDS AND DAMAGES	$0	$0	0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
0.3%	Project Management	$57	$7	12%	$64	3.7%	$59	$7	$66	2015Q3	2.1%	$60	$7	$67
2.5%	Planning & Environmental Compliance	$429	$49	12%	$478	3.7%	$445	$51	$496	2015Q3	2.1%	$454	$52	$506
1.5%	Engineering & Design	$258	$30	12%	$288	3.7%	$267	$31	$298	2015Q3	2.1%	$273	$31	$304
0.2%	Reviews, ATRs, IEPRs, VE	$27	$3	12%	$30	3.7%	$28	$3	$31	2015Q3	2.1%	$29	$3	$32
0.1%	Life Cycle Updates (cost, schedule, risks)	$16	$2	12%	$18	3.7%	$17	$2	$18	2015Q3	2.1%	$17	$2	$19
0.0%	Contracting & Reprographics	$0	$0	12%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.6%	Engineering During Construction	$107	$12	12%	$119	3.7%	$111	$13	$124	2016Q2	5.3%	$117	$13	$130
0.0%	Planning During Construction	$0	$0	12%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	12%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
3.6%	Construction Management	$607	$94	15%	$701	3.7%	$629	$97	$727	2016Q2	5.3%	$662	$103	$765
0.0%	Project Operation:	$0	$0	15%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.6%	Project Management	$109	$17	15%	$126	3.7%	$113	$18	$130	2016Q2	5.3%	$119	$18	$137
	CONTRACT COST TOTALS:	$18,593	$3,767		**$22,360**		$18,964	$3,840	$22,803			$19,438	$3,935	**$23,373**

IGE CHECKLIST-

Date: 26-Apr-14
Job: **Portsmouth Piscataqua**
0
Unrestricted
Job No.: **W912WJ-1x-xx-xxxx**
Reviewer: Patricia H. Bolton, CCC, AVS
Cost Engr: William McIntyre

n/A	**1**	Check Titles/Dates on IGE cover sheet and software.
Y	**2**	Do the project notes provide a clear definition of scope?
N/A	**3**	Does the project notes acknolwedge ammendments and type of estimate?
N/A	**4**	Check GE sign sheet for typing accuracy, unit prices and totals, and correct authority signature block. Math check?
Y	**5**	Check bid schedule and software estimate schedule agreement.
Y	**6**	Are the unit prices in line with historic prices for previous jobs?
Y	**7**	Is the Home Office percent reasonable (7% usually)?
Y	**8**	Is Field Overhead as a reasonable % of direct costs for job type? Is the Supervision crew composition reasonable?
Y	**9**	Is Bond classification and % reasonable? Should profit be applied? Does the OGE sheet state if applied?
Y	**10**	What portions of the job will probably be subcontracted, if any? Sub markups added?
Y	**11**	Check Crew hour time versus the Supervision hours listed.
Y	**12**	Are crews reasonable? Do Crew Labor and Equipment hours (1 oper with 1 dozer) agree?
Y	**13**	Check detail items (especially main drivers in cost) for reasonableness; notes, crew, production, unit price.
Y	**14**	Check specification for specified minimum productions and ensure crew production compliance.
N	**15**	Were temporary construction measures applied? Traffic control, construction roads, unwatering, dewatering?
Y	**16**	Do quote prices in the cost software agree with quote documentation?
Y	**17**	Has quote documentation been put into the Contact Supplier data base?
Y	**18**	Check labor rates, overburden, overtime, per diem? (OT marked on detail titles & sum)
Y	**19**	Check equipment rates, adjustments for region, six month cost of money update, fuel, shift, agreement with calculated amounts.
Y	**20**	Mob and Demob properly accounted for, interim mob and demob? Job delays, standby time, etc?
N/A	**21**	Electronic files posted according to "File Setup" tab? Bid Abstract posted on Ceshare?

WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

For Project No. 109098

NAE – Portsmouth Harbor & Piscataqua River for Navigation Improvement (Federal Base Plan)

The Portsmouth Harbor and Piscataqua River Feasibility Study, as presented by New England District, has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of June 12, 2014, the Cost MCX certifies the estimated total project cost of:

FY 2015 Price Level: $20,774,000
Fully Funded Amount: $21,295,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.

NEUBAUER.JAMES.GERARD.1153289898

Digitally signed by NEUBAUER.JAMES.GERARD.1153289898
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=NEUBAUER.JAMES.GERARD.1153289898
Date: 2014.06.12 08:56:19 -07'00'

For **Kim C. Callan, PE, CCE, PM**
Chief, Cost Engineering MCX
Walla Walla District

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX F
GEOTECHNICAL INVESTIGATIONS

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
GEOTECHNICAL INVESTIGATIONS

Project

The purpose of this project is to dredge the existing channel and modify the existing Federal navigation project on the Piscataqua River in Portsmouth, New Hampshire to increase the width of the upper turning basin to a 1200 foot radius. The authorized depth of the Federal Channel is 35 feet below MLLW and the target maximum dredge depth is 39 feet below MLLW.

Location of Project

Portsmouth Harbor is located at the mouth of the Piscataqua River, about 45 miles northeast of Boston Harbor, Massachusetts. The river forms the boundary between the states of New Hampshire and Maine. The existing Federal project includes a 35-foot deep channel, 400 feet wide, extending from deep water in Portsmouth Harbor (river mile 2.6) upstream to river mile 8.8. The project includes widening the bends at Henderson Point, Gangway Rock, Badgers Island, the Maine-New Hampshire interstate Bridge, and Boiling Rock, a 950-foot wide turning basin upstream of Boiling Rock, and an 850-foot wide turning basin near the upstream end of the Federal channel. The turning basin is located between the Nannie Island Fault to the Southeast and the General Sullivan Fault to the Northwest. The Nannie Island Fault is a strike slip fault while the General Sullivan Fault is a ductile shear zone.

Previous Explorations

On 21-22 December 2006, Ocean Surveys, Inc. (OSI) conducted a geophysical survey of the project site. The materials encountered appeared to provide several interfaces that may be changes in material type or changes in density. Unfortunately, the soils at the site are dense and therefore difficult to evaluate with the equipment that was used. In September 2007, eight test borings and three probes were drilled to measure the soil parameters at the site and to field verify the OSI results. The borings were terminated at approximately elevation -40 feet MLLW. The probes were advanced to refusal assumed to be bedrock. Rock was only encountered in test boring B-6 at elevation -27 feet. The rock was penetrated for 18 feet. The rock encountered may be bedrock or a very large erratic boulder. Either way, it is a hard fine grained rock which will likely require blasting prior to excavation. The soil boring locations are shown on Figure 1. Logs for borings B-1 through B-8 and Probes P-1 through P-3 are included later in this Appendix. Ten representative samples of the soils were tested for grain size and one Atterberg Limit test was conducted on the clay material obtained from boring B-5. The laboratory results are presented later in this Appendix. It should be noted that borings B-1 and B-3 are both outside of the proposed turning basin.

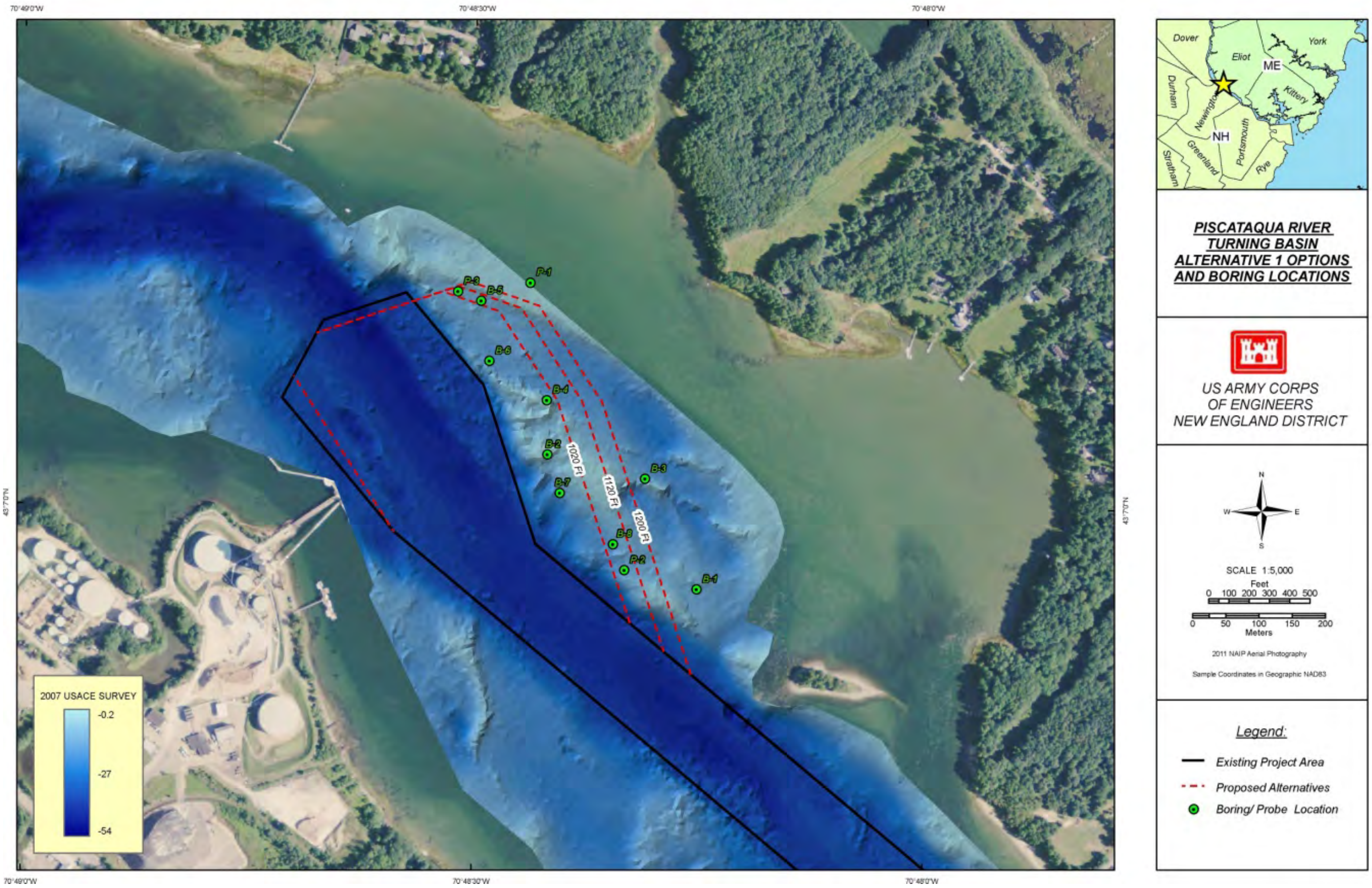

Figure 1 - Location of Borings and Probes in Upper Turning Basin Expansion Area

Overburden Materials

Along the Piscataqua River, surficial geologic material consists of marine regressive deposits (PMRS generally composed of sand, gravel, and silt) and drumlinoid deposits of surficial materials that strike northwest-southeast.

The mud line varies from elevation -2 to -19 ft MLLW. The materials at the mud line are silty fine sand and sub-angular gravel. They appear to be outwash deposits which were deposited during medium to high flow conditions within the river banks. The silt tends to thicken towards the north and east to approximately 10 feet at B-5. The thick deposit was determined to be a low plasticity clay with a liquid limit of 35 and a plastic limit of 17. The remaining overburden material is generally sand and gravel that appears to have been washed clean of fine grained soils. The quantity of gravel determines the density of the material. Typically, “N” values were between 7 and 13 within the fine sand, between 10 to 29 in medium sand, and coarse sand and gravel between 27 and 62. The “N” value is the number of blows required to drive a standard 2-inch spoon one foot with a 140 pound hammer dropped 30 inches. The coarse material is not suitable for measurement using a standard split spoon, typically resulting “N” values that are artificially high. The sampling spoon was only plugged with a rock on two occasions, which suggests that there is little coarse gravel or larger stones in the formation. However, many of the samples from borings B-5, B-7 and B-8 had little or no recovery. When the recovery was insufficient, a three-inch spoon was driven with a 300 pound hammer to collect a representative sample. The three inch spoon was driven approximately one foot. The material collected was likely scraped from the side of the boring and is not necessarily representative of the foundation within that interval. The soil boring logs indicated that the roller bit encountered significant amounts of gravel in layers between samples. It is therefore concluded that most of the gravel encountered during the sampling process was pushed aside. The foundation materials appear to become denser at or just above the bedrock surface.

The probes were driven through the overburden to refusal without sampling. Casing blows were recorded for the first probe. From 19 feet to 58 feet, the blows ranged between 21 and 29 per foot, and the blows between 53 feet and the bottom of the hole ranged from 34 to 56 per foot. This suggests that the material encountered was consistently deposited. The data for material encountered in the uppermost 7 feet of boring B-5 was fine sand and silt which might not be suitable for beach nourishment The top 4 inches of material was black.

On 2 June 2009, USACE conducted 22 Van Veen grab samples from a 75 foot grid north of boring B-6 to supplement the data from sediment cores collected in 2007 to ensure that there are not areas of fine grained sediments not suitable for beach nourishment. Sediments in the sample area consisted of poorly sorted sand, gravel, cobble, and shell with scattered pockets of fine sand and silt. Six locations where no sample was obtained were attributed to a rocky bottom or coarse material preventing the grab from closing. Three of these adjacent to the existing dredged channel may be bedrock at approximate elevation -15 feet. Only two probes encountered fine sand and silt. They are located adjacent to boring B-5 and at grab location 21 which is 75 feet further north. None of the samples had any organic odor. Based on this sampling, all the overburden material is classified suitable for placement on beaches.

Bedrock

The rock core recovered from geotechnical boring B-6 appears to be gray phyllite, rather than gneiss as noted in the boring log. Riverbed geomorphology and stratigraphic framework in the Piscataqua River at the site consists of the Eliot Formation of the Merrimack Group. The bedrock is generally thin bedded gray calcareous and ankeritic quartz-biotite-chlorite phyllite and metasiltstone, and dark gray biotie-chlorite-muscovite phyllite. The Elliot formation ranges from metamorphosed to more metamorphosed argillaceous, sedimentary rocks that are Precambrian in age. In the least metamorphosed portions of the formation, predominantly easily-weathered quartzose and calcareous slates, gray on fresh surface , turn buff-colored when normally exposed. With an increase in the grade of metamorphism, biotite begins to form and the fresh rocks become purplish-brown biotie schist, the more quartose become quartz-mica schist and the calcareous rocks become biotite-actinolite schist and green-gray actinolite granulite. The uppermost section of the Eliot formation consists of the Calef member which is primarily recognized as a black phyllite with some green quartz-chlorite phyllite. Outcrops of the Eliot formation consist of a mix of the rock types described above in alternating beds a few inches to a few feet thick. The Elliot Formation strikes northeast and dips steeply southeast (70 degrees). Compositional layering in the metamorphic rock of the Elliot Formation has been documented in the area of the General Sullivan Fault. A diabase dike outcrops on the south bank of the Piscataqua River and strikes northeast with a near vertical dip.

See the OSI report for the regional geology attached at the end of this appendix. The report indicates that the seismic reflection survey was unable to differentiate between acoustic basement composed of bedrock or of glacial till. The surface of the acoustic basement exhibits significant relief as shown in the cross-sections.

The bedrock encountered in test boring B-6 located nearest the channel towards the northwestern end of the turning basin was encountered at the depth of the acoustic basement reflector recorded in the seismic reflection survey. Therefore, the northwestern portion of the seismic survey appears to be composed of bedrock. The top of rock as determined by the refusal depth of the geotechnical probes does not correspond with the acoustic basement. The acoustic basement is assumed to be either composed of glacial till or bedrock. Probes P-1 and P-3 extended beyond the depth of the acoustic basement, while P-2 encountered refusal shallower than acoustic basement. P-1 and P-3 are both located in the vicinity of B-5 to the north of B-6. Refusal of probe P-2 may be due to a boulder or a bedrock pinnacle. An acoustic basement high is located in the southeast portion of the seismic reflection survey area. No borings or probes have been conducted in this area. The basement high is located along strike of the onshore biabase dike, which may suggest that the high is composed of bedrock.

The boring logs indicate the bedrock is a metamorphosed granitic rock with similar banding and properties to the Eliot formation. It is a slightly weathered fine grained rock with two joints in the ten feet cored. The joints were at 19.9 and 23.6 foot depths dipping 50 and 60 degrees from the horizontal. The rock drilled at a rate of three to four minutes per foot produced 100 percent recovery with an RQD of between 92 and 94 percent. The uppermost 6 feet of bedrock was not cored. The weathering at the surface of the bedrock is unknown, but is likely slight to moderate based on the way it drilled with a roller bit. The wash water was cloudy gray, and tailings appeared to be crushed rock. The section of the cored rock between 18 and 19 feet contained pitted voids.

Construction Concerns

The overburden is rounded or sub-angular and should be removable with a mechanical dredge. The borings are spaced at approximately 100 yards so there is a high degree of uncertainty about the amount of bedrock which will be encountered. The side scan sonar may have indicated some boulders near the surface. Additional probes and test borings are recommended to further identify the extent of the rock. There was no evidence of other large erratic boulders. The rock encountered in boring B-6 is hard, intact, and apparently only slightly fractured. Removal of ten feet of this rock, including 2 feet of over-dredging, will require blasting.

The cut for the turning basin will be approximately 20 feet high and the side slope can be cut to 1V to 3H. It is thought that steeper slopes may be stable, but the prop wash from tug boats in the basin would erode the side slopes resulting in sloughing and possible need for more frequent dredging.

A total of 74 magnetic anomalies indicate that there may be man-made debris on the bottom. None of the anomalies indicated that they were too large to be excavated.

FINAL REPORT

MARINE GEOPHYSICAL INVESTIGATION
NAVIGATION CHANNEL IMPROVEMENT PROJECT
PISCATAQUA RIVER
PORTSMOUTH, NEW HAMPSHIRE

OSI REPORT NO. 06ES102-NH

Prepared For: Public Archaeology Laboratory, Inc.
210 Lonsdale Avenue
Pawtucket, RI 02860

Prepared By: Ocean Surveys, Inc.
91 Sheffield St.
Old Saybrook, CT 06475

17 September 2008

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FINAL REPORT

Marine Geophysical Investigation
Navigation Channel Improvement Project
Piscataqua River
Portsmouth, New Hampshire

1.0 INTRODUCTION

Ocean Surveys, Inc. (OSI) conducted a marine geophysical investigation in the Piscataqua River in Portsmouth Harbor, New Hampshire on 21 and 22 December 2006 (Figure 1) in support of the United States Army Corps of Engineers (USACE), New England District, proposed navigation channel improvement project. The project site is specifically located at the northernmost end of the federally maintained navigation channel, immediately northwest of Frankfort Island and Mast Cove. The site actually borders Eliot, Maine to the northeast and Newington, New Hampshire to the southwest. The project proposes to dredge a turning basin on the east side of the channel between red nun buoys #10 and #12 to increase the area available for commercial vessel maneuverability off from the Sprague Energy Terminal.

This investigation was designed to provide information both for a marine archaeological assessment of the riverbed and an evaluation of geologic conditions in the project depth of interest. A proposed maximum dredging depth of 45 feet below MLLW (mean lower low water) was noted in the final scope of work (SOW) dated 6 November 2006. The study was performed under contract with The Public Archaeology Laboratory, Inc. (PAL) who are responsible for the marine archaeology portion of the project.

In support of the marine archaeological and geological site assessments, the primary objectives of the marine geophysical investigation thus included (1) the identification of natural and man made objects on and below the bottom and (2) high resolution seismic data acquisition down to 52 feet MLLW and an overall assessment of subsurface conditions to 70 feet MLLW.

The intent of objective no. 2 was to identify the presence of coarse glacial till (cobbles, boulders) and bedrock that may adversely affect dredging operations within the depth of interest. The subbottom profile data were also reviewed to provide information on any seismic facies suggestive of paleo-environments, such as buried channels and shorelines, that might represent potential pre-historic cultural sites.

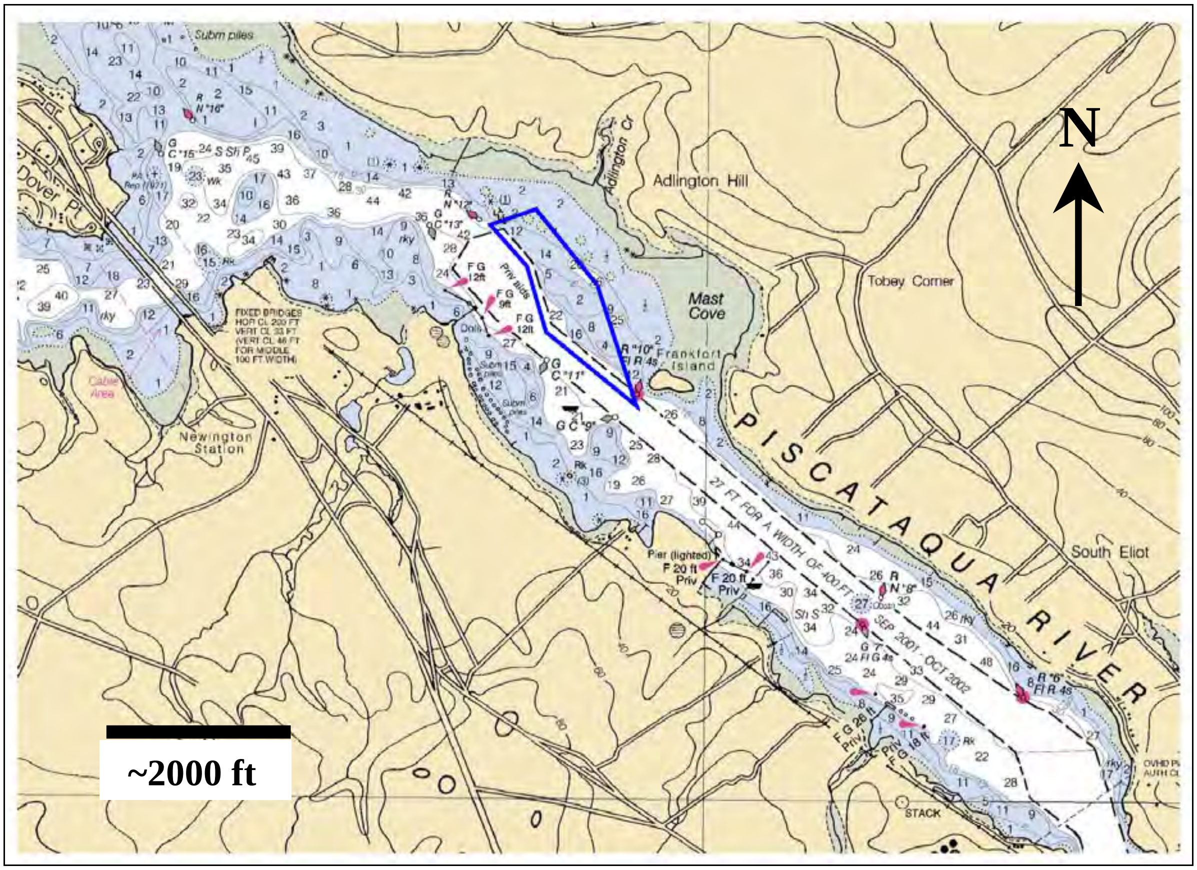

Figure 1. Location of the area investigated for this project (site limits in blue). Nautical chart no. 13285 in background.

1.1 Project Tasks

To accomplish the goals and objectives discussed above, the following survey tasks were completed in support of the proposed channel improvement project in the Piscataqua River:

- **Side scan sonar survey** to identify coarse materials as well as natural and man-made acoustic targets on the bottom
- **Magnetic intensity survey** to identify objects composed of ferrous materials on and below the bottom
- **Subbottom profile survey** to map subsurface stratigraphy and possible large buried obstructions to the depth of interest

At the request of the USACE, no hydrographic survey work was performed during this investigation. Original depth to acoustic basement calculations, completed for the earlier draft of this report, were based on historical hydrographic data provided by the USACE. In April 2008, the USACE provided depth data from an August 2007 hydrographic survey (multibeam) conducted by the USACE as well as geotechnical data acquired in September 2007 for correlation with seismic profiles. Revision of the June 2007 OSI draft report has resulted in this final report which presents the results of the analysis and correlation of updated USACE data sets with the OSI geophysical interpretations, generating new depth to primary acoustic basement calculations.

2.0 GEOLOGIC SETTING

Riverbed geomorphology and stratigraphic framework in the Piscataqua River near Mask Cove and Frankfort Island consists primarily of rocks of the ‘Merrimack Group’, specifically the Eliot Formation (Billings, 1980). The Merrimack Group generally covers southeastern New Hampshire and the southern tip of Maine. The rocks of the Eliot Formation (“Sze” on the bedrock geology map; Anderson, 1985) range from somewhat metamorphosed to more metamorphosed, argillaceous, sedimentary rocks (green schist facies) that are Silurian-PreCambrian in age. In the least metamorphosed portions of the formation, predominantly easily-weathered, quartzose and calcareous slates, gray on fresh surfaces, turn buff-colored when normally exposed. With an increase in the grade of metamorphism, biotite begins to form and the fresh rocks become purplish-brown biotite schist, the more quartzose become quartz-mica schist, and the calcaleous rocks become brown biotite-actinolite schist and green-gray actinolite granulite (Billings, 1980). Quartzites are estimated to constitute approximately 15% of the formation (Freedman, 1950).

The uppermost section of the Eliot formation consists of the Calef Member which is primarily recognized as a black phyllite with some green quartz-chlorite phyllite. Maximum thickness of the Calef Member is estimated at 800 feet while the entire formation in this region is believed to extend up to 6,500 feet deep (Freedman, 1950). Outcrops of the Eliot Formation consist of a mix of the rock types described above in alternating beds a few inches to a few feet thick.

The Piscataqua River bottom in the site is comprised of an extremely wide range of materials from fine grained sediments (such as silt nearshore, outside the stronger current flows in the channel), to coarse glacial till (including gravel, cobbles, and possibly boulders). The extreme tidal range in this area generates high velocity currents which can inhibit the deposition of most finer materials, leaving only coarser deposits on the riverbed.

3.0 SURVEY AREA AND TRACKLINES

The project site covers an approximate 900 foot by 2,600 foot shoal area east of the Piscataqua River federal navigation channel between red nun buoys #10 and #12. The site is offshore from Adlington Creek and Mast Cove, and extends approximately 100 feet out into the federal channel (Figure 2). The table below lists the corner coordinates of the survey area. Due to the absence of water in the site during low tide, all survey work had to be completed around high tide, with the exception of a few lines along the edge of the channel.

Piscataqua River Survey Area Limits

Point	Easting (feet) *	Northing (feet) *
1	2781542.5	105206.7
2	2782299.3	104257.0

Point	Easting (feet) *	Northing (feet) *
3	2782784.7	102743.9
4	2781666.7	103670.2
5	2781430.9	104492.0
6	2780980.4	105009.4

*Note: Site limit coordinates referenced to the Maine State Plane Coordinate System, West Zone 1802, NAD 83.

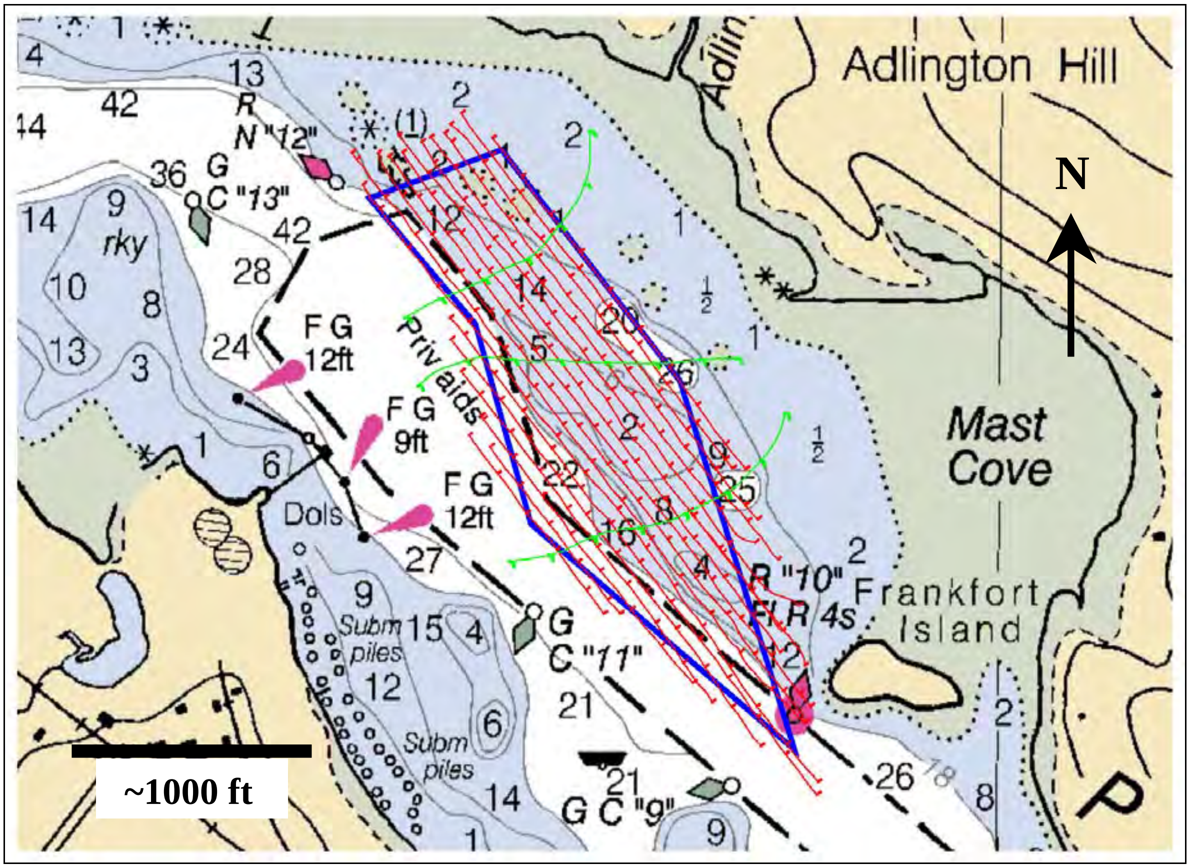

Figure 2. Primary survey tracklines (red) and tielines (green) in the project site (outline in blue), overlaying chart no. 13285.

Primary survey tracklines were spaced 50 feet apart throughout the entire survey area and were oriented generally parallel to the main axis of the channel (see Figure 2). Magnetic intensity measurements were collected on every primary line, while side scan sonar imagery and subbottom profiles were recorded on every third line at a minimum. This included Lines 1, 4, 7, 10, 12, 15, and 18. Tielines were surveyed through the site (Lines 19, 20, 21) and oriented generally perpendicular to the primary survey lines, based on the preliminary field review of subsurface data. Only subbottom profile data were collected along the tielines.

4.0 SURVEY EQUIPMENT OVERVIEW

The major equipment systems mobilized to the Piscataqua River for this investigation, and a brief description of their operation, are listed below. A complete discussion of this equipment along with the operational procedures employed to collect the data for this project can be found in Appendix E. Specification sheets for all the equipment used can be found in Appendix F.

Synopsis of Survey Equipment Operations

Equipment System	Description
Trimble 4000RS DGPS Receiver	Global positioning system receiver capable of tracking up to 9 satellites simultaneously; interfaced with Trimble ProBeacon receiver and HYPACK® navigation computer.
Trimble ProBeacon USCG Beacon Receiver	Beacon receiver which receives USCG differential corrections that are input to the Trimble 4000 receiver, increasing the overall system accuracy.
HYPACK® navigation software and data logging computer	HYPACK® software runs on a Pentium notebook computer providing real time trackline control, digital data logging, and many survey utility functions; this package allows for efficient simultaneous acquisition of digital data from multiple systems.
Klein 3000 Dual Frequency Side Scan Sonar System	Side scan sonar system providing acoustic imagery of the bottom out to either side of the survey trackline; dual frequency technology allows the acquisition of high resolution images (500 kHz) and extended sweep ranges (100 kHz).
Geometrics G-882 Marine Cesium Magnetometer	Marine cesium magnetometer used to detect ferrous metal on and below the bottom to a 0.1 gamma accuracy. Measurements collected at a rate of 10 times per second.
Applied Acoustics Engineering “Boomer” Subbottom Profiling System	Powerful low frequency 0.5-8 kHz “Boomer” system used to try and penetrate coarse glacial till and adverse geologic conditions to resolve subsurface layering and lithologic structures in the stratigraphic column.

The side scan sonar towfish and magnetometer sensor were deployed off the sides of the vessel and each towed off a davit and winch to allow modificiation of sensor height along tracklines. The side scan sonar system utilized a 164 foot (50 meter) sweep range to provide high resolution imagery. Over 200% coverage of the bottom, as data were collected on parallel lines spaced 150 feet apart. The side scan sonar towfish was maintained at an altitude of 10-15% of the sweep range where possible (shallow water does not permit this). Similarly, the magnetic sensor was towed at a nominal height of 20 feet but was actually much closer in shallow water nearshore.

The subbottom profiler sound source (catamaran with transducer plate) and receiver (hydrophone array or “eel”) were towed off the vessel’s stern outside the boat propeller wash to minimize acoustic noise. The “boomer” subbottom profiler used a 100 millisecond scan rate to record a total depth profile (water and stratigraphic column) of approximately 250 feet (assumes 5,000 feet per second sound velocity in sediments). The system collects raw seismic signals in the 500-8,000 hertz range, with filtered frequencies of 800-4,000 hertz used for final display and interpretation. Laybacks and offsets to sensors were recorded in the field for application during post-survey processing.

5.0 SUMMARY OF FIELD INVESTIGATION

The marine geophysical investigation took place on 20 and 21 December 2006 under favorable weather conditions for the time of year. Calm sea states were encountered the afternoon of 20 December and morning of 21 December followed by windy, choppy conditions in the afternoon of 21 December. The field survey successfully navigated around the shoal and timed the operations perfectly around high tide. The following OSI personnel comprised the field crew for this project.

Geophysical Survey Crew:

Jeffrey D. Gardner	Geophysical Project Manager
Gregory L. Schulmeister	Geophysical Technician

The R/V Ready II (26 foot Parker Sport with dual 150 Hp outboard engines) was outfitted with the necessary geophysical equipment and support gear to complete the field investigation and transited directly from Searsport, Maine where a similar geophysical program was conducted during the seven days prior. The vessel is outfitted with an enclosed cabin and full suite of electronic navigation devices to ensure safe operations under a wide range of weather conditions. David Robinson from PAL was onboard the vessel for the duration of the field program.

5.1 Horizontal Control

Horizontal positioning of the survey vessel was accomplished by utilizing a Trimble 4000 Differential Global Positioning System (DGPS via interface to Trimble ProBeacon Reciever) which calculates geodetic coordinates referenced to the WGS-84 datum (World Geodetic System established in 1984), and equivalent to NAD 83 (North American Datum established in 1983). Differential corrections were received from the U.S. Coast Guard reference beacon at Portsmouth, New Hampshire (288 kilohertz at a transmission rate of 100 bps) with good reliability and signal strength. This DGPS configuration typically provides better than a 3 foot (sub-meter) repeatable position accuracy, as stated by the manufacturer.

The HYPACK® computer navigation software utilized aboard the survey vessel converts the geodetic coordinates (latitude-longitude) to state plane coordinates (easting-northing) for navigation while logging these position data at 1 second intervals along survey tracklines. The survey was conducted in the Maine State Plane Coordinate System (West Zone 1802), referenced to NAD 83 with all coordinates in feet. The table below lists information for the horizontal check point established at the marina dock with the DGPS system. Navigation checks were performed over this point at the beginning and end of each field day to ensure the positioning system was functioning properly and delivering the horizontal position accuracy required for the project.

Point ID	Position *	Description
Great Bay Marine Slip A1	N 103845 E 2774061	Point marked by PK nail with pink survey flagging flush with the dock. Point is positioned midway along the southeast edge of outermost dock, next to center cleat, Slip A1

*Note: Coordinates referenced to the Maine State Plane Coordinate System, West Zone 1802, NAD 83.

6.0 DATA PROCESSING AND DELIVERABLES

Data processing techniques and the methods used for analysis of the side scan sonar, magnetic intensity, and subbottom profile data are described in Appendix G. The following list details the data products generated for this project. Final drawings have been provided separately in hard copy (24x36 inch, D sheets) and digital (AutoCAD 2000) formats. Drawings have been constructed at a horizontal scale of 200 feet per inch in a plan view format. All data have been referenced to the Maine State Plane Coordinate System (West Zone 1802), NAD 83 in feet, in the horizontal plane. Vertical reference datum for the project is Mean Lower Low Water (MLLW) as dictated by the USACE April 2008 hydrographic data.

Product	Scale/Format	Description
As Appendices at End of Report		
Sonar Target List	NA Excel spreadsheet	Table of acoustic targets interpreted from the side scan sonar imagery, included in Appendix A
Magnetic Anomaly List	NA Excel spreadsheet	Table of magnetic anomalies interpreted from the total earth's magnetic field intensity data, included in Appendix B

Product	Scale/Format	Description
Geologic Cross Sections	(as shown) PDF format	Interpretation of selected subbottom profiles used to determine depth to coarse glacial till or bedrock, included in Appendix C

Product	Scale/Format	Description
Hard Copy and Digital Full Size Drawings, Separate Deliverable		
Drawing V-1	1 inch = 200 feet	Water depth contours at a 1 foot interval developed from August 1007 USACE hydrographic survey
Drawing V-2	1 inch = 200 feet	Geophysical data results; side scan sonar targets and magnetic anomaly locations as well as areas of coarse surficial material
Drawing V-3	1 inch = 200 feet	Contour map of the primary acoustic basement reflector, contour interval 1 foot

On April 24, 2008 USACE provided to OSI, an XYZ ASCII file titled "Portsmouth proposed channel aug16+17+2007 03 avg.xyz". This file contains a 3 foot by 3 foot cell matrix of soundings, referenced to MLLW (1983-2001 Tidal Epoch) based on average depth selection and is considered the full resolution data set by the USACE. Figure 3 is a plan view illustration of the hydrographic data coverage (gray) in relation to the subbottom profile transects (red) surveyed by OSI. Note that there were some gaps in the hydrographic data (greater than 3 foot by 3 foot spacing between soundings) especially in the shallow areas, in the northern corner of the survey area. A digital surface model of the multibeam hydrographic data was generated using QuickSurf DTM software to determine water depths along the subbottom profiler tracklines. Reflector depths below the bottom were measured and exported out of ReflexW seismic processing software and referenced to MLLW using the multibeam hydrographic surface.

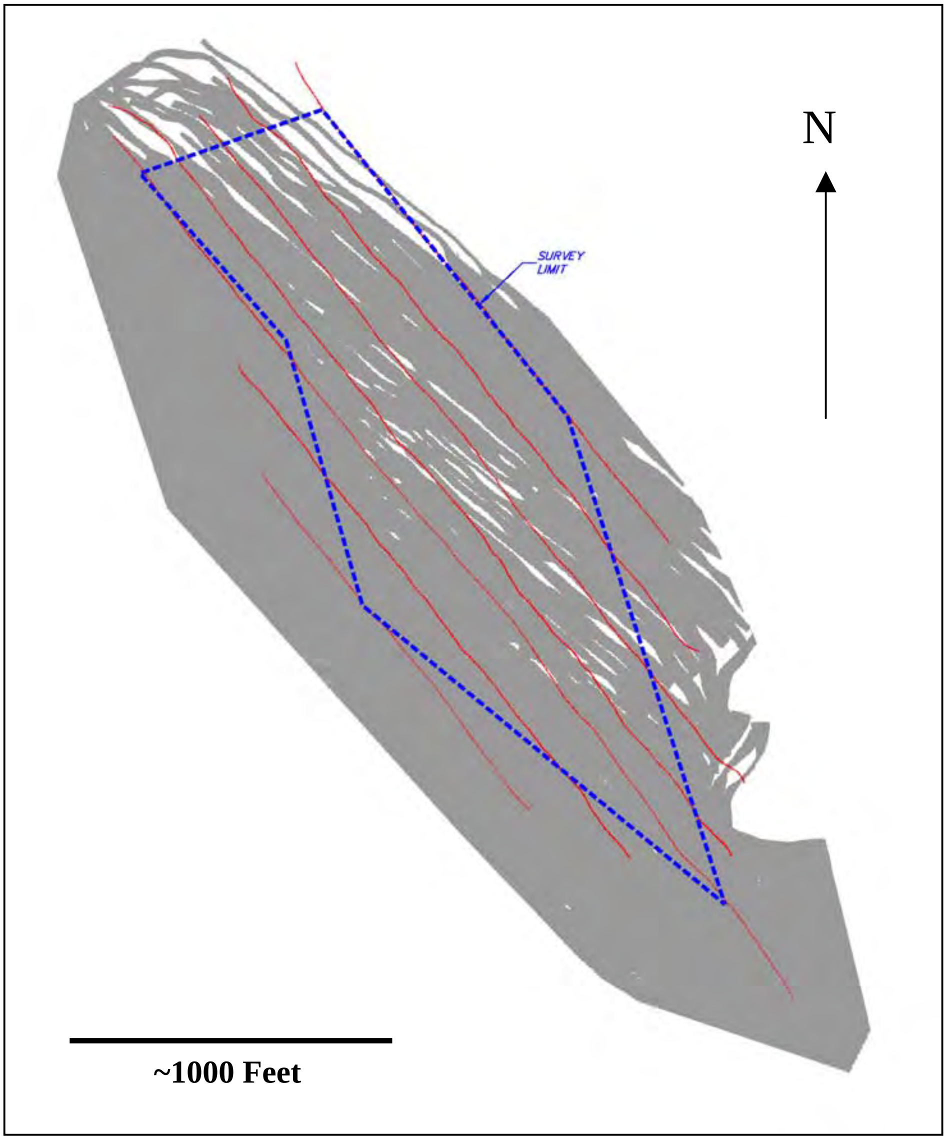

Figure 3. Illustration of the OSI 2006 subbottom data points (red) and site boundary (blue) in relation to the hydrographic data "Portsmouth proposed channel aug16+17+2007 03 avg.xyz"provided by the USACE (gray). Note, white spaces indicate holidays in hydrographic data (greater than 3 feet by 3 feet spacing between points).

7.0 SURVEY RESULTS

The following discussion of survey results references the project drawings listed above. All water depths discussed in the text are referenced to MLLW, while subsurface reflector or lithology depths may be relative to MLLW or depth below the bottom, as specified in the text. Subsurface results were developed from interpretation of the OSI geophysical data (collected December 2006) and correlated to geotechnical data (probes and borings collected in September 2007) provided by the USACE in October 2007 and June 2008. Geotechnical logs provided by the USACE for the eight borings and three probes are included in Appendix D.

7.1 Side Scan Sonar Imagery

Review and interpretation of the side scan sonar imagery reveals acoustic reflectivity representative of different sediment types and bottom features. Stronger reflectivity on the records can be related to coarser material (sand, gravel, rocks), submerged aquatic vegetation, and/or variations in bottom morphology, whereas weaker acoustic returns are typically associated with finer grained sediments (silt-clay). It is important to remember the side scan sonar system is a surface mapping tool only and does not provide information on subsurface conditions.

Based on interpretation of the sonar images, coarse glacial till (gravel, cobbles, boulders) is apparent over some portions of the site (Figure 4). Sand and gravel are suspected to dominate the remainder of the riverbed and cover a majority of the navigation channel slope. Some silt may exist closer to the Maine river bank in slightly deeper, quiescent waters infilling depressions in the bedrock surface. The shoal that covers the central portion of the site, parallel to the top of the channel slope, is at least partially comprised of coarse glacial till.

A total of 80 acoustic targets have been identified in the site from review of the side scan sonar images. Most appear as isolated, linear or oblong targets or debris fields inclusive of numerous targets. Many of the targets could be boulder-sized material (greater than 12 inches diameter) associated with the coarse glacial till in some portions of the site. In many cases, it is difficult to determine from acoustical properties only whether a target is a natural feature or man made. Non-linear targets average approximately 3 feet by 6 feet in size. Ten of the sonar targets have correlating magnetic anomalies within close proximity, suggesting the targets may be generated by nearby ferrous objects.

7.2 Magnetic Intensity Data

Measurements of the earth's total magnetic field allowed the identification of local deviations in the field due to the presence of ferrous objects on or below the riverbed. A magnetic anomaly with no associated sonar target at the same location indicates the ferrous object may be buried below the bottom. The magnetic intensity data were analyzed in order to map isolated anomalies in the site potentially generated by man made debris. Significant variation in the magnetic intensity readings exists due to shallow metamorphic bedrock and boulders in the area. The abundance of ferrous minerals in the rocks affect the total measured magnetic field, resulting in more pronounced background variations. Fluctuations in the background magnetic field generated by subsurface geology were not included in the anomaly list. A total of 74 magnetic anomalies have been identified within the limits of the designated survey area (Appendix B). Man made debris is common in harbors such as this where heavy commercial traffic has existed for years.

It is important to remember that anomalies are always measured at the sensor position along each trackline. The magnetic sensor cannot determine distance from an object which may rest at some distance offline, at the surface, or buried in the riverbed. Thus the anomaly location does not necessarily represent the exact position of the ferrous object. In some cases, the anomaly may be associated with a nearby sonar target identified from the side scan sonar imagery.

7.3 Subbottom Profile Data

The subbottom profiling method achieved subsurface penetration over a majority of the survey area where surficial materials allowed. Little to no organic-rich, gaseous deposits were evident, while apparent coarse material deposits on and below the riverbed did limit signal penetration in a number of places. It is possible these accumulations of material could be outcroppings of coarse glacial till (boulders, cobbles, gravel), piles of man made debris, or side castings of coarse dredged materials from the channel. Please refer to the interpreted subbottom profiles in Appendix C (Lines 1, 4, 7, 10, 12, 15, 18) for the following discussion.

An acoustic basement reflector was mapped from interpretation of the “boomer” subbottom profiles and correlated to the geotechnical data set. This reflector may represent either the top of coarse glacial till (mix of gravel, cobbles, and boulders with a sand matrix) or the bedrock surface underlying the site. The acoustic basement reflector is relatively weak and discontinuous in nature and the mapped surface is based primarily on the geotechnical information. This is typical in areas where a high concentration of coarse material inhibits the seismic signal penetration down to the top of rock.

The USACE borings and probes suggest bedrock is generally deeper than 40 feet MLLW except in the vicinity of Boring B6 which encountered metamorphic rock at a depth of 15 feet below the riverbed (30 feet MLLW). Although correlation of Boring B6 is indirect due to its position between geophysical tracklines, interpretation of adjacent seismic profiles #7 and #10 indicates the acoustic basement reflector slopes up closer to the bottom in this area. Figure 4 illustrates the areas where the acoustic basement has been mapped shallower than 45 feet MLLW based on interpretation of the seismic profiles. Full scale OSI Drawing 3 presents contours of the acoustic basement reflector depth below MLLW at a 1 foot interval.

In the remainder of the site, the primary acoustic basement reflector was apparent at depths of 10-20 feet below the bottom in the channel (Line 18) and along the toe of the slope (Lines 12 and 15). The interpreted top of the coarse glacial till/bedrock surface slopes up slightly to the east-northeast toward the top of the channel slope. Geotechnical results suggest bedrock is generally deeper than 40 feet MLLW in the southeastern two-thirds of the site as only one station, P2, penetrated deeper to 52 feet MLLW. None of the borings or probes indicate hard refusal was encountered. The shoal evident in the central portion of the site, particularly on Lines 7, 10, and 12, is believed to be primarily comprised of sand with coarse material (gravel, cobbles, boulders), mainly gravel according to the borings.

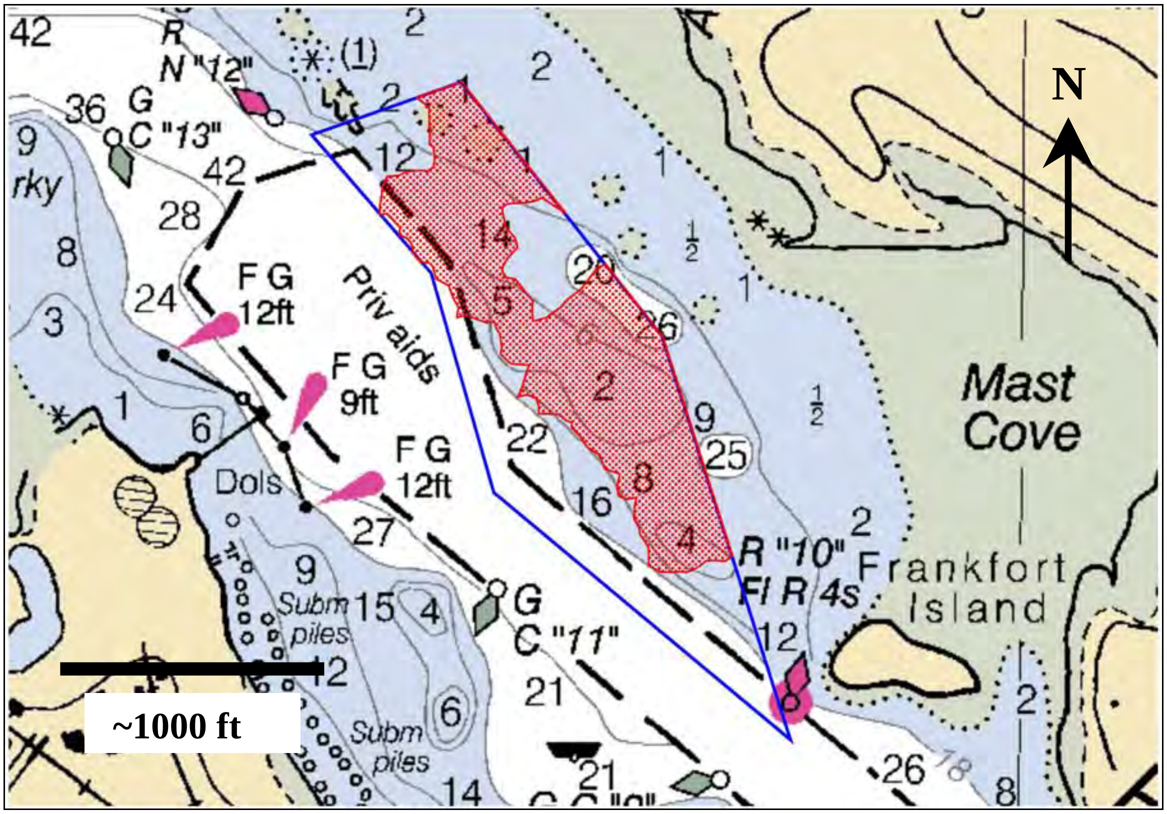

Figure 4. Map showing the areas within the site (blue outline) where the acoustic basement has been interpreted from the seismic reflection profiles and identified at Boring B6 shallower than 45 feet MLLW (red hatch).

One anomalous area of the site is evident from review of the data sets. Despite the findings of Probe P1 along Line 1 that indicate 59 feet of unconsolidated sediments, the seismic profile reveals a strong acoustic basement reflector quite shallower, closer to 20-30 feet below the riverbed (see Line 1 profile in Appendix C) where it has been mapped. It is possible that this reflection is a partial side echo from a mound of coarse till or bedrock high spot located just off the trackline.

An average acoustic velocity of 5,000 feet per second was used to calculate sediment thickness, a potentially conservative estimate of sound speed for dominantly coarse material overburden. For example, an increase in the assumed average velocity from 5,000 feet per second (representative of finer grained, saturated marine sediments such as silt to medium sand) up to 6,000 feet per second (more typical of coarser grained, saturated marine sediments such as gravel and cobbles) would result in an increase of 20% in the estimated reflector depths. Given the shallow nature of the acoustic basement reflector at this site, this velocity variation would have minimal affect on the interpreted sediment thickness and resulting depth to acoustic basement contoured surface.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The detailed marine geophysical investigation conducted in the Piscataqua River on 21-22 December 2006 has provided valuable information for riverbed and subsurface characterization of site geology. Geophysical data sets acquired have also allowed the mapping of natural and man made objects on and possibly below the bottom. A total of 80 side scan sonar targets and 73 magnetic anomalies have been identified from interpretation of the geophysical data sets, as well as bottom areas where sonar reflectivity suggests the presence of coarse material. Such objects and features observed on the side scan sonar and magnetic intensity data may represent obstructions to future dredging operations. All data products generated as a result of this investigation have been delivered to PAL for their archaeological assessment of the site, a determination of the presence of potentially significant cultural resources.

Regarding the subsurface geologic conditions, coarse glacial till and bedrock are present shallower than 45 feet MLLW in the vicinity of Boring B6 and may exist above this project depth of interest in other portions of the site, as suggested by seismic interpretation (see Figure 4). Due to the abundance of coarser deposits (coarse sand, gravel, cobbles) in the nearsurface, it is difficult to determine from the seismic profiles whether the origin of the acoustic basement reflector is coarse glacial till or bedrock. There is not much acoustic signal left to resolve the bedrock surface at depth after being reflected proportionally by the overlying coarse materials. Interpretation of the seismic profiles does suggest significant relief may exist in the acoustic basement reflector that could represent locally abrupt changes in elevation. The acoustic basement is apparent just below the bottom of the navigation channel (5-10 feet), suggesting coarse till and rock may have been dredged from the channel previously (this is the point where the channel widens toward the turning basin at its northwest end).

The difficult nature of the site conditions on the seismic reflection profiling technique, causing reduced penetration and resolution of the acoustic basement, indicates geotechnical investigations may provide the most absolute findings. If further delineation of the bedrock surface and coarse glacial till deposits are necessary, additional borings (Figure 5) are recommended to fill in the remainder of the site with geotechnical information and supplement geophysical data acquisition and its interpetation.

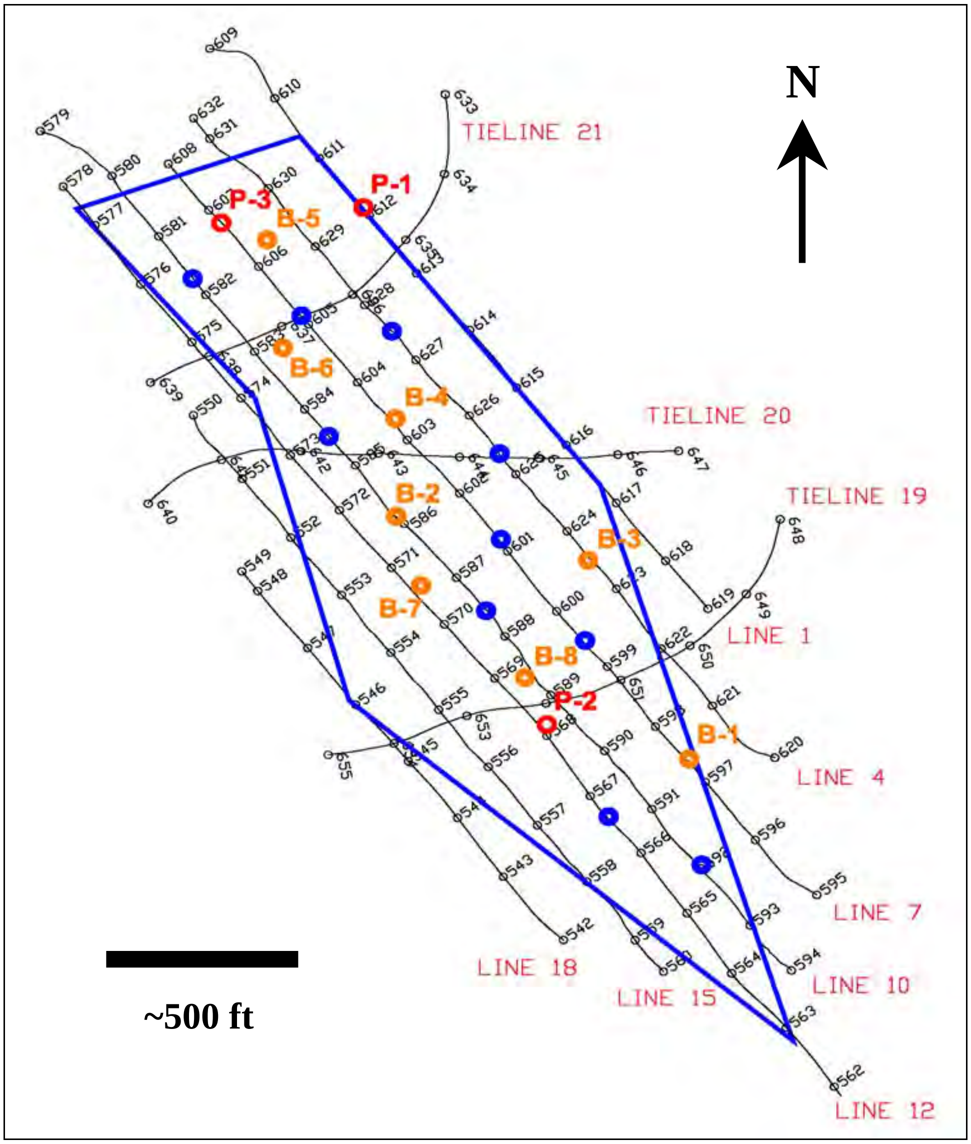

Figure 5. Recommended additional geotechnical stations in the site (blue), if further delineation of subsurface geologic conditions is deemed necessary.

9.0 REFERENCES

Anderson, W.A., 1985. Bedrock Geologic Map of Maine, Maine Geological Survey / Department of Conservation, 1:500,000 scale.

Billings, M.P., 1980. The Geology of New Hampshire, Part II: Bedrock Geology, New Hampshire Department of Resources and Economic Development, p. 38-43.

Freedman, J., 1950. Stratigraphy and Structure of the MT. Pawtuckaway Quadrangle, Southeastern New Hampshire. Geological Society of America Bulletin: Vol. 61, No. 5, p. 449–492.

NOTES

1. GRID SYSTEM IS IN FEET AND IS THE MAINE STATE PLANE COORDINATE SYSTEM WEST ZONE 1802, (NAD 83).

2. DEPTHS ARE IN FEET AND REFERENCED TO MEAN LOWER LOW WATER (MLLW). CONTOURS ARE BASED ON DEPTHS PROVIDED BY USACE IN FILE "portsmouth proposed channel aug16+17+2007 03 avg.xyz".

3. CONTOUR INTERVAL IS 1 FOOT. CONTOURS WERE COMPUTER GENERATED USING "QUICKSURF" VERSION 5.1 (SCHREIBER INSTRUMENTS, INC.) OPERATING WITHIN "AUTOCAD" VERSION 2000 (AUTODESK).

4. LAND IMAGERY ARE PORTIONS OF DIGITAL ORTHOPHOTO QUADRANGLES OBTAINED FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS).

5. THE INFORMATION PRESENTED ON THIS DRAWING IS BASED ON MATRIX OF SOUNDINGS PROVIDED TO OCEAN SURVEYS, INC. BY THE USACE. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

SAFETY PAYS

GRAPHIC SCALE:
200 0 200 400
1" = 200'

US Army Corps
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New England District

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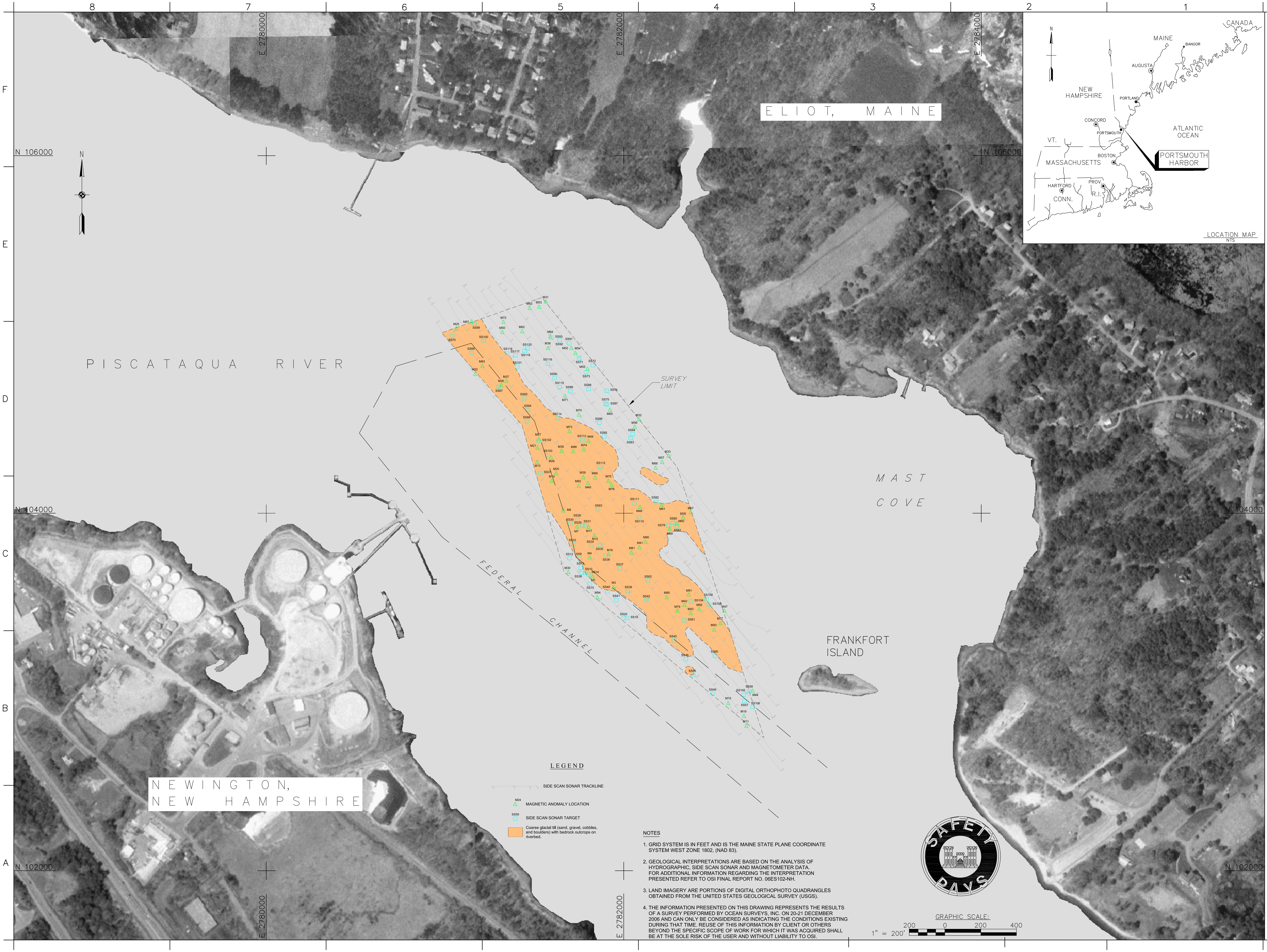
Symbol	Description	Date	Appr.

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS	Surveyed By: J.D. GARDNER	Date:	Rev.
	Plotted By: P.J. LACKEY	Design file:	
OCEAN SURVEYS, INC. OLD SAYBROOK, CONNECTICUT (860) 388-4631 www.oceansurveys.com	Asst. Chief, Survey Section	Drawing code: 2625	
	Chief, Survey Section	File name: 06ES102_PH01 Plot date: 09/15/08 Plot scale: 1" = 200'	

PISCATAQUA RIVER
PORTSMOUTH, NEW HAMPSHIRE
HYDROGRAPHIC CONTOURS

Reference number:
V-1

Sheet 1 of 1



LEGEND

	SIDE SCAN SONAR TRACKLINE
M24 △	MAGNETIC ANOMALY LOCATION
SS59 □	SIDE SCAN SONAR TARGET
🟧	Coarse glacial till (sand, gravel, cobbles, and boulders) with bedrock outcrops on riverbed.

NOTES

1. GRID SYSTEM IS IN FEET AND IS THE MAINE STATE PLANE COORDINATE SYSTEM WEST ZONE 1802, (NAD 83).
2. GEOLOGICAL INTERPRETATIONS ARE BASED ON THE ANALYSIS OF HYDROGRAPHIC, SIDE SCAN SONAR AND MAGNETOMETER DATA. FOR ADDITIONAL INFORMATION REGARDING THE INTERPRETATION PRESENTED REFER TO OSI FINAL REPORT NO. 06ES102-NH.
3. LAND IMAGERY ARE PORTIONS OF DIGITAL ORTHOPHOTO QUADRANGLES OBTAINED FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS).
4. THE INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 20-21 DECEMBER 2006 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING DURING THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

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Plotted By: P.J. LACKEY	Design file:	
Asst. Chief, Survey Section	Drawing code: 2625	
Chief, Survey Section	File name: 06ES102_PS01 Plot date: 09/15/08 Plot scale: 1" = 200'	

PISCATAQUA RIVER
PORTSMOUTH, NEW HAMPSHIRE
SIDE SCAN SONAR TARGETS,
MAGNETIC ANOMALIES &
SURFICIAL FEATURES

Reference number:
V-2

Sheet 1 of 1

LEGEND

	SEISMIC REFLECTION "BOOMER" TRACKLINE
P-2 B-1	USACE PROBE & BORING LOCATIONS

NOTES

1. GRID SYSTEM IS IN FEET AND IS THE MAINE STATE PLANE COORDINATE SYSTEM WEST ZONE 1802, (NAD 83).

2. DEPTH TO ACOUSTIC BASEMENT WAS DETERMINED BY ADDING THE INTERPRETED THICKNESS OF THE OVERBURDEN (BASED ON SUBBOTTOM DATA ANALYSIS) TO THE WATER DEPTHS, REFERENCED TO MLLW PROVIDED BY USACE IN FILE "portsmouth proposed channel aug16+17+2007 03 avg.xyz". ACOUSTIC VELOCITY USED FOR DETERMINING OVERBURDEN THICKNESS IS 5,000 FEET/SEC. FOR ADDITIONAL INFORMATION REGARDING THE INTERPRETATION PRESENTED REFER TO OSI FINAL REPORT NO. 06ES102-NH.

3. CONTOUR INTERVAL IS 1 FOOT. CONTOURS ARE BASED ON A GRIDDED SURFACE MODEL GENERATED WITHIN "QUICKSURF" VERSION 5.1 (SCHREIBER INSTRUMENTS, INC.) OPERATING WITHIN "AUTOCAD" VERSION 2000 (AUTODESK).

4. LAND IMAGERY ARE PORTIONS OF DIGITAL ORTHOPHOTO QUADRANGLES OBTAINED FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS).

5. THE INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 20-21 DECEMBER 2006 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING DURING THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

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Plotted By: P.J. LACKEY	Design file:	
Asst. Chief, Survey Section	Drawing code: 2625	
Chief, Survey Section	File name: 06ES102_PB01 Plot date: 09/15/08 Plot scale: 1" = 200'	

PISCATAQUA RIVER
PORTSMOUTH, NEW HAMPSHIRE
ACOUSTIC BASEMENT
CONTOURS

Reference
number:
V-3
Sheet 1 of 1

APPENDICES

- A Side Scan Sonar Target Listing
- B Magnetic Anomaly Listing
- C Seismic Reflection Profiles
- D Geotechnical Logsheets (provided by the USACE)
- E Equipment Operations and Procedures
- F Equipment Specification Sheets
- G Data Processing and Analysis Methods

APPENDIX A

Side Scan Sonar Target Listing

Piscataqua River / Navigation Channel Improvement Project

Side Scan Sonar Targets

Date	***Run***	***Line***	***Event***	***Target ID #***	***Easting***	***Northing***	***Length***	***Width***	***Height or Relief***	***Comment***	***Associated Magnetic Anomaly***
					feet	feet	feet	feet	feet		
21-Dec	2	18	419.8	SS8	2781753	103748	3.6	1.6	1.3	curved	
			420.3	SS10	2781783	103665	3.0	2.3	1.0	rectangular, possible lobster pot	
			419.6	SS12	2781697	103749	40.0	0.3	<0.5	linear	
			420.1	SS13	2781759	103695	2.0	1.6	1.6	triangular	
			420.3	SS14	2781803	103656	35.4	2.3	1.0	broken linear	M1
			420.5	SS15	2781810	103605	4.9	3.6	1.3	rounded	
			422.0	SS19	2782018	103413	n/a	0.3	<0.5	long linear end	
			421.9	SS20	2781998	103413	2.3	1.0	0.7	small	
21-Dec	4	15	435.1	SS27	2781534	104225	13.1	6.6	5.2	possible angular, at edge of boulder field	
			436.7	SS28	2781741	103965	3.0	1.3	0.7	oval	
			436.9	SS29	2781769	103930	2.6	0.7	0.7	rectangular	
			436.7	SS30	2781701	103941	n/a	0.3	<0.5	long linear begin	
			437.0	SS31	2781784	103933	n/a	0.3	<0.5	long linear2 begin	
			437.3	SS33	2781717	103826	2.3	2.0	1.3	curved	
			437.6	SS34	2781818	103820	3.0	1.6	1.6	curved object	
			437.7	SS35	2781867	103823	n/a	0.3	<0.5	long linear2 end	
			438.0	SS36	2781900	103763	n/a	0.3	<0.5	begin long linear4	M16
			438.6	SS37	2781977	103691	13.1	2.0	0.3	wide linear	
			438.0	SS38	2781765	103667	5.6	3.9	0.7	curved	
			439.2	SS39	2782023	103565	4.6	3.0	3.9	angled, alonglong linear4 object	
			438.8	SS40	2781909	103563	5.9	0.7	0.7	2 linear approimately same size	
			439.2	SS41	2781958	103513	n/a	0.3	<0.5	approximate end of long linear3	
			439.7	SS42	2782126	103515	4.6	1.3	1.6	2 parallel rectangular	
			441.1	SS45	2782281	103289	7.2	4.6	1.3	rectangular	
			441.7	SS46	2782347	103184	1.3	1.0	1.0	small	
			447.7	SS49	2782498	102991	n/a	0.7	<0.5	end long linear4	
21-Dec	5	12	447.0	SS57	2782676	102950	n/a	0.3	<0.5	approximate beginning long linear	
			447.2	SS58	2782700	103003	5.6	1.0	1.0	2 objects, one oblong, one oval	M44

Piscataqua River / Navigation Channel Improvement Project

Side Scan Sonar Targets

Date	Run	Line	Event	Target ID #	Easting	Northing	Length	Width	Height or Relief	Comment	Associated Magnetic Anomaly
					feet	feet	feet	feet	feet		
			448.4	SS59	2782388	103096	8.5	0.7	0.3	linear	
			448.5	SS60	2782510	103203	3.3	1.3	1.3	small	
			449.8	SS61	2782338	103400	7.2	4.6	0.7	rectangular	
			451.3	SS62	2782135	103625	4.3	3.3	2.3	rounded	
			453.7	SS63	2781855	104021	n/a	0.7	<0.5	approximate end long linear	
			457.2	SS64	2781464	104578	6.2	4.6	5.2	angular, in boulder field	
			457.5	SS65	2781442	104642	5.6	7.5	<0.5	angular, in boulder field	
			456.9	SS66	2781458	104513	12.8	3.0	2.6	possible angular, in boulder field	
			458.2	SS67	2781301	104707	5.2	6.2	6.2	curved angular	M26
			459.4	SS68	2781148	104898	5.2	2.3	<0.5	rectangular	
			460.3	SS70	2781040	104992	4.9	2.6	5.9	oval	
21-Dec	24	1	663.4	SS71	2781750	104865	4.6	2.0	0.7	rectangular	
			663.7	SS72	2781827	104828	6.2	2.3	1.0	2 adjacent curved	
			663.7	SS73	2781789	104788	11.5	4.3	0.7	possible partially buried rectangular object	M55
			664.6	SS74	2781904	104685	17.4	<0.5	<0.5	linear depression	
			664.8	SS75	2781899	104613	5.2	2.0	1.0	3 oblong shapes	
21-Dec	25	4	674.0	SS79	2782249	103930	3.0	2.3	1.0	roughly rectangular	M69
			674.0	SS80	2782275	103946	3.9	3.9	1.0	square	M60
			673.8	SS81	2782298	103926	4.6	3.0	1.3	curved/round	
			674.7	SS82	2782181	104063	4.9	2.3	1.6	curved-angular	
			676.6	SS83	2782038	104420	3.3	2.6	1.0	oval	
			676.7	SS84	2782050	104443	3.9	1.6	1.0	linear	
			677.1	SS85	2781890	104429	4.9	1.3	0.7	2 objects approximate same size, oblong	
			677.5	SS86	2781864	104507	4.3	3.6	1.6	1 linear, 1 oblong	
			677.7	SS87	2781905	104608	8.2	5.6	3.3	curved	
			678.7	SS88	2781700	104682	4.6	3.6	1.0	angled	
			678.4	SS89	2781802	104694	12.1	3.0	1.0	curved angluar	
			679.3	SS90	2781613	104756	18.0	3.3	0.3	somewhat pointed	
			679.8	SS91	2781694	104951	18.4	3.6	<0.5	2 parallel linear	
			680.0	SS92	2781641	104968	3.6	4.6	0.7	rounded	
			680.2	SS93	2781596	104983	35.4	2.0	1.0	partially buried linear	M64
21-Dec	26	10	685.0	SS99	2781164	105060	6.2	0.3	<0.5	possible linear object	M87
			685.5	SS100	2781214	104964	4.3	1.0	1.3	curved next to round	

Piscataqua River / Navigation Channel Improvement Project

Side Scan Sonar Targets

Date	***Run***	***Line***	***Event***	***Target ID #***	***Easting***	***Northing***	***Length***	***Width***	***Height or Relief***	***Comment***	***Associated Magnetic Anomaly***
					feet	feet	feet	feet	feet		
			686.7	SS101	2781403	104821	8.5	1.3	1.3	possible curved-linear	
			688.7	SS102	2781524	104404	n/a	0.7	<0.5	begin linear	M27
			689.2	SS103	2781572	104324	n/a	0.7	<0.5	end linear	
			694.8	SS104	2782375	103507	5.6	2.6	1.3	oblong	
			697.8	SS105	2782672	102984	11.2	8.5	<0.5	area with curved and linear features	
			698.4	SS106	2782722	102915	<0.5	<0.5	<0.5	approximately 20m long striations with one rounded target	
21-Dec	28	7	706.7	SS108	2782477	103488	12.5	3.9	1.0	possibly partially buried object	
			706.9	SS109	2782462	103521	3.9	1.6	2.3	oblong	
			709.9	SS110	2782085	103978	17.4	27.2	3.6	oblong and curved-angular objects	
			710.3	SS111	2782058	104055	6.6	1.3	2.3	wide linear	
			711.7	SS112	2781867	104259	4.6	0.7	2.0	linear	
			712.6	SS113	2781769	104408	5.6	3.0	4.3	oval	
			713.5	SS114	2781631	104531	8.9	3.0	3.6	crescent-shape	
			714.2	SS115	2781641	104706	21.7	3.6	1.3	somewhat linear	
			714.8	SS116	2781575	104837	13.5	6.6	3.3	roughly rectangular	
			715.7	SS117	2781393	104883	5.9	2.6	1.0	oblong	
			715.8	SS118	2781347	104893	35.8	3.0	2.3	linear, possible partially buried object	
			715.6	SS119	2781445	104908	8.5	1.6	1.3	curved and linear	
			715.6	SS120	2781462	104922	8.9	2.0	3.0	possibly partially buried object	

NOTES:

1. Coordinates are referenced to the Maine State Plane system, West Zone 1802, NAD83, in feet.
2. Target sizes and dimensions are based on acoustic measurements only and have not been verified directly.
3. The side scan sonar method only identifies features located on (not below) the bottom.
4. Only targets evident on more than one side scan sonar image / trackline were mapped; targets located outside the survey areas were not mapped.
5. Target identification numbers are not sequential, as mutliple targets on overlapping images were removed from the data set.

APPENDIX B

Magnetic Anomaly Listing

Piscataqua River / Navigation Channel Improvement Project

Magnetic Anomalies

Date	***Run***	***Line***	***Event***	***Anomaly ID#***	***Easting***	***Northing***	***Size***	***Type***	***Duration***	***Sensor Altitude***	***Dipolar ferrous mass (lbs)***	***Monopolar ferrous mass (lbs)***	***Associated Side Scan Target***
					feet	feet	gammas		feet	feet	pounds	pounds	
21-Dec	7	16	472.0	M1	2781826	103643	12	D	67	45.7	1189.3	26.0	SS014
21-Dec	8	15	481.0	M3	2781944	103583	10	M+	25	45.5	978.2	21.5	
			482.0	M4	2781810	103750	15	M+	100	51.7	2152.5	41.6	
21-Dec	9	14	494.4	M7	2781739	103923	200	M+	60	29.9	5551.6	185.7	
			494.9	M8	2781662	104013	250	M-	25	35.6	11712.9	329.0	
21-Dec	10	13	500.4	M11	2782686	102808	110	M+	150	50.5	14710.9	291.3	
			507.3	M12	2781836	103874	190	M+	67	35.0	24514.8	491.3	
			509.9	M13	2781516	104283	50	M+	133	44.6	4606.3	103.3	
			509.3	M14	2781597	104180	20	M+	100	42.4	1583.1	37.3	
			501.3	M15	2782585	102936	18	M+	67	49.9	2322.5	46.5	
			506.6	M16	2781916	103768	20	M+	133	32.3	699.9	21.7	SS036
			507.6	M17	2781803	103921	20	M+	50	34.0	816.3	24.0	
21-Dec	11	12	514.5	M19	2782673	102864	150	D	225	47.8	17011.7	355.9	
			523.2	M20	2781621	104222	150	D	67	47.7	16905.2	354.4	
			524.0	M21	2781517	104365	40	M-	150	43.8	3490.2	79.7	
			526.8	M22	2781169	104777	140g	M+	133	47.7	15778.2	330.8	
21-Dec	38	11	825.4	M25	2781063	105032	8g	M-	40	27.1	165.3	6.1	
			827.4	M26	2781315	104715	75g	M+	200	39.8	4910.0	123.4	SS067
			829.2	M27	2781524	104412	10g	M+	33	42.9	819.9	19.1	SS102
			829.8	M28	2781593	104311	53g	D	100	38.9	3239.7	83.3	
20-Dec	1	18	413.3	M30	2781690	103669	100g	M+	225	18.6	668.2	35.9	
21-Dec	24	1	661.7	M31	2781565	105182	32g	D	133	7.3	12.9	1.8	
			665.8	M32	2782085	104524	20g	M-	133	26.0	365.0	14.0	
			667.2	M33	2782250	104319	35g	M+	133	28.4	832.5	29.3	
21-Dec	25	4	674.1	M35	2782332	103973	75g	M+	200	18.3	477.3	26.1	
			680.2	M36	2781576	104922	10g	M+	15	11.4	15.4	1.3	
21-Dec	26	10	686.9	M37	2781343	104738	40g	M+	200	21.5	412.8	19.2	
			689.4	M38	2781652	104348	5g	M+	18	10.1	5.3	0.5	
			690.4	M39	2781774	104199	12g	M+	29	6.8	4.8	0.7	
			690.6	M40	2781800	104167	10g	M+	33	7.3	4.0	0.6	
			692.9	M41	2782087	103807	30	M+	133	18.0	181.7	10.1	
			694.9	M42	2782339	103484	5	M+	67	8.6	3.3	0.4	
			695.3	M43	2782374	103439	15	M+	67	8.6	9.9	1.2	

Piscataqua River / Navigation Channel Improvement Project

Magnetic Anomalies

Date	Run	Line	Event	Anomaly ID#	Easting	Northing	Size	Type	Duration	Sensor Altitude	Dipolar ferrous mass (lbs)	Monopolar ferrous mass (lbs)	Associated Side Scan Target
					feet	feet	gammas		feet	feet	pounds	pounds	
			633.7	M44	879695	285016	33.9	M+	50	15.37	127.8	8.3	SS171
21-Dec	28	7	706.5	M47	2782563	103453	38	D	225	17.2	200.8	11.7	
			710.3	M48	2782091	104033	8	D	13	6.6	2.4	0.4	
			712.6	M49	2781802	104402	8	M+	33	5.9	1.7	0.3	
			716.5	M50	2781321	105012	15	D	100	30.2	429.0	14.2	
21-Dec	31	2	730.8	M52	2781707	104922	5	M+	20	6.6	1.5	0.2	
			729.3	M53	2781527	105153	10	M+	67	8.1	5.5	0.7	
			731.0	M54	2781730	104894	4	M+	20	6.8	1.3	0.2	
			731.6	M55	2781797	104806	20	M+	200	15.1	71.5	4.7	SS073
			733.7	M56	2782062	104482	30	M-	171	23.1	384.0	16.6	
			734.9	M57	2782215	104285	30	M+	133	24.0	430.7	17.9	
21-Dec	32	5	741.5	M60	2782297	103941	50	M+	200	24.8	792.0	31.9	SS080
			742.2	M61	2782213	104044	10	M+	67	14.4	31.0	2.2	
			748.4	M62	2781432	105016	18	M+	100	6.7	5.6	0.8	
21-Dec	33	3	752.3	M63	2781474	105146	35	M+	50	7.8	17.2	2.2	
			753.3	M64	2781590	104986	5	M+	17	6.8	1.6	0.2	SS093
			755.8	M65	2781923	104577	12	M+	100	22.7	145.8	6.4	
			757.9	M66	2782178	104252	15	M+	100	20.3	130.3	6.4	
			759.5	M67	2782375	104003	80	M+	175	11.0	110.6	10.1	
21-Dec	34	6	767.2	M69	2782256	103910	25	M+	200	21.9	272.7	12.5	SS079
			771.3	M70	2781749	104550	12	M+	150	19.9	98.2	4.9	
			771.8	M71	2781672	104655	25	M+	50	14.7	82.5	5.6	
			774.6	M72	2781327	105068	20	M-	125	6.3	5.2	0.8	
21-Dec	35	8	781.8	M73	2781696	104457	10	M+	50	7.4	4.2	0.6	
			782.5	M74	2781777	104355	5	M+	50	9.0	3.8	0.4	
			783.5	M75	2781914	104178	3	M+	25	7.3	1.2	0.2	
			783.7	M76	2781931	104157	5	M+	25	6.8	1.6	0.2	
			788.6	M77	2782541	103383	25	M+	200	14.8	84.2	5.7	
21-Dec	36	11	796.2	M79	2782300	103453	10	D	50	11.7	16.6	1.4	
			796.6	M80	2782240	103528	10	M+	67	12.4	19.8	1.6	
			798.2	M81	2782042	103778	20	M+	175	20.4	176.3	8.6	
			800.6	M82	2781748	104151	100	M-	50	6.1	23.6	3.9	
			804.9	M83	2781209	104821	50	M-	100	34.0	2040.7	60.0	
21-Dec	37	9	809.8	M87	2781149	105071	20	M+	50	6.1	4.7	0.8	SS099

Piscataqua River / Navigation Channel Improvement Project

Magnetic Anomalies

Date	***Run***	***Line***	***Event***	***Anomaly ID#***	***Easting***	***Northing***	***Size***	***Type***	***Duration***	***Sensor Altitude***	***Dipolar ferrous mass (lbs)***	***Monopolar ferrous mass (lbs)***	***Associated Side Scan Target***
					feet	feet	gammas		feet	feet	pounds	pounds	
			814.4	M88	2781717	104345	2	M+	7	8.4	1.2	0.1	
			815.4	M89	2781840	104197	15	M+	40	5.7	2.9	0.5	
			817.7	M90	2782122	103838	30	M+	100	12.5	60.8	4.9	
			819.5	M91	2782363	103543	10	M+	50	12.7	21.3	1.7	
			820.0	M92	2782422	103461	25	D	100	8.4	15.4	1.8	
			820.8	M93	2782506	103346	30	M+	175	11.3	45.0	4.0	
21-Dec	6	17	464.7	M94	2781852	103528	8	M+	29	20.2	68.5	3.4	

NOTES

1. Positions are referenced to the Maine State Plane Coordinate System, West Zone 1802, NAD83, in feet.
2. Estimated ferrous masses calculated using the following formulas:

$W = T r^2 / 963$ for monopoles

$W = T r^3 / 963$ for dipoles

where W = weight of ferrous object, T = anomaly amplitude, r = distance between magnetic sensor and object

*Magnetic moment is assumed at a median value of 963, but may vary by an order of magnitude between 175 and 1750.

3. Anomaly types: M+ = positive monopole, M- = negative monopole, D = dipole, CD = complex dipole
4. Anomaly identification numbers are not sequential, as those positioned outside the site limits were removed from the listing.

APPENDIX C

Seismic Reflection Profiles

Lines 1, 4, 7, 10, 12, 15, 18
and TieLines 19, 20, 21

NOTES ON SEISMIC PROFILES:

1. Assumed seismic velocity of 5,000 feet per second used to correct the raw time sections to geologic profiles.

2. Profiles have been referenced to MLLW based on predicted tide values for Dover Point, New Hampshire, the nearest NOAA tide station.

3. ReflexW Seismic Processing Software used to pick acoustic reflectors and export x,y,z values for contouring.

4. Event numbers (black) across the top of each profile are spaced 200 feet apart. Green line numbers with vertical mark represent the intersection points of crossing tracklines.

5. Primary survey lines labeled L1, L4, L7, L10, L12, L15, and L18. Tielines labeled T19, T20, and T21.

6. Reflector color codes are:
   blue = interpreted acoustic basement reflector (top of coarse glacial till or bedrock)

7. Geotechnical stations positioned slightly off the geophysical tracklines were projected onto adjacent profiles. Due to highly variable bottom topography, some stations could not be realistically projected.

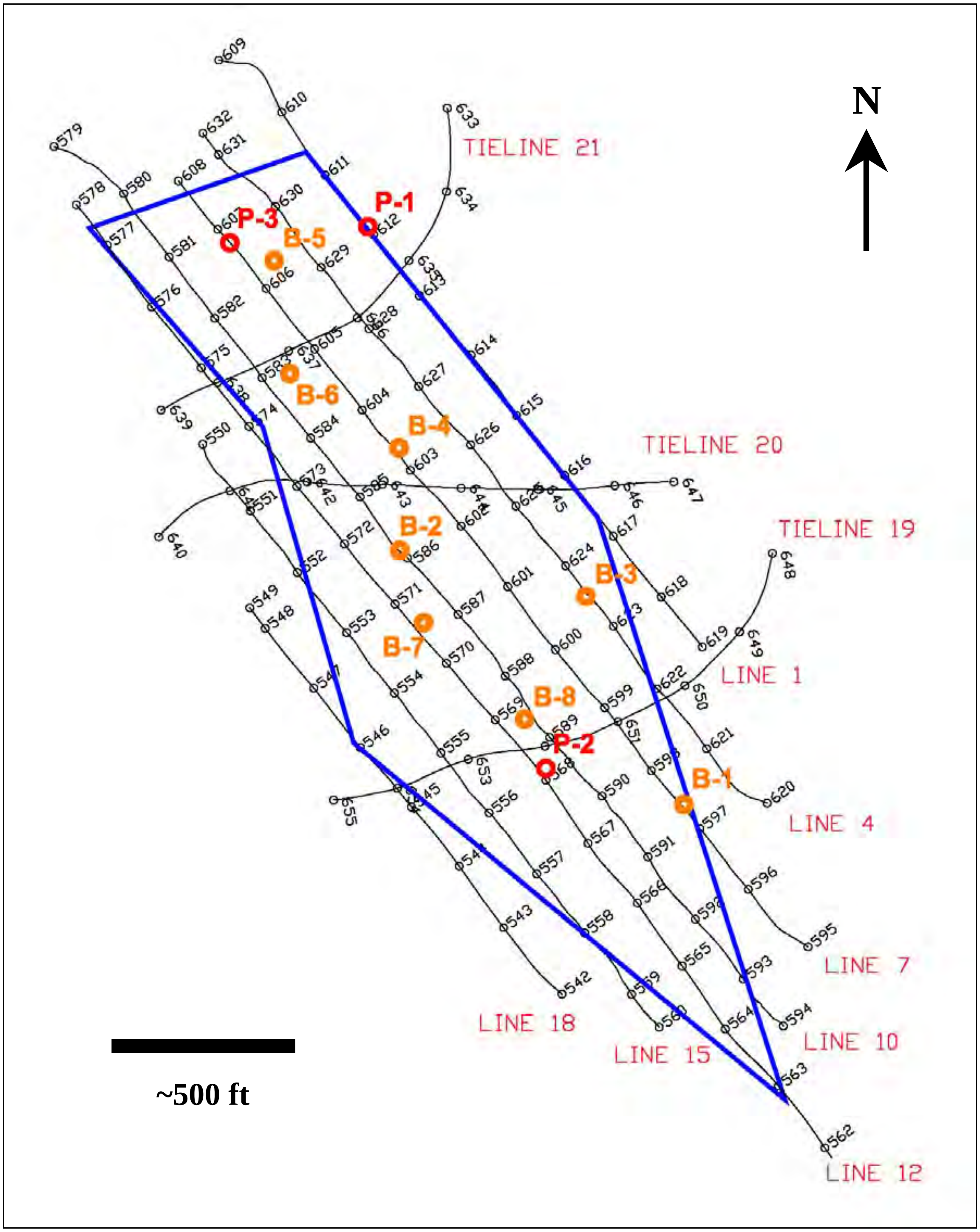
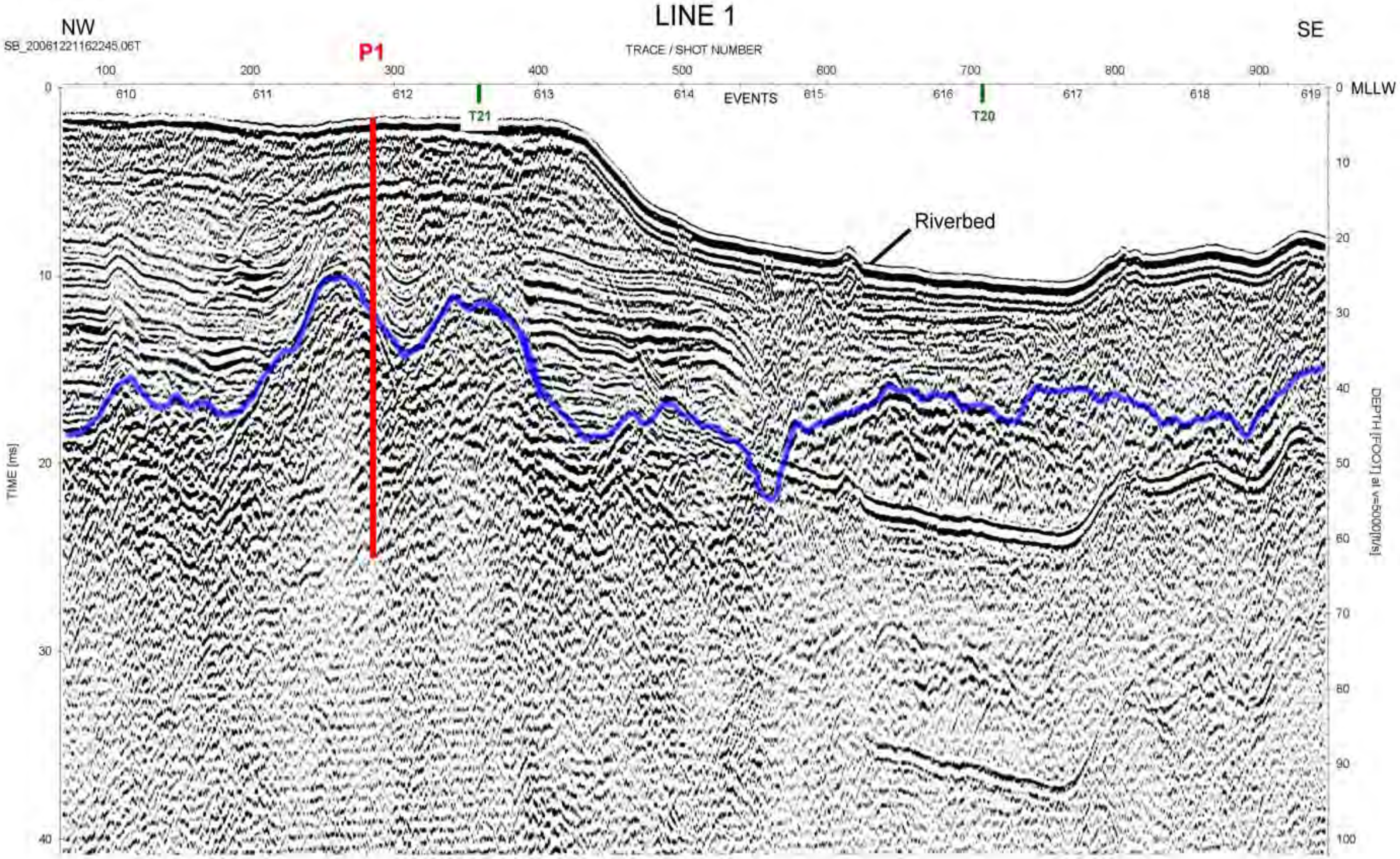


Figure showing the location of subbottom "boomer" profile lines and borings in the site.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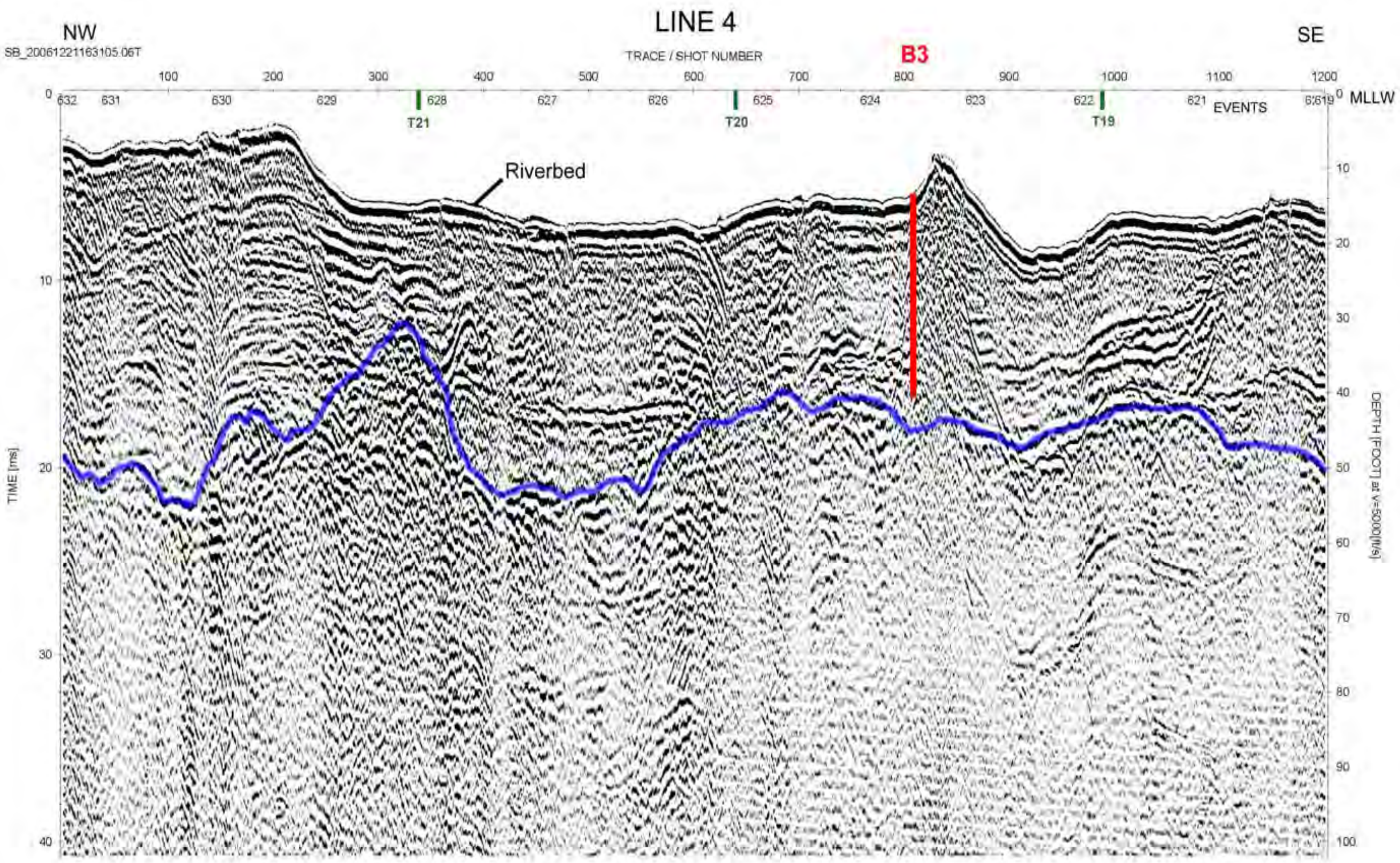
300
400
500
600
700
800
900
EVENTS
610
611
612
613
614
615
616
617
618
619
T21
T20
0 MLLW
Riverbed
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at v=5000[ft/s]
10
20
30
40
50
60
70
80
90
100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SE
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300
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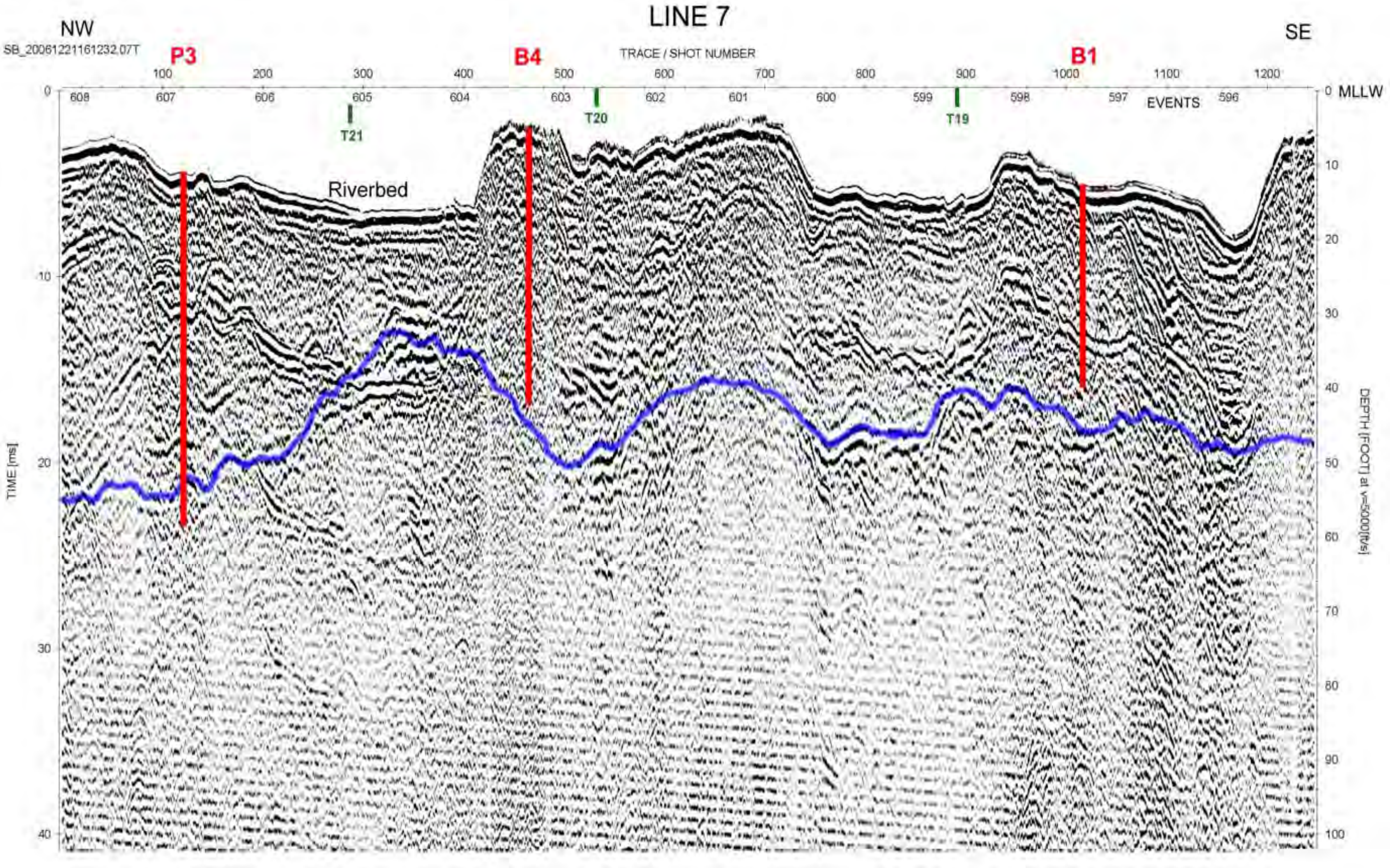
700
800
900
1000
1100
1200
632
631
630
629
628
627
626
625
624
623
622
621
620
619
EVENTS
0 MLLW
T21
T20
T19
Riverbed
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at V=5000[ft/s]
10
20
30
40
50
60
70
80
90
100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SE
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B4
B1
TRACE / SHOT NUMBER
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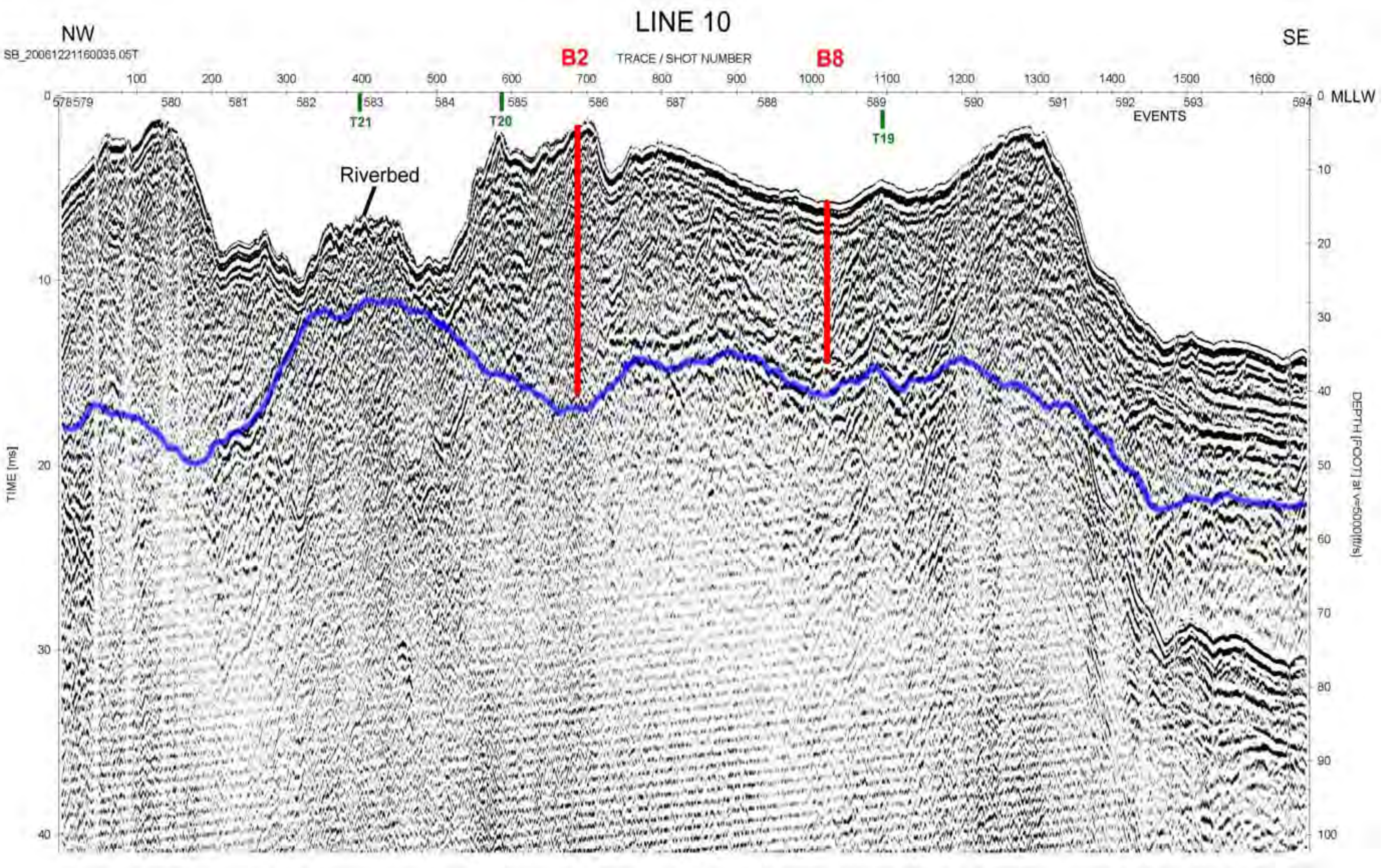
300
400
500
600
700
800
900
1000
1100
1200
608
607
606
605
604
603
602
601
600
599
598
597
596
EVENTS
T21
T20
T19
Riverbed
0 MLLW
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at v=5000[ft/s]
10
20
30
40
50
60
70
80
90
100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SE
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B2
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B8
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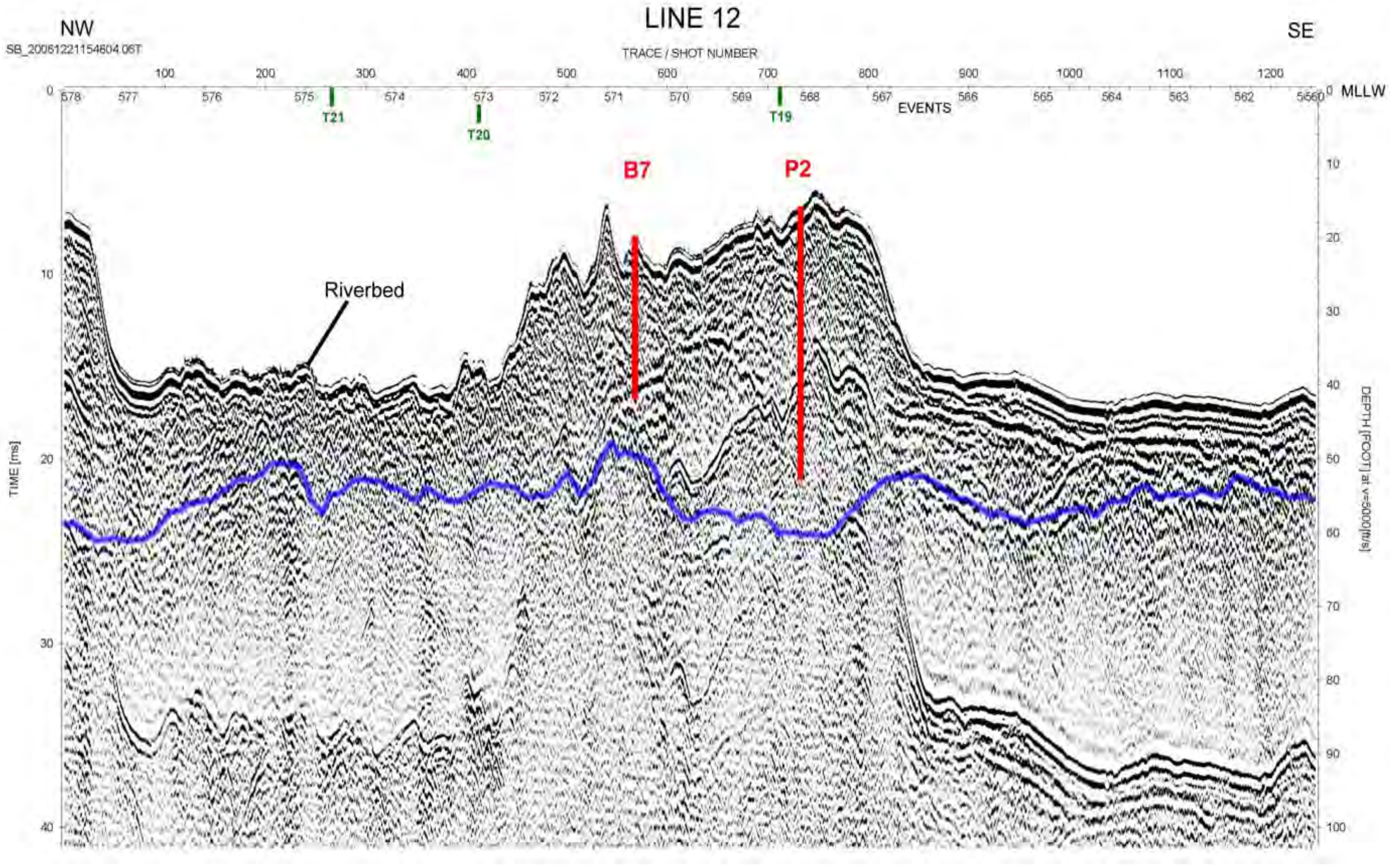
800
900
1000
1100
1200
1300
1400
1500
1600
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
T21
T20
T19
EVENTS
Riverbed
0 MLLW
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at v=5000[ft/s]
10
20
30
40
50
60
70
80
90
100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600
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800
900
1000
1100
1200
578
577
576
575
574
573
572
571
570
569
568
567
566
565
564
563
562
5560
EVENTS
T21
T20
T19
B7
P2
Riverbed
TIME [ms]
0
10
20
30
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0 MLLW
10
20
30
40
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60
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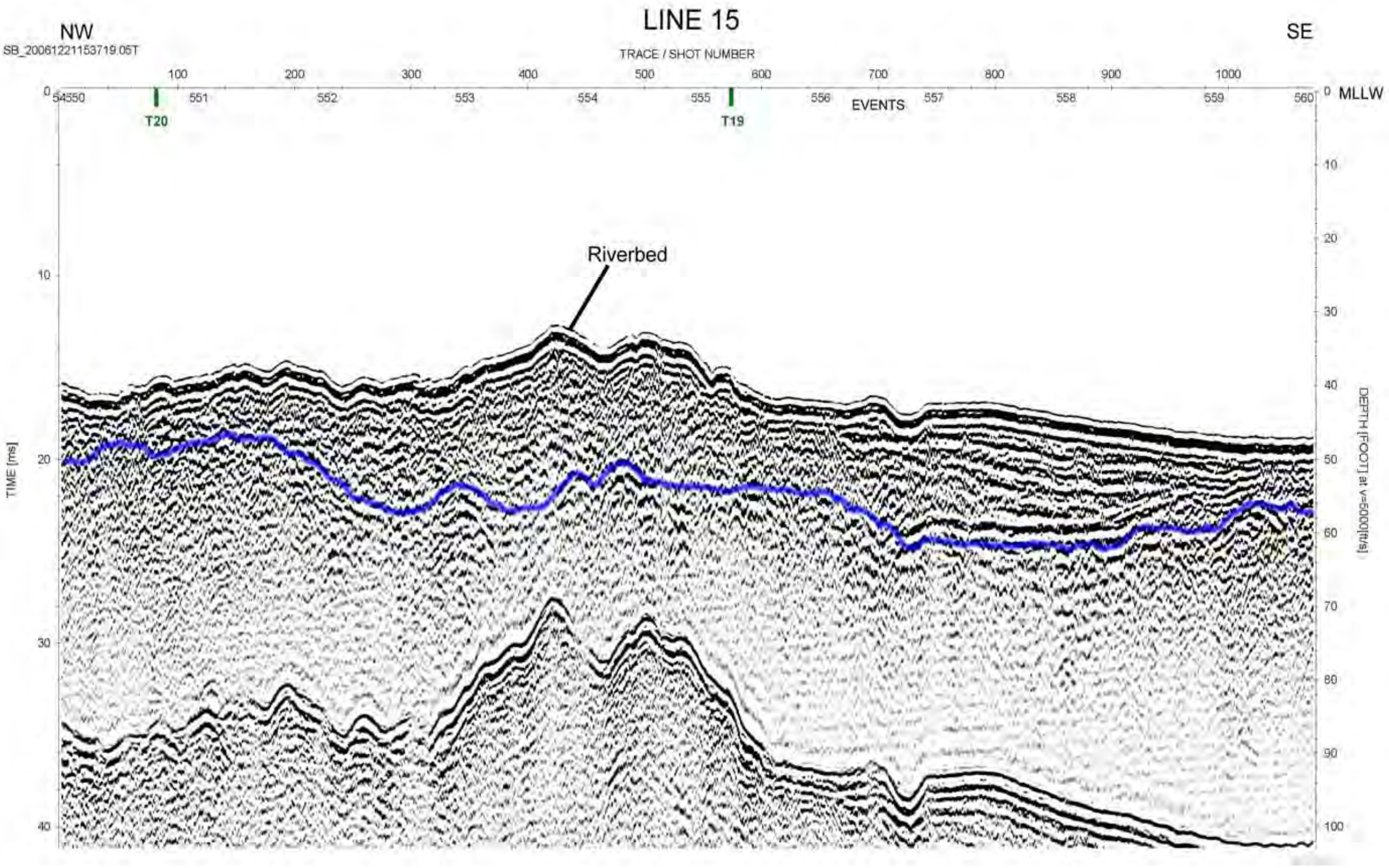
90
100
DEPTH [FOOT] at v=5000[ft/s]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551
552
553
554
555
556
557
558
559
560
EVENTS
T20
T19
0 MLLW
Riverbed
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at v=5000[ft/s]
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30
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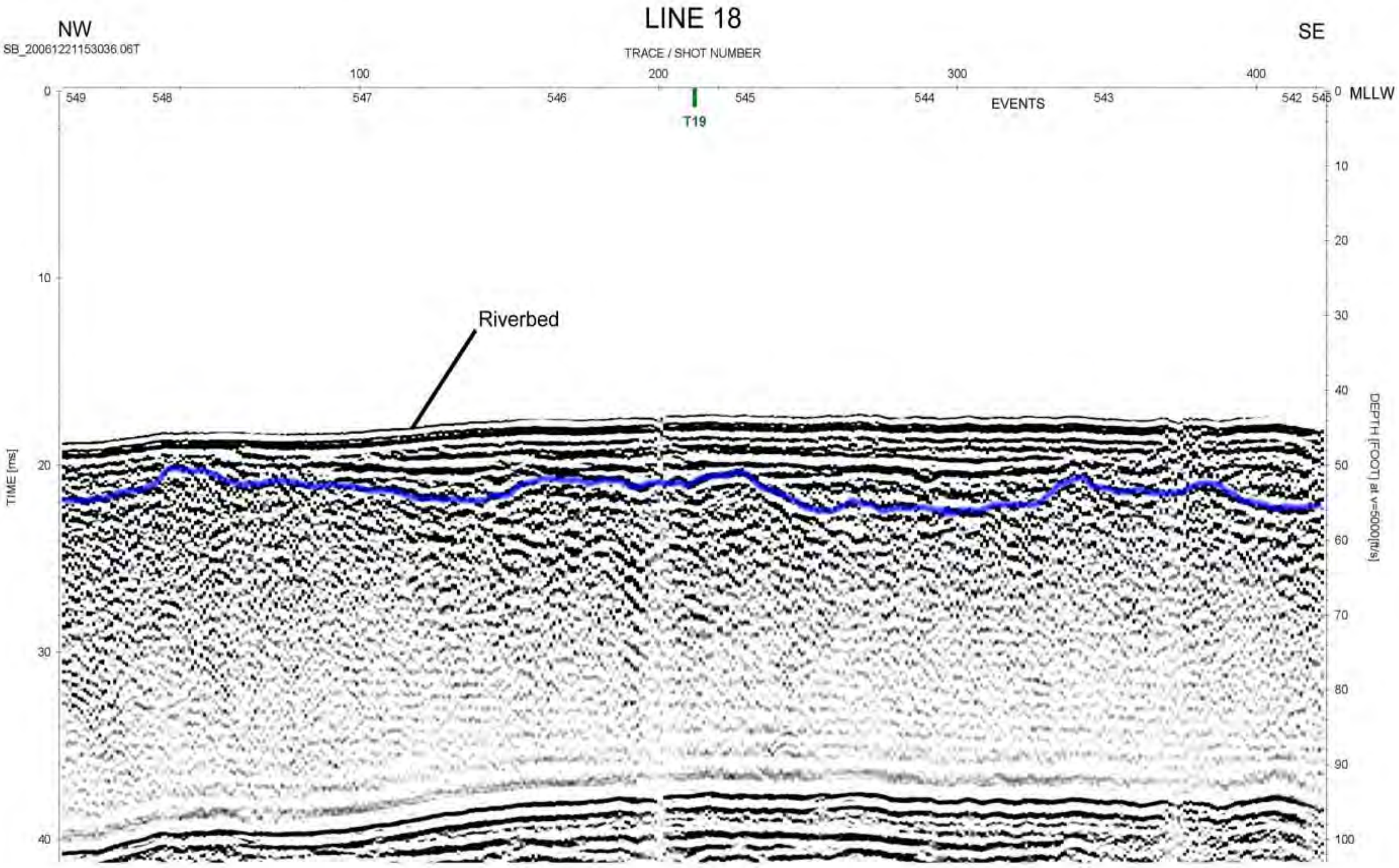
80
90
100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300
400
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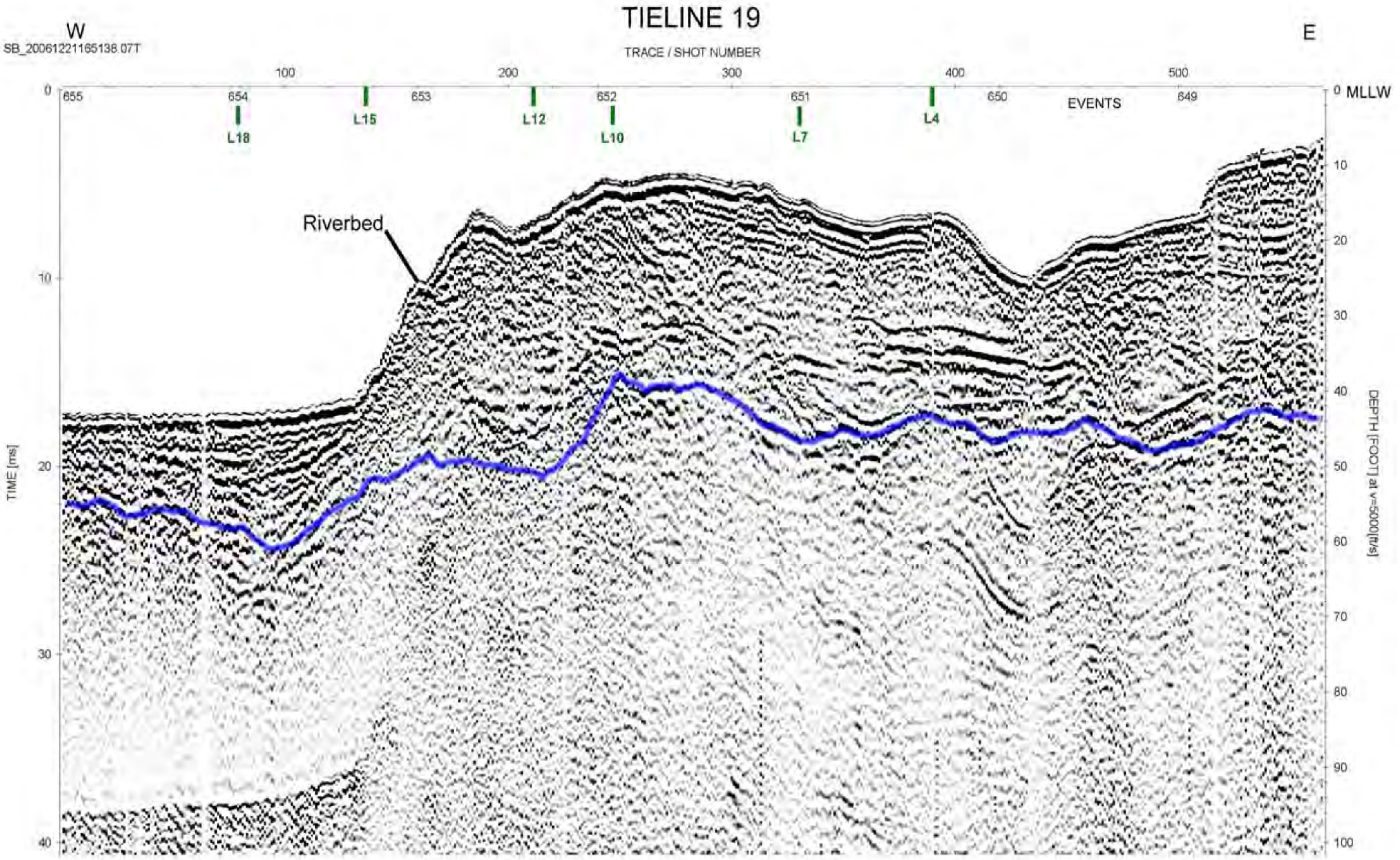
548
547
546
545
544
543
542
546
EVENTS
T19
0 MLLW
Riverbed
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at v=5000[ft/s]
10
20
30
40
50
60
70
80
90
100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E
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TRACE / SHOT NUMBER
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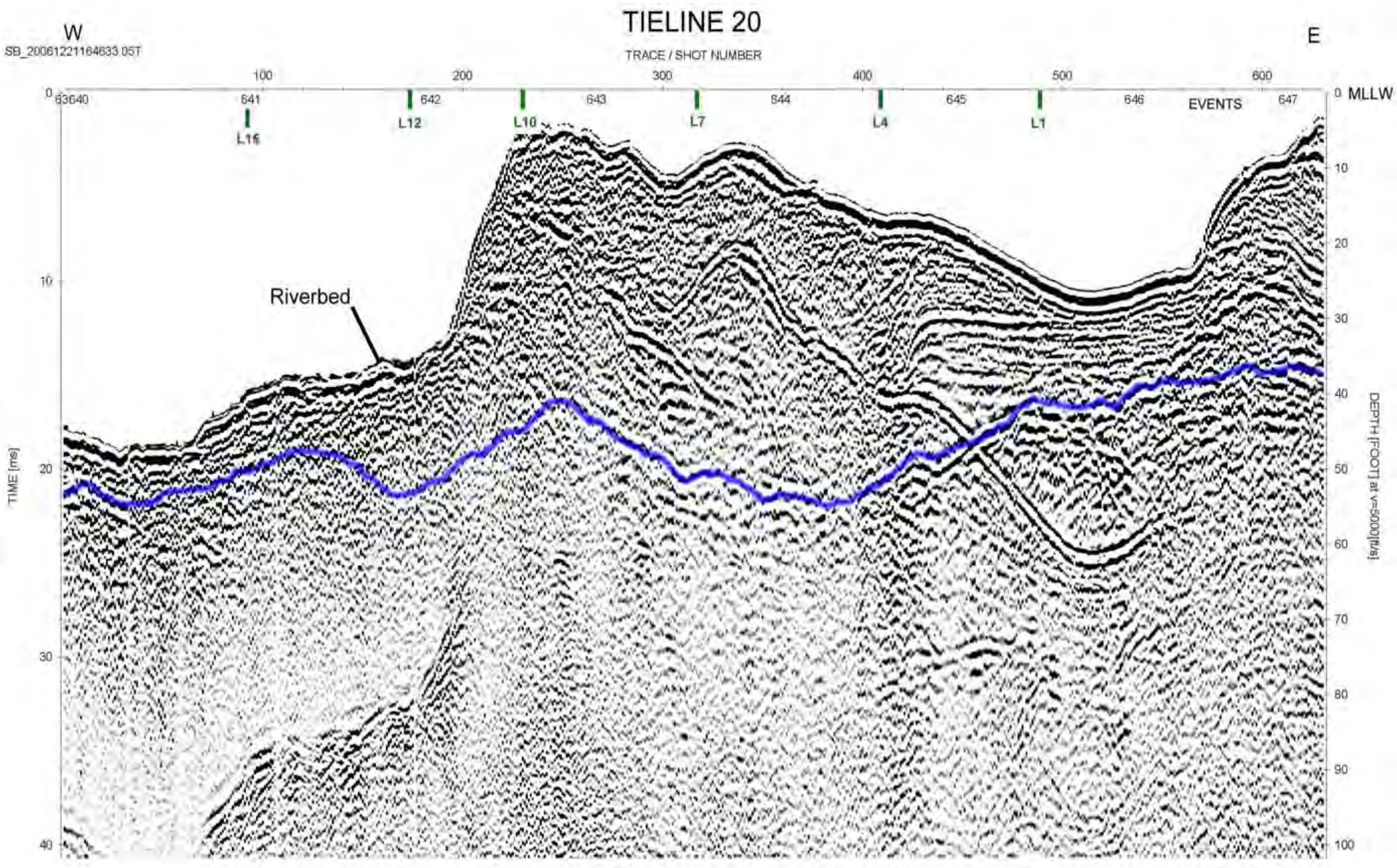
200
300
400
500
655
654
653
652
651
650
649
EVENTS
L18
L15
L12
L10
L7
L4
Riverbed
TIME [ms]
0
10
20
30
40
0 MLLW
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]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SB_20061221164633.05T
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200
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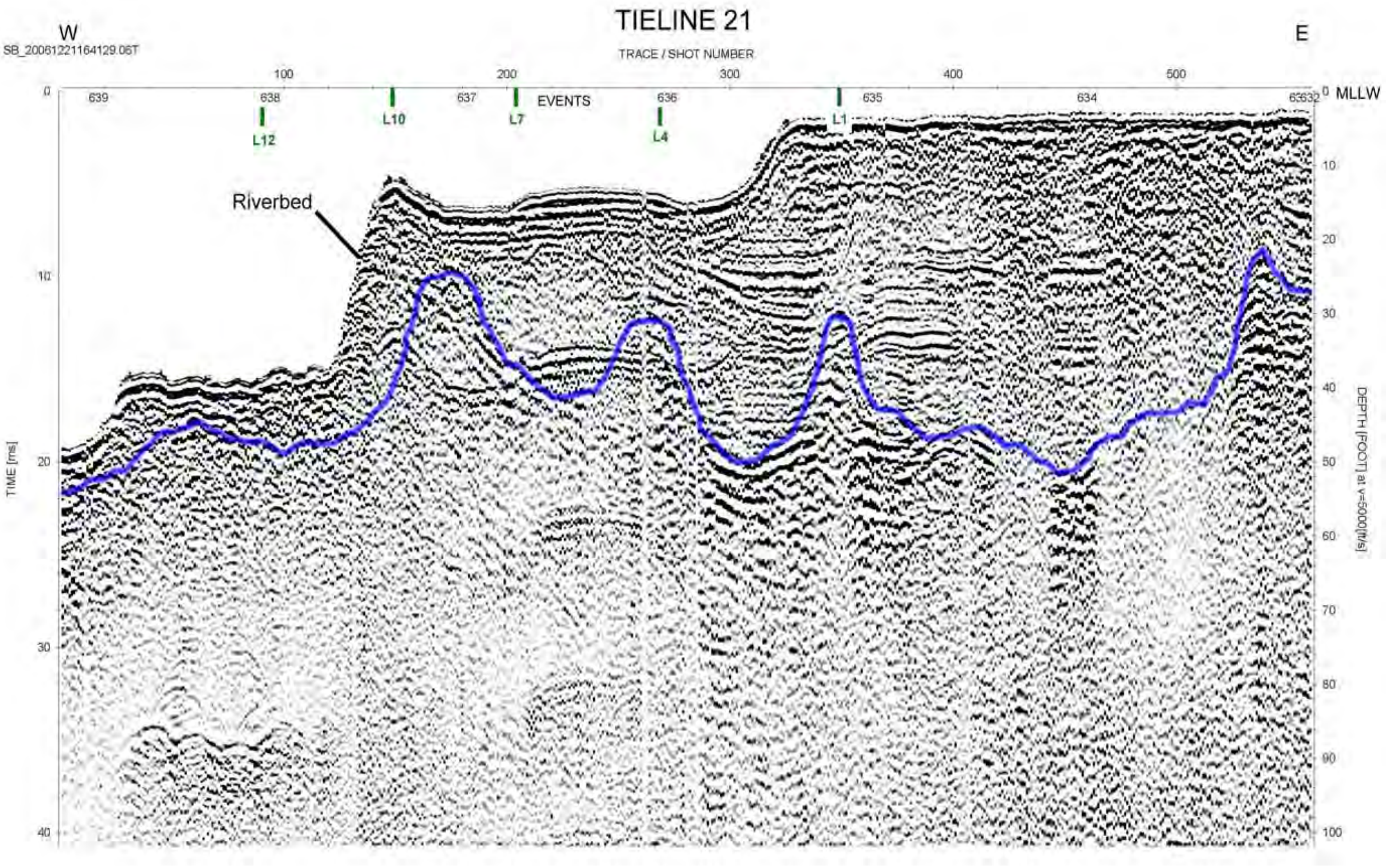
500
600
63640
641
642
643
644
645
646
647
EVENTS
L16
L12
L10
L7
L4
L1
Riverbed
TIME [ms]
0
10
20
30
40
0 MLLW
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]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200
300
400
500
639
638
637
636
635
634
63632
EVENTS
L12
L10
L7
L4
L1
Riverbed
TIME [ms]
0
10
20
30
40
0 MLLW
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]

APPENDIX D

Geotechnical Logsheets
(provided by the USACE)

Hole No. B-1

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT 4" roller bit
2. BORING LOCATION (Coordinates or Station) N 103,511.5 E 2,782,522.9	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Manlea "Bub" Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 0 15. ELEVATION GROUND WATER ft ▽ ft ▽ ft ▼ ft
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	16. DATE/TIME: STARTED 9/10/07 0945; COMPLETED 9/10/07 1200
	17. ELEVATION TOP OF HOLE -13.00 ft
7. THICKNESS OF OVERBURDEN 27.00 ft	18. TOTAL ROCK CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK ft	19. SIGNATURE OF INSPECTOR Maria Orosz
9. TOTAL DEPTH OF HOLE 27.00 ft	

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-13.00 -15.00	0.00 2.00		0.0-2.0 Silty fine, SAND and gravel, wet, brown		J-1	SPT	2-2-17-21		0.7	35%		
-18.00	5.00		2.0-5.0 ROLLERBITTED.									
-20.00	7.00		5.0-7.0 Medium to coarse, SAND and gravel, wet, brown		J-2	SPT	16-11-11-11		0.5	25%		
-23.00	10.00		7.0-10.0 ROLLERBITTED.									
-25.00	12.00		10.0-12.0 Medium to coarse, SAND and gravel, wet, brown, with one larger angular piece of gravel.		J-3	SPT	13-14-13-8		0.3	15%		
-28.00	15.00		12.0-15.0 ROLLERBITTED.									
-30.00	17.00		15.0-17.0 Medium to coarse, SAND and gravel, wet, brown, with one larger piece of gravel.		J-4	SPT	5-7-8-8		0.4	20%		
-33.00	20.00		17.0-20.0 ROLLERBITTED.									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▽ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-13.00 ft

Hole No. B-1

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-35.00	22.00		20.0-22.0 Fine, SAND little gravel, wet, brown		J-5	SPT	3-3-7-9		1	50%		
-38.00	25.00		22.0-25.0 ROLLERBITTED.									
-40.00	27.00		25.0-27.0 Fine, SAND some gravel, wet, brown BOTTOM OF HOLE		J-6	SPT	4-5-8-14		0.9	45%		

<u>Notes:</u>

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 16.5'
4. Drill rods periodically ran rough for short periods of time during drilling, especially while drilling through sands and gravels.
5. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
6. Boring were advanced using 4" casing and 4" rollerbit.
7. Roundness of gravel was subangular.
8. GPS coordinates were determined through data processing.

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

Hole No. B-2

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 3 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,172.3 E 2,781,786.4

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Manlea "Bub" Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 37.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 37.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 8; UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▽ ft
▼ ft

16. DATE/TIME: STARTED 9/10/07 1322; COMPLETED 9/11/07 0855

17. ELEVATION TOP OF HOLE -3.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-3.00 -5.00	0.00 2.00		0.0-2.0 Medium to coarse, SAND and gravel, wet, brown		J-1	SPT	9-11-5-2		0.5	25%		
-8.00	5.00		2.0-5.0 ROLLERBITTED.									
-10.00	7.00		5.0-7.0 Medium, SAND little gravel, wet, brown		J-2	SPT	6-5-4-5		0.6	30%		
-13.00	10.00		7.0-10.0 ROLLERBITTED.									
-15.00	12.00		10.0-12.0 Fine to medium, SAND little gravel, wet, brown		J-3	SPT	4-4-6-8		1	50%		
-18.00	15.00		12.0-15.0 ROLLERBITTED.									
-20.00	17.00		15.0-17.0 Fine to medium, SAND little gravel, wet, brown, Bottom 0.3 medium to coarse sand and gravel.		J-4	SPT	4-8-12-12		0.8	40%		
-23.00	20.00		17.0-20.0 ROLLERBITTED.									

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▽ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-3.00 ft

Hole No. B-2

PROJECT	INSTALLATION	SHEET
FS for Navigational Improvement	Baltimore District	2 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-25.00	22.00		20.0-22.0 Medium to coarse, SAND and gravel, wet, brown		J-5	SPT	9-12-17-17		0.6	30%		
-28.00	25.00		22.0-25.0 ROLLERBITTED.									
-30.00	27.00		25.0-27.0 Medium to coarse, SAND and gravel, wet, brown		J-6	SPT	6-8-11-14		0.7	35%		
-33.00	30.00		27.0-30.0 ROLLERBITTED									
-35.00	32.00		30.0-32.0 Medium to coarse, SAND and gravel, wet, brown		J-7	SPT	11-12-14-18		0.8	40%		
-38.00	35.00		32.0-35.0 ROLLERBITTED									
-40.00	37.00		35.0-37.0 GRAVEL with medium to coarse sand, wet, brown, In tip of SPT the color changed to gray BOTTOM OF HOLE		J-8	SPT	7-31-30-27		0.8	40%		
			Notes: 1. Soils are field visually classified in accordance with the Unified Soils Classification System 2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30". 3. Water depth at start of drilling from top of water to mudline was 9.0' 4. Drill rods running rough between 20.0' - 27.0'. 5. Drill rods periodically ran rough for short periods of time during drilling, especially while drilling through sands and gravels. 6. The majority of SPT samples did not have sample in shoe, most likely due to wash out. 7. Boring were advanced using 4" casing and 4" rollerbit. 8. Roundness of gravel was subangular.									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -3.00 ft

Hole No. B-2

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 3 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			9. GPS coordinates were determined through data processing.									

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement	HOLE NO. B-2

Hole No. B-3

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,052.6 E 2,782,268.9

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Manlea "Bub" Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 27.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 27.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN — DISTURBED 6 — UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft

▼ ft

▼ ft

16. DATE/TIME — STARTED 9/11/07 1000 — COMPLETED 9/11/07 1310

17. ELEVATION TOP OF HOLE -15.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-15.00 -17.00	0.00 2.00		0.0-2.0 Fine to medium, SAND contains shells, little gravel, wet, black and brown	J-1	SPT	3-3-3-2		0.4	20%		
-20.00	5.00		2.0-5.0 ROLLERBITTED.								
-20.60	5.60		5.0-5.6 Fine to medium, SAND little gravel, wet, brown	J-2	SPT	31-120/0.1		0.6	100%		
-25.00	10.00		7.0-10.0 ROLLERBITTED.								
-27.00	12.00		10.0-12.0 Sandy fine, SILT with gravel, wet, brown	J-3	SPT	2-5-22-37		1.2	60%		
-30.00	15.00		12.0-15.0 ROLLERBITTED.								
-32.00	17.00		15.0-17.0 Fine, SAND with two interbedded silt layers, wet, brown	J-4	SPT	4-5-5-6		0.7	35%		
-35.00	20.00		17.0-20.0 ROLLERBITTED.								

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-3

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -15.00 ft

Hole No. B-3

PROJECT FS for Navigational Improvement

INSTALLATION Baltimore District

SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-37.00	22.00		20.0-22.0 Fine, SAND wet, brown		J-5	SPT	8-2-6-8		0.4	20%		
-40.00	25.00		22.0-25.0 ROLLERBITTED.									
-42.00	27.00		25.0-27.0 Fine to medium, SAND wet, brown BOTTOM OF HOLE		J-6	SPT	8-6-4-6		0.9	45%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 18.5'
4. Casing dropped 0.5' while setting up to sample J-2, potentially due to washed out sand and gravel.
5. Drill rods running rough between 5.6' to 10.0' - sounded like grinding on gravel.
6. Drilling for B-3 was rougher for longer periods of time than B-1 and B-2.
7. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
8. Boring were advanced using 4" casing and 4" rollerbit.
9. Roundness of gravel was subangular.
10. GPS coordinates were determined through data processing.

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-3

Hole No. B-4

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT: FS for Navigational Improvement, Portsmouth, NH
2. BORING LOCATION (Coordinates or Station): N 104,438.4 E 2,781,783.8
3. DRILLING AGENCY: New Hampshire Boring
4. NAME OF DRILLER: Manlea "Bub" Thompson
5. NAME OF INSPECTOR: Maria Orosz
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 37.00 ft
8. DEPTH DRILLED INTO ROCK: ft
9. TOTAL DEPTH OF HOLE: 37.00 ft
10. SIZE AND TYPE OF BIT: 4" roller bit
11a. VERTICAL DATUM: MLLW
11b. HORIZONTAL DATUM: State Plane, NAD 83 Maine West
12. MANUFACTURER'S DESIGNATION OF DRILL: Detrich D-50
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 5 UNDISTURBED 0
14. TOTAL # OF ROCK SAMPLES: 0
15. ELEVATION GROUND WATER: ft
16. DATE/TIME: STARTED 9/13/07 1230 COMPLETED 9/13/07 1230
17. ELEVATION TOP OF HOLE: -3.00 ft
18. TOTAL ROCK CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Maria Orosz

▽ ft
▼ ft
▼ ft

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-3.00 -5.00	0.00 2.00		0.0-2.0 Silty medium to coarse, SAND and gravel, wet, brown, rock stuck in tip of SPT		J-1	SPT	8-12-21-18		0.6	30%		
-8.00	5.00		2.0-5.0 ROLLERBITTED.									
-10.00	7.00		5.0-7.0 Fine to medium, SAND little gravel, wet, brown		J-2	SPT	4-6-9-11		0.9	45%		
-18.00	15.00		7.0-15.0 ROLLERBITTED.									
-20.00	17.00		15.0-17.0 Fine to medium, SAND little gravel, wet, brown, Bottom 0.2 fine sandy silt		J-3	SPT	4-6-10-12		1.3	65%		
			17.0-25.0 ROLLERBITTED.									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT: FS for Navigational Improvement
HOLE NO. B-4

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE -3.00 ft	**Hole No. B-4**
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-28.00	25.00											
-30.00	27.00		25.0-27.0 Fine to medium, SAND little gravel, wet, brown		J-4	SPT	7-13-30-42		1.1	55%		
-38.00	35.00		27.0-35.0 ROLLERBITTED.									
-40.00	37.00		35.0-37.0 Fine to medium, SAND wet, brown BOTTOM OF HOLE		J-5	SPT	10-12-38-81		1.4	70%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 8.0'
4. Drill rods running rough between 2.0' to 5.0', 7.0' to 10.0', and 25.0' to 37.0'.
5. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
6. Boring was advanced using 4" casing and 4" rollerbit.
7. Roundness of gravel was subangular.
8. GPS coordinates were not processed and the raw utilized.

Hole No. B-5

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,925.0 E 2,781,460.3

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Dave Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 27.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 27.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▼ ft
▼ ft

16. DATE/TIME: STARTED 11/27/07 0945; COMPLETED 11/27/07 1245

17. ELEVATION TOP OF HOLE -14.50 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-14.50 -16.50	0.00 2.00		0.0-2.0 Sandy fine, SILT wet, brown, Upper 0.3 black fine sand with shells		J-1	SPT	1-1-3-3		1.4	70%		
-19.50	5.00		2.0-5.0 ROLLERBITTED.									
-21.50	7.00		5.0-7.0 Sandy fine, SILT wet, brown		J-2	SPT	3-3-5-5		0.6	30%		
-24.50	10.00		7.0-10.0 ROLLERBITTED.									
-26.30	11.80		10.0-11.8 Silty fine, SAND with gravel, wet, brown, One large piece of gravel approx 0.1'		J-3	SPT	30-50-96-100/0.3		1.2	67%		
-29.50	15.00		11.8-15.0 ROLLERBITTED.									
-31.50	17.00		15.0-17.0 Fine, SAND wet, brown, Bottom 0.2 gravel and coarse sand.		J-4	SPT	20-17-18-21		1.1	55%		
-34.50	20.00		17.0-20.0 ROLLERBITTED.									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement | HOLE NO. B-5

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -14.50 ft		**Hole No. B-5**
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-36.50	22.00		20.0-22.0 Fine, SAND little gravel, wet, brown		J-5	SPT	9-20-21-24		1.2	60%		
-39.50	25.00		22.0-25.0 ROLLERBITTED.									
-41.50	27.00		25.0-27.0 Fine to medium, SAND little gravel, wet, brown BOTTOM OF HOLE		J-6	SPT	12-29-40-48		1.3	65%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 23.5'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. Drill rods running rough between 7.0' to 15.0'.
7. GPS coordinates were not processed and the raw utilized.

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

Hole No. B-6

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,631.0 E 2,781,500.2

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Dave Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 12.00 ft

8. DEPTH DRILLED INTO ROCK 10.00 ft

9. TOTAL DEPTH OF HOLE 28.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 3 UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 2

15. ELEVATION GROUND WATER ft

▽ ft
▼ ft
▼ ft

16. DATE/TIME STARTED 11/28/07 0800 COMPLETED 11/28/07 1305

17. ELEVATION TOP OF HOLE -15.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING 100 %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-15.00 -17.00	0.00 2.00		0.0-2.0 Fine to medium, SAND with gravel, wet, brown		J-1	SPT	7-8-9-10		0.6	30%		
-20.00	5.00		2.0-5.0 ROLLERBITTED.									
-22.00	7.00		5.0-7.0 Silty fine, SAND with gravel, wet, brown		J-2	SPT	18-28-40-43		0.5	25%		
-25.00	10.00		7.0-10.0 ROLLERBITTED.									
-27.00	12.00		10.0-12.0 Silty fine, SAMD with gravel, wet, brown, Upper 0.2 black gravel and coarse sand		J-3	SPT	76-88-63-72		1	50%		
-33.00	18.00		12.0-15.0 ROLLERBITTED. 15.0-18.0 SPT refusal @ 15' (0.0/100). ROLLERBITTED to 18.0'. Wash water from tailings was cloudy gray, and tailings appeared to be crushed rock. Began coring at 18.0.'									
			18.0-23.0 Gneiss gray, slightly weathered, fine, medium hard, Rock contained pitted voids from 18.0 to 19.0'. One apparent fracture at 19.9'. Fracture was slightly stained, rough, narrow, dipping at approx 50 degrees.									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-15.00 ft

Hole No. B-6

PROJECT	INSTALLATION	SHEET
FS for Navigational Improvement	Baltimore District	2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-38.00	23.00		Mechanical breaks occurred at 18.2', 18.9', 20.1', 20.5' and 22.2'.			CR Run 1			5	100%	0.92	55.2
-43.00	28.00		23.0-28.0 Gneiss gray, slightly weathered, fine, medium hard, One apparent fracture at 23.7'. Fracture was slightly stained, rough, narrow, dipping at approx 60 degrees. Mechanical breaks occurred at 24.6', 25.3', 25.7', and 26.5'. Mechanical break angles ranged from 40 to 70 degrees. BOTTOM OF HOLE			CR Run 2			5	100%	0.94	56.4

<u>Notes:</u>

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 15.0'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. Run Times (ft/min) for Run #1: 3-4-4-4-4, and Run#2: 4-3-3-3-3.
7. Poor recovery for J-2 due to rock in catcher.
8. Drill rods running rough between 7.0' to 10.0'.
9. GPS coordinates were determined through data processing.

Hole No. B-7

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH
2. BORING LOCATION (Coordinates or Station)
N 103,983.5 E 2,781,847.7
3. DRILLING AGENCY
New Hampshire Boring
4. NAME OF DRILLER
Dave Thompson
5. NAME OF INSPECTOR
Maria Orosz
6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN 22.00 ft
8. DEPTH DRILLED INTO ROCK ft
9. TOTAL DEPTH OF HOLE 22.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit
11a. VERTICAL DATUM MLLW
11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 5; UNDISTURBED 0
14. TOTAL # OF ROCK SAMPLES 0
15. ELEVATION GROUND WATER ft
▽ ft
▽ ft
▼ ft
16. DATE/TIME: STARTED 11/29/07 0830; COMPLETED 11/28/07 1100
17. ELEVATION TOP OF HOLE -19.00 ft
18. TOTAL ROCK CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-19.00 -21.00	0.00 2.00		0.0-2.0 Fine, SAND little gravel, wet, brown		J-1	SPT	11-4-3-2		1	50%		
-24.00	5.00		2.0-5.0 ROLLERBITTED.									
-26.00	7.00		5.0-7.0 Fine to medium, SAND little gravel, wet, brown		J-2	SPT	5-5-3-5		1.3	65%		
-29.00	10.00		7.0-10.0 ROLLERBITTED.									
-31.00	12.00		10.0-12.0 Fine to coarse, SAND with gravel, wet, brown		J-3	SPT	4-4-4-6		1.2	60%		
-34.00	15.00		12.0-15.0 ROLLERBITTED.									
-36.00	17.00		15.0-17.0 Medium to coarse, SAND with gravel, wet, brown		J-4	SPT	7-8-12-31		0.9	45%		
-39.00	20.00		17.0-20.0 ROLLERBITTED.									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
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▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement
HOLE NO. B-7

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-19.00 ft

Hole No. B-7

PROJECT	INSTALLATION	SHEET 2 OF 2 SHEETS
FS for Navigational Improvement	Baltimore District	

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			20.0-22.0 Medium to coarse, SAND with gravel, wet, brown		J-5	SPT	13-78-39-26		1.4	70%		
-41.00	22.00		BOTTOM OF HOLE									

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 25.0'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. Drill rods running rough between 17.0' to 20.0'.
7. The current was very strong in this location.
8. For samples J-1, J-3, and J-5, the 3" spoon was used to retrieve a greater amount of sample.
9. GPS coordinates were determined through data processing.

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
B-7

Hole No. B-8

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH
2. BORING LOCATION (Coordinates or Station)
N 103,732.7 E 2,782,109.8
3. DRILLING AGENCY
New Hampshire Boring
4. NAME OF DRILLER
Dave Thompson
5. NAME OF INSPECTOR
Maria Orosz
6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN 22.00 ft
8. DEPTH DRILLED INTO ROCK ft
9. TOTAL DEPTH OF HOLE 22.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit
11a. VERTICAL DATUM MLLW
11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN DISTURBED 5 UNDISTURBED 0
14. TOTAL # OF ROCK SAMPLES 0
15. ELEVATION GROUND WATER ft
∇ ft
⊻ ft
▼ ft
16. DATE/TIME STARTED 11/29/07 1237 COMPLETED 11/30/07 1000
17. ELEVATION TOP OF HOLE -18.00 ft
18. TOTAL ROCK CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-18.00 -20.00	0.00 2.00		0.0-2.0 Fine to medium, SAND wet, brown, One large piece of gravel approx 0.3'	J-1	SPT	19-6-2-2		0.7	35%		
-23.00	5.00		2.0-5.0 ROLLERBITTED.								
-25.00	7.00		5.0-7.0 Coarse, SAND AND GRAVEL wet, brown	J-2	SPT	5-5-7-9		1	50%		
-28.00	10.00		7.0-10.0 ROLLERBITTED.								
-30.00	12.00		10.0-12.0 Fine to medium, SAND AND GRAVEL little gravel, wet, brown	J-3	SPT	14-19-23-30		0.9	45%		
-33.00	15.00		12.0-15.0 ROLLERBITTED.								
-35.00	17.00		15.0-17.0 Medium to coarse, SAND AND GRAVEL wet, brown	J-4	SPT	12-30-31-40		2	100%		
-38.00	20.00		17.0-20.0 ROLLERBITTED.								

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
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∇ DURING DRILLING ⊻ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement
HOLE NO. B-8

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -18.00 ft

Hole No. B-8

PROJECT FS for Navigational Improvement

INSTALLATION Baltimore District

SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			20.0-22.0 Coarse, SAND AND GRAVEL wet, brown		J-5	SPT	13-15-17-14		1	50%		
-40.00	22.00		BOTTOM OF HOLE									

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 25.0'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. For samples J-1, J-2, J-4, and J-5, the 3" spoon was used to retrieve a greater amount of sample.
7. GPS coordinates were determined through data processing.

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

Hole No. P-1

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 3 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 105,013.1 E 2,781,703.1

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Manlea "Bub" Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 58.90 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 58.90 ft

10. SIZE AND TYPE OF BIT

11a. VERTICAL DATUM
MLLW

11b. HORIZONTAL DATUM
State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN : DISTURBED 0 : UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▽ ft
▼ ft

16. DATE/TIME : STARTED 9/13/07 0740 : COMPLETED 9/13/07 0915

17. ELEVATION TOP OF HOLE -2.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-2.00	0.00		0.0-58.9									
			19.0-24.0 Casing blows per foot: 26-24-22-24-21									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

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▽ DURING DRILLING ▽ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
P-1

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE -2.00 ft		**Hole No. P-1**
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District		SHEET 2 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			24.0-29.0 Casing blows per foot: 23-21-22-21-21									
			29.0-34.0 Casing blows per foot: 21-21-20-21-22									
			34.0-39.0 Casing blows per foot: 26-25-25-22-20									
			39.0-44.0 Casing blows per foot: 23-27-24-23-22									
			44.0-49.0 Casing blows per foot: 21-21-18-21-27									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-2.00 ft

Hole No. P-1

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 3 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			49.0-54.0 Casing blows per foot: 26-26-29-34-42									
			54.0-58.9 Casing blows per foot: 40-42-48-56-49									
-60.90	58.90		BOTTOM OF HOLE									

Notes:

1. Water depth at start of drilling from top of water to mudline was 2.5'
2. Probe holes were advanced using a 300 lb hammer to pound NW rods into the sediment. An A-rod center plug that was ground into a 60 degree point was used to advance the NW rods.
3. Top of rock was determined by a bouncing refusal.
4. Casing blows were only recorded for P-1.
5. GPS coordinates were determined through data processing.

NAB FORM 1836-A
NOV 06

∇ DURING DRILLING ▽ AT COMPLETION ▼ AFTER DRILLING

Hole No. P-2

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT
2. BORING LOCATION (Coordinates or Station) N 103,605.5 E 2,782,165.0	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Manlea "Bub" Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 0; UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 0 15. ELEVATION GROUND WATER ft ▽ ft ⊻ ft ▼ ft
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	16. DATE/TIME: STARTED 9/12/07 0130; COMPLETED 9/12/07 1453
7. THICKNESS OF OVERBURDEN 37.00 ft	17. ELEVATION TOP OF HOLE -15.50 ft
8. DEPTH DRILLED INTO ROCK ft	18. TOTAL ROCK CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 37.00 ft	19. SIGNATURE OF INSPECTOR Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-15.50	0.00		0.0-37.0									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ⊻ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-15.50 ft

Hole No. P-2

PROJECT	INSTALLATION	SHEET 2
FS for Navigational Improvement	Baltimore District	OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-52.50	37.00		BOTTOM OF HOLE									

Notes:

1. Water depth at start of drilling from top of water to mudline was 15.5'

2. Hard driving rods near bottom of probe hole.

3. At completion of probe hole, the final rod that was pulled was bent.

4. Probe holes were advanced using a 300 lb hammer to pound NW rods into the sediment. An A-rod center plug that was ground into a 60 degree point was used to advance the NW rods.
5. Top of rock was determined by a bouncing refusal.
6. GPS coordinates were not processed and the raw utilized.

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 3 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,971.2 E 2,781,345.4

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Manlea "Bub" Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 49.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 49.00 ft

10. SIZE AND TYPE OF BIT

11a. VERTICAL DATUM
MLLW

11b. HORIZONTAL DATUM
State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN — DISTURBED 0 — UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▼ ft
▼ ft

16. DATE/TIME — STARTED 9/12/07 0840 — COMPLETED 9/12/07 1132

17. ELEVATION TOP OF HOLE -12.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-12.00	0.00		0.0-49.0									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE -12.00 ft	**Hole No. P-3**

PROJECT	INSTALLATION	SHEET 2
FS for Navigational Improvement	Baltimore District	OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD

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▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-12.00 ft

Hole No. P-3

PROJECT
FS for Navigational Improvement

INSTALLATION
Baltimore District

SHEET 3
OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-61.00	49.00		BOTTOM OF HOLE									

Notes:

1. Water depth at start of drilling from top of water to mudline was 11.5'
2. Probe holes were advanced using a 300 lb hammer to pound NW rods into the sediment. An A-rod center plug that was ground into a 60 degree point was used to advance the NW rods.
3. Top of rock was determined by a bouncing refusal.
4. GPS coordinates were determined through data processing.

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

APPENDIX E

Equipment Operations and Procedures

Trimble 4000RS and ProBeacon Differential GPS
HYPACK® Navigation Software
Klein 3000 Dual Frequency Side Scan Sonar System
Geometrics G-882 Marine Cesium Magnetometer
Applied Acoustics Engineering “Boomer” Seismic Reflection System

EQUIPMENT OPERATIONS AND PROCEDURES

Trimble 4000RS and ProBeacon Differential GPS

The Trimble 4000RS satellite positioning system provides reliable, high-precision positioning and navigation for a wide variety of operations and environments. The system consists of a GPS receiver, a GPS volute antenna and cable, RS232 output data cables, and a secondary reference station receiver, in this case a Trimble ProBeacon receiver. The beacon receiver consists of a small control unit, a volute antenna and cable, and RS232 interface to the Trimble GPS unit.

Fully automated, the Trimble 4000RS provides means for 9 channel simultaneous satellite tracking with real time display of geodetic position, time, date, and boat track if desired. The Trimble unit is mounted on the survey vessel with the ProBeacon receiver which continuously receives differential satellite correction factors via radio link from one of the DGPS United States Coast Guard beacons. The Trimble 4000RS accepts the correction factors via the ProBeacon interface and applies the differential corrections to obtain continuous, high accuracy, real time position updates. The Trimble 4000 system is interfaced to the OSI data logging computer and HYPACK® navigation software for trackline control. The output data string from the Trimble receiver can be modified to send all or part of the data parameters to the computer for logging.

The Coast Guard beacon located at Portsmouth Harbor, New Hampshire (frequency of 288 kHz, @ 100 bps) was used during this project with good reliability and signal strength.

HYPACK® Navigation Software

Survey vessel trackline control and position fixing were obtained by utilizing an OSI computer-based data logging package running HYPACK® navigation software. The Pentium computer is interfaced with the Trimble 4000 DGPS system onboard the survey vessel. Vessel position data from the Trimble 4000RS were updated at 1.0 second intervals and input to the HYPACK® navigation system which processes the geodetic positions into State Plane coordinates used to guide the survey vessel accurately along preselected tracklines. The incoming data are logged on disk and processed in real time allowing the vessel position to be displayed on a video monitor and compared to each preplotted trackline as the survey progresses. A nautical chart background shows the shoreline, general water depths, and locations of existing structures, buoys, and control points on the monitor in relation to the vessel position. The OSI computer logging system combined with the HYPACK® software thus provide an accurate visual representation of survey vessel location in real time, combined with highly efficient data logging capability and post-survey data processing and plotting routines.

Klein 3000 Dual Frequency Side Scan Sonar System

Side scan sonar images of the bottom were collected using a Klein 3000 dual frequency, high resolution sonar system operating at frequencies of 100 and 500 kilohertz. The system consists of a topside notebook computer, external monitor, keyboard, mouse, an EPC1086NT dual channel thermal graphic recorder, a Kevlar tow cable and sonar towfish. The system contains an integrated navigational plotter which accepts standard NMEA 0183 input from a GPS system. This allows vessel position and sonar sweep to be displayed on the monitor and speed information to be used for controlling the sonar ping rate.

All sonar images are stored digitally and can be enhanced real-time or post-survey by numerous mathematical filters available in the program software. Other software functions that are available during data acquisition include; changing range scale and delay, display color, automatic or manual gain, speed over bottom, multiple enlargement zoom, target length, height, and area measurements, logging and saving of target images, and annotation frequency and content. The power of this system is its real-time processing capability for determining precise dimensions of targets and areas on the bottom.

As with many other marine geophysical instruments, the side scan sonar derives its information from reflected acoustic energy. A set of transducers mounted in a compact towfish generate the short duration acoustic pulses required for extremely high resolution. The pulses are emitted in a thin, fan-shaped pattern that spreads downward to either side of the fish in a plane perpendicular to its path. As the fish progresses along the trackline, the acoustic beam is capable of scanning the bottom from a point beneath the fish, outward as far as 200 meters on each side of the survey trackline, depending on towfish height above the seabed.

Acoustic energy reflected from any bottom discontinuities is received by the set of transducers in the towfish, amplified and transmitted to the survey vessel via the tow cable where it is further amplified, processed, and converted to a graphic record by the side scan recorder. The sequence of reflections from the series of pulses is displayed on the dual-channel graphic recorder on which paper is incrementally advanced prior to printing each acoustic pulse. The resulting output is essentially analogous to a high angle oblique "photograph" providing detailed representation of the bottom features and characteristics.

Geometrics G-882 Marine Cesium Magnetometer

Total magnetic field intensity measurements were acquired along the survey tracklines using an Geometrics G-882 cesium magnetometer which has an instrument sensitivity of 0.1 gamma. The G-882 magnetometer system includes the sensor head with a coil and optical component tube, a sensor electronics package which houses the AC signal generator and mini-counter that converts the Larmor signal into a magnetic anomaly value in gammas, and a RS-232 data cable for transmitting digital measurements to a data logging system. The cesium-based method of magnetic detection allows the sensor to be towed off the side of the survey vessel, simultaneously with other remote sensing equipment, while maintaining high quality, quiet magnetic data with ambient fluctuations of less than 1 gamma. The G-882 features an altimeter that provides digital height above the bottom in real time thus allowing the sensor height to be precisely maintained along line. The altimeter and magnetic intensity data were recorded at a 10 hertz sampling rate on the OSI data logging computer by HYPACK®.

The G-882 magnetometer acquires information on the ambient magnetic field strength by measuring the variation in cesium electron energy states. The presence of only one electron in the cesium atom’s outermost electron shell (known as alkali metals) makes cesium ideal for optical pumping and magentometry.

In operation, a beam of infrared light is passed through a cesium vapor chamber producing a Larmor frequency output in the form of a continuous sine wave. This radio frequency field is generated by an H1 coil wound around a tube containing the optical components (lamp oscillator, optical filters and lenses, split-circular polarizer, and infrared photo detector). The

Larmor frequency is directly proportional to the ambient magnetic intensity measurements, and is exactly 3.49872 times the ambient magnetic field measured in gammas or nano-Teslas. Changes in the ambient magnetic field cause different degrees of atomic excitation in the cesium vapor which in turn allows variable amounts of infrared light to pass, resulting in fluctuations in the Larmor frequency.

Although the earth's magnetic field does change with both time and distance, over short periods and distances the earth's field can be viewed as relatively constant. The presence of magnetic material and/or magnetic minerals, however, can add to or subtract from the earth's magnetic field creating a magnetic anomaly. Rapid changes in total magnetic field intensity which are not associated with normal background fluctuations mark the locations of these anomalies.

Determination of the location of an object producing a magnetic anomaly depends on whether or not the magnetometer sensor passed directly over the object and if the anomaly is an apparent monopole or dipole. A magnetic dipole can be thought of simply as a common bar magnet having a positive and negative end or pole. A monopole arises when the magnetometer senses only one end of a dipole as it passes over the object. This situation occurs mainly when the distance between opposite poles of a dipole is much greater than the distance between the magnetometer and the sensed pole, or when a dipole is oriented nearly perpendicular to the ambient field thus shielding one pole from detection. For dipolar anomalies, the location of the object is at the point of maximum gradient between the two poles. In the case of a monopole, the object associated with the anomaly is located below the maximum or minimum magnetic value.

Applied Acoustics Engineering "Boomer" Seismic Reflection System

Subbottom information from deeper below the seafloor was gathered using an Applied Acoustics Engineering seismic reflection system. The AAE "boomer" system consists of a variable 100-300 joule power supply, a catamaran boomer plate for sound source, a 10 element hydrophone array (eel) as receiver, and a graphic recorder for printing the acoustic returns. For this project, an Octopus Model 760 Marine Seismic Processor with universal amplifier and filter was used inline with the system, which includes TVG (time varied gain) with bottom tracking, automatic gain control, and a swell filter. A Kronhite Model 3200 analog filter was also used to band pass the signals for unwanted electrical and tow noise. The entire system was interfaced with an EPC Model 1086NT thermal recorder for displaying the seismic profiles.

The Octopus 760 seismic processor adds significant power and versatility to the system. Besides the typical amplification and filtering options (band pass filter, time varied gain (TVG), it also includes a number of time varied filtering (TVF) features such as signal stacking and swell filtering which help minimze noise in the horizontal plane. The system has the ability to save data in a variety of digital formats.

Operationally, a seismic source is used to create an intense, short duration acoustic pulse or signal in the water column. This signal propagates downward to the seafloor where it is partially reflected at the sediment-water interface, while the rest of the signal continues into the subbottom. As the downward propagating signal encounters successive interfaces between layers of different material, similar partial reflections occur. The types of sediment which cause acoustic signals to behave in such a manner are defined primarily by the cross-product of the bulk density and the compressional wave velocity of each material, a quantity known as the acoustic impedance. As a first approximation, the percentage of an acoustic signal which is reflected from an interface is directly proportional to the change in acoustic impedance across that interface.

The return signal consists of a continuous sequence of reflected energy which has a series of "peaks" correlative in intensity with the magnitude of the change in acoustic impedance of the materials on either side of the interface. These return signals received by the transducer array are subsequently converted to electrical voltages which are proportional to the intensity of the return and hence dictate how strongly the return is printed by the graphic recorder. Ambient noise is filtered out and the signal is then amplified with overall gain and/or TVG and displayed trace-by-trace iteratively on the recorder to yield a continuous display somewhat analogous to a geologic cross section. The lower frequency and increased band width of the boomer waveform is designed to achieve greater penetration into the subsurface for resolution of deeper stratigraphy.

APPENDIX F

Equipment Specification Sheets

4000RSi & 4000DSi

DGPS Reference Surveyor and Differential Surveyor

Key features and benefits

- **Sub 0.5 meter accuracy**
- **Real time QA/QC**
- **Everest Multipath Rejection Technology**
- **Super-trak Signal Processing Technology**

The 4000RSi™ Reference Surveyor receiver and 4000DSi™ Differential Surveyor receiver incorporate the latest in GPS technology, offering true, real-time positioning accuracy better than 0.5 meter. Based on Trimble's advanced Maxwell processing technology, these DGPS receivers provide the highest level of accuracy even when operating in the most challenging conditions.

The 4000RSi receiver operates as an autonomous reference station, generating DGPS corrections in the RTCM SC-104 standard format for transmission to mobile GPS receivers.

The 4000DSi receiver is designed to use DGPS corrections in the RTCM SC-104 standard format broadcast by the 4000RSi receiver. The 4000DSi's standard NMEA-0183 messages, navigation firmware, data, and 1PPS outputs allow for optimal flexibility for system integration and interfacing with other instruments.

The signal processing of the two reeivers incorporates Trimble's Super-trak™ technology. This technology enhances low power satellite signal acquisition, improves signal tracking capabilities under less than ideal conditions and provides increased immunity to signal jamming from radio frequency interference (RFI). These improvements are derived from integrating complex RF circuitry onto a single chip and by using state-of-the-art Surface Acoustic Wave filter technology.

Super-trak technology increases productivity and facilitates continual operations in demanding environments, such as ports, harbors, along riverbanks and near RFI sources that would normally interfere with satellite signals.

The 4000RSi and 4000DSi receivers also incorporate Trimble's latest advance in multipath rejection through enhanced signal processing: the patented EVEREST™ Multipath Rejection Technology. This technology eliminates multipath error before the receiver calculates GPS measurements. When combined with Trimble's advanced carrier-aided filtering and smoothing techniques applied to exceptionally low noise C/A code measurements, the result is real-time positioning accuracy on the order of a few decimeters.

The two receivers are ideal for hydrographic and navigation systems, vessel tracking, dynamic positioning systems, dredging, and other dynamic positioning and navigation applications. Both receivers feature nine channels of continuous satellite tracking (12 channels optional); a lightweight, rugged, weatherproof housing; and low power consumption for extending the field operation time from batteries.

During operation, both receivers can output binary and ASCII data for archiving or post-mission analysis. In addition, the 4000RSi receiver can operate as a mobile receiver with the same features, functionality and options as the 4000DSi receiver. For optimum DGPS performance, combine the receivers with any of Trimble's data communication systems and QA/QC firmware to ensure the integrity of positioning accuracy.

4000RSi & 4000DSi

DGPS Reference Surveyor and Differential Surveyor

4000 RSI FEATURES

- RTCM Input
- RTCM Output; filtered and carrier-smoothed RTCM differential corrections (version 1.0 and 2.X) (4000RSi)
- EVEREST Multipath Rejection Technology
- Super-trak Signal Processing Technology
- Better than 0.5 meter DGPS accuracy using 4000RSi receiver corrections
- 0.5 second measurement rate
- Weighted-least squares solution
- Autonomous operation - automatic mode restoration after power-cycle
- Data integrity provision
- 2 RS-232 I/O ports with flow control for data recording and data link (4 RS-232/422 on rack mount)
- Triple DC input
- Low power; lightweight; portable; environmentally protected
- 1 PPS output; NMEA-0183 outputs
- L1 geodetic antenna; 30m antenna cable (4000RSi)
- Compact Dome antenna; 30m antenna cable (4000Dsi)
- 1-year warranty
- Firmware upgrades via serial port

OPTIONS AND ACCESSORIES

- Firmware update service - 1 and 4 year
- Extended hardware warranty
- L1 Carrier Phase
- 12 L1 channels
- L1/L2 Carrier Phase (rackmount)
- 12 L1/L2 channels (rackmount)
- Internal Memory for datalogging
- Event Marker input (requires memory option)
- QA/QC feature
- Rackmount Version
- 4 serial I/O ports (standard on rackmount)
- L1 and Ll/L2 Geodetic antennas
- 30m antenna cable extension, with in-line amplifier
- Office Support Module: OSM II (CE Marked)
- Receiver transport case
- TRIMTALK™ Series radio links
- ProBeacon™ MSK receiver
- LEMO to dual BNC sockets adapter

PHYSICAL CHARACTERISTICS

Receiver

Size	9.8" W x 11.0" D x 4.0" H (portable) (24.8cm X 28.0cm x 10.2cm) 16.8" W x 16.0" D x 5.25" H (rackmount) (42.7cm x 40.6cm x 13.3cm)
Weight	6 lbs (2.7kg) (portable), 15 lbs. (6.8kg) (rackmount) 0.5 lbs (0.2kg) compact dome antenna 5.7 lbs (2.6kg) L1 geodetic antenna
Power	Nominal 10.5-35 VDC, 7 Watts (portable) 100, 120, 220, 240 VAC, 40 Watts (rack mount) DC: 10-36 Volts, 30 Watts
Operating temperature	-20°C to +55°C (portable), 0°C to +50°C (rack mount)
Storage temperature	-30°C to +75°C (portable) -20°C to +60°C (rack mount)
Humidity	100%, fully sealed, buoyant (portable) 95%, non-condensing (rack mount)

Geodetic Antenna

Size	16" D x 3.5" H
Weight	5.7 lbs.
Operating temperature	-40°C to +65°C
Storage temperature	-55°C to +75°C
Humidity	100%, fully sealed

Interface

Keyboard	Alphanumeric, function and softkey entry
Display	Backlit LCD, four lines of forty alphanumeric characters; Large, easy-to-read– 2.8mm x 4.9mm; Viewing area: 32 cm^2; adjustable backlight and viewing angle
Serial Ports	Port 1 and 3: up to 57600 bps, software flow control Port 2 and 4: up to 57600 bps, hardware/software flow control RS-232 / RS-422 user configurable (rack mount)
Data recording	RTCM and GPS data available via serial port
Remote control	Trimble Data Collector Interface
Antenna	External, LEMO socket connector (portable), N-Type Socket connector (rack mount)
RTCM Messages	Types 1, 2, 3, 6, 9, 16; Version 1.0 and 2.X
1 PPS	LEMO 7-pin, adapter to BNC available (portable) BNC socket (rack mount)
Event Marker	LEMO 7-pin, adapter to BNC available (portable) BNC socket (rack mount)
NMEA-0183	ALM, BWC, GGA, GLL, GRS, GSA, GST, GSV, RMB, RMC, VTG, WPL, ZDA

PERFORMANCE CHARACTERISTICS

Signal Processing	Multibit Super-trak technology; Maxwell architecture with EVEREST Multipath Rejection Technology; very low noise C/A code processing
Tracking (Standard)	9 channels L1 C/A code and carrier
(Optional)	12 L1, 12 L1 + 12 L2; C/A, P and/or cross-correlation code and carrier (rack mount)
Startup time	< 2 minutes after cold start
Measurement rate	0.5 second per independent measurement
Accuracy	Typically better than 0.5 m RMS: assumes at least 5 satellites, PDOP less than 4, and using 4000RSi corrections.
RTCM Corrections	4000RSi corrections can be applied to all differential-equipped RTCM compatible GPS receivers.

ORDERING INFORMATION

4000RSi Reference Surveyor	P/N 29443-75
4000RSi Reference Surveyor pair	P/N 29561-00
4000DSi Differential Surveyor	P/N 29443-70
4000RSi Reference Surveyor Rackmount	P/N 26541-80

Trimble
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ProBeacon

Marine Radiobeacon MSK Receiver

Key features and benefits

- High noise immunity
- Rapid signal aquisition
- Automatic and manual modes
- FFT signal analysis

Differential GPS correction data broadcast from marine radiobeacons provides GPS users with the improved accuracy of DGPS without setting up and maintaining a reference station. Depending on the DGPS receiver being used in conjuction with the ProBeacon™, the combination can provide position and navigation accuracies of less than a meter to land surveyors, dredge operators, resource management agencies, crop dusters, and many others operating on land, offshore or in the air. Anyone within the range of a radiobeacon, whose application requires real-time positions, time, or velocity can benefit from this form of DGPS.

Differential GPS using MSK radiobeacon broadcasts.

RTCM and IALA complaint

The International Association of Lighthouse Authorities (IALA), the U.S. Coast Guard and the Radio Technical Commission for Maritime Services (RTCM) have developed standards for the broadcast of DGPS correction data for public access.

All digital design

Obtaining the highest levels of DGPS performance requires a superior MSK receiver. Trimble's ProBeacon is an all-digital design, proven in independent testing to have the best overall performance, even under conditions of low signal strength and/or high noise levels. This all-digital design facilitates rapid signal acquisition and superior tracking capabilities. In addition, the ProBeacon signal processing is based upon a proprietary (patented) "noise cancellation" technique utilizing multiple channels to further improve data reception by rejecting the "impulsive" type of noise commonly found in this frequency band.

The ProBeacon also utilizes advanced logic, working in conjunction with the DGPS receiver to select the most appropriate beacon. The ProBeacon constantly monitors Message Error Ratio, switching to a different beacon if the signal degrades. By utilizing the broadcast beacon almanacs and receiving the position data from the DGPS receiver, the ProBeacon switches to the nearest beacon to maintain the highest accuracy possible.

H-field loop antenna

These features, combined with an advanced, high sensitivity H-field antenna, ensure that the DGPS user realizes the best performance under all conditions.

ProBeacon

Marine Radiobeacon MSK Receiver

DESCRIPTION

Differential GPS (DGPS) is the most accurate long range form of GPS for surveying, positioning and navigation. GPS receivers that are differential capable use the correction data to counter the effects of Selective Availability, errors induced by the ionosphere and troposphere and other correlated errors that degrade the GPS solution. The ProBeacon is designed to provide this correction data in the RTCM SC-104 standard format to any compatible DGPS receiver, using standard RS-232 and RS-422 serial connections. Accuracy will depend on the type of DGPS receiver utilized. Trimble offers several GPS receivers with DGPS capability designed to meet all types of application requirements.

PERFORMANCE CHARACTERISTICS

General

Frequency range	283.5 kHz to 325.0 kHz
Channel spacing	500 Hz
MSK modulation	25, 50, 100 & 200 bits/second
Signal strength	10 µV/meter minimum
Dynamic range	100 dB
Channel selectivity	60 dB @ 500 Hz offset
Frequency offset	10 ppm maximum (200 bits/second) 40 ppm maximum (100, 50 & 25 bits/second)
3rd order intercept	+15 dBm @ RF input (min. AGC setting)

PHYSICAL CHARACTERISTICS

Receiver

Size	5.6″ W x 2.7″ H x 7.5″ D (14.2 cm x 6.9 cm x 19.0 cm)
Weight	2.5 lbs. (1.1 kg)
Power consumption	3.5 watts
Voltage	10 to 32 volts DC
Operating temperature	–20°C to +60°C
Humidity	95% non-condensing

Antenna

Dimensions	5.8″ D x 4.5″ H (14.7 cm x 11.4 cm)
Weight	1.4 lbs. (0.63 kg)
Operating temp	–30°C to +65°C
Humidity	100% – fully sealed
Cable length	50 ft. (15 meters)

FEATURES

Automatic

The ProBeacon serves as a stand-alone receiver of DGPS correction data. Once on, it automatically selects and tracks the best differential beacon in your area. If you lose reception of a differential beacon, the ProBeacon automatically switches to another beacon for continuous DGPS coverage.

Manual

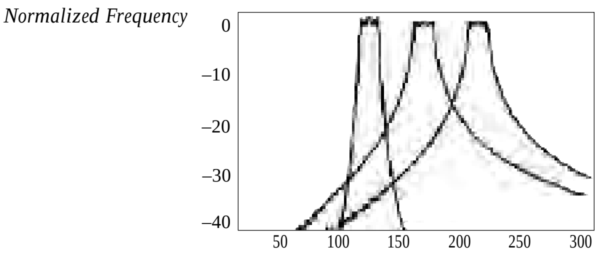
Manual mode allows the operator to select a specific beacon, to pre-program a list of preferred beacons, and to request signal levels, SNR data, PLL offsets, RTCM message errors, and tracking history.

Fast acquisition

The ProBeacon uses a proprietary spectral search algorithm which enables exceptionally fast identification and acquisition of differential beacons under all operating conditions.

Jamming immunity

Only a subset of all marine radiobeacons will be differential beacons. The ProBeacon is able to track a weaker differential beacon signal in the presence of multiple jamming signals from nearby standard radiobeacons.



Integrity monitoring

The ProBeacon continuously monitors the integrity of incoming RTCM messages. If it observes parity errors, the ProBeacon will automatically switch to an adjacent beacon to ensure RTCM data integrity.

Noise immunity

Using advanced digital signal processing, the ProBeacon reliably tracks even in the presence of heavy atmospheric noise (e.g. lightning). Using algorithms based on a proprietary (patented) noise cancellation technique, the ProBeacon realizes improved performance in the presence of impulsive noise. As shown in the above figure, the signal channel plus two additional channels are monitored by the MSK receiver. These two noise-only, or pilot, channels facilitate noise reduction as the output from all the channels is highly correlated. Reduction in noise in the signal channel improves the performance of the ProBeacon in all operating environments.

Almanac monitoring

Each differential beacon broadcasts an almanac message with the identity (frequency, data rate, etc.) for adjacent differential beacons. The ProBeacon uses this message to accelerate the switch between beacons. This minimizes the interruption in DGPS data when you lose reception of a beacon.

Dual serial ports

The ProBeacon offers two bi-directional serial ports and multiple baud rates (1200, 2400, 4800, 9600). Both RS-232 and RS-422 are supported. One port supports modem operation, allowing remote control of the ProBeacon

Trimble
THE GPS SOLUTION

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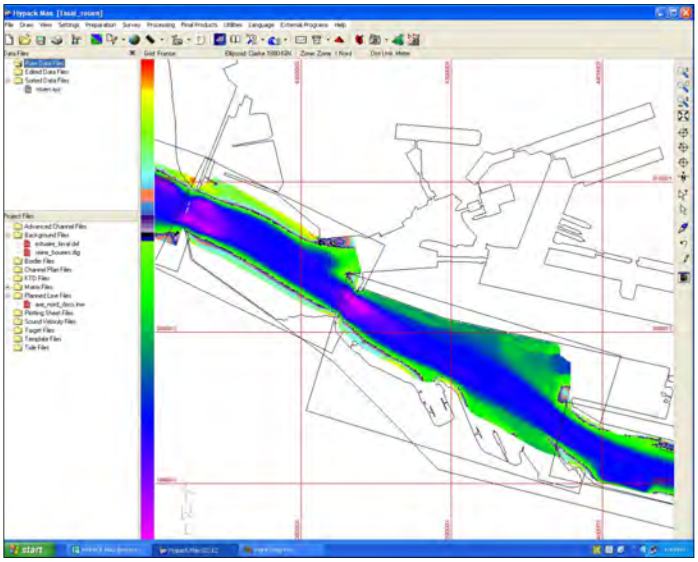
HYPACK®

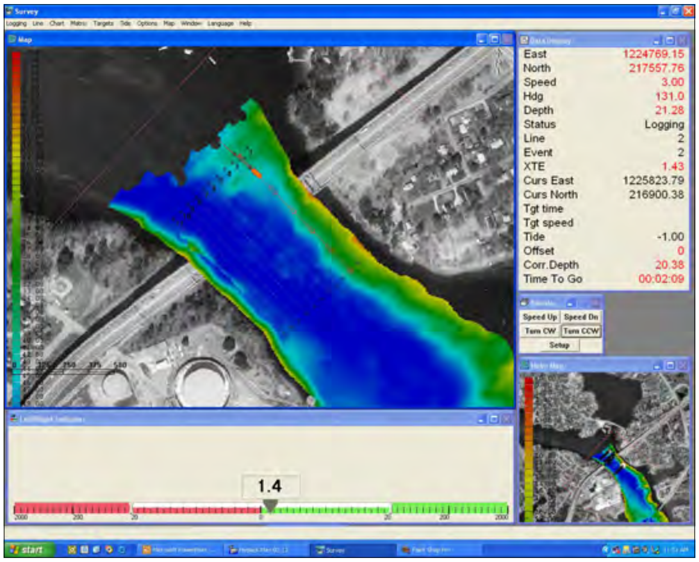
HYDROGRAPHIC SURVEY SOFTWARE

HYPACK®

HYPACK® is one of the most widely used hydrographic surveying packages in the world, with over 3,000 users. It provides the surveyor with all of the tools needed to design their survey, collect data, process it, reduce it, and generate final products. Whether you are collecting hydrographic survey data or environmental data, or positioning your vessel in an engineering project, HYPACK® provides the tools needed to complete your job. With users spanning the range from small vessel surveys with just a GPS and single beam echosounder to large survey ships with networked sensors and systems, HYPACK® gives you the power needed to accomplish your task in a system your surveyors can master.

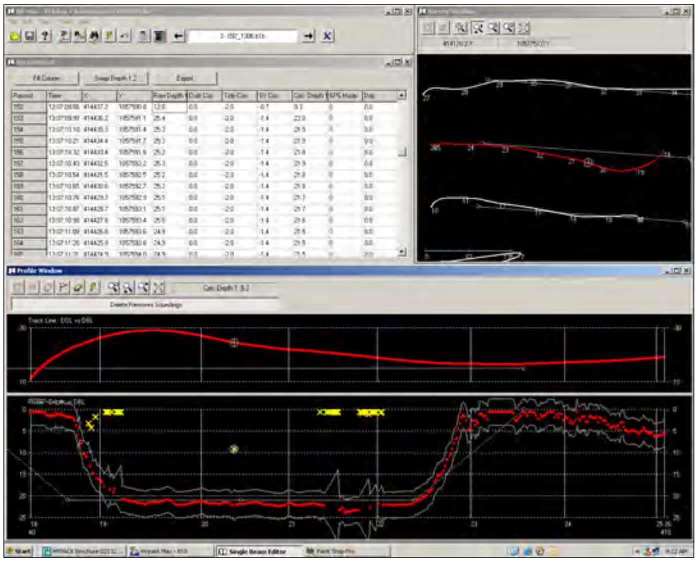


SURVEY DESIGN: HYPACK® allows you to create a 'Project' that contains all of your survey information for each job. You can easily define your geodetic basis, selecting from existing national grids or defining your own projection or local grid. HYPACK® also allows you to import background files in a variety of formats, including S-57, OrthoTif, ARCS, DXF, DGN, BSB and VPF. These files can be displayed while you create your planned lines, survey, edit and plot your results.

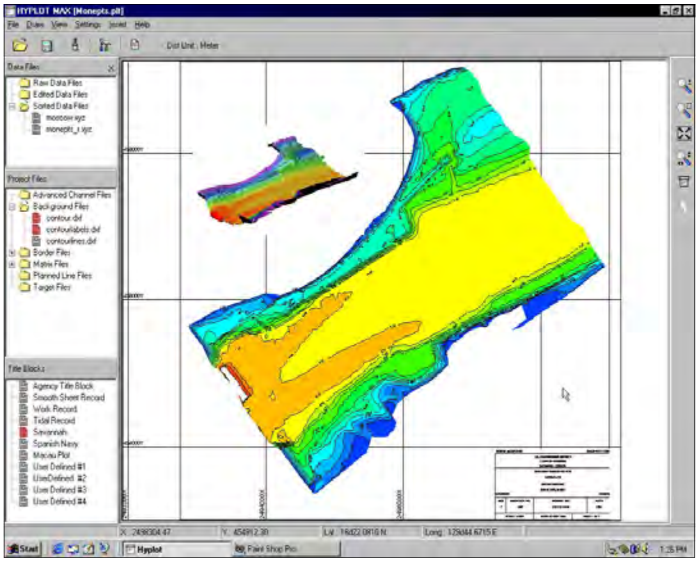


East	1224769.15
North	217557.76
Speed	3.00
Hdg	131.0
Depth	21.28
Status	Logging
Line	2
Event	2
XTE	1.43
Curs East	1225823.79
Curs North	216900.38
Tgt time	
Tgt speed	
Tide	-1.00
Offset	0
Corr.Depth	20.38
Time To Go	00:02:09

SURVEY: HYPACK® contains interface drivers to over 200 devices includings positioning systems, echosounders, heave-pitch-roll sensors, gyros and other types of equipment. SURVEY supports a single vessel or multiple vessels, along with towfish and ROVs. Data is logged with incredible precision (<1mSec). Survey data and windows can be broadcast over a network to any other computer or saved to a file using our Shared Memory Output routines.



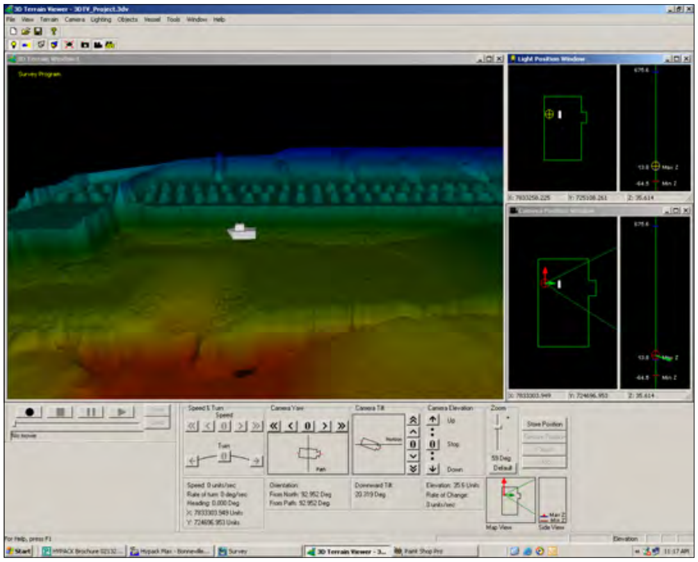
EDITING: The SINGLE BEAM EDITOR program is used to quickly review your survey data and to automatically and/or manually remove outliers. Sounding data is simultaneously displayed in plan, spreadsheet, and profile views with the channel design info drawn in the backgrounds. Routines developed by **HYPACK®** from collaboration with the U.S. Army Corps of Engineers to integrate water level corrections based on RTK GPS elevation info are a standard part of package.



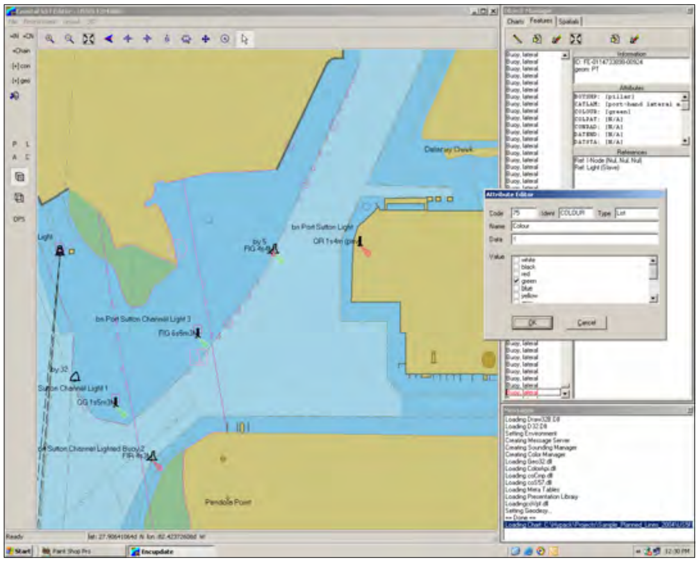
FINAL PRODUCTS: The ability to create the final products you need separates **HYPACK®** from the rest. The plotting program generates professional smooth sheets with soundings, grids, graphics and contours in a WYSIWYG display. The VOLUMES program is the de facto standard of the U.S. Army Corps of Engineers for the computation of quantities in dredging projects. TIN MODEL creates surface models that can be used for contouring, volume computations and surface visualization.

HYPACK®

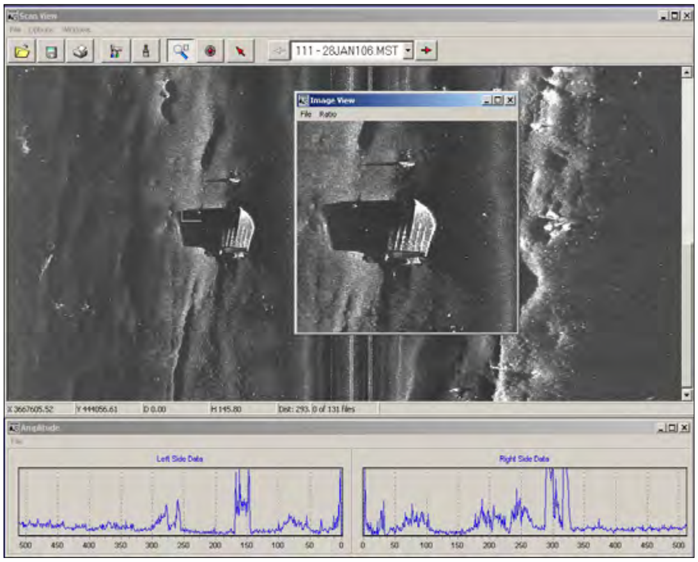
Support: An important factor in the purchase of any hydrographic survey system is the support provided to the end-user. **HYPACK®** prides itself on taking good care of our users. A trained, professional staff is on-call to answer your questions, develop custom device drivers or modify programs to meet your needs. **HYPACK®** training seminars are held annually in many countries to provide you with the latest information. We continue to update our training materials every year to make it easier for you to get the most out of our products. Our latest training material contains PowerPoint presentations with embedded AVI demonstrations on over 100 topics. Our bi-monthly newsletter, 'Sounding Better' is published on our web site (www.hypack.com) and contains technical articles on how to get the most out of your package.



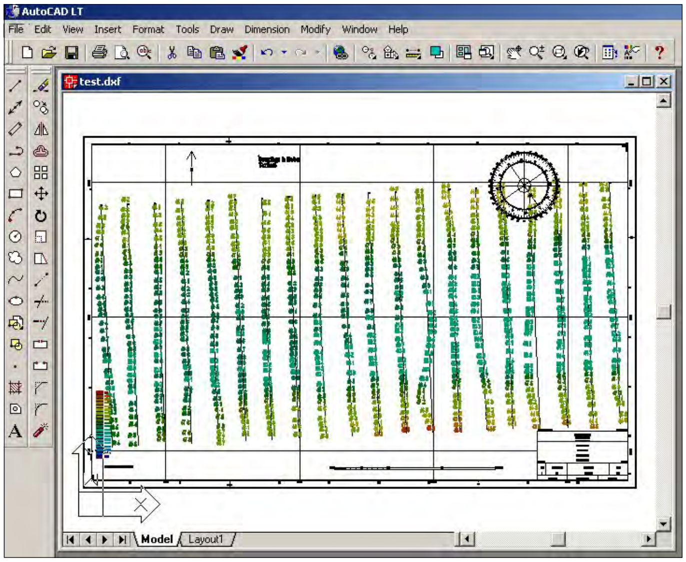
DATA VISUALIZATION: The TIN MODEL and 3D TERRAIN VIEWER (3DTV) programs of **HYPACK®** provide fantastic tools to view and present your data. 3DTV allows you to fly a 'camera' across your edited XYZ surface and display the results or save them to a AVI file for distribution to your clients. 3DTV also allows you to position the camera relative to the actual vessel position, showing the vessel in real time against the bottom surface.



ENCEdit is a new **HYPACK®** module that allows you to create, modify and verify ENC data in S-57 format. ENCEdit provides you with tools to re-attribute, create, move or delete existing features. You can also create new features by manually entering coordinates, by importing data from DXF/DGN, or by transferring targets in real time from SURVEY directly into ENCEdit.



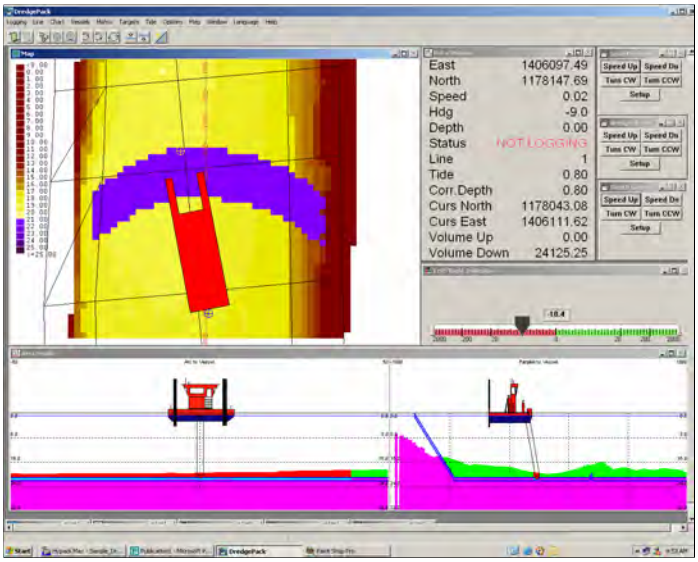
Side Scan Sonar (SSS) Support: **HYPACK®** provides support of SSS systems in its basic package. All analog and several digital side scan systems can be utilized with the SIDE SCAN SURVEY program. Users can display the real time data and perform targeting in real time or post-processing. A program that generates side scan mosaics in GeoTIF format allows you to plot your results in **HYPACK®** or export them to your GIS.



Export to CAD: Many of our users are interested in exporting their survey data into their CAD/GIS package. **HYPACK®** has several tools to import/export via DXF/DGN. The EXPORT TO CAD program takes all of the our files and converts them to DXF and DGN. The plotting sheets and sectional plots can also be exported directly to DXF. Users can create planned lines in their CAD/GIS program and import them into **HYPACK®**.

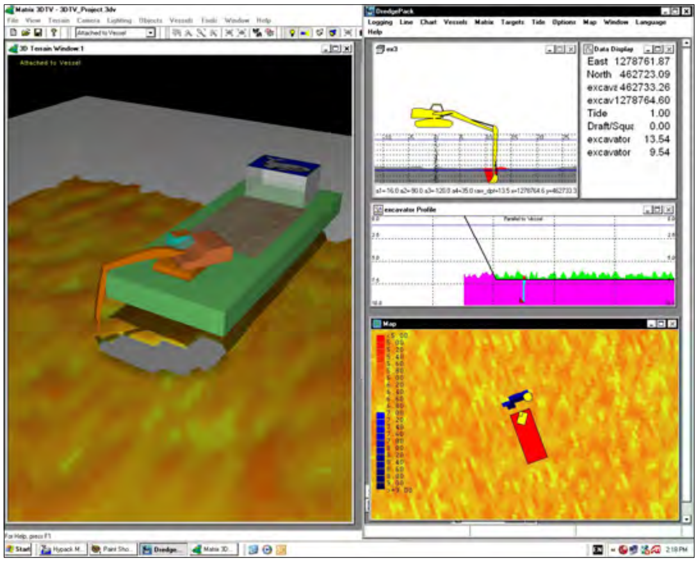
DREDGEPACK®

DREDGEPACK® is a specially modified version of **HYPACK®** used for providing precise digging information on dredges. It allows you to see exactly where you are digging, how deeply you are digging and how deeply you need to dig. With the ADVANCED CHANNEL DESIGN program, you can create complex dredging plans. Real time cross sections are provided to show you the design profile, the depth of the cutting tool and the material that has to be removed.



East 1406097.49
North 1178147.69
Speed 0.02
Hdg -9.0
Depth 0.00
Status NOT LOGGING
Line 1
Tide 0.80
Corr.Depth 0.80
Curs North 1178043.08
Curs East 1406111.62
Volume Up 0.00
Volume Down 24125.25

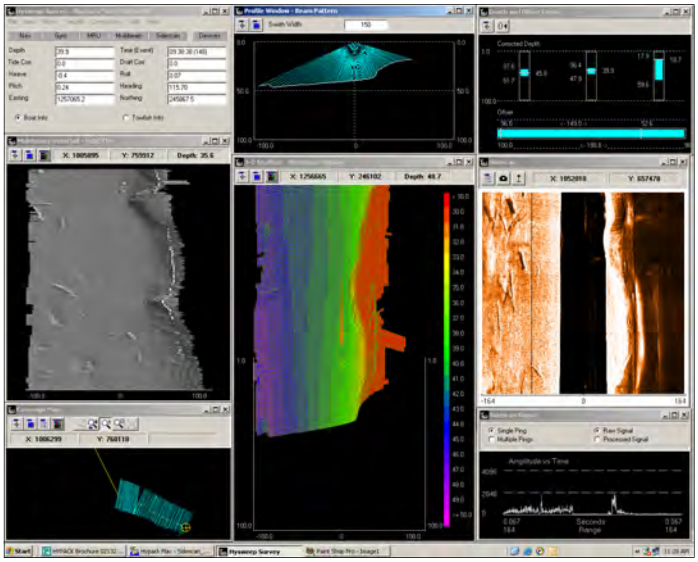
DREDGEPACK® runs on cutter suction, hopper, excavator and bucket-style dredges. It can store a history of the dredge's position, draft, digging tool depth and digging status in order to meet reporting requirements. DREDGEPACK® has been designed to run with a minimum of user intervention. Make sure you are maximizing your dredge's efficiency with DREDGEPACK®



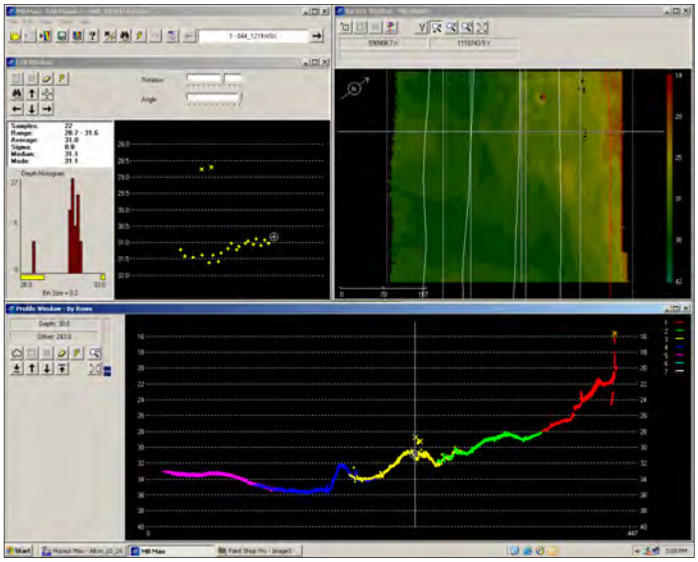
Data Display
East 1278761.87
North 462723.09
excavt 462733.26
excav1278764.60
Tide 1.00
Draft/Squa 0.00
excavator 13.54
excavator 9.54

HYSWEEP®

HYSWEEP® is an optional module that integrates the collection and processing of multibeam and multiple transducer sonar systems into **HYPACK®.** Time and again, surveyors switch to HYSWEEP® due to the powerful tools and the ease-of-use of the package. Survey data collected in **HYSWEEP®** is fully integrated with the final products of **HYPACK®**. More surveyors use **HYSWEEP®** for multibeam data collection and processing than any other multibeam software package.



HYSWEEP® SURVEY: The data collection program of **HYSWEEP®** runs simultaneously with the SURVEY program of **HYPACK®**. It provides real time display, QC functions and data logging for most commercially available multibeam systems, including those from Atlas, Odom, Reson, Sea Beam and Simrad. A coverage map lets you examine the bottom coverage in real time, ensuring that you have 100% or 200% coverage before leaving the area.



MULTIBEAM EDITING: Multibeam data editing, sonar alignment calibration and system performance testing are all provided in the powerful MULTIBEAM EDITOR of **HYSWEEP®**. The program performs automatic or manual filtering, using geometric and statistical methods. It also contains the Performance Test that measures the overall performance of your system versus beam angle as required by USACE. **HYSWEEP®** can also use water level corrections created from RTK GPS elevations.

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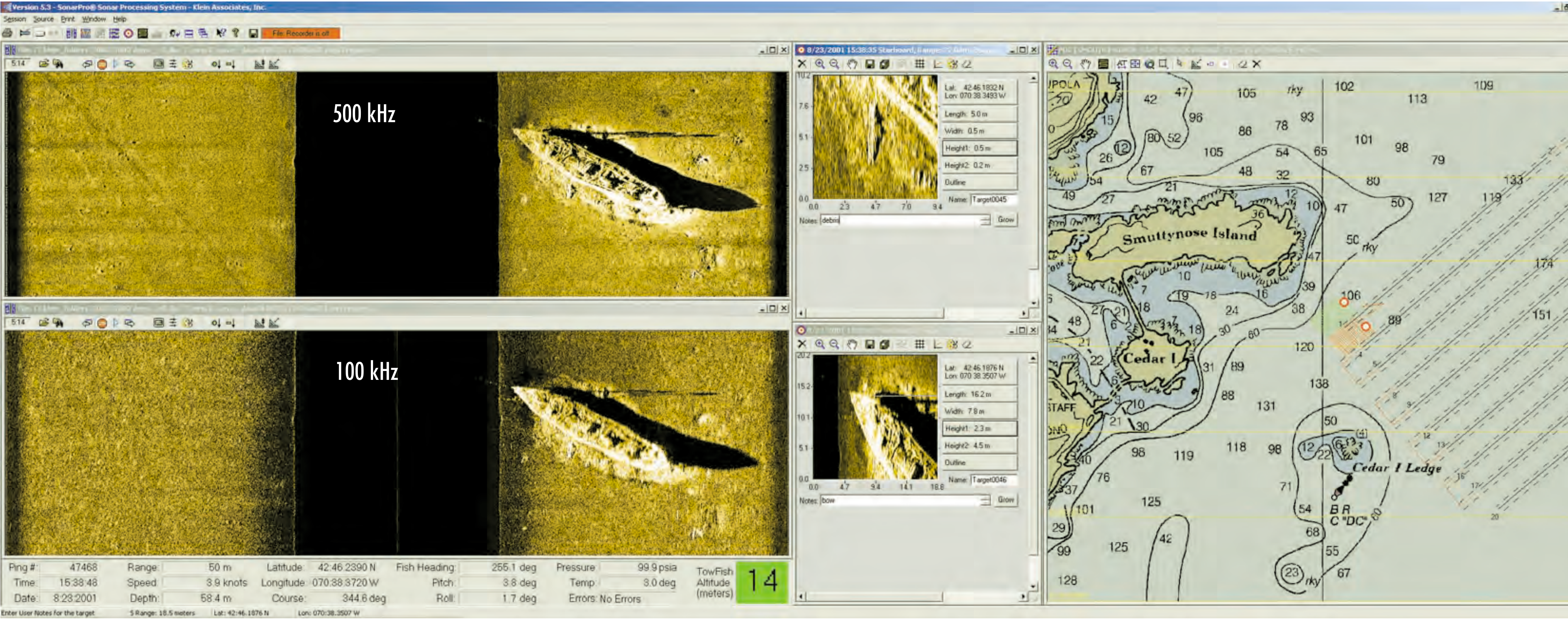
11 Klein Drive, Salem, N.H. 03079-1249, U.S.A.
Phone: (603) 893-6131   Fax: (603) 893-8807
E-mail: sales@L-3com.com
Web site: www.L-3Klein.com

Klein System 3000 Digital Side Scan Sonar

"The difference is in the Image!"

Klein Associates, Inc.'s, new System 3000 presents the latest technology in digital side scan sonar imaging. The simultaneous dual frequency operation is based on new transducer designs as well as the high resolution circuitry recently developed for the Klein multi-beam focused sonar. The System 3000 performance and price is directed to the commercial, institutional, and governmental markets.

- ***ADVANCED SIGNAL PROCESSING AND TRANSDUCERS PRODUCE SUPERIOR IMAGERY***
- ***COST EFFECTIVE, AFFORDABLE***
- ***PC BASED OPERATION WITH SONARPRO® SOFTWARE, DEDICATED TO KLEIN SONARS***
- ***SMALL, LIGHTWEIGHT, AND SIMPLE DESIGNS - EASY TO RUN AND MAINTAIN***
- ***EASILY ADAPTED TO ROVS, AND CUSTOM TOWFISH***



Lat: 42 46.1832 N Lon: 070 38.3493 W
Length: 5.0 m
Width: 0.5 m
Height1: 0.5 m
Height2: 0.2 m
Name: Target0045
Notes: debris

Lat: 42 46.1876 N Lon: 070 38.3507 W
Length: 16.2 m
Width: 7.8 m
Height1: 2.3 m
Height2: 4.5 m
Name: Target0046
Notes: bow

Ping #: 47468 Range: 50 m Latitude: 42 46.2390 N Fish Heading: 255.1 deg Pressure: 99.9 psia
Time: 15:38:48 Speed: 3.9 knots Longitude: 070 38.3720 W Pitch: 3.8 deg Temp: 3.0 deg
Date: 8:23:2001 Depth: 58.4 m Course: 344.6 deg Roll: 1.7 deg Errors: No Errors
TowFish Altitude (meters) 14
Enter User Notes for the target 5 Range: 18.5 meters Lat: 42:46.1876 N Lon: 070:38.3507 W

SPECIFICATIONS

Towfish

Frequencies	100 kHz (132 kHz +/- 1% act.), 500 kHz (445 kHz, +/- 1% act.)
Transmission Pulse	Tone Burst, operator selectable from 25 to 400 μsecs. **Independent pulse controls for each frequency**
Beams	Horizontal - 0.7 deg. @ 100 kHz, 0.21 deg. @ 500 kHz Vertical - 40 deg.
Beam Tilt	5, 10,15, 20, 25 degrees down, adjustable
Range Scales	15 settings - 25 to 1,000 meters
Maximum Range	600 meters @ 100 kHz; 150 meters @ 500 kHz
Depth Rating	1,500 meters standard, other options available
Construction	Stainless Steel
Size	122 cm long, 8.9 cm diameter
Weight	29 kg in air
Standard Sensors	Roll, pitch, heading
Options	Magnetometer Interface, pressure, Acoustic Positioning Responder, and Responder Interface Kits

Transceiver Processor Unit (TPU)

Operating System	vxWorks® with custom application
Basic Hardware	19-inch rack or table mount, VME bus structure
Outputs	100 Base-Tx, Ethernet LAN
Navigation Input	NMEA 0183
Power	120 watts @ 120/240 VAC, 50/60 Hz
Interfacing	Interfaces to all major Sonar Data Processors
Options	Splash proof packaging option available

Klein Sonar Workstation

Basic Operating System	Windows NT®, 2000®, XP® or equiv.
Sonar Software	SonarPro®
Data Format	SDF or XTF or both selectable
Data Storage	Internal hard drive, optional devices available
Hardware	Industrial PC with technically advanced components
Options	Optional waterproof laptops available

Tow Cables

Klein offers a selection of coaxial, Kevlar® reinforced, lightweight cables, double armored steel cables, and interfaces to fiber optic cables. All cables come fully terminated at the towfish end.

communications
Klein Associates, Inc.
11 Klein Drive, Salem, N.H. 03079-1249, U.S.A.
Phone: (603) 893-6131 Fax: (603) 893-8807
E-mail: sales@L-3com.com Web site: www.L-3Klein.com

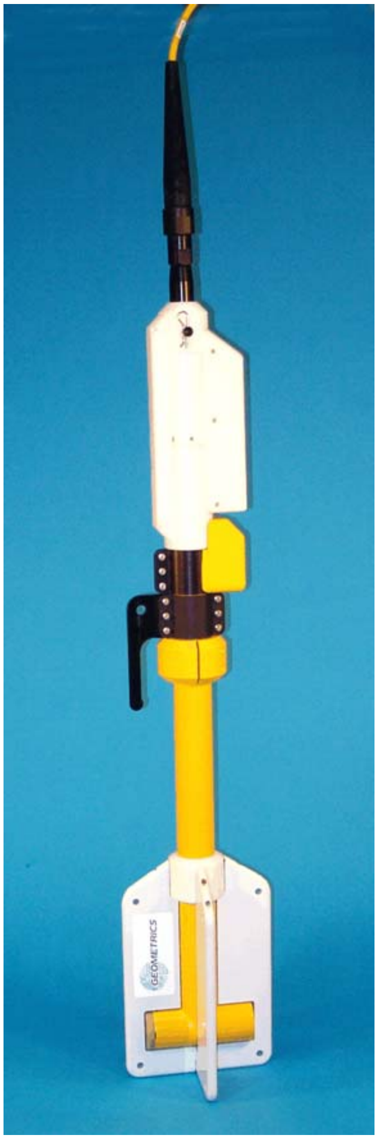
SonarPro® Software

Custom developed software by users and for users of Klein side scan sonar systems operating on Windows NT®, 2000® & XP®. Field proven for many years on Klein's Multi-Beam Focused Sonar Series 5000 Systems and adapted to the System 3000 single-beam system. SonarPro® is a modular package combining ease of use with advanced sonar features.

Basic Modules	Main Program, Data Display, Information, Target Management, Navigation, Data Recording & Playing, and Sensor Display.
Multiple Display Windows	Permits multiple windows to view different features as well as targets in real time or in playback modes. Multi-Windows for sonar channels, navigation, sensors, status monitors, targets, etc.
Survey Design	Quick & easy survey set up with ability to change parameters, set tolerances, monitor actual coverage, and store settings.
Target Management	Independent windows permitting mensuration, logging, comparisons, filing, classification, positioning, time & survey target layers, and feature enhancements. Locates target in navigation window.
Sensor Window	Displays all sensors in several formats (includes some alarms) and responder set up to suit many frequencies and ping rates.
Networking	Permits multiple, real time processing workstations via a LAN including "master and slave" configurations.
"Wizards"	To help operator set up various manual and default parameters.
Data Comparisons	Target and route comparisons to historical data.

G-882 MARINE MAGNETOMETER

- ***CESIUM VAPOR HIGH PERFORMANCE – Highest detection range and probability of detecting all sized ferrous targets***
- ***NEW STREAMLINED DESIGN FOR TOW SAFETY – Low probability of fouling in lines or rocks***
- ***NEW QUICK CONVERSION FROM NOSE TOW TO CG TOW – Simply remove an aluminum locking pin, move tow point and reinsert. New built in easy carry handle!***
- ***NEW INTERNAL CM-221 COUNTER MODULE – Provides Flash Memory for storage of default parameters set by user***
- ***NEW ECHOSOUNDER / ALTIMETER OPTION***
- ***NEW DEPTH RATING – 4,000 psi !***
- ***HIGHEST SENSITIVITY IN THE INDUSTRY – 0.004 nT/Hz RMS with the internal CM-221 Mini-Counter***
- ***EASY PORTABILITY & HANDLING – no winch required, single man operation, only 44 lbs with 200 ft cable (without weights)***
- ***COMBINE TWO SYSTEMS FOR INCREASED COVERAGE – Internal CM-221 Mini-Counter provides multi-sensor data concatenation allowing side by side coverage which maximizes detection of small targets and reduces noise***



G-882 with Weight Collar Depth Option & Altimeter

Very high resolution Cesium Vapor performance is now available in a low cost, small size system for professional surveys in shallow or deep water. High sensitivity and sample rates are maintained for all applications. The well proven Cesium sensor is combined with a unique and new CM-221 Larmor counter and ruggedly packaged for small or large boat operation. Use your computer and standard printer with our MagLogLite™ software to log, display and print GPS position and magnetic field data. The G–882 is the lowest priced high performance full range marine magnetometer system ever offered.

The G-882 offers flexibility for operation from small boat, shallow water surveys as well as deep tow applications (4,000 psi rating, telemetry over steel coax available to 10Km). The G-882 also directly interfaces to all major Side Scan manufacturers for tandem tow configurations. Being small and lightweight (44 lbs net, without weights) it is easily deployed and operated by one person. But add several streamlined weight collars and the system can quickly weigh more than 100 lbs. for deep tow applications. Power may be supplied from a 24 to 30 VDC battery power or the included 110/220 VAC power supply. The tow cable employs high strength Kevlar strain member with a standard length of 200 ft (61 m) and optional cable length up to 500m with no telemetry required.
A rugged fiber-wound fiberglass housing is designed for operation is all parts of the world allowing sensor rotation for work in equatorial regions. The shipboard end of the tow cable is attached to an included junction box or optional on-board cable for quick and simple hookup to power and output of data into any Windows 98, ME, NT, 2000 or XP computer equipped with RS-232 serial ports.

The G-882 Cesium magnetometer provides the same operating sensitivity and sample rates as the larger deep tow model G-880. MagLogLite™ Logging Software is offered with each magnetometer and allows recording and display of data and position with Automatic Anomaly Detection and automatic anomaly printing on Windows™ printer! Additional options include: MagMap2000 plotting and contouring software and post acquisition processing software MagPick™ (free from our website.)

The G-882 system is particularly well suited for the detection and mapping of all sizes of ferrous objects. This includes anchors, chains, cables, pipelines, ballast stone and other scattered shipwreck debris, munitions of all sizes (UXO), aircraft, engines and any other object with magnetic expression. Objects as small as a 5 inch screwdriver are readily detected provided that the sensor is close to the seafloor and within practical detection range. (Refer to table at right).

The design of this high sensitivity G-882 marine unit is directed toward the largest number of user needs. It is intended to meet all marine requirements such as shallow survey, deep tow through long cables, integration with Side Scan Sonar systems and monitoring of fish depth and altitude.

Typical Detection Range For Common Objects

Ship 1000 tons	0.5 to 1 nT at 800 ft (244 m)
Anchor 20 tons	0.8 to 1.25 nT at 400 ft (120 m)
Automobile	1 to 2 nT at 100 ft (30 m)
Light Aircraft	0.5 to 2 nT at 40 ft (12 m)
Pipeline (12 inch)	1 to 2 nT at 200 ft (60 m)
Pipeline (6 inch)	1 to 2 nT at 100 ft (30 m)
100 KG of iron	1 to 2 nT at 50 ft (15 m)
100 lbs of iron	0.5 to 1 nT at 30 ft (9 m)
10 lbs of iron	0.5 to 1 nT at 20 ft (6 m)
1 lb of iron	0.5 to 1 nT at 10 ft (3 m)
Screwdriver 5 inch	0.5 to 2 nT at 12 ft (4 m)
1000 lb bomb	1 to 5 nT at 100 ft (30 m)
500 lb bomb	0.5 to 5 nT at 50 ft (16 m)
Grenade	0.5 to 2 nT at 10 ft (3 m)
20 mm shell	0.5 to 2 nT at 5 ft (1.8 m)

MODEL G-882 CESIUM MARINE MAGNETOMETER SYSTEM SPECIFICATIONS

OPERATING PRINCIPLE:	Self-oscillating split-beam Cesium Vapor (non-radioactive)
OPERATING RANGE:	20,000 to 100,000 nT
OPERATING ZONES:	The earth's field vector should be at an angle greater than 6° from the sensor's equator and greater than 6° away from the sensor's long axis. Automatic hemisphere switching.
CM-221 COUNTER SENSITIVITY:	<0.004 nT/ √Hz rms. Up to 20 samples per second
HEADING ERROR:	±1 nT (over entire 360° spin)
ABSOLUTE ACCURACY:	<2 nT throughout range
OUTPUT:	RS-232 at 1,200 to 19,200 Baud
MECHANICAL:	
Sensor Fish:	Body 2.75 in. (7 cm) dia., 4.5 ft (1.37 m) long with fin assembly (11 in. cross width), 40 lbs. (18 kg) Includes Sensor and Electronics and 1 main weight. Additional collar weights are 14lbs (6.4kg) each, total of 5 capable
Tow Cable:	Kevlar Reinforced multiconductor tow cable. Breaking strength 3,600 lbs, 0.48 in OD, 200 ft maximum. Weighs 17 lbs (7.7 kg) with terminations.
OPERATING TEMPERATURE:	-30°F to +122°F (-35°C to +50°C)
STORAGE TEMPERATURE:	-48°F to +158°F (-45°C to +70°C)
ALTITUDE:	Up to 30,000 ft (9,000 m)
WATER TIGHT:	O-Ring sealed for up to 4,000 psi (9000 ft or 2750 m) depth operation
POWER:	24 to 32 VDC, 0.75 amp at turn-on and 0.5 amp thereafter
ACCESSORIES:	
Standard:	View201 Utility Software operation manual and ship kit
Optional:	Telemetry to 10Km coax, gradiometer (longitudinal or transverse), reusable shipping case
MagLog Lite™ Software:	Logs, displays and prints Mag and GPS data at 10 Hz sample rate. Automatic anomaly detection and single sheet Windows printer support

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE ***12/03***

GEOMETRICS, INC. 2190 Fortune Drive, San Jose, California 95131
408-954-0522 Fax 408-954-0902 Internet: sales@mail.geometrics.com

GEOMETRICS Europe Manor Farm Cottage, Galley Lane, Great Brickhill, Bucks,
England MK179AB 44-1525-261874 Fax 44-1525-261867

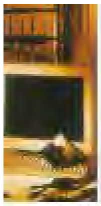
GEOMETRICS China Laurel Industrial Co. Inc. - Beijing Office, Room 2509-2511, Full Link Plaza
#18 Chaoyangmenwai Dajie, Chaoyang District, Beijing, China 100020
10-6588-1126 (1127..1130), 10-6588-1132 Fax 010-6588-1162

AA200 Boomer Plate and CAT200 catamaran

The Model AA200 is a proven design in boomer plates which encompasses precision moulding techniques to give a rugged design with a stable and repeatable signature. Designed specifically for use with our CSP range of energy sources, (although others can be used) the efficiency of the AA200 transducer ensures high output with an excellent pulse shape.

Designed for ease of use in the real world offshore, we have ensured that the flying lead connectors can be replaced in the field in case of damage. Diaphragm replacement is also straightforward. The lightweight design allows easy transportation. The unit is shown fitted to our 'CAT200' small sized catamaran which has been praised for its towing characteristics. Spectral content information is available.

- **Small Size and weight**
- **Repeatable high output pulse**
- **Rugged mechanical design**
- **Proven Performance**



TECHNICAL SPECIFICATION

Size : 38cm x 38 cm x 5cm thick 9cm including connectors.

Weight in air / water : 18 / 10 kg.

Fixing centres : 31.5cm square.

Recommended use : 100-200J / shot.

Maximum energy input : 300J / shot.

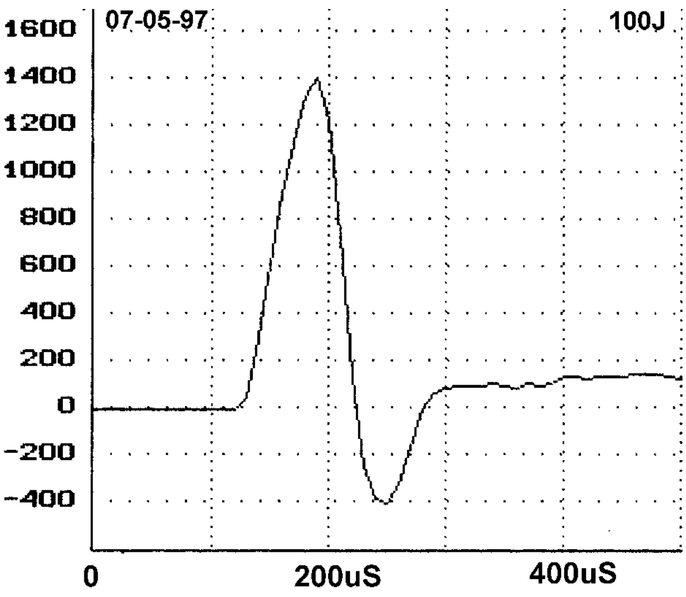
Source Level : 215dB re 1uPa @1m at 200J.

Pulse Length : See graph below.

Reverberation : <1/10 x initial pulse.

Connector type : Joy plug male & female.

AA200 Pulse Shape



Part of our integrated Sub-bottom Profiler system. Sample data is available upon request.

December 2001

APPLIED ACOUSTIC ENGINEERING
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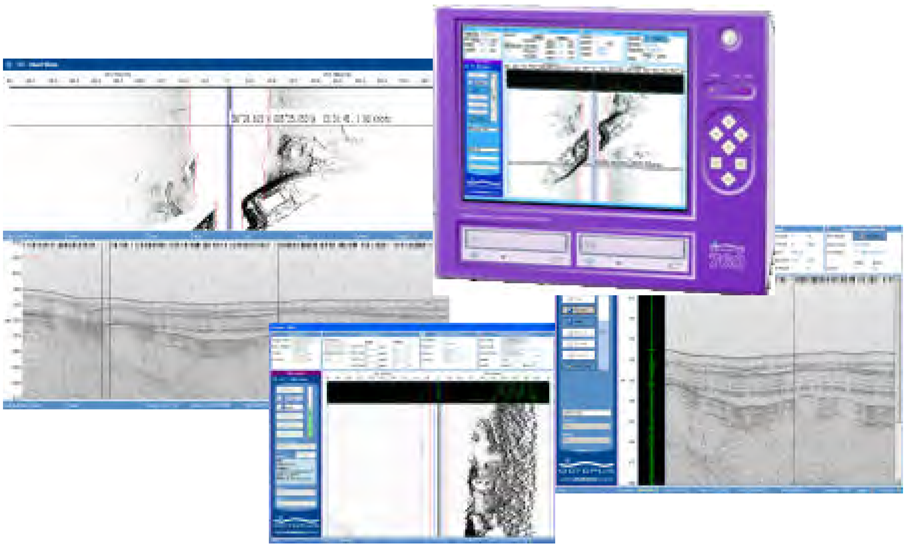
www.appliedacoustics.com email: general@appliedacoustics.com

760 Geophysical Acquisition System

The simple digital solution for simultaneous sidescan and sub-bottom profiler



The OCTOPUS 760 GEOPHYSICAL ACQUISITION SYSTEM is an all-new multi-channel acquisition package for sidescan sonar and sub-bottom profiler in a single instrument.

Building on the reputation of the industry leading Octopus 360 Sub-Bottom Processor and the 460 Sonar Acquisition Systems, the 760 brings the Octopus geophysical acquisition range right up to date, whilst retaining the simplicity of operation and rugged, reliable design familiar to Octopus users around the world.

Combining Octopus design philosophy focussing on ease of use, with the latest hardware and software and technology, the 760 guarantees compatibility with other systems and peripherals. Incorporating a large high resolution display and the familiar Octopus key-driven user interface in a rugged instrument, the 760 is simple to use in all survey scenarios and is ideally suited to use on small and large vessels alike. Adopting the latest features and familiarity of Windows XP in an instrument package provides all of the benefits with none of the problems. With a simple layout taken from the existing 360 and 460, the 760 combines ease of use with maximum flexibility and performance. Designed and packaged specifically for geophysical acquisition, the 760 is ready to use out-of-the-box and requires minimal training and no special hardware configuration, whilst the optional in-built UPS capability guards against power failure ensuring all data is kept safe. Adding optional internal GPS makes the 760 fully self-contained, for added simplicity.

The Octopus 760 is compatible with all standard sidescan sonars, including the latest digital towfish, and all standard sub-bottom profilers, pingers, boomers, sparkers and chirp, in one compact package.

FEATURES

- 4 channel analogue sidescan acquisition
- 2 channel analogue sub-bottom acquisition
- Analogue output
- Dual SIMULTANEOUS sidescan and sub-bottom acquisition
- Simultaneous display of sidescan and sub-bottom
- Asynchronous sidescan and sub-bottom trigger timing
- Standard formats, XTF, SEGY, CODA, GeoPro
- Internal recording to hard disk and DVD RAM disks
- Simple 7-key interface
- Serial inputs for navigation and standard fix strings
- High resolution 15” screen
- High speed network connectivity
- 19” rack mountable or freestanding
- Supports all standard printers
- In-built UPS

BENEFITS

- Simple to use
- Reduced operating costs
- Reduced hardware
- Minimal user training
- Maximum flexibility
- Fully compatible with all popular post processing systems
- Extends the life of analogue sonars
- Data stored internally is easily and quickly downloaded

OCTOPUS
LeadingGeoSurveySolutions

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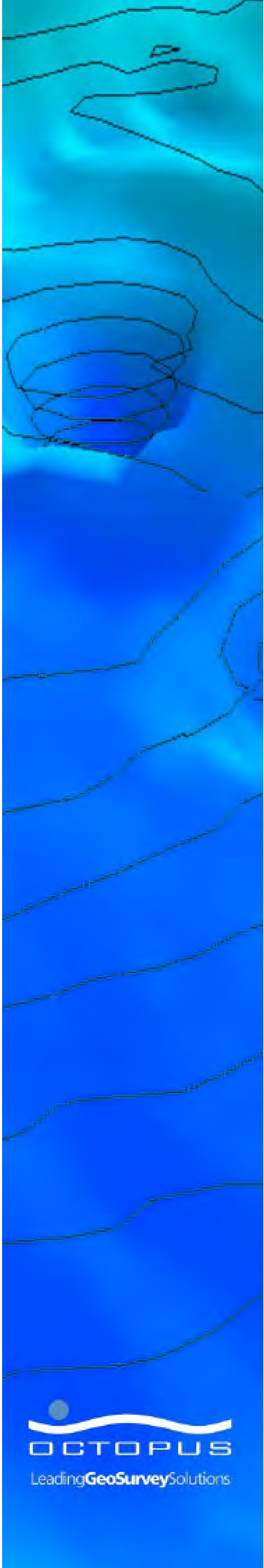
sales@codaoctopus.com
tell +44 (0)131 553 1380 OR +44 (0)1869 337570
24hr support: USA +1 888 340 CODA; **worldwide** +44 (0) 131 553 7003;support@codaoctopus.com

760 Geophysical Acquisition System
Technical Specification



INPUTS AND OUTPUTS

	760 Standard - single acquisition card.	**760 Dual Acquisition** - as standard 760 with the following additional features.
	Note: *With single acquisition card, the 760 is user configurable for sub-bottom* ***or*** *sidescan acquisition.* *With dual acquisition cards, the 760 supports simultaneous sub-bottom* ***and*** *sidescan sonar acquisition.*	
Analogue inputs	4 independent 16 bit channels scalable from 125mV to 5V configurable as 4 x sidescan sonar **OR** 1 x sub-bottom + analogue heave input	2 independent 16 bit channels scalable from 125mV to 5V configured as 1 x sub-bottom + analogue heave input.
Analogue outputs	2 analogue outputs, selectable source, synchronous with trigger out.	1 analogue output, synchronous with trigger out.
Trigger input	Single trigger input with variable threshold, synchronises all channels.	Single trigger input with variable threshold. Can operate asynchronously to main trigger.
Trigger outputs	Internal trigger (5v) user selectable range, 25-1000m. Delayed trigger synced to start of sub-bottom acquisition.	Internal trigger (5v), user selectable range 50 – 1000mS. Delayed trigger synced to start of sub-bottom acquisition.
Navigation & fix data	2 x RS232 serial inputs (9 pin D-type) for NMEA navigation (GGA, GLL, VTG, RMC etc.) or Octopus fix and annotation strings. Additional inputs on request.	
GPS	Optional in-built GPS (with DGPS and/or WASS) for fully self contained operation. Antenna connection at rear. *Available mid 2004*	
Printer interfaces	Centronics (25 way D-type) interface for EPC, Ultra and Isys printers. SCSI interface for Alden/GeoPrinter (SCSI interface optional)	
Network	10/100/1000 MbitS^{-1} Ethernet interface (RJ45).	
Other interfaces	USB x 2 (standard) SCSI II (optional), others available on request.	

DATA RECORDING

Recording devices	Internal 2.5" shock mounted hard disk (60Gb) Single DVD RAM/CD-R drive as standard. Optional second DVD RAM/CD-R. Other devices such as DAT, removable HDD etc. available on request.
Recording formats	Sidescan sonar – XTF, Coda, GeoPro Sub-bottom profiler – SEGY, Coda, XTF All data is recorded raw (without gain or processing applied).

DISPLAY MODES

Sidescan	Up to 4 channels of sidescan in vertical scrolling waterfall display with co-registered oscilloscope. All gain and processing controls on-screen.
Sub-bottom	Single channel sub-bottom profiler display, horizontal scrolling with co-registered oscilloscope display. Pan and zoom functions for optimum data view. All gain and processing controls on-screen.
Dual format	Simultaneous vertically scrolling sidescan AND horizontally scrolling sub-bottom.
Navigation	All navigation, fix, annotation and status information shown on all screens.

CONTROLS

User Interface	Familiar Octopus 7 key interface allowing quick and easy navigation to all functions without the need for a mouse. Arrow keys snap between groups of controls and allow selection of specific functions. Y & N keys allow settings to be saved or cancelled. PAGE key allows rapid selection of display screens.

PROCESSING

Sidescan	Channel-independent gain & TVG. Bottom tracking, slant-range correction.
Sub-bottom	Gain, three stage TVG, high & low pass time varied filters (TVF), time varied stacking, swell compensation (automatic or external heave input).

PHYSICAL

Dimensions	443mm(w) x 355mm(h) x 235mm(d) (19" rack compatible).
Weight	15kg
Power	90-250Vac 47-400Hz, 200Watts. Optional 24Vdc Automatic power management and controlled-shutdown. In-built UPS capability further guards against power loss. *NB. requires optional 24V battery pack in place of second DVD drive*
Construction	Rugged but lightweight aluminium chassis with anodised front panel
Display	High-brightness 15" TFT screen, 1024x768 resolution
Controls	Octopus 7 key user controls for all functions

760ver F-pdf Feb 2004

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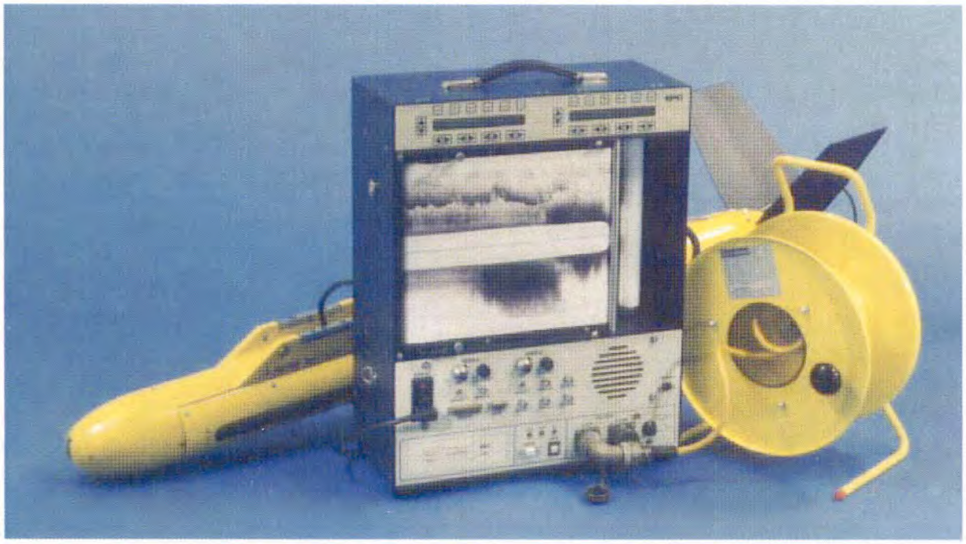
A CodaOctopus® *product. We reserve the right to change equipment specifications without notice.*

EPC

MODEL MP-1086

Multi-Purpose Recording System



The EPC Model MP-1086 is a multi-purpose recording system that serves as a continuous gray scale printer, analog tow fish interface, mass storage device, and signal processor.

Photographic quality images are produced using the direct thermal printing expertise that has made EPC the industry leader in this field. The analog tow fish interface allows users to connect commonly used side-scan sonars directly to the MP-1086, with no need for external components. Data can be easily logged for post processing directly to the removable disk or sent to a network server for storage.

Real-time acquisition is robust. By incorporating slant range correction, speed correction, TVG, band-pass filtering, and GPS/NMEA decoding, the MP1086 provides a total top-side solution. So, forget about all those extra boxes and cables — the MP1086 Recording System has everything you need.

HARDWARE

CPU Bus
32 Bit PCI/ISA Bus
Control Panel
Sealed membrane type, software defined
Displays
Twin 2x40 LCD displays, LED backlights

POWER

Power Supply
350 Watt, auto-sensing, universal input
84-265 VAC, 50-60 Hz
Power Consumption
80 Watts non-printing
130 Watts Peak

PHYSICAL

Dimensions & Weight
17.6"W x 23.1"H x 8.9"D
55 LBS.
Media
Heat sensitive thermal paper or high grade plastic film - 23dB dynamic range
Paper Length: 150 feet
Film Length: 130 feet
Temperature (non-condensing)
0°C to 65°C - Operating
-28°C to 65°C - Storage

PRINTING

Gray Levels & Resolution
Selectable: 2, 16, 64, 256 Levels
Printhead: 2048 Pixels @ 203 DPI
Maximum Line Speeds (nominal)
@ 2 Shades: 12 ms
@ 16 Shades: 14 ms
@ 64 Shades: 42 ms
@ 256 Shades: 170 ms
Chart Speeds (Lines Per Inch)
Fixed: 80, 100, 120,150, 200, 240, 300
Variable: Preset automatically configured by speed input from gps/nav computer

ANALOG INTERFACE

Dual Signal Input
0V to 10V SIGNAL BNC inputs
(2Kohm Input Impedance)
External Trigger Input (slave)
TTL EXT TRIG BNC with slope-sense
Internal Key Output (master)
TTL KEY OUT BNC with polarity selection
(62.5us pulse width)
Gain, Threshold, Polarity
Independent controls for each channel
Minimum printable signal 150 mV
Time Bases
High B/W A/D with 8 Bit resolution
Scan - 5 ms to 10 secs, 1 ms resolution
Key - 5 ms to 10 secs, 1 ms resolution
Delay - 0 secs to 8 secs, 1 ms resolution

PARALLEL INTERFACE

Interconnect
25 Pin Sub D, metal shell
Data Input (Pins 2-9)
Eight Bit Centronics Compatible
2048 bytes per raster line
Burst Rate Bandwidth: Over 250 kHz
Sustained Bandwidth: Based on gray levels

NETWORK INTERFACE

Interconnect
RJ-45 on front panel
Method
Winsock type Socket Interface for data & commands. High-level programmer's API available

COMMAND INTERFACE

QWERTY Keyboard
Jack for commands and annotation
RS-232 Serial Data Input (DCE)
9 Pin Sub 'D' for commands and GPS
RJ-45 for Socket/Ethernet API

ACCESSORIES

Top Cover Assembly (optional)
Custom mini keyboard
Water proof, Heavy duty keyboard (optional)
Rack mount kit (optional)
Spares kit (optional)

ENHANCED ANALOG FEATURES

Time Varied Gain
255 Logarithmic curves to choose from
Band Pass Filtering
LOW PASS:
1kHz, 1.2kHz, 2kHz, 2.4kHz, 3kHz, 4kHz, 6 kHz, 12 kHz

HIGH PASS:
83Hz, 100Hz, 166Hz, 200Hz,
250Hz, 333Hz, 500Hz, and 1kHz

TOW FISH OUTPUTS

E-type High Voltage
750Vdc short circuit proof indefinately
E-Type Trigger Pulse
100kHz- +12V pulse duration 125us
500kHz- +12V pulse duration 250us
E-Type Compatibility
Edgetech 272T ans 272TD
E-Type Connector
Amp MS3102E20 EG&G 259, 960 & 260

K-Type High Voltage
750Vdc short circuit proof indefinately
K-Type Trigger Pulse
12-15Vdc carrier with riding 12V pulse
Pulse duration 1ms
K-Type Compatibility
Klein 100kHz, 500kHz or dual frequency
K-Type Connector
Amp MS3102E22-19 (Klein 595)

DIGITAL DATA PROCESSING

Slant Range Correction
Controls for bottom tracking algorithm, and fish height alarm.

STORAGE

High Capacity Removable Disk
DVD Ram, IDE hard drive
Storage Format
XTF (standard)
SEGY,RAW (consult EPC)

EPC LABORATORIES INC., 42A Cherry Hill Drive, Danvers, MA 01923 USA PHONE: (978) 777-1996
FAX: (978) 777-3955 EMAIL: sales@epclabs.com WEB: http://www.epclabs.com

APPENDIX G

Data Processing and Analysis Methods

Navigation Files
Side Scan Sonar Imagery
Magnetic Intensity Measurements
Seismic Reflection Profile Data

DATA PROCESSING AND ANALYSIS METHODS

Navigation Files

Upon completion of the field work, the digital files of vessel position were processed using HYPACK® software to facilitate post-survey reconstruction of vessel tracklines to assist data interpretation. Event marks generated by HYPACK® during the field survey are plotted along each track and correlate all data by vessel position and time. These event marks are spaced 200 feet apart and are sequentially numbered throughout the duration of the entire field investigation. Events are stored digitally in the HYPACK® navigation files as well as printed on all hard copy data records.

USACE Depth Data

Processed x, y, z hydrographic data were provided by the USACE from previous surveys in Portsmouth Harbor. Data were provided in a final processed format, having been tide adjusted and refenced to the MLLW datum by the USACE. These data points were input to QuickSurf digital terrain modeling software (Schreiber Instruments, Inc.) operating within the AutoCAD 2004 program to generate depth contours of the harbor floor. The points were first used to develop a bottom surface within QuickSurf then contoured using the TIN-GRID method. Contours were generated at a 1 foot interval and presented in a plan view format on the final drawings.

Side Scan Sonar Imagery

During interpretation of the side scan sonar records, areas on the seabed exhibiting different acoustical properties were identified and mapped. The variation in acoustical characteristics on the bottom represents changes in surficial lithology and/or the presence of benthic communities and foreign material. Areas of large natural seabed features were identified by the increased topographic relief and morphologic variations observed on the records. In particular, areas of different surficial lithology of importance to the project were plotted on the plan view drawings. In general, coarser and harder materials show increased reflectivity whereas finer sediments exhibit weaker reflective characteristics.

Imagery were also reviewed to identify individual acoustic targets representative of natural or man made objects resting on the bottom. An object exhibiting some relief (or height) above the bottom will generate a strong reflection on the sonar image from the side of the object facing the side scan towfish. Shape and textures associated with an object may be interpreted, depending on the acoustic signal angle of incidence, geometry of the object, line orientation with respect to the object, and site conditions at the time of the survey, among other variables.

Files were reviewed and targets picked using the Klein SonarPro software which was also used for acquisition. The SonarPro software files apply the proper sensor layback and ground range correction when positioning a target on the bottom. Individual acoustic targets identified have been compiled and described in detail in an ExCel spreadsheet. These targets are also plotted on a plan view drawing of the site relative to mapped surificial materials and magnetic anomalies.

Magnetic Intensity Measurements

Digital records of the magnetic data were reviewed using HYPACK® software to determine the presence of ferrous material on or below the harbor floor. Anomalous readings above the geologic background gradient were identified. Anomalies are essentially a disturbance in the earth's total magnetic field, created by a more pronounced local field generated by a ferrous object. The object's local, induced field causes a deviation of the earth's total field in its immediate vicinity which is measured by the sensor passing nearby. The magnetic anomalies were then plotted in their proper location on the plan view trackline sheets taking layback of the sensor into account. The magnetic anomalies have been presented on the final drawings in plan view format and also summarized in detail in an ExCel spreadsheet included at the end of this report.

Seismic Reflection Profile Data

The processed navigation data were used to generate a plan view survey trackline sheet as part of the overall review of seismic reflection coverage and subsurface conditions. Digital seismic data was imported to the seismic processing program REFLEXW (Sendmeier Software) Version 2.5 for analysis, interpretation, final data formatting. REFLEXW is a 32 bit software package running in a Windows 2000 environment. Since raw seismic reflection data is measured in time travel of the acoustic signals, a time to distance/depth conversion is required. Acoustic velocities for subsurface layers can be obtained directly from seismic refraction methods or assumed from physical sampling of materials. Historical research shows most marine sediment types and compositions fall into certain velocity ranges. In the absence of geotechnical information, an average acoustic sediment velocity of 5,000 feet per second was used for this project, a typical value for saturated marine sediments tending toward the finer grain sizes.

The seismic reflector depths or sediment thicknesses were exported by the REFLEXW program in a x, y, z format and imported to the QuickSurf digital terrain modeling software. A surface was developed for the sediment thickness "z" value interpreted from the seismic profiles, which was then added to the USACE MLLW depth surface to obtain a final subbottom surface referencing the reflector to the project datum, MLLW. In this manner, depths to the primary acoustic basement reflector were developed relative to the project datum. The final surface was contoured using the TIN-GRID method at a 1 foot interval and presented in plan view on a final drawing.

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX G

TURNING BASIN TIDAL HYDRODYNAMIC ANALYSIS
HYDROLOGIC & HYDRAULIC APPENDIX

PORTSMOUTH HARBOR – PISCATAQUA RIVER
TURNING BASIN TIDAL HYDRODYNAMIC ANALYSIS
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ATTACHMENT

1.Woods Hole Group, Inc. Contract No. W912WJ-09-D-0001-0009
FINAL REPORT FOR ADCP AND TIDE DATA COLLECTION
PORTSMOUTH HARBOR AND PISCATAQUA RIVER
PORTSMOUTH, NEW HAMPSHIRE
October 2009

PORTSMOUTH HARBOR – PISCATAQUA RIVER
TURNING BASIN TIDAL HYDRODYNAMIC ANALYSIS
HYDROLOGIC & HYDRAULIC APPENDIX

1.0 EXECUTIVE SUMMARY

This H&H analysis analyzed the tidal hydrodynamics of the study area at the existing turning basin at the upstream end of the federal navigation channel along the Piscataqua River in accordance with turning basin design standards contained in EM 1110-2-1613 (31 May 2006).

Woods Hole Group, under contract to USACE NAE, collected 2 months of tide data, and collected Accoustic Doppler Current Profiler (ADCP) data along four transects over two 12.5 hour tide cycles in June 2009 across the navigation channel to be used in the development and calibration of the two-dimensional mathematical model of the harbor.

The modeling effort evaluated both the existing and alternative improvement conditions and determined that the current magnitude (speed) did not measurably increase or decrease for any of the alternatives. The difference in current between the existing conditions and the different turning basin alternatives are within the error of the field data and model capabilities, which indicate that increasing the width of the turning basin would not increase or decrease the current magnitude within the turning basin area.

Further analysis of the recorded ADCP data reveals that the average current magnitude recorded in 3-minute intervals over the tide cycle does not exceed the maximum allowable current of 1.5 knot per the turning basin regulation (EM 1110-2-1613) within 60-minutes of the low slack tide or high slack tide.

2.0 INTRODUCTION

This document includes the hydrologic and hydraulic (H&H) analysis for the Portsmouth Harbor and Piscataqua River New Hampshire and Maine Navigation Improvement Study, in accordance with Corps Regulations (ER 5-1-11 and ER 1105-2-100, Planning Guidance).

This study was initiated at the request of the State of New Hampshire, Pease Development Authority, Division of Ports and Harbors, the study sponsor, and authorized by Section 436 of the Water Resources Development Act of 2000 (P.L. 105-541):

"The Secretary shall conduct a study to determine the feasibility of modifying the project for navigation, Portsmouth Harbor and Piscataqua River, Maine and New Hampshire, authorized by section 101 of the River and Harbor Act of 1962 (76 Stat. 1173) and modified by section 202(a) of the Water Resources Development Act of 1986 (100 Stat. 4095) to increase the authorized width of turning basins in the Piscataqua River to 1,000."

This H&H analysis will investigate the tidal hydrodynamics of the study area with the authorized turning basin width located at the upstream end of the federal navigation channel in the Piscataqua River. The basis for this investigation will include developing a numerical model to evaluate the altered geometry at the turning basin and the impacts to tidal hydrodynamics at several points within the harbor. These hydrodynamics include the river current magnitude (speed) and tide elevation.

3.0 STUDY AREA

The Portsmouth Harbor is a deep draft harbor located 45 miles northeast of Boston, Massachusetts and 37 miles southwest of Portland, Maine. The Piscataqua River runs through the harbor and includes a federally maintained navigation channel of 35 feet at mean low water and a minimum width of 400 feet. The channel extends from deep water in Portsmouth Harbor (river mile 2.6) upstream to just north of the Sprague terminal in Newington, New Hampshire (river mile 8.8).

The harbor has one of the fastest flowing currents of commercial harbors in northeastern United States with tidal currents reaching speeds of up to 5 knots (5.75 miles per hour). The size of the ships that can navigate within the harbor is restricted by several features of the river, including the current, the width of the Sarah Long Bridge, and the turning basin diameter. In 2011, 3.1 million tons of cargo worth $1.7 billion was transferred in and out of the harbor to southern Hampshire, eastern Vermont and southern Maine.

The Piscataqua River flows southeast through the towns of Eliot and Kittery, Maine, and Dover, Newington, Portsmouth, and New Castle, New Hampshire forming the boundary between New Hampshire and Maine. The river is tidally influenced and spans 13-miles long between its headwater at the confluence of the Salmon Falls and Cocheco Rivers in Dover, New Hampshire and its mouth at the Gulf of Maine. The drainage basin is approximately 1,495 square miles encompassing five rivers that flow into the Great Bay, a 6,000 acre estuary that discharges into the Piscataqua River headwater in Dover, New Hampshire.

The Portsmouth, New Hampshire area has a temperate climate in the summer months and often severe climate in the winter months. In the winter, coastal storms frequently bring snow mixed with rain with high winds prevailing northwesterly

4.0 EXISTING TURNING BASIN

a. Existing Turning Basin Features and Operation. The existing turning basin is located at the northern end of the federal navigation channel near the Sprague terminal in Newington, New Hampshire.

Existing Operations: Currently, all turns take approximately 10 minutes and take place during slack conditions. Slack conditions occur when the current is at its lowest speed coinciding with both peak and low tide. Turns that take place near low slack tide begin 30 minutes before low tide with 30 minutes of ebb remaining. Currents during these conditions are approximately 1.0 knots. High slack turns begin 50 minutes before high slack with 50 minutes of flood remaining. Currents during this condition are approximately 1.0-1.5 knots. The ability to turn ships may be affected by severe weather conditions, such as noreasters and hurricanes, as they change the physical characteristics of the river.

b. Turning Basin Regulations per EM 1110-2-1613 (31 May 2006). The basin enables the ships to reverse direction and allow an outbound sailing transit. During normal conditions, pilots use tugs to bring the ship about as well as prevailing currents and wind conditions to help maneuver the ship. The pilot strategy may be different on flood or ebb tide and may change with wind direction or the presence of shoals, rocks, docks, etc. The turning basin will be designed to provide sufficient area to allow the design ship to turn around using ship bow and stern thrusters (if available).

i. Turning Basin Size. The size of the turning basin should provide a minimum turning diameter of at least 1.2 times the length of the design ship where prevailing currents are 0.5-1.5 knots or less. The basin should be elongated along the prevailing current direction when currents are greater than 1.5 knots and designed according to tests conducted on a ship simulator.

ii. Features. Where traffic conditions permit, the turning basin should use the navigation channel as part of the basin area. The shape of the basin is usually trapezoidal or elongated trapezoidal with the long side coincident with the prevailing current direction and the channel edge. The short side will be at least equal to the design multiple (1.2 or 1.5, depending on current) times the ship length. The ends will make angles of 45 degrees or less with the adjacent edge of the channel, depending on local shoaling tendencies.

iii. Depth. Normally, the depth of the turning basin should be equal to the channel depth leading or adjacent to the basin proper. This is done to prevent any possibility of confusion by the channel project users that could cause grounding accidents. The normal dredging tolerance and advance maintenance are included in the depth of the basin..

iv. Shoaling. A turning basin will tend to increase shoaling rates above normal channel rates because of the increase of the channel cross-sectional area, which modifies current patterns. Increased shoaling in the basin could cause modifications in shoaling patterns farther downstream or upstream.

c. Design Vessel for Proposed Turning Basin. Based on the limitations of the existing navigation channel (width, bridges, turns and river currents), the Pilots have determined that the largest vessel that could access the upper turning basin is a maximum length of 800-ft. Vessels of this size typically have a beam of approximately 118-ft. Therefore, this has been selected as the design vessel at the time of this study.

5.0 PROPOSED TURNING BASIN ALTERNATIVES.

The proposed basin alternatives are presented in Figure 1. These alternatives include various basin diameters and drift, which will be evaluated based on the recorded and modeled currents of the river during optimum turning conditions and federal regulation EM 1110-2-1613 (31 May 2006).

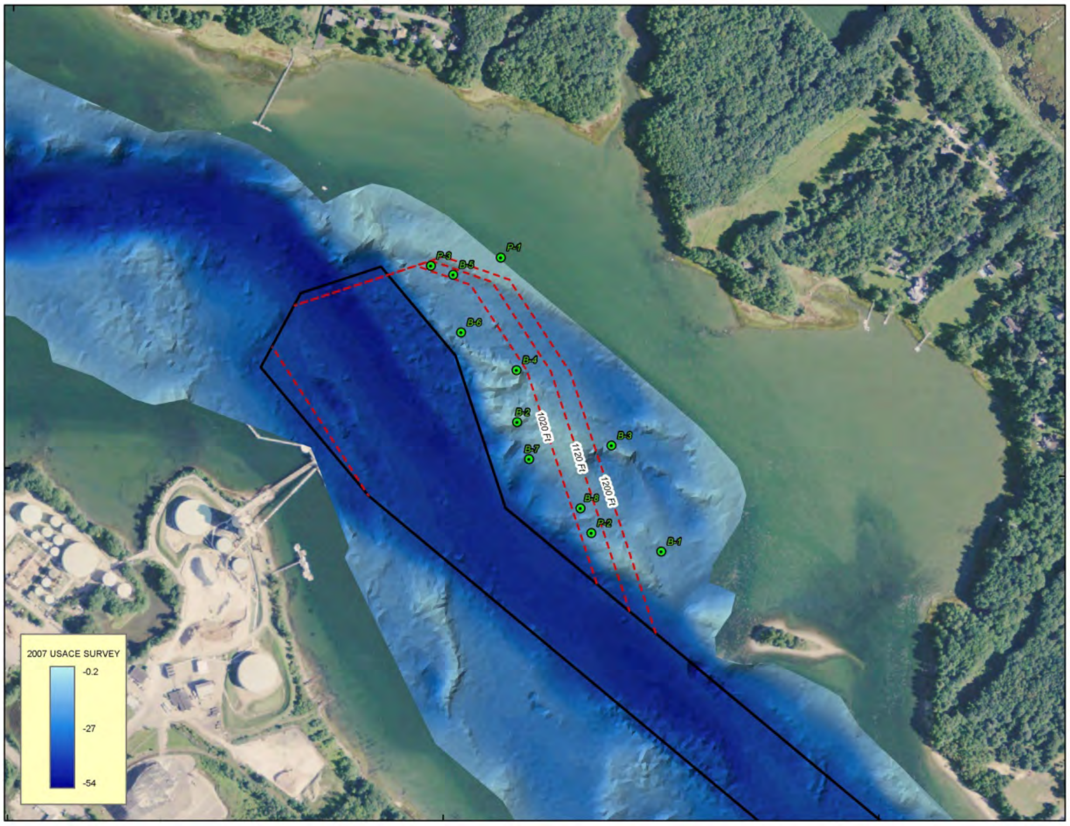

Figure 1. Turning Basin Alternatives

6.0 METHODOLOGY

a. Data Collection / Field Activities. Woods Hole Group under contract to USACE NAE, collected 2 months of tide data and collected Accoustic Doppler Current Profiler (ADCP) data along four transects across the navigation channel to be used in the development and calibration of the two-dimensional model of the harbor. The tide data was collected over the spring tide during 2009.

First, time-series of water surface elevations (WSE) were obtained from two (2) locations over approximately one month at the Piscataqua River site (Figure 1). Measurements were collected directly at the turning basin (Station P2 near the Sprague Energy Terminal at River Road in Newington, NH), and approximately 3.3 miles downstream of the turning basin (Station P1 near the State of New Hampshire, Division of Ports and Harbors , DPH, Market Street Terminal in Portsmouth, NH). Data recorded from these two tide gauges was subsequently compared to data from the National Oceanic and Atmospheric Administration (NOAA) NOS station in Portland, Maine to identify the tidal attenuation in the system, as well as ground truth the observed data. (WHG, 2009).

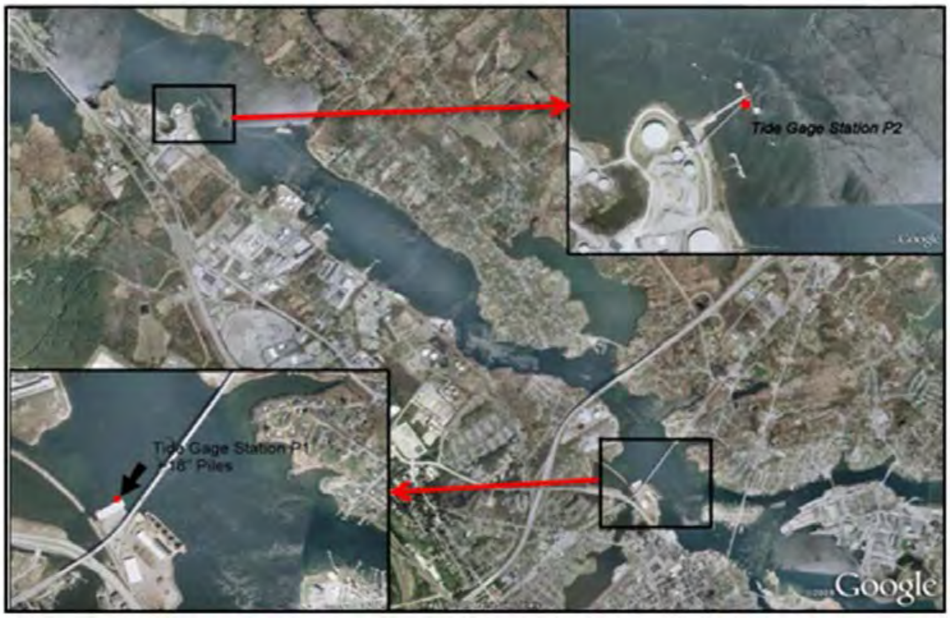

Figure 2. Tide Gauge Locations (WHG, 2009)

Figure 2 presents the results of the atmospherically corrected and vertical referenced tidal observations obtained from the Piscataqua River gauges. The blue line presents the time series of the WSE (ft, NAVD88) at the DPH Market Street Terminal (station P1), while the red line presents the time series of the WSE (ft, NAVD88) at the Sprague Energy Terminal (station P2). The two stations are plotted together for comparison of the upstream and downstream locations. The observations show that there is some tidal attenuation that occurs between these two stations, as the tidal wave propagates in the River. During the spring tide, approximately 1.0-1.5 feet of tidal attenuation occurs between the two stations, while during the neap tide, approximately 0.2-0.5 feet of tidal attenuation occurs. The tide lags approximately 30-45 minutes between the two stations during high tide. This can also be explained that the high tide occurs at the Sprague Energy P2 location approximately 30-45 minutes after high tide occurs at the DPH Market Street Terminal.

A portion of the collected tide signal is provided in the following figure. A slight phase and amplitude difference is discernible between the two gauges.

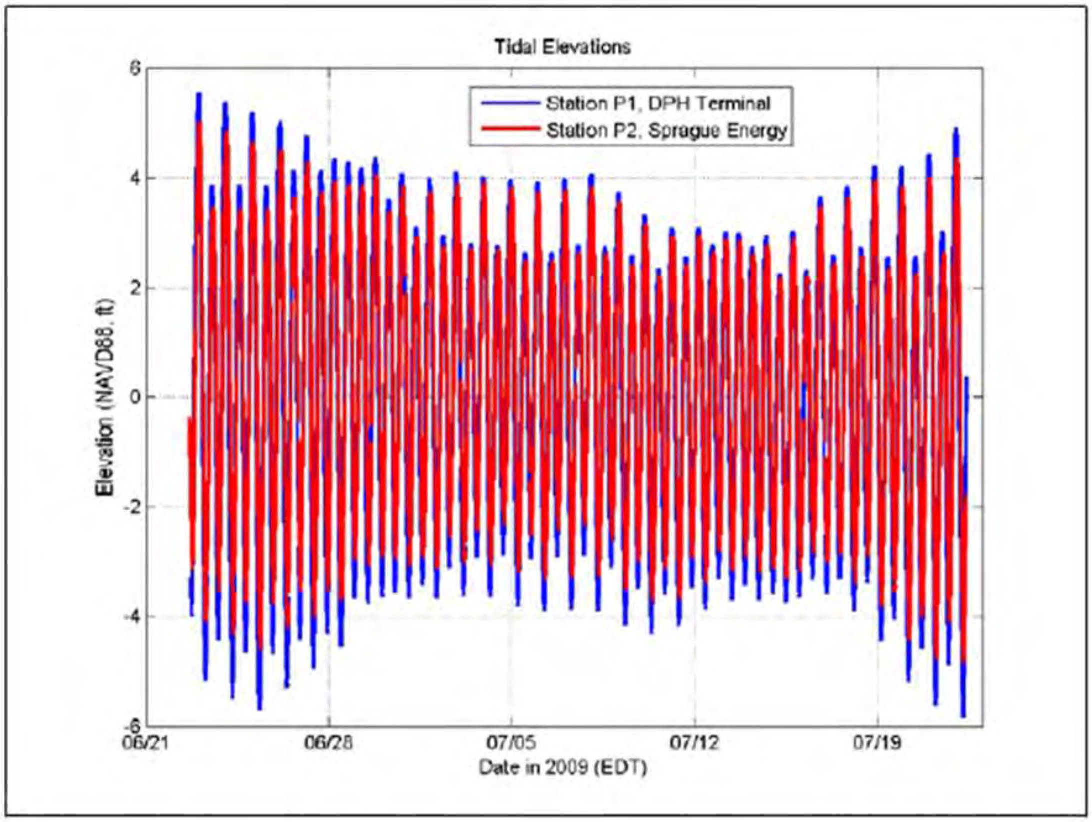

Figure 3. Measured Tide Elevations (WHG, 2009)

b. ADCP Data Collection. Currents were collected by performing boat transects over a 12 hour tide cycle. The location of these transects is shown below in Figure 4 and Figure 5. A plot of the average recorded current during low slack tide and high slack tide conditions is shown in Figure 10, following a discussion of the modeling effort and analysis of current magnitude (speed) during the turning basin alternatives.

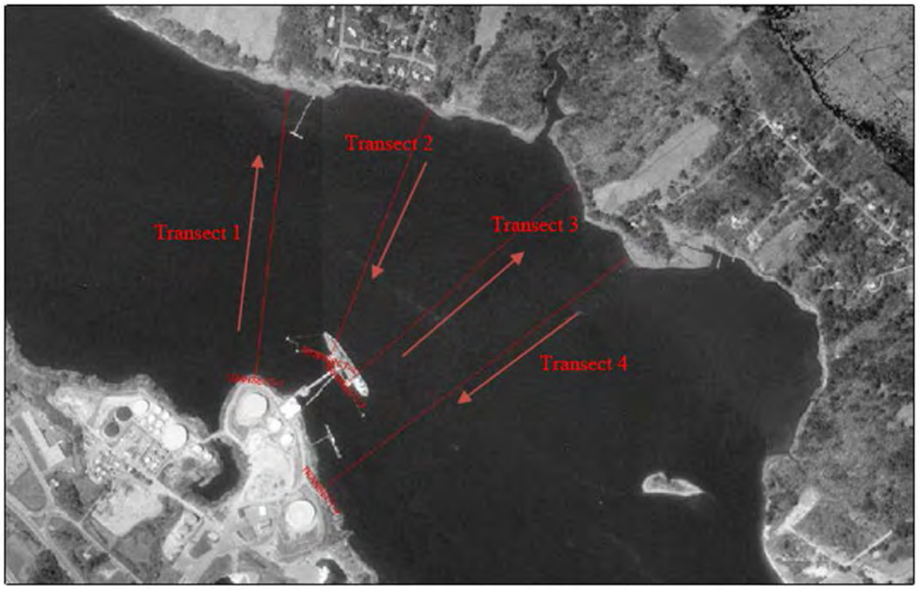

Figure 4. Boat Based ADCP Transects (WHG, 2009)

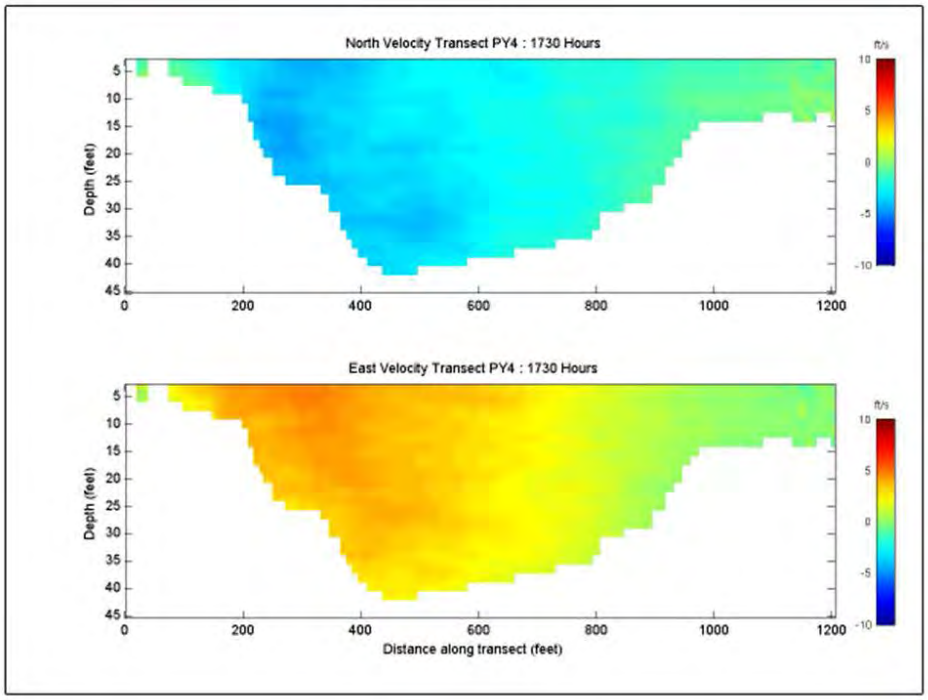

Figure 5. Measured Currents (WHG, 2009).

c. Data Limitations. The analysis is limited by the sparse bathymetry data available outside the navigation channel. Significant effort was made to incorporate other bathymetry data including prior NOAA survey data but a large portion of the river was interpolated from navigation charts.

d. Numerical Modeling.

i. Model Selection. Several two-dimensional numerical models developed and supported by the USACE and ERDC were considered for this analysis. Preliminary efforts made using the RMA-2 and ADH models; however, both of these models had difficulty calibrating and remaining stable throughout the model runs and were ultimately abandoned.

ii. Coastal Modeling System (CMS) Development & Calibration. CMS, developed by USACE and ERDC Coastal & Hydraulics Laboratory (CHL) was selected to evaluate the study area. The CMS software package consists of several individual numerical models and their supporting software in one system. It is a finite-element numerical model that computes both hydrodynamics (water levels and current flow values under any combination of tide, wind, surge, waves and river flow).

A non-uniform grid was constructed to cover the entirety of the river, 42 km in the alongshore and 18 km cross shore. The flow model was driven from temporarily offset tides derived from the Portsmouth Gauge (Station #8418150) and waves from the offshore CDIP Buoy (160). Stream gauge forcing was also provided by prior field observations by NAE.

The CMS model ran stable, showed proper model calibration and was able to effectively perform the alternative runs.

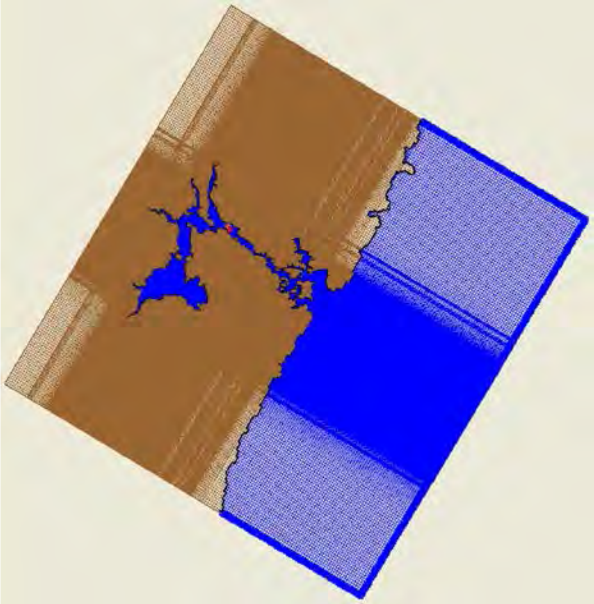

Figure 6. CMS Grid Domain

Model calibration was checked using water levels collected from the 2009 field effort. As shown in the following figure, the phase of the measured and modeled water elevation shows good correlation however the model is slightly over predicting the amplitude of the tide.

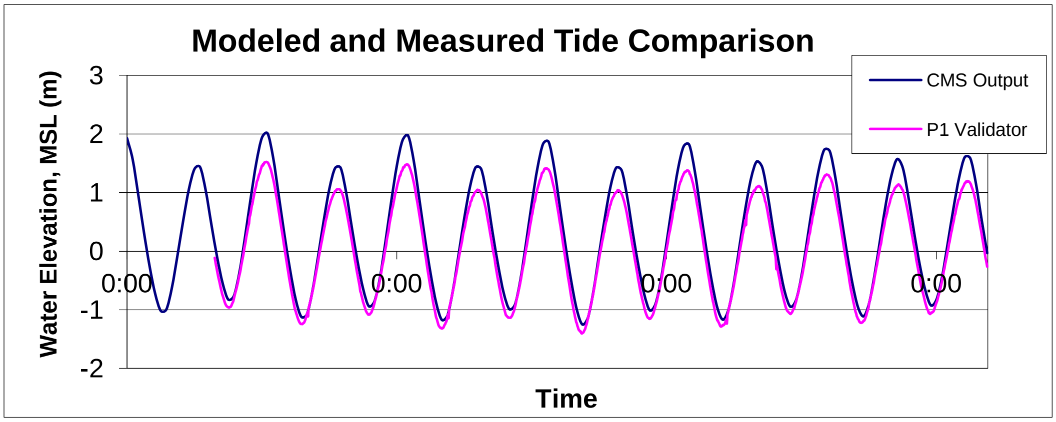

Figure 7. Modeled and Measured Tide Comparison at Station P1

The measured current magnitude (speed) was compared with the simulated currents over each transect. Figure 8 shows Transect 1 current comparison with units of meters/second (m/s) as computed by the CMS model. The model is in phase with the measured currents; however, slightly under predicts the current amplitude. Therefore, additional evaluation of the measured currents, converted from units of m/s to knots, was conducted confirming that the average current magnitude at low slack tide and high slack tide are less than the 1.5 knot allowable per regulation EM 1110-2-1613 (31 May 2006) as discussed in Section 7.0 and presented in Figure 10.

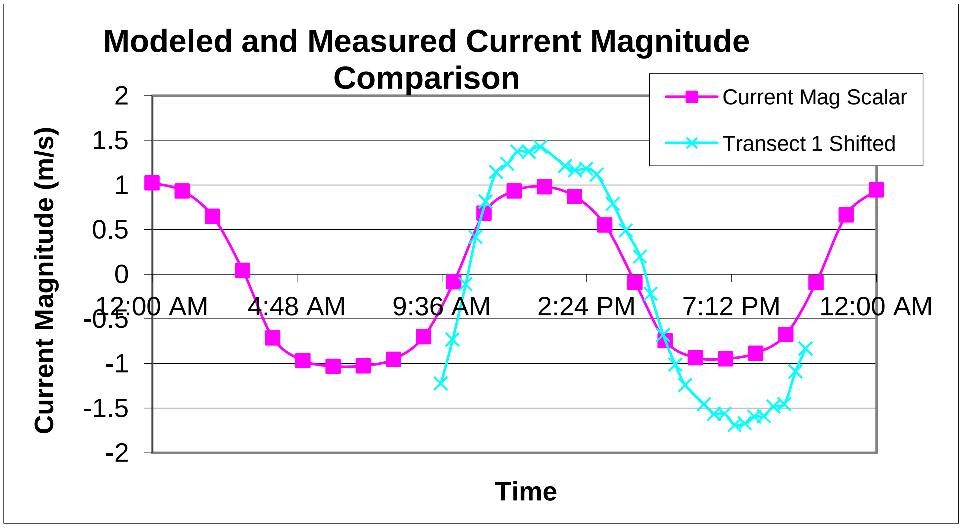

Figure 8. Modeled and Measured Current Magnitude at Transect 1

e. Model Alternative Results. In order to compare and assess alternative performance, four observation points (nodes) were placed in the approximate center of the channel and turning basin and were also the approximate midpoint of the boat based ADCP survey transects. The maximum and average current speeds were extracted at each point for each alternative and compared. These observation points are shown in the following figure as points overlain on the model grid.

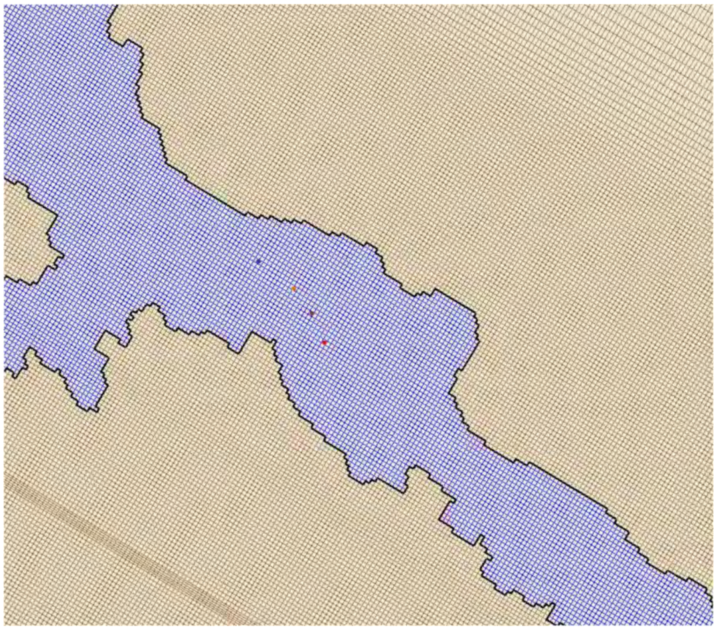

Figure 9. Location of Observation Points

The analysis of the existing and the alternative conditions determined that the current magnitude (speed) did not vary significantly, for all three alternatives. The difference in current between the existing conditions and the different turning basin alternatives are within the error of the field data and model capabilities which indicates that the change in the turning basin would not significantly impact the current during low slack tide or high slack tide. See Table 1.

Table 1. Modeled Current Speeds

Maximum Current Speed, m/s (knots)				
Alternative	**Node 1**	**Node 2**	**Node 3**	**Node 4**
Existing Conditions	1.15 (2.24)	1.16 (2.25)	1.10 (2.13)	1.09 (2.11)
1020	1.15 (2.24)	1.18 (2.29)	1.08 (2.10)	1.07 (2.08)
1120	1.16 (2.25)	1.19 (2.31)	1.09 (2.11)	1.06 (2.06)
1200	1.16 (2.25)	1.19 (2.31)	1.07 (2.08)	1.06 (2.06)

Average Current Speed, m/s (knots)				
Alternative	**Node 1**	**Node 2**	**Node 3**	**Node 4**
Existing Conditions	0.61 (1.19)	0.60 (1.17)	0.60 (1.17)	0.59 (1.15)
1020	0.61 (1.19)	0.61 (1.19)	0.59 (1.15)	0.56 (1.09)
1120	0.61 (1.19)	0.61 (1.19)	0.59 (1.15)	0.55 (1.07)
1200	0.62 (1.21)	0.61(1.19)	0.58 (1.13)	0.54 (1.05)

7.0 CONCLUSION.

Upon determination by the modeling analysis that increasing the basin diameter does not increase or decrease the current magnitude (speed), it can be concluded that the turning schedule allowable at low slack tide and high slack tide will be unchanged. Further analysis of the recorded ADCP tide data is presented in Figure 10. Approximately 45 data points (measuring current) were collected along each transect within a 3-minute time period during an entire 12.5 hour tide cycle. This data was averaged for each 3-minute period as the tide approached both low and high slack tide and confirms the current does not exceed the minimum 1.5 knot regulation EM 1110-2-1613 (31 May 2006) within the turning basin as described in section 4.1.a and 4.1.b.

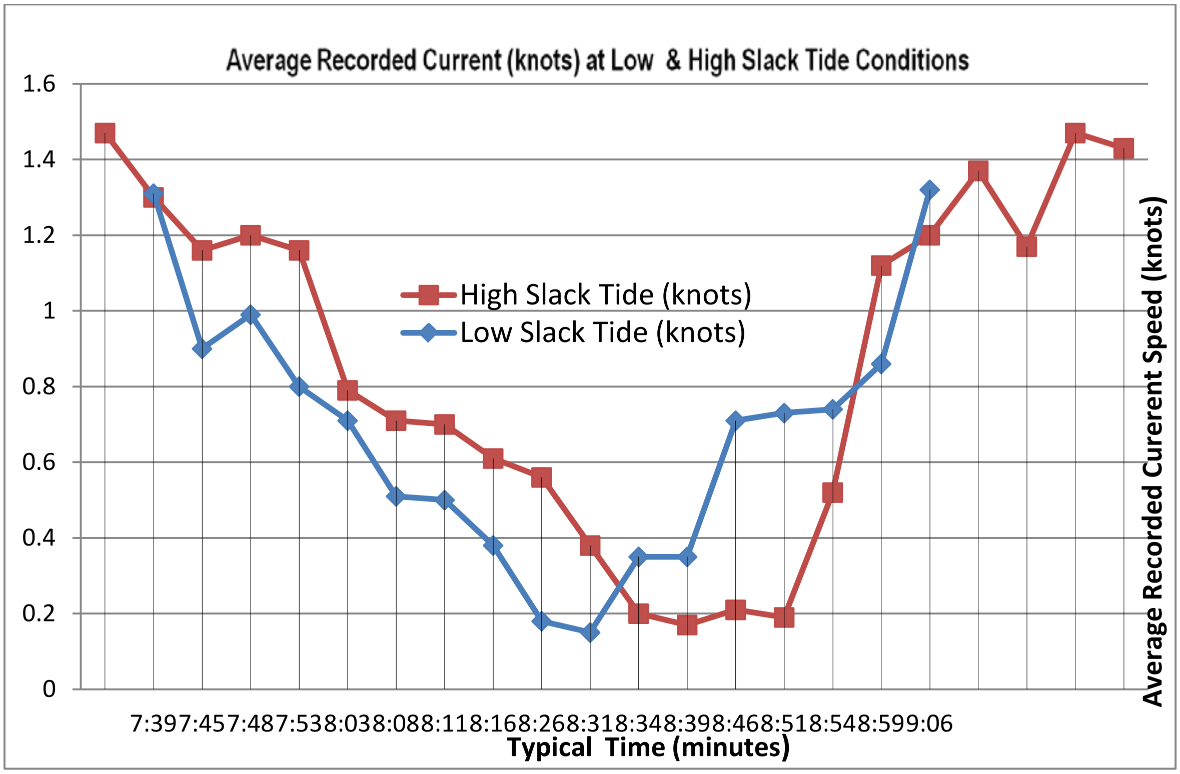

Figure 10. Average Recorded Currents at Low Slack Tide and High Slack Tide (knots)

8.0 REFERENCES.

Woods Hole Group (2009). “Final Report for ADCP and Tide Data Collection Portsmouth Harbor and Piscataqua River, Portsmouth, New Hampshire”.

FINAL REPORT
FOR
ADCP AND TIDE DATA COLLECTION PORTSMOUTH HARBOR AND PISCATAQUA RIVER PORTSMOUTH, NEW HAMPSHIRE

Contract No. W912WJ-09-D-0001-0009

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

Prepared By:
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October 2009

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FINAL REPORT
FOR
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PORSTMOUTH HARBOR AND PISCATAQUA RIVER
PORTSMOUTH, NEW HAMPSHIRE

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1.0 INTRODUCTION

This brief report presents the boat-based Acoustic Doppler Current Profiler (ADCP) data and associated tide data observed in the Piscataqua River region near Portsmouth, New Hampshire. The data were collected within the Piscataqua River as part of the Piscataqua River Turning Basin deepening/widening study. The overall scope of study by the United States Corps of Engineers (USACE) includes the development of a two-dimensional hydrodynamic model of the region. The data presented herein are intended to be used to assist in the calibration and validation of the model.

Woods Hole Group (WHG) was responsible for collecting these measurements for the U.S. Army Corps of Engineers under task order contract number W912WJ-09-D-0001-0009.

2.0 TIDE DATA COLLECTION

Time-series of water surface elevation were obtained from two (2) locations over approximately one month at the Piscataqua River site (Figure 1). This report and the associated files on the companion CD, present the tide data and the data collection procedures and instrumentation. These observations can be used to analyze and define the tidal fluctuations in the region(s), as well as define boundary conditions and calibration points in the development of a hydrodynamic model.

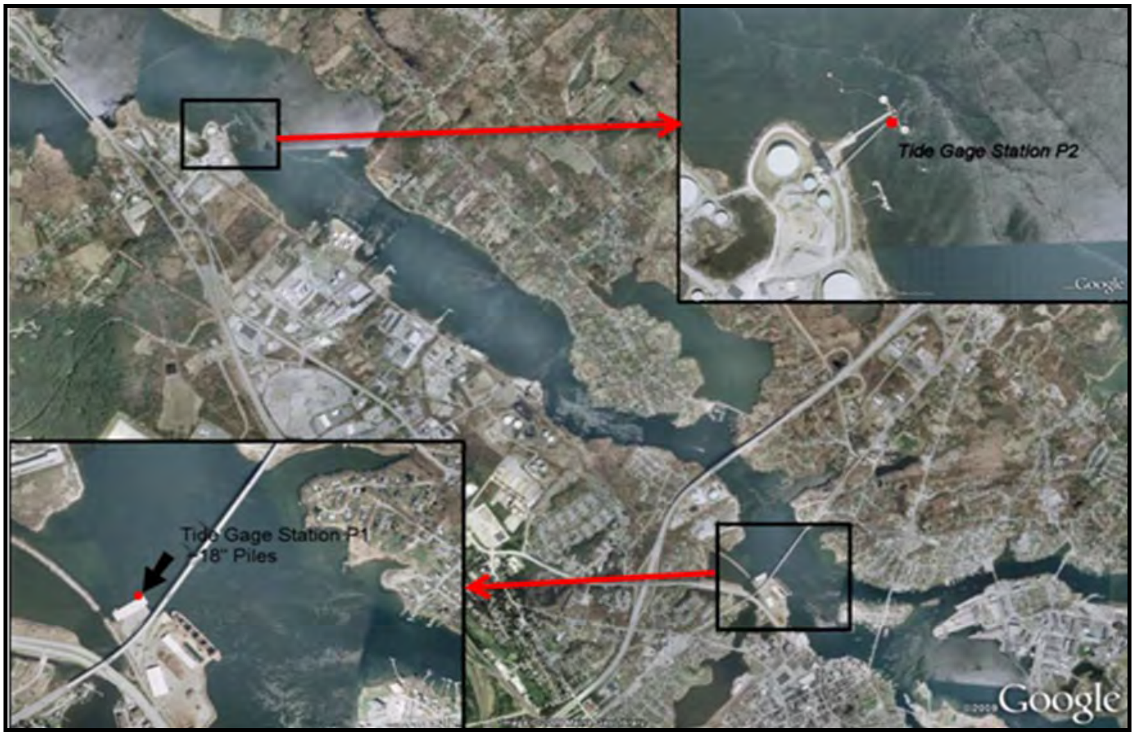


Figure 1. Tide gauge locations within the study area of Piscataqua River.

Deployment locations on the Piscataqua River were chosen to measure the surface water fluctuations directly at the turning basin location (Station P2 near the Sprague Energy Terminal at River Road in Newington), and approximately 3.3 miles downstream of the turning basin location (Station P1 near the State of New Hampshire, Division of Ports and Harbors (DPH) Market Street Terminal in Portsmouth). These locations were selected by the United States Army Corps of Engineers to characterize the local tidal changes that occur through the lower portion of the system, and to provide boundary condition and calibration information for a hydrodynamic modeling effort. Figure 2 shows the tide gage located at the Sprague Energy Terminal (Station P2) at a spring low tide. The photograph illustrates the deployment methodology used to secure the tide gage to the dock piling to ensure the gage remained submerged under the full tidal range. Copies of the field notes from the deployment and recovery of the tide gages is included in Appendix A.

Figure 2. Photograph of tide gage located at station P2, Sprague Energy Terminal in Newington, NH, during a spring low tide.

The data from these two tide gauges was subsequently compared to data from the National Oceanic and Atmospheric Administration (NOAA) NOS station in Portland, Maine to identify the relative tidal attenuation in the system, as well as ground truth the observed data. Table 1 presents the recording interval and frequency of the deployed tide gauges, as well as their exact positions recorded via GPS.

Table 1. Instrument deployment summary.

Tide Station Location (description)	GPS Location (State Plane feet, NAD83)	Log Interval (minutes)	Began Recording	Ended Recording
Piscataqua: DPH Market Street Terminal	northing: 214357.144 easting: 1225514.780	6	6/22/2009	7/22/2009
Piscataqua: Sprague Energy Terminal	northing: 225912.377 easting: 1212786.076	6	6/22/2009	7/22/2009

Tidal pressures were measured using Sea-Bird SBE37-SM MicroCAT conductivity, temperature and pressure gauges. Each of these instruments measured conductivity, temperature and pressure at set intervals, in this case, every six minutes. Pressure data were downloaded using a personal computer and associated software packages.

Each tide gauge measured the pressure above the instrument, which is a combination of the weight of the water and weight of the atmosphere. In order to analyze the tide data (gauge pressure), the atmospheric pressure needs to be removed from the measured signal. The data collected was pressure corrected using regional atmospheric pressure data from the National Oceanic and Atmospheric Administration (NOAA) station in Wells, Maine. This raw barometric pressure data used for this correction is presented in Figure 3. Gaps in the NOAA barometric pressure record were filled by interpolating between the temporal adjacent observations. Subsequently, this tide pressure data were converted to water surface elevation using the hydrostatic relationship based on the density of water. In order to reference the tide gauges to a common vertical datum, tide data from each gauge was referenced to the NAVD 1988 vertical datum. The tide gauges were surveyed in directly to the instruments pressure port via an RTK-GPS survey and verified with local benchmark information. Appendix B presents the results of the survey and adjustment of the tide gage to the NAVD 1988 vertical datum.

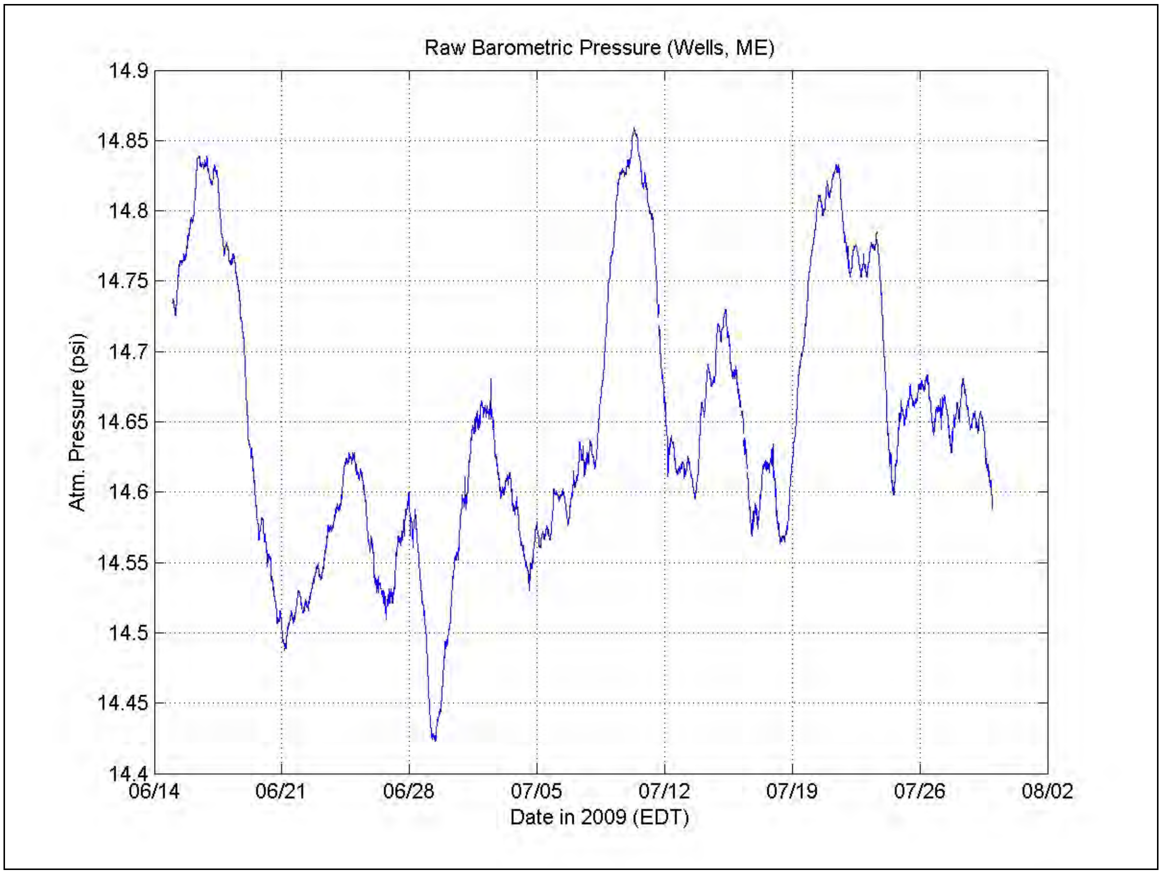


Figure 3. Atmospheric pressure data obtained from National Oceanic and Atmospheric Administration (NOAA) station # 8419317 (Wells, ME).

Figure 4 presents the results of the atmospherically corrected and vertical referenced tidal observations obtained from the Piscataqua River gages. The blue line presents the time series of water surface elevation (feet, NAVD88) at the DPH Market Street Terminal (station P1), while the red line presents the time series of water surface elevation (feet, NAVD88) at the Sprague Energy Terminal (station P2). The two stations at Piscataqua River are plotted together for comparison of the tides at the upstream and downstream locations. The observations show there is some tidal attenuation that occurs between the two stations, as the tidal wave propagates in the River. During the spring tide, approximately 1.0-1.5 feet of tidal attenuation occurs between the two stations, while during the neap tide, approximately 0.2-0.5 feet of tidal attenuation occurs. The phase shift (lag) between high tide at the two stations ranges from approximately 30-45 minutes. In other words, high tide occurs at the Sprague Energy location approximately 30-45 minutes after high tide occurs at the DPH Market Street Terminal.

Figure 5 presents the observed data from Piscataqua River stations, along with the National Oceanic and Atmospheric Administration stations at Portland, ME. The NOAA data are provided as a regional reference to the collected data at local stations on the Piscataqua River. All tide data, including the NOAA station data, is provided on the companion CD to this report in the Tide Data directory.

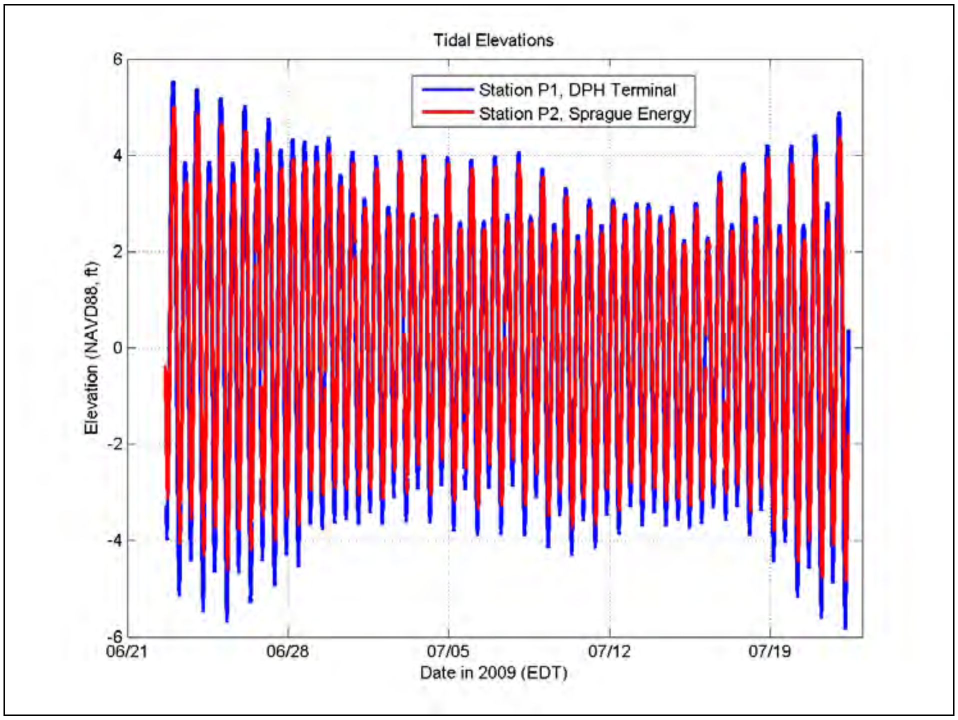


Figure 4. **Measured water surface elevation in the Piscataqua River, New Hampshire from June 22 to July 22, 2009.**

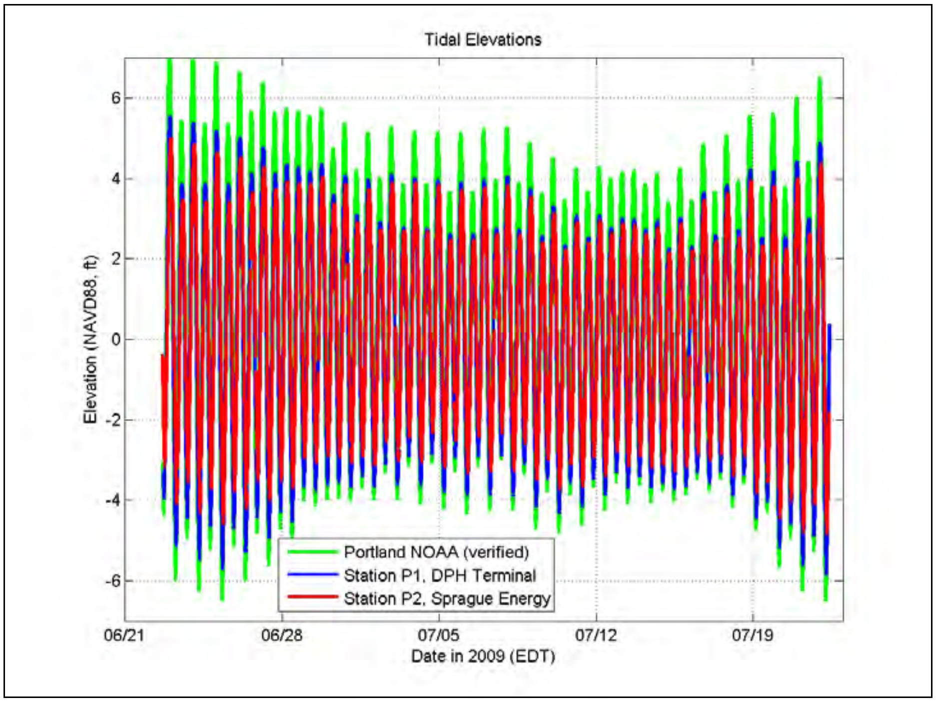


Figure 5. **Measured water surface elevation from the Piscataqua River and NOAA's verified water surface elevation from Portland, ME.**

3.0 ADCP DATA COLLECTION

In support of the development of the hydrodynamic model and design criteria for the Piscataqua River Turning Basin deepening/widening study, Woods Hole Group, Inc. measured the tidal currents at selected locations in the River during two spring tide conditions. The observations were obtained using an Acoustic Doppler Current Profiler (ADCP) mounted to a small survey vessel. Data were collected through complete lunar semi-diurnal tidal cycles (12.4 hours), once in June and once in July. Each transect was traversed from shoreline to shoreline in a direction perpendicular to the channel. The resulting data sets offer an unparalleled view of the temporal variation in spatial structure of tidal currents through the waterway.

This chapter details the survey instrumentation and methods used to perform the measurements. Data representing high-resolution measurements of tidal current structure at these sample locations are also presented. The results are presented in both time series format (spatially averaged results), as well as full color contours of current velocity components for selected stages of the tide. The complete data set and associated figures are also provided in the companion CD to this report in the ADCP Survey Data directory.

3.1 SURVEY REGION AND DATES

The surveys for the Piscataqua River location were performed on June 23 and July 21, 2009. Four (4) transects were surveyed near the turning basin in the Piscataqua River offshore of the Sprague Energy Terminal, as shown in Figure 6. These four transects formed a reasonable depiction of the currents across the cross-section of the Piscataqua River at this location and adequately represent the current regime in this area. The transects were surveyed continuously throughout the day, travelling in the direction of the arrows indicated on Figure 6. A majority of the transect lines were navigable throughout the tidal cycle; however, the far north/northeast ends of the transect lines were too shallow to survey, and were non-navigable even for the small survey vessel. Table 2 presents the survey dates, locations, transect repetition period and temporal coverage for each transect line.

Table 2. Survey dates, locations, frequency, and temporal coverage of the ADCP transects.

Transect ID	Easting, Northing Transect Start (State Plane NAD83, feet)	Easting, Northing Transect End (State Plane NAD83, feet)	June 23, 2009 Survey		July 21, 2009 Survey	
			Frequency (minutes)	# of Transects	Frequency (minutes)	# of Transects
1	1212157, 225908	1212400, 228014	~4	32	~4	29
2	1213443, 227862	1212714, 226060	~2.5	32	~2.5	29
3	1212845, 225858	1214516, 227326	~3	32	~3	29
4	1214910, 226769	1212673, 225078	~3	32	~3	29

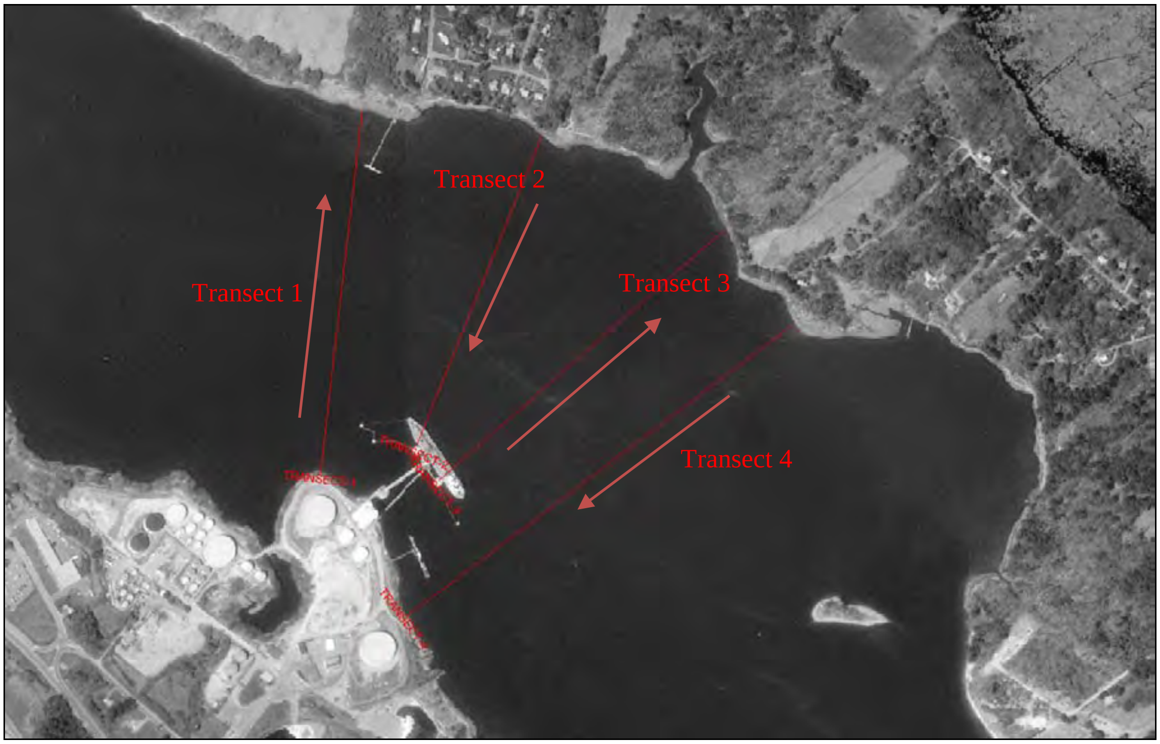


Figure 6. Location of ADCP transects in the Piscataqua River.

3.2 EQUIPMENT DESCRIPTION

Measurements were obtained with a broadband 1200 Khz Acoustic Doppler Current Profiler (ADCP) manufactured by Teledyne/RDInstruments of San Diego, CA. The ADCP was mounted rigidly to the starboard rail of the survey vessel, the 24-foot *Privateer*. Position information was provided by a Trimble 4000-series differential GPS.

The ADCP is capable of high-resolution measurements of the spatial structure of current flow beneath the instrument transducer. When mounted to a moving platform, such as a small vessel, a detailed picture of the current characteristics can be obtained. Repeating the transects at regular time intervals throughout a complete tidal cycle offers an unparalleled determination of the temporal variation in tidal current structure in the study area.

The ADCP measures currents using acoustic pulses emitted individually from four angled (at 20° from the vertical) transducers in the instrument. The instrument listens to the backscattered echoes from discrete depth layers in the water column. The returned echoes, reflected from ambient sound scatters (plankton, debris, sediment, etc.), are compared in the frequency domain to the original emitted pulse. The change in frequency (doppler shift) between the emitted versus the reflected pulse is directly proportional to the speed of the water parallel to the individual beam. For example, an echo of lower frequency indicates water moving away from the transducer while an echo of higher frequency indicates water moving toward the transducer. By combining the doppler velocity components for at least three of the four directional beams, the current velocities can be transformed to an orthogonal earth coordinate system in terms of east, north, and vertical components of current velocity.

Vertical resolution is gained using a technique called ‘range-gating’. Returning pulses are divided into discrete ‘bins’ based on discrete time intervals following the emission of the original pulse. With knowledge of the speed of sound, the discrete time intervals reflect the range (or depth) of each discrete bin from the transducer face.

The collection of accurate current data with an ADCP requires the removal of the speed of the transducer (mounted to the vessel) from the estimates of current velocity. This is performed by ‘bottom tracking’ or, using the doppler shift to measure simultaneously the velocity of the transducer relative to the bottom. Bottom tracking allows the ADCP to record absolute versus relative velocities beneath the transducer. In addition, the accuracy of the current measurements can be compromised by random errors (or noise) inherent to this technique. Improvements in the accuracy of each measurement are achieved typically by averaging several individual pulses together. These averaged results are termed ‘ensembles’; the more pings used in the average, the lower the standard deviation of the random error.

For these studies each ensemble took approximately 1.8 seconds to collect. The vertical resolution was set to 50 centimeters (approximately 19.7 inches), or one velocity observation per every 50 centimeters (approximately 19.7 inches) of water depth. The first measurement bin was centered approximately 2.7 feet from the surface, allowing for the transducer draft as well as an appropriate blanking distance between the transducer and the first measurement. The transducer was set 1.2 feet below the surface to prevent the transducer from coming out of the water due to potential waves and boat wakes.

Position information was collected by Hypack, an integrated navigation software package running on a PC computer, linked to a Trimble 4000-series differential GPS. Position updates were available every 1 second, and raw position data was also sent to the ADCP laptop to assist in verifying the clock synchronization between the GPS and ADCP.

3.3 SURVEY TECHNIQUE

The transect lines presented in Figure 6 were surveyed throughout the 12.4 hour tidal cycle and the completion of each set of transects represented a loop. These loops were repeated throughout the survey period to depict the changing effects of the current regime throughout the tidal cycle. Each repetition of the loop was performed in the same direction to assure consistent results.

Position data for each transect were recorded using Hypack, with the GPS signals distributed to both the Hypack computer and the ADCP recording computer for later comparison. ADCP data were recorded in binary format on the computer hard disk. Data recording was begun as the vessel neared the start of each line and was terminated at the end of each line. Copies of the field notes recorded throughout each of the ADCP surveys are presented in Appendix A. A summary of transects and loops is also presented in Appendix C, which includes the start and stop time of each transect, the associated recorded file names, and any comments during the survey.

3.4 DATA PROCESSING TECHNIQUES

The survey resulted in two types of data: current velocity and vessel position. The ADCP data for a single transect consisted of velocity components at every depth bin for every ensemble. In addition, the raw ADCP (binary) files also include ancillary data such as correlation magnitudes, echo amplitudes, percent good pings, and error velocities (among others). These data can be used to recalculate velocities, as well as assure quality of the results. Each ensemble also includes header information such as the ensemble number, time of the ensemble, and water temperature.

Position data were recorded as time-northing-easting. The northing-easting pairs were referenced to State Plane Coordinates, NAD 1983 (feet). The raw ADCP data were converted to ASCII files using Teledyne/RDI's proprietary software to a user-defined data format.

Subsequently, the ensemble profiles must be merged with the position data to assign a unique x-y pair to every ensemble. This merging operation is done using time and GPS position as the common link between the GPS and ADCP data files. By searching for the unique position at a specific time for each of the data sets, an accurate x-y location was assigned to each ensemble. Further numerical processing was performed to calculate the depth-averaged cross-sectional plots.

3.5 SURVEY RESULTS

3.5.1 Data Files

Detailed ASCIII data files, which provide every ensemble of data collected along each transect, are provided on the companion CD in the ADCP survey directory and as indicated in Appendix C. A sample ensemble data set is presented as Table 3.

Table 3. Example data file format for data files provided on the companion CD to this report.

Date and Time (EST)	Easting (NAD83, feet)	Northing (NAD83, feet)	Depth (feet)	Ve (ft/s)	Vn (ft/s)	Magnitude (ft/s)	Direction (radians)
23-Jun-2009 17:31:28	1213568.604	225901.548	2.723	3.88	-3.24	4.36	2.21
23-Jun-2009 17:31:28	1213568.604	225901.548	4.364	3.74	-3.19	4.89	2.19
23-Jun-2009 17:31:28	1213568.604	225901.548	6.004	3.75	-3.05	4.36	2.34
23-Jun-2009 17:31:28	1213568.604	225901.548	7.644	3.91	-2.97	4.62	2.03
23-Jun-2009 17:31:28	1213568.604	225901.548	9.285	3.66	-2.99	4.83	2.20
23-Jun-2009 17:31:28	1213568.604	225901.548	10.925	3.65	-3.06	4.34	2.22
23-Jun-2009 17:31:28	1213568.604	225901.548	12.566	3.62	-2.92	4.69	2.12
23-Jun-2009 17:31:28	1213568.604	225901.548	14.206	3.58	-3.05	4.47	2.13

23-Jun-2009 17:31:28	1213568.604	225901.548	15.846	3.66	-2.97	4.73	2.19
23-Jun-2009 17:31:28	1213568.604	225901.548	17.487	3.84	-3.13	4.92	2.16
23-Jun-2009 17:31:28	1213568.604	225901.548	19.127	3.68	-3.55	4.81	2.38
23-Jun-2009 17:31:28	1213568.604	225901.548	20.768	3.88	-3.38	5.55	2.29
23-Jun-2009 17:31:28	1213568.604	225901.548	22.408	3.68	-3.26	4.65	2.25
23-Jun-2009 17:31:28	1213568.604	225901.548	24.049	3.78	-3.43	4.90	2.37
23-Jun-2009 17:31:28	1213568.604	225901.548	25.689	3.83	-3.45	5.55	2.17
23-Jun-2009 17:31:28	1213568.604	225901.548	27.329	3.89	-3.26	4.72	2.11
23-Jun-2009 17:31:28	1213568.604	225901.548	28.970	3.52	-3.39	4.48	2.21
23-Jun-2009 17:31:28	1213568.604	225901.548	30.610	3.51	-3.56	6.45	2.42
23-Jun-2009 17:31:28	1213568.604	225901.548	32.251	3.47	-3.86	5.76	2.30
23-Jun-2009 17:31:28	1213568.604	225901.548	33.891	3.26	-3.65	4.92	2.28
23-Jun-2009 17:31:28	1213568.604	225901.548	35.531	3.03	-3.29	4.13	2.18
23-Jun-2009 17:31:28	1213568.604	225901.548	37.172	2.84	-3.49	5.35	2.36
23-Jun-2009 17:31:28	1213568.604	225901.548	38.812	2.72	-3.32	3.95	2.32
23-Jun-2009 17:31:28	1213568.604	225901.548	40.453	2.73	-3.47	4.79	2.37
23-Jun-2009 17:31:28	1213568.604	225901.548	42.093	2.27	-3.23	4.41	2.57
23-Jun-2009 17:31:28	1213568.604	225901.548	43.734	NaN	NaN	4.80	2.81
23-Jun-2009 17:31:28	1213568.604	225901.548	NaN	NaN	NaN	NaN	NaN
23-Jun-2009 17:31:28	1213568.604	225901.548	NaN	NaN	NaN	NaN	NaN
23-Jun-2009 17:31:28	1213568.604	225901.548	NaN	NaN	NaN	NaN	NaN

The data files contain information along each transect line throughout depth. The first column is the date and time of the observation, the second and third columns are the easting and northing coordinate of the observation (in NAD 1983, feet), the fourth column is the center of each depth bin (in feet), the fifth column is the east component of velocity (in feet/second), the sixth column is the north component of velocity, the seventh column is the magnitude of the current, and the eighth column is the current direction (in radians with 0 being north). The NaN's in the last rows indicate 'bad' results for depth bins below the bottom; these data are ignored. Some of the deepest bins have NaN's in the easting and northing velocity components as well. The bottom bins can become contaminated by the higher amplitude echoes reflected near the bottom and should be discounted.

3.5.2 Color Contour Plots of Current Structure

Color contour plots for every transect observed during each survey for both sites are presented in the companion CD to this report. The color contour plots represent measured conditions at the time of the survey. Each pair of plots present the spatial structure of flow through the transect at a discrete time period. Viewing a series of these plots for sequential stops through a complete tidal cycle can offer a unique understanding of how the spatial structure of flow varies with time. Figure 7 presents and example color contour plot for the June 23 Survey (transect Y4) during an ebb tide.

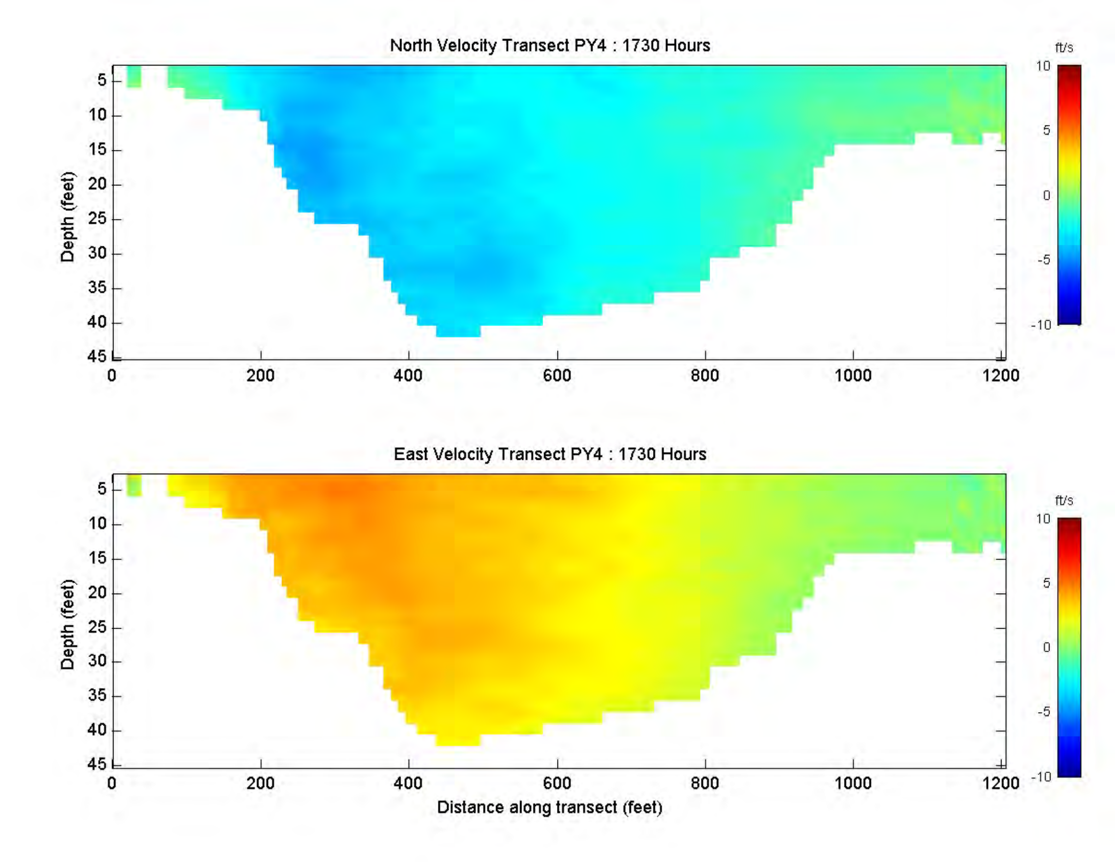


Figure 7. The current velocities, presented in color contour plots, observed during the deployment survey (June 23, 2009) for Transect Y4. The upper panel presents the north/south velocity component, while the lower panel presents the east/west velocity component.

Each figure consists of two panels: the top panel presents the north/south component of velocity through the transect, the bottom panel presents the east/west component of velocity through the transect. The directions are referenced to magnetic north. For example, positive north velocities represent water flowing in a northerly direction. Negative velocities represent water flowing to the south. Positive east velocities represent water flowing to the east; negative east velocities represent flow to the west.

The vertical axis for each plot is depth (in feet), representing the depth of the water column. The horizontal axis represents distance across the transect line. A distance of zero (0) indicates the start of the line, while the end of the transect is indicated by the maximum distance.

The color bar to the right of each plot indicates the magnitude of the north and east current velocities (in feet/second). Strong northerly and easterly flow is indicated by deep red; strong southerly and westerly flow is indicated by deep blue. White areas of each plot indicate regions below the bottom; therefore, this provides a crude indication of the channel bathymetry outlined by the white areas below the color-filled spaces.

For example, Figure 7 shows a strong south/southeast flow occurring at approximately 1730 on June 23, 2009 along transect 4 occurring during the ebb tide. The strongest flow occurs in the southwest portion of the transect, with maximum current magnitudes of approximately 7-8 feet/second (comprised of a maximum easterly component of approximately 5 to 6 feet/second and a maximum southerly component of approximately 5-6 feet/second). Figure 7 is provided as an example. The complete data set is presented on the companion CD in the ADCP survey directory.

Overall, the differences between the deployment and recovery ADCP surveys are minimal, as the data collected during each survey occurred during similar spring tide conditions. The tidal flow is relatively consistent and the current is concentrated in the River's main channel in the area of the ADCP survey. The current is also relatively uniform in depth and consists of strong flood and ebb currents that are clearly defined from times of slack low and slack high water. At this particular location, maximum current magnitudes during a flood tide are approximately 6-7 feet/second, while during an ebb tide, maximum currents are approximately 7-8 feet/second. The direction of the current aligns with the direction of the main channel in the River and forms a predictable pattern.

3.5.3 Depth Averaged Velocities

The velocities at selected nodes across each transect were determined for each time step. Each transect was divided into eight (8) equal-length subsections; the center of each subsection was labeled individually as node 1 through node 8. For each node, vertically- and horizontally-averaged (east and north) velocity components were calculated for each time step. The vertical average of each ensemble consisted of the mean velocity for all valid bins. The validity of the bottom bin measurements was determined by comparing the standard deviation of bottom values to the standard deviation of mid-column measurements. If the standard deviation at the bottom was more than twice the standard deviation of mid-column measurements, the bottom bin was discarded from the calculation. If the bottom value was within the limits defined by adjacent measurements, the value was included in the calculation. The horizontal average included all vertically-averaged ensemble velocities within each nodal subsection.

The result of this averaging procedure was a series of values showing the average velocity magnitude and direction for each loop of transects. In addition, the nodal averages included the average time of all ensembles in the subsection, average water depth of all ensembles in the subsection, and x-y position of each node. The values for each contiguous loop were plotted as arrows on separate georeferenced maps to show the current characteristics during each time step. Figure 8 shows an example from the June 23, 2009 ADCP survey for loop Y, observed from 1718 to 1733 hours during an ebb tide. Each yellow vector presents the magnitude and direction of the horizontally and depth-averaged currents along a transect line. The length of the vector corresponds to the magnitude of the current, relative to the scale arrow shown at the top of the plot. The plot shows an overall characterization of the flow patterns in the vicinity of the turning basin. The series of loop figures (presented on the companion CD in the ADCP survey directory) provide a time series of the depth-averaged current patterns for the Piscataqua River survey location.

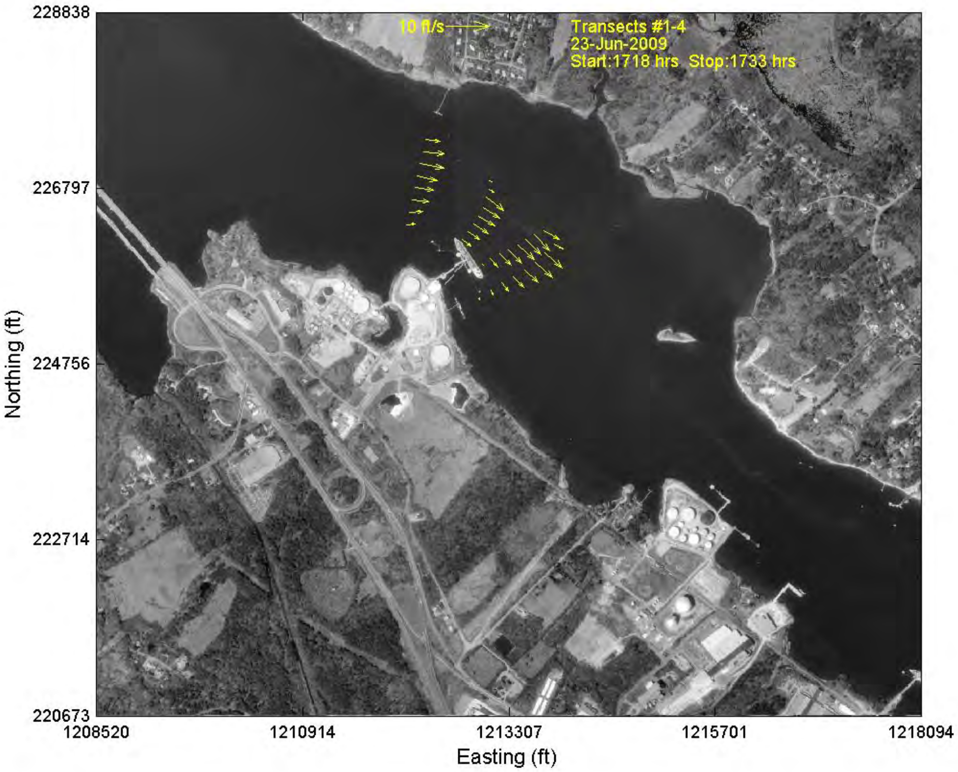


Figure 8. **Depth-averaged current results for the transects of Loop Y during the June 23, 2009 survey.**

Additionally, a similar method was used to output a depth-averaged velocity (magnitude and direction) at every 25 feet along a transect line, as requested in the RFP. These data files are provided on the companion CD in the ADCP Survey directory, and the file name nomenclature is presented in Appendix C.

APPENDIX A FIELD NOTES

6/22 Piscataqua

1532 - TIDE GAUGE DEPLOYED
OFF OF Sprague Energy.
- SBE 37SM S/N 1826
- POSITION: N 43° 07.000'
W 070° 48.645'
waypoint: "Piscat TG1"
- TIDE GAUGE MOUNTED ON
A WOODEN 2x4, 8' LENGTH.
Top of 8' 2x4 is 5.3'
below Top OF STEEL I-BEAM
ON SPRAGUE ENERGY DOCK.

1615 - TIDE GAUGE DEPLOYED
@ City of Portsmouth Dock.
- SBE 37SM S/N 1825
- position: N 43° 05.076'
W 070° 45.813'
waypoint: "PISCAT TG2"
- TIDE GAUGE MOUNTED ON
A WOODEN 2x4, 8' (feet) in Length.
Top of 8' 2x4 is 10.08' below
top of Concrete pier/dock surface.
- TIDE GAUGE ATTACHED TO

6/22 Piscataqua

cont.
wood piling adjacent to Harbor-master's boat ramp.

6/23/2009

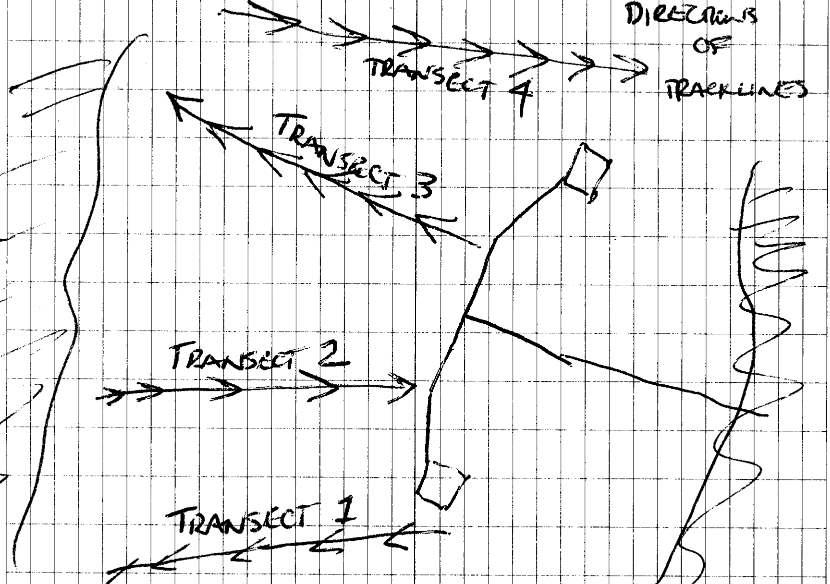
- ADCP SURVEY FOR PISCATAQUA RIVER
  6/23/2009

- LOG FILE STARTS ON NEXT PAGE

- START TIME : 0500 IN FIELD
  PREPPING ADCP

- 5:30 - CHECK ADCP
  TILT AND ROLL CALIBRATION = 2.3°

- 7:20 - TRANSDUCER DEPTH = 2.1 FT



LOOP - TRANSECT #	START TIME	STOP TIME	FILES	COMMENTS	
A - 1	0734	0739	PISCATAQUA _001.*	- END OF OUTGOING TIDE	
A - 2	0742	0745	PISCATAQUA _002.*	- END OF OUTGOING TIDE	COULDN'T GET TOO CLOSE TO EAST SHORE
A - 3	0746	0748	PISCATAQUA _003.*	- END OF OUTGOING TIDE	
A - 4	0750	0753	PISCATAQUA _004.*	- END OF OUTGOING TIDE	
B - 1	0759	0803	PISCATAQUA _005.*	SLACK LOW	
B - 2	0805	0808	PISCATAQUA _006.*	SLACK LOW	*HIT ROCK
B - 3	0809	0811	PISCATAQUA _007.*	SLACK LOW	
B - 4	0812	0816	PISCATAQUA _008.*	SLACK LOW	
C - 1	0823	0826	PISCATAQUA _009.*	[illegible]	
C - 2	0828	0831	PISCATAQUA _010.*	SLACK	
C - 3	0832	0834	PISCATAQUA _011.*		
C - 4	0836	0839	PISCATAQUA _012.*		
D - 1	0843	0846	PISCATAQUA _013.*	SLACK/START OF	
D - 2	0849	0851	PISCATAQUA _014.*	[illegible] FLOOD	
D - 3	0852	0854	PISCATAQUA _015.*		
D - 4	0856	0859	PISCATAQUA _016.*		
E - 1	0903	0906	PISCATAQUA _017.*	FLOOD	
E - 2	0908	0910	PISCATAQUA _018.*		
E - 3	0912	0913	PISCATAQUA _019.*		
E - 4	0915	0918	PISCATAQUA _020.*		
F - 1	0924	0927	Piscataqua _021.*		
F - 2	0931	0934	Piscataqua _022.*		
F - 3	0936	0938	Piscataqua _023.*		
F - 4	0939	0943	Piscataqua _024.*		

LOOP - TRANSECT	START TIME	STOP TIME	FILES	COMMENTS
G-1	0946	0948	PISCATAQUA -025.*	STRONG FLOOD
G-2	0951	0954	PISCATAQUA -026.*	
G-3	0955	0958	PISCATAQUA -027.*	
G-4	0959	1002	PISCATAQUA -028.*	
H-1	1006	1009	PISCATAQUA -029.*	
H-2	1012	1015	PISCATAQUA -030.*	FLOOD
H-3	1017	1019	PISCATAQUA -031.*	
H-4	1022	1025	PISCATAQUA -032.*	
I-1	1029	1032	PISCATAQUA -033.*	
I-2	1035	1038	PISCATAQUA -034.*	
I-3	1041	1043	PISCATAQUA -035.*	
I-4	1045	1048	PISCATAQUA -036.*	
J-1	1052	1055	PISCATAQUA -037.*	
J-2	1058	1101	PISCATAQUA -038.*	
J-3	1104	1107	PISCATAQUA -039.*	
J-4	1108	1112	PISCATAQUA -040.*	
K-1	11~~17~~41	11~~20~~44	PISCATAQUA -043.*	- ADCP power lost 1119-1120 Line repeated.
K-2	1146	1149	Piscataqua -044.*	
K-3	1151	1153	Piscataqua -045.*	
K-4	1154	1157	Piscataqua -046.*	
L-1	1201	1204	Piscataqua -047.*	STILL STRONG FLOOD
L-2	1206	1209	PISCATAQUA -048.*	
L-3	1211	1214	PISCATAQUA -049.*	
L-4	1215	1219	PISCATAQUA -050.*	

LOOP TRANSECT	START TIME	STOP TIME	FILES	COMMENTS
M-1	1223	1226	PISCATAQUA_051.*	
M-2	1228	1231	PISCATAQUA_052.*	STILL
M-3	1232	1235	PISCATAQUA_053.*	FLOODING BOAT BASED -POTENTIAL CURRENTS AT
M-4	1236	1240	PISCATAQUA_054.*	START OF LINE -START OF SLACK
N-1	1244	1247	PISCATAQUA_055.*	~~[illegible]~~
N-2	1249	1252	PISCATAQUA_056.*	START OF
N-3	1253	1256	PISCATAQUA_057.*	SLACK.
N-4	1257	1300	PISCATAQUA_058.*	INTERESTING CURRENT PATTERNS
O-1	1316	1319	PISCATAQUA_059.*	WAIT FOR OCEAN FREIGHTER
O-2	1321	1324	PISCATAQUA_060.*	TO LEAVE SEA-3 TERMINAL
O-3	1326	1330	PISCATAQUA_061.*	CHANGING TIDES
O-4	1332	1337	PISCATAQUA_062.*	ADCP SETUP CHANGED TO 36
P-1	1342	1347	PISCATAQUA_063.*	BINS, 18m DEPTH DUE TO HIGH
P-2	1350	1354	PISCATAQUA_064.*	WATER
P-3	1355	1358	PISCATAQUA_065.*	SLACK, ~~EBB START~~
P-4	1400	1405	PISCATAQUA_066.*	
Q-1	1410	1414	PISCATAQUA_067.*	SLACK
Q-2	1416	1419	PISCATAQUA_068.*	HIGH
Q-3	1419	1422	PISCATAQUA_069.*	
Q-4	1423	1427	PISCATAQUA_070.*	
R-1	1431	1436	PISCATAQUA_071.*	START OF EBB
R-2	1438	1441	PISCATAQUA_072.*	
R-3	1441	1444	PISCATAQUA_073.*	
R-4	1445	1450	PISCATAQUA_074.*	

LOOP TRANSECT	START TIME	STOP TIME	FILES	COMMENTS
S-1	1456	1500	PISCATAQUA _075.*	
S-2	1502	1505	PISCATAQUA _076.*	
S-3	1506	1508	PISCATAQUA _077.*	
S-4	1509	1514	PISCATAQUA _078.*	EBB
T-1	1520	1524	PISCATAQUA _079.*	
T-2	1526	1529	PISCATAQUA _080.*	
T-3	1529	1531	PISCATAQUA _081.*	
T-4	1532	1535	PISCATAQUA _082.*	
U-1	1540	1544	PISCATAQUA _083.*	
U-2	1546	1548	PISCATAQUA _084.*	
U-3	1548	1551	PISCATAQUA _085.*	
U-4	1552	1556	PISCATAQUA _086.*	← LOST NAV BATTERIES DEAD IN GPS REPLACED AND CONTINUED
V-1	1617	1621	PISCATAQUA _089.*	
V-2	1622	1625	PISCATAQUA _090.*	
V-3	1625	1627	PISCATAQUA _091.*	
V-4	1628	1632	PISCATAQUA _092.*	EBB
W-1	1637	1642	PISCATAQUA _093.*	
W-2	1643	1645	PISCATAQUA _094.*	
W-3	1646	1648	PISCATAQUA _095.*	
W-4	1648	1652	PISCATAQUA _096.*	
X-1	1658	1702	PISCATAQUA _097.*	
X-2	1704	1706	PISCATAQUA _098.*	
X-3	1706	1708	PISCATAQUA _099.*	
X-4	1709	1712	PISCATAQUA _100.*	

LOOP-TRANSECTS	START TIME	STOP TIME	FILES	COMMENTS
Y - 1	1718	1722	PISCATAQUA -101.*	
Y - 2	1724	1726	PISCATAQUA -102.*	
Y - 3	1727	1729	PISCATAQUA -103.*	
Y - 4	1730	1733	PISCATAQUA -104.*	
Z - 1	1738	1741	PISCATAQUA -105.*	
Z - 2	1742	1744	PISCATAQUA -106.*	
Z - 3	1745	1747	PISCATAQUA -107.*	
Z - 4	1748	1751	PISCATAQUA -108.*	
AA - 1	1757	1801	PISCATAQUA -109.*	
AA - 2	1802	1804	PISCATAQUA -110.*	
AA - 3	1804	1807	PISCATAQUA -111.*	
AA - 4	1808	1811	PISCATAQUA -112.*	
BB - 1	1816	1820	PISCATAQUA -113.*	
BB - 2	1821	1823	PISCATAQUA -114.*	
BB - 3	1823	1826	PISCATAQUA -115.*	
BB - 4	1827	1830	PISCATAQUA -116.*	
CC - 1	1835	1839	PISCATAQUA -117.*	
CC - 2	1841	1843	PISCATAQUA -118.*	
CC - 3	1843	1845	PISCATAQUA -119.*	
CC - 4	1846	1849	PISCATAQUA -120.*	CHECKED TIDE GAUGE TO ENSURE SUBMERGED
DD - 1	1857	1902	PISCATAQUA -121.*	WENT BEYOND END POINT ON TRANSECT LINE
DD - 2	1903	1905	-122.*	
DD - 3	1906	1909	-123.*	
DD - 4	1910	1913	-124.*	

LOOP-TRANSECT	START TIME	STOP TIME	FILES	COMMENTS
EE-1	1919	1922	PISCATAQUA_0125.*	
EE-2	1924	1925	PISCATAQUA_0126.*	END OF
EE-3	1926	1928	PISCATAQUA_0127.*	EBB
EE-4	1929	1931	PISCATAQUA_0128.*	
FF-1	1937	1942	PISCATAQUA_0129.*	
FF-2	1944	1947	PISCATAQUA_0130.*	
FF-3	1947	1950	PISCATAQUA_0131.*	
FF-4	1951	1954	PISCATAQUA_0132.*	

— END OF SURVEY —

SEARSPORT 6/29/2009

11:42 - SET UP PPK UNIT AT SPRAGUE TERMINAL

11:55 - UP AND RUNNING

CALLED BASE STATION - PPK BASE-TERMINAL

12:25 - PPK ~~[illegible]~~ CORPS BENCH MARK ON SEARSPORT PUBLIC BOAT RAMP TWICE

SEARSPORT - BM & SEARSPORT - BM2

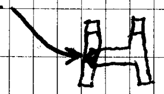
- PPK BENCHMARK ON ISLEBORO ISLAND

ISLEBORO-T1 & ISLEBORO T2

(1827)

ISLEBORO TIDEGAGE DEPLOYED AT 4:04 PM

8.7' FEET FROM PRESSURE PORT TO TOP OF 2x4, THEN 6.95' FROM TOP OF 2x4 TO PPK ~~[illegible]~~ MEASURED POINT ON IBEAM.



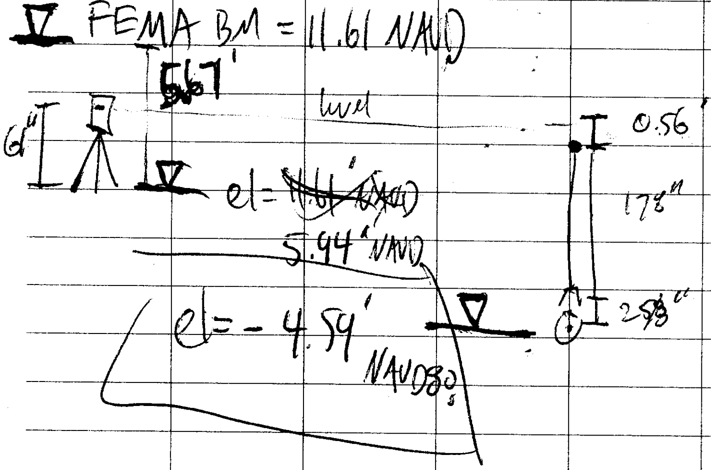
SO FROM PRESSURE PORT TO TOP OF IBEAM

= 15.65'

GAGE 1827

SBE
1826
elevation using
FEMA BM elev
slack / col-east

11.61' NAVD88
From Photogrammet
ground Control survey



7/21/09 Piscataqua
ADCP Survey

~ 6am arrive Hilton Park

Dave Walsh, Nate Dill
Lenny TG+B

VMDAS ADCP software
rr - recorder Record
Re - ErAsE - Recorder Erase
(clear Internal memory)

730 In Water

ADCP offset 1.9 ft transducer → surf
0.58 meter

VMDAS
File
Collect Data
options
Edit data..
Command tab

ADCP input 9600 bps
NEMA input 4800 bps

ADCP setup 36 Bins
0.5 m

7/21/09 Piscataqua River ADCP Survey

TRANSECT	START TIME	FILE NAME	END TIME
1 A 1	0809	Piscataqua2.001.*	0813
2 A 2	0818	Piscataqua2_002.*	0822
3 A 3	0824	Piscatqua2_003.*	0828
4 A 4	0831	_004.*	
5 B 1	0842	_005.*	0845
6 B 2	0849	_006.*	0854
7 B 3	0855	_007.*	0859
8 B 4	0901	_008.*	0905
9 C 1	0909	_009.*	0913
10 C 2	0916	_010.*	0919
11 C 3	0921	_011.*	0924
12 C 4	0926	_012.*	0931
13 D 1	0935	_013.*	0939
14 D 2	0942	_014.*	0946
15 D 3	0947	_015.*	0950
16 D 4	0952	_016.*	0957
17 E 1	1000	_017.*	1003
18 E 2	1006	_018.*	1010
19 E 3	1011	_019.*	1015
20 E 4	1019	_020.*	1023
21 F 1	1026	_021	1029
22 F 2	1032	_022.*	1035
23 F 3	1037	_023.*	1041
24 F 4	1042	_024.*	1047

(Work Horse Sentinel
1200 kHz)

Install
VmDas v1.44

PROGRAM OPTIONS

ADCP Setup

#Bins=36
Bin size=0.5
Blank dist.=0.5
Transducer depth = measure 0.58m

Heading Sensor - Internal
tilt sensor - Internal

Max range = 18

Set Bot track on

Ping as fast as possible

NAV

Enable ship position NEMA1
Enable ship speed NEMA1

Transform

Heading Source ADCP Compass
Tilt source ADCP tilt sensor
Rest Default / Blank

Piscataqua ADCP cont.

Transect	Start Time	Filename	END	
25 G1	1051	Piscataqua2_025.*	1054	
26 G2	1057	_026.*	1101	
27 G3	1101	_027.*	1105	
28 G4	1107	_028.*	1111	
29 H1	1115	_029.*	1119	
30 H2	1122	_030.*	1125	
31 H3	1126	_031.*	1129	
32 H4	1131	_032.*	1136	
33 I1	1139	_033.*	1143	
34 I2	1146	_034.*	1150	
35 I3	1152	_035.*	1156	
36 I4	1158	_036.*	1202	
37 J1	1205	_037.*	1209	
38 J2	1212	_038.*	1216	
39 J3	1216	_039.*	1220	
40 J4	1221	_040.*	1226	
41 K1	1229	_041.*	1233	
42 K2	1236	_042.*	1239	
43 K3	1239	_043.*	1243	
44 K4	1244	_044.*	1249	
45 L1	1254	_045.*	1258	
46 L2	1300	_046.*	1303	
47 L3	1304	_047.*	1308	
48 L4	1308	_048.*	1313	Direction Change
49 M1	1318	049.*	1322	

VmDas setup Cont.

Prog. opt. cont.

Averging

- Temporal

  First STA 5 Sec

  LTA 30

enable Profile Ping Ref. Layer

2 → 10

Data screening

✓ Mark Data bad below Bottom

But leave

User exits

✓ Launch WinADCP

STA

5

Sim Inputs

Leave as is

Piscataqua cont.

transect	start	Filename	End
50 M2	1324	Piscataqua2_050.*	1327
51 M3	1327	_051.*	1331
52 M4	1333	_052.*	1337
53 N1	1342	_053.*	1346
54 N2	1349	_054.*	1351
55 N3	1352	_055.*	1356
56 N4	1358	_056.*	
57 O1	1409	_057.*	1413
58 O2	1415	_058.*	1418
59 O3	1419	_059.*	1423
60 O4	1425	_060.*	1430
61 P1	1435	_061.*	1440
62 P2	1442	_062.*	1444
63 P3	1445	_063.*	1448
64 P4	1451	_064.*	1456
65 Q1	1500	_065.*	1507
66 Q2	1510	_066.*	1512
67 Q3	1513	_067.*	1517
68 Q4	1519	_068.*	1525
69 R1	1530	_069.*	1535
70 R2	1538	_070.*	1540
71 R3	1541	_071.*	1544
72 R4	1545	_072.*	1549
73 S1	1554	_073.*	1559
74 S2	1600	_074.*	1603

7/22/09 Piscataqua

Nate Dill Mitch Burk

PPK survey

Arrive Hilton Park 0715 Tide is Low

Base Antenna @ 1.5m
Set on grass (relatively firm soil)
SE corner of Park South of
Boat Ramp, East of Hwy Bridge

PPK Base Recording @ 0744

Boat in Water @ 0850

<u>Recover MicroCAT sn(1826) @ terminal</u> (PPK)

Rover pole 2m on top of Beam

63" Top of 2x4 → top of Beam

113 1/2" Water Surface → top of Beam 0927
Time

96 1/8" top of 2x4 → pressure port

Piscataqua cont.

Transect	Start	filename	END	
75 S3	1604	Piscataqua2_075.*	1606	
76 S4	1608	_076.*	1611	
77 T1	1616	_077.*	1620	
78 T2	1621	_078.*	1623	
79 T3	1624	_079.*	1628	
80 T4	~~sto~~ off track	_080.*		skip
80 T4	1631	_081.*	1634	
81 U1	1638	_082.*	1642	Wake of Bouy
82 U2	1643	_083.*	1645	
83 U3	1645	_084.*	1649	
84 U4	1650	_085.*	1653	
85 V1	1657	_086.*	1701	
86 V2	1703	_087.*	1705	
87 V3	1706	_088.*	1709	
88 V4	1712	_089.*	1716	
89 W1	1721	_090.*	1725	
90 W2	1728	_091.*	1731	
91 W3	1731	_092.*	1734	
92 W4	1735	_093	1738	
93 X1	1742	_094.*	1746	
94 X2	1748	_095.*	1749	ADCP
95 X3	1750	_096.*	1753	Hit shoal
96 X4		_097.*		← skip
97 Y1	1844	_097.*	1847	
98 Y2	1849	_098.*	1851	

7/22/09 cont.

MicroCat Recovery Sn1826 at terminal

PA - predeployment test
PC1 - Beam continuity - Rubdown
PC2 - Sensor test
CZ - put to sleep

1753 ADCP struck gravel/rocky bottom of shoal, water obviously very shallow - shallower than indicated on chart. ADCP removed from water & inspected. Inspection shows Transducers all OK, only some scratches/gouges in plastic. Communicatio w/ADCP ok as well.

Piscataqua Cont.

transect	Start	Filename	END
99 Y 3	1851	Piscataqua_099.*	1854
100 Y 4	1856	_100.*	1858
101 Z 1	1901	_101.*	1904
102 Z 2	1905	_102.*	1908
103 Z 3	1909	_103.*	1911
104 Z 4	1913	_104.*	
105 AA	1920	_105.*	1922
106 AA 2	1925	_106.*	1928
107 AA 3	1929	_107.*	1931
108 AA	1934	_108.*	1937
109 BB 1	1940	_109.*	1944
110 BB 2	1947	_110.*	1950
111 BB 3	1951	_111.*	1954
112 BB 4	1957	_112.*	1959
113 CC	2002	_113.*	2005
114 CC 2	2007	_114.*	2009
115 CC 3	2010	_115.*	2012
116 CC 4	2014	_116.*	2016

7/22/09

Recovery of tide gage at Portsmouth fire Boat — Time 0946

10.04 ft top of Peir to top of 2x4
Concrete

Tide Looking pretty High

9.2 ft water surface → concrete

0.53 ft high point on piling → concrete

Sn 1825 usually
in good condition

96¼" top of 2x4 → pressure port

---

get data off Microcats

Sn 1826

stop 1120
ds Max sample # 7164
DD

seabird 37sm

Sn 1825

---

max sample # 7174

stop 1221
dd 0, 7174

Total Stat Survey

Shot 1 : Tripod → BM

X	57.46	57.44	57.42
Z	1.82	1.84	1.80

Rod 73 1/8"
Total 65 1/8"

Shot 2 : Tripod → B160

X	72.84	72.88
Z	0.20	0.20

Rod = 73 1/8"
Tot = 65 1/8"

Shot 3: Tripod → P200

X	100.40	100.38	100.32
Z	1.42	1.42	1.42

Rod = 73 1/8"
Tot = 65 1/8"

Shot 4: Tripod → S412

X	262.42	262.44	262.30
Z	0.56	0.52	0.52

Rod = 73
Tot = 65 1/8

(Through metal fence)

Shot 5: Tripod → Base

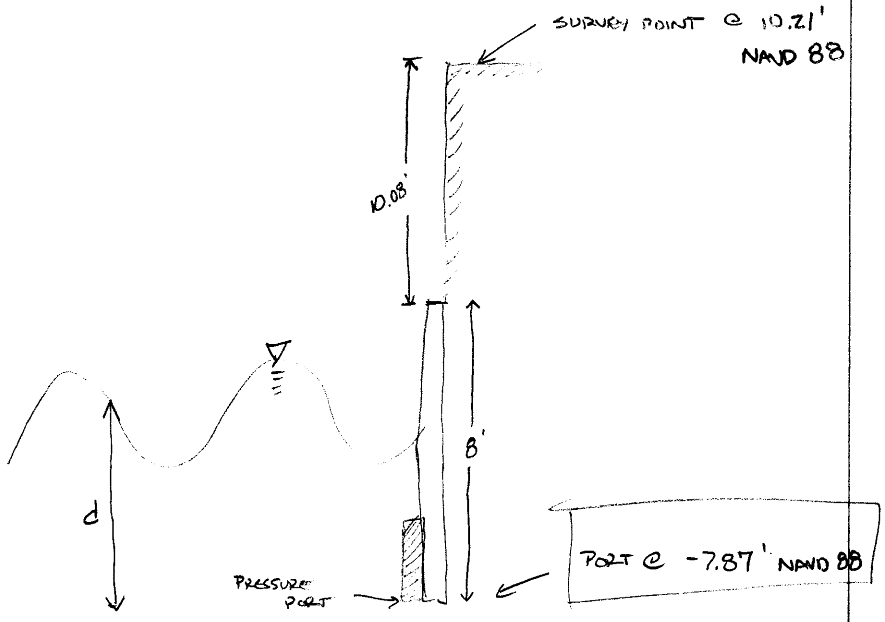
X	520.28	520.24	520.18	520.26
Z	-2.40	-2.02	-2.04	-2.62

X	520.18	520.12	520.02
Z	-2.36	-2.16	2.80

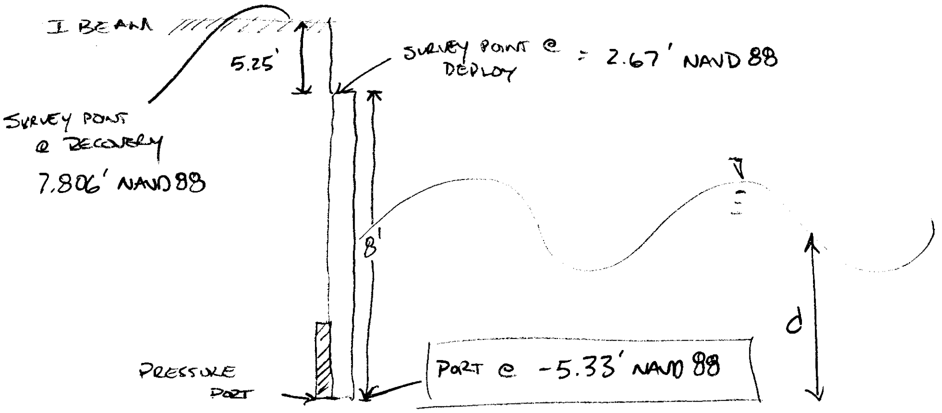
APPENDIX B TIDE DATA BENCHMARKING

PISCATAQUA RIVER TIDAL SURVEY ADJUSTMENT TO DATUM

STATION P1 AT CITY OF PORTSMOUTH DOCK, GAUGE S/N 1825



STATION P2 AT SPRAGUE ENERGY TERMINAL, GAUGE S/N 1826



APPENDIX C ADCP TRANSECT AND LOOP SUMMARY

PISCATAQUA RIVER DEPLOYMENT SURVEY, June 25, 2009

Loop	Transect	Start Time	Stop Time	Entire Data File	Depth-Averaged Data File	Comments
A	1	734	739	PA1_0734.dat	DA_PA1_0734.dat	End of Ebb Tide
A	2	742	745	PA2_0742.dat	DA_PA2_0742.dat	
A	3	746	748	PA3_0746.dat	DA_PA3_0746.dat	
A	4	750	753	PA4_0750.dat	DA_PA4_0750.dat	
B	1	759	803	PB1_0759.dat	DA_PB1_0759.dat	Slack Low
B	2	805	808	PB2_0805.dat	DA_PB2_0805.dat	
B	3	809	811	PB3_0809.dat	DA_PB3_0809.dat	
B	4	812	816	PB4_0812.dat	DA_PB4_0812.dat	
C	1	823	826	PC1_0823.dat	DA_PC1_0823.dat	Slack Low
C	2	828	831	PC2_0828.dat	DA_PC2_0828.dat	
C	3	832	834	PC3_0832.dat	DA_PC3_0832.dat	
C	4	836	839	PC4_0836.dat	DA_PC4_0836.dat	
D	1	843	846	PD1_0843.dat	DA_PD1_0843.dat	Start of Flood
D	2	849	851	PD2_0849.dat	DA_PD2_0849.dat	
D	3	852	854	PD3_0852.dat	DA_PD3_0852.dat	
D	4	856	859	PD4_0856.dat	DA_PD4_0856.dat	
E	1	903	906	PE1_0903.dat	DA_PE1_0903.dat	
E	2	908	910	PE2_0908.dat	DA_PE2_0908.dat	
E	3	912	913	PE3_0912.dat	DA_PE3_0912.dat	
E	4	915	918	PE4_0915.dat	DA_PE4_0915.dat	
F	1	924	927	PF1_0924.dat	DA_PF1_0924.dat	
F	2	931	934	PF2_0931.dat	DA_PF2_0931.dat	
F	3	936	938	PF3_0936.dat	DA_PF3_0936.dat	
F	4	939	943	PF4_0939.dat	DA_PF4_0939.dat	
G	1	946	948	PG1_0946.dat	DA_PG1_0946.dat	
G	2	951	954	PG2_0951.dat	DA_PG2_0951.dat	
G	3	955	958	PG3_0955.dat	DA_PG3_0955.dat	
G	4	959	1002	PG4_0959.dat	DA_PG4_0959.dat	
H	1	1006	1009	PH1_1006.dat	DA_PH1_1006.dat	
H	2	1012	1015	PH2_1012.dat	DA_PH2_1012.dat	
H	3	1017	1019	PH3_1017.dat	DA_PH3_1017.dat	
H	4	1022	1025	PH4_1022.dat	DA_PH4_1022.dat	
I	1	1029	1032	PI1_1029.dat	DA_PI1_1029.dat	Flood
I	2	1035	1038	PI2_1035.dat	DA_PI2_1035.dat	
I	3	1041	1043	PI3_1041.dat	DA_PI3_1041.dat	
I	4	1045	1048	PI4_1045.dat	DA_PI4_1045.dat	
J	1	1052	1055	PJ1_1052.dat	DA_PJ1_1052.dat	
J	2	1058	1101	PJ2_1058.dat	DA_PJ2_1058.dat	
J	3	1104	1107	PJ3_1104.dat	DA_PJ3_1104.dat	
J	4	1108	1112	PJ4_1108.dat	DA_PJ4_1108.dat	
K	1	1141	1144	PK1_1141.dat	DA_PK1_1141.dat	ADCP Power lost on Line K1, reinitialized and repeated line
K	2	1146	1149	PK2_1146.dat	DA_PK2_1146.dat	
K	3	1151	1153	PK3_1151.dat	DA_PK3_1151.dat	
K	4	1154	1157	PK4_1154.dat	DA_PK4_1154.dat	
L	1	1201	1204	PL1_1201.dat	DA_PL1_1201.dat	
L	2	1206	1209	PL2_1206.dat	DA_PL2_1206.dat	
L	3	1211	1214	PL3_1211.dat	DA_PL3_1211.dat	
L	4	1215	1219	PL4_1215.dat	DA_PL4_1215.dat	
M	1	1223	1226	PM1_1223.dat	DA_PM1_1223.dat	Vessel traffic, possible induced currents on Line M3
M	2	1228	1231	PM2_1228.dat	DA_PM2_1228.dat	
M	3	1232	1235	PM3_1232.dat	DA_PM3_1232.dat	
M	4	1236	1240	PM4_1236.dat	DA_PM4_1236.dat	
N	1	1244	1247	PN1_1244.dat	DA_PN1_1244.dat	Possible boat induced currents, Ocean Freighter leaving SEA-3 Terminal
N	2	1249	1252	PN2_1249.dat	DA_PN2_1249.dat	
N	3	1253	1256	PN3_1253.dat	DA_PN3_1253.dat	
N	4	1257	1300	PN4_1257.dat	DA_PN4_1257.dat	

O	1	1316	1319	PO1_1316.dat	DA_PO1_1316.dat	
O	2	1321	1324	PO2_1321.dat	DA_PO2_1321.dat	
O	3	1326	1330	PO3_1326.dat	DA_PO3_1326.dat	
O	4	1332	1337	PO4_1332.dat	DA_PO4_1332.dat	
P	1	1342	1347	PP1_1342.dat	DA_PP1_1342.dat	Approaching Slack High
P	2	1350	1354	PP2_1350.dat	DA_PP2_1350.dat	
P	3	1355	1358	PP3_1355.dat	DA_PP3_1355.dat	
P	4	1400	1405	PP4_1400.dat	DA_PP4_1400.dat	
Q	1	1410	1414	PQ1_1410.dat	DA_PQ1_1410.dat	Slack High
Q	2	1416	1419	PQ2_1416.dat	DA_PQ2_1416.dat	
Q	3	1419	1422	PQ3_1419.dat	DA_PQ3_1419.dat	
Q	4	1423	1427	PQ4_1423.dat	DA_PQ4_1423.dat	
R	1	1431	1436	PR1_1431.dat	DA_PR1_1431.dat	Start of Ebb
R	2	1438	1441	PR2_1438.dat	DA_PR2_1438.dat	
R	3	1441	1444	PR3_1441.dat	DA_PR3_1441.dat	
R	4	1445	1450	PR4_1445.dat	DA_PR4_1445.dat	
S	1	1456	1500	PS1_1456.dat	DA_PS1_1456.dat	
S	2	1502	1505	PS2_1502.dat	DA_PS2_1502.dat	
S	3	1506	1508	PS3_1506.dat	DA_PS3_1506.dat	
S	4	1509	1514	PS4_1509.dat	DA_PS4_1509.dat	
T	1	1520	1524	PT1_1520.dat	DA_PT1_1520.dat	Ebb
T	2	1526	1529	PT2_1526.dat	DA_PT2_1526.dat	
T	3	1529	1531	PT3_1529.dat	DA_PT3_1529.dat	
T	4	1532	1535	PT4_1532.dat	DA_PT4_1532.dat	
U	1	1540	1544	PU1_1540.dat	DA_PU1_1540.dat	
U	2	1546	1548	PU2_1546.dat	DA_PU2_1546.dat	
U	3	1548	1551	PU3_1548.dat	DA_PU3_1548.dat	
U	4	1552	1556	PU4_1552.dat	DA_PU4_1552.dat	
V	1	1617	1621	PV1_1617.dat	DA_PV1_1617.dat	Lost GPS signal after Line U4, batteries dead, replaced batteries and
V	2	1622	1625	PV2_1622.dat	DA_PV2_1622.dat	
V	3	1625	1627	PV3_1625.dat	DA_PV3_1625.dat	
V	4	1628	1632	PV4_1628.dat	DA_PV4_1628.dat	
W	1	1637	1642	PW1_1637.dat	DA_PW1_1637.dat	
W	2	1643	1645	PW2_1643.dat	DA_PW2_1643.dat	
W	3	1646	1648	PW3_1646.dat	DA_PW3_1646.dat	
W	4	1648	1652	PW4_1648.dat	DA_PW4_1648.dat	
X	1	1658	1702	PX1_1658.dat	DA_PX1_1658.dat	
X	2	1704	1706	PX2_1704.dat	DA_PX2_1704.dat	
X	3	1706	1708	PX3_1706.dat	DA_PX3_1706.dat	
X	4	1709	1712	PX4_1709.dat	DA_PX4_1709.dat	
Y	1	1718	1722	PY1_1718.dat	DA_PY1_1718.dat	Strong Ebb
Y	2	1724	1726	PY2_1724.dat	DA_PY2_1724.dat	
Y	3	1727	1729	PY3_1727.dat	DA_PY3_1727.dat	
Y	4	1730	1733	PY4_1730.dat	DA_PY4_1730.dat	
Z	1	1738	1741	PZ1_1738.dat	DA_PZ1_1738.dat	
Z	2	1742	1744	PZ2_1742.dat	DA_PZ2_1742.dat	
Z	3	1745	1747	PZ3_1745.dat	DA_PZ3_1745.dat	
Z	4	1748	1751	PZ4_1748.dat	DA_PZ4_1748.dat	
AA	1	1757	1801	PAA1_1757.dat	DA_PAA1_1757.dat	
AA	2	1802	1804	PAA2_1802.dat	DA_PAA2_1802.dat	
AA	3	1804	1807	PAA3_1804.dat	DA_PAA3_1804.dat	
AA	4	1808	1811	PAA4_1808.dat	DA_PAA4_1808.dat	
BB	1	1816	1820	PBB1_1816.dat	DA_PBB1_1816.dat	
BB	2	1821	1823	PBB2_1821.dat	DA_PBB2_1821.dat	
BB	3	1823	1826	PBB3_1823.dat	DA_PBB3_1823.dat	
BB	4	1827	1830	PBB4_1827.dat	DA_PBB4_1827.dat	
CC	1	1835	1839	PCC1_1835.dat	DA_PCC1_1835.dat	Checked tide gage after Line CC4
CC	2	1841	1843	PCC2_1841.dat	DA_PCC2_1841.dat	
CC	3	1843	1845	PCC3_1843.dat	DA_PCC3_1843.dat	

CC	4	1846	1849	PCC4_1846.dat	DA_PCC4_1846.dat	
DD	1	1857	1902	PDD1_1857.dat	DA_PDD1_1857.dat	
DD	2	1903	1905	PDD2_1903.dat	DA_PDD2_1903.dat	
DD	3	1906	1909	PDD3_1906.dat	DA_PDD3_1906.dat	
DD	4	1910	1913	PDD4_1910.dat	DA_PDD4_1910.dat	
EE	1	1919	1922	PEE1_1919.dat	DA_PEE1_1919.dat	End of Ebb Tide
EE	2	1924	1925	PEE2_1924.dat	DA_PEE2_1924.dat	
EE	3	1926	1928	PEE3_1926.dat	DA_PEE3_1926.dat	
EE	4	1929	1931	PEE4_1929.dat	DA_PEE4_1929.dat	
FF	1	1939	1942	PFF1_1939.dat	DA_PFF1_1939.dat	
FF	2	1944	1947	PFF2_1944.dat	DA_PFF2_1944.dat	
FF	3	1947	1950	PFF3_1947.dat	DA_PFF3_1947.dat	
FF	4	1951	1954	PFF4_1951.dat	DA_PFF4_1951.dat	

PISCATAQUA RIVER RECOVERY SURVEY, July 21, 2009						
				Entire	Depth-Averaged	
Loop	Transect	Start Time	Stop Time	Data File	Data File	Comments
A	1	809	813	PA1_0809.dat	DA_PA1_0809.dat	
A	2	818	822	PA2_0818.dat	DA_PA2_0818.dat	
A	3	824	828	PA3_0824.dat	DA_PA3_0824.dat	
A	4	831	835	PA4_0831.dat	DA_PA4_0831.dat	
B	1	842	845	PB1_0842.dat	DA_PB1_0842.dat	
B	2	849	854	PB2_0849.dat	DA_PB2_0849.dat	
B	3	855	859	PB3_0855.dat	DA_PB3_0855.dat	
B	4	901	905	PB4_0901.dat	DA_PB4_0901.dat	
C	1	909	913	PC1_0909.dat	DA_PC1_0909.dat	
C	2	916	919	PC2_0916.dat	DA_PC2_0916.dat	
C	3	921	924	PC3_0921.dat	DA_PC3_0921.dat	
C	4	926	931	PC4_0926.dat	DA_PC4_0926.dat	
D	1	936	939	PD1_0936.dat	DA_PD1_0936.dat	
D	2	942	946	PD2_0942.dat	DA_PD2_0942.dat	
D	3	947	950	PD3_0947.dat	DA_PD3_0947.dat	
D	4	952	957	PD4_0952.dat	DA_PD4_0952.dat	
E	1	1000	1003	PE1_01000.dat	DA_PE1_01000.dat	
E	2	1006	1010	PE2_01006.dat	DA_PE2_01006.dat	
E	3	1011	1015	PE3_01011.dat	DA_PE3_01011.dat	
E	4	1018	1023	PE4_01018.dat	DA_PE4_01018.dat	
F	1	1026	1029	PF1_01026.dat	DA_PF1_01026.dat	
F	2	1032	1035	PF2_01032.dat	DA_PF2_01032.dat	
F	3	1037	1041	PF3_01037.dat	DA_PF3_01037.dat	
F	4	1042	1047	PF4_01042.dat	DA_PF4_01042.dat	
G	1	1051	1054	PG1_01051.dat	DA_PG1_01051.dat	
G	2	1057	1101	PG2_01057.dat	DA_PG2_01057.dat	
G	3	1101	1105	PG3_01101.dat	DA_PG3_01101.dat	
G	4	1107	1111	PG4_01107.dat	DA_PG4_01107.dat	
H	1	1115	1119	PH1_1115.dat	DA_PH1_1115.dat	
H	2	1122	1125	PH2_1122.dat	DA_PH2_1122.dat	
H	3	1126	1129	PH3_1126.dat	DA_PH3_1126.dat	
H	4	1131	1136	PH4_1131.dat	DA_PH4_1131.dat	
I	1	1139	1143	PI1_1139.dat	DA_PI1_1139.dat	
I	2	1146	1150	PI2_1146.dat	DA_PI2_1146.dat	
I	3	1152	1156	PI3_1152.dat	DA_PI3_1152.dat	
I	4	1158	1202	PI4_1158.dat	DA_PI4_1158.dat	
J	1	1205	1209	PJ1_1205.dat	DA_PJ1_1205.dat	
J	2	1212	1216	PJ2_1212.dat	DA_PJ2_1212.dat	
J	3	1216	1220	PJ3_1216.dat	DA_PJ3_1216.dat	
J	4	1222	1226	PJ4_1222.dat	DA_PJ4_1222.dat	
K	1	1229	1233	PK1_1229.dat	DA_PK1_1229.dat	
K	2	1236	1239	PK2_1236.dat	DA_PK2_1236.dat	
K	3	1239	1243	PK3_1239.dat	DA_PK3_1239.dat	
K	4	1244	1249	PK4_1244.dat	DA_PK4_1244.dat	
L	1	1254	1258	PL1_1254.dat	DA_PL1_1254.dat	
L	2	1300	1303	PL2_1300.dat	DA_PL2_1300.dat	
L	3	1304	1308	PL3_1304.dat	DA_PL3_1304.dat	
L	4	1308	1313	PL4_1308.dat	DA_PL4_1308.dat	
M	1	1318	1322	PM1_1318.dat	DA_PM1_1318.dat	
M	2	1324	1327	PM2_1324.dat	DA_PM2_1324.dat	
M	3	1327	1330	PM3_1327.dat	DA_PM3_1327.dat	
M	4	1333	1337	PM4_1333.dat	DA_PM4_1333.dat	
N	1	1342	1346	PN1_1342.dat	DA_PN1_1342.dat	
N	2	1349	1351	PN2_1349.dat	DA_PN2_1349.dat	
N	3	1352	1356	PN3_1352.dat	DA_PN3_1352.dat	
N	4	1358	1403	PN4_1358.dat	DA_PN4_1358.dat	

O	1	1408	1413	PO1_1408.dat	DA_PO1_1408.dat	
O	2	1416	1418	PO2_1416.dat	DA_PO2_1416.dat	
O	3	1419	1423	PO3_1419.dat	DA_PO3_1419.dat	
O	4	1425	1430	PO4_1425.dat	DA_PO4_1425.dat	
P	1	1435	1440	PP1_1435.dat	DA_PP1_1435.dat	
P	2	1442	1444	PP2_1442.dat	DA_PP2_1442.dat	
P	3	1445	1448	PP3_1445.dat	DA_PP3_1445.dat	
P	4	1450	1456	PP4_1450.dat	DA_PP4_1450.dat	
Q	1	1500	1507	PQ1_1500.dat	DA_PQ1_1500.dat	
Q	2	1509	1512	PQ2_1509.dat	DA_PQ2_1509.dat	
Q	3	1513	1517	PQ3_1513.dat	DA_PQ3_1513.dat	
Q	4	1519	1525	PQ4_1519.dat	DA_PQ4_1519.dat	
R	1	1530	1535	PR1_1530.dat	DA_PR1_1530.dat	
R	2	1537	1540	PR2_1537.dat	DA_PR2_1537.dat	
R	3	1541	1544	PR3_1541.dat	DA_PR3_1541.dat	
R	4	1545	1549	PR4_1545.dat	DA_PR4_1545.dat	
S	1	1554	1559	PS1_1554.dat	DA_PS1_1554.dat	
S	2	1601	1603	PS2_1601.dat	DA_PS2_1601.dat	
S	3	1603	1606	PS3_1603.dat	DA_PS3_1603.dat	
S	4	1608	1611	PS4_1608.dat	DA_PS4_1608.dat	
T	1	1616	1620	PT1_1616.dat	DA_PT1_1616.dat	
T	2	1621	1623	PT2_1621.dat	DA_PT2_1621.dat	
T	3	1624	1628	PT3_1624.dat	DA_PT3_1624.dat	
T	4	1631	1634	PT4_1631.dat	DA_PT4_1631.dat	
U	1	1638	1642	PU1_1638.dat	DA_PU1_1638.dat	
U	2	1643	1645	PU2_1643.dat	DA_PU2_1643.dat	
U	3	1646	1649	PU3_1646.dat	DA_PU3_1646.dat	
U	4	1650	1653	PU4_1650.dat	DA_PU4_1650.dat	
V	1	1657	1701	PV1_1657.dat	DA_PV1_1657.dat	
V	2	1703	1705	PV2_1703.dat	DA_PV2_1703.dat	
V	3	1705	1709	PV3_1705.dat	DA_PV3_1705.dat	
V	4	1712	1716	PV4_1712.dat	DA_PV4_1712.dat	
W	1	1720	1725	PW1_1720.dat	DA_PW1_1720.dat	
W	2	1728	1731	PW2_1728.dat	DA_PW2_1728.dat	
W	3	1731	1734	PW3_1731.dat	DA_PW3_1731.dat	
W	4	1734	1738	PW4_1734.dat	DA_PW4_1734.dat	
X	1	1742	1746	PX1_1742.dat	DA_PX1_1742.dat	
X	2	1748	1749	PX2_1748.dat	DA_PX2_1748.dat	Shallow water, ADCP hit bottom, removed and inspected and tested prior to restarting survey
X	3	1750	1753	PX3_1750.dat	DA_PX3_1750.dat	
X	4	NaN	NaN	NaN	NaN	
Y	1	1844	1847	PY1_1844.dat	DA_PY1_1844.dat	
Y	2	1849	1851	PY2_1849.dat	DA_PY2_1849.dat	
Y	3	1851	1854	PY3_1851.dat	DA_PY3_1851.dat	
Y	4	1856	1858	PY4_1856.dat	DA_PY4_1856.dat	
Z	1	1901	1904	PZ1_1901.dat	DA_PZ1_1901.dat	
Z	2	1906	1908	PZ2_1906.dat	DA_PZ2_1906.dat	
Z	3	1909	1911	PZ3_1909.dat	DA_PZ3_1909.dat	
Z	4	1913	1918	PZ4_1913.dat	DA_PZ4_1913.dat	
AA	1	1920	1922	PAA1_1920.dat	DA_PAA1_1920.dat	
AA	2	1925	1928	PAA2_1925.dat	DA_PAA2_1925.dat	
AA	3	1929	1931	PAA3_1929.dat	DA_PAA3_1929.dat	
AA	4	1934	1937	PAA4_1934.dat	DA_PAA4_1934.dat	
BB	1	1940	1944	PBB1_1940.dat	DA_PBB1_1940.dat	
BB	2	1947	1950	PBB2_1947.dat	DA_PBB2_1947.dat	
BB	3	1951	1954	PBB3_1951.dat	DA_PBB3_1951.dat	
BB	4	1957	1959	PBB4_1957.dat	DA_PBB4_1957.dat	
CC	1	2002	2005	PCC1_2002.dat	DA_PCC1_2002.dat	
CC	2	2007	2009	PCC2_2007.dat	DA_PCC2_2007.dat	

CC	3	2010	2012	PCC3_2010.dat	DA_PCC3_2010.dat	
CC	4	2014	2016	PCC4_2014.dat	DA_PCC4_2014.dat	

US Army Corps of Engineers
New England District

Portsmouth Harbor and Piscataqua River
Navigation Improvement Project
New Hampshire and Maine

Appendix H

Real Estate Plan

Prepared by:
R. Jeffrey Teller
New England District

June 12, 2014

U.S. ARMY CORPS OF ENGINEERS
New England District

1. GENERAL

The purpose of the feasibility study is to determine whether navigation improvements to the existing Federal navigation project at Portsmouth Harbor and Piscataqua River are warranted and in the Federal interest. The Non-Federal Sponsor has been identified as the NH Pease Development Authority, Division of Ports and Harbors. The existing 800 foot width of the upper turning basin is too narrow for efficient and safe handling of existing and future commerce. The proposed alternative provides a wider turning basin to serve the two terminals situated in the upper channel reaches of the Piscataqua River. This study of Portsmouth Harbor and Piscataqua River, New Hampshire and Maine, was directed by Section 436 of the Water Resources Development Act of 2000 (P.L. 106-541) which states:

> *"The Secretary shall conduct a study to determine the feasibility of modifying the project for navigation, Portsmouth Harbor and Piscataqua River, Maine and New Hampshire, authorized by section 101 of the River and Harbor Act of 1962 (76 Stat. 1173) and modified by section 202(a) of the Water Resources Development Act of 1986 (100 Stat. 4095), to increase the authorized width of turning basins in the Piscataqua River to 1,000 feet."*

It is noted the referenced study authority is based on a width up to 1,000 feet wide; however, Section 216 of the Flood Control Act of 1970 also provides the Corps general authority to review completed civil works projects.

> *"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to the significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest".*

The existing Federal Navigation Project for Portsmouth Harbor and Piscataqua River consists of a 6.2 mile long navigation channel that is 35-feet deep at mean lower low water (MLLW), a minimum of 400 feet wide, and extends from deep water at the river's mouth at New Castle, New Hampshire/Kittery, Maine to the head of deep-draft navigation at Newington, New Hampshire/Eliot, Maine. Alternative improvement plans analyzed and compared during the feasibility study included no action, widening the existing turning basin from 800 feet to widths of 1020, 1120 or 1200 feet, and relocating the turning basin to either an upstream or downstream location. The tentatively recommended navigation improvement plan identified in the report is widening the existing turning basin to 1200 feet at the authorized depth of 35 feet mean lower low water. Approximately 728,100 cubic yards of mostly sand and gravel (glacial till), and about 25,300 cubic yards of rock would be removed to widen the existing turning basin to 1200 feet; the total project foot-print has been defined as approximately 20+/-acres relative to basin improvements. The disposal area has been identified as one circular nautical mile.

Development of the recommended plan was based on identification of the plan with the highest net annual benefits which is the National Economic Development (NED) plan, in this case widening the existing turning basin to a width of 1200 feet. The NED Plan includes the Federal Base Plan for ocean placement of the dredged material and rock at the Isles of Shoals North site (IOS-N), identified by the Corps and US EPA as a likely selectable site, and is the plan selected for implementation.

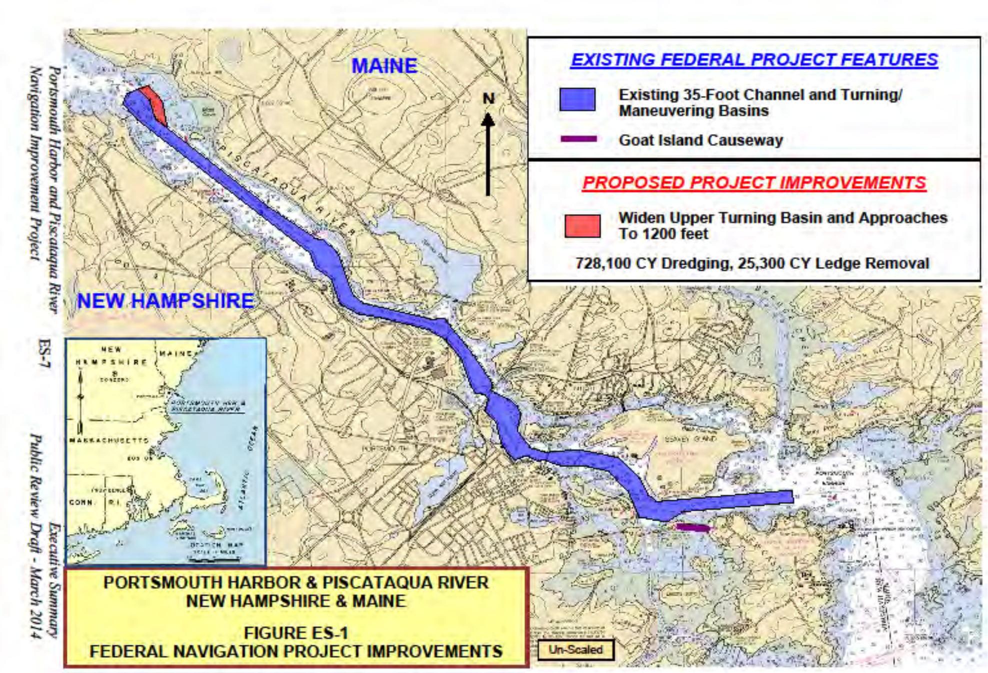
In accordance with feasibility plan review, the proposed areas to be dredged and the open water disposal and alternative near shore disposal areas required for construction are below the ordinary high watermark of the navigable watercourse. Therefore, navigational servitude will apply to this project.

No lands, easements, rights-of way are required for improvement project implementation. The area to be dredged and the open water disposal areas required for construction are below the ordinary high watermark of the navigable watercourse and will entail work by a waterborne dredging plant. There are no pierhead or bulkhead lines for the upper Piscataqua River where this project is located including the State pier area. Therefore, navigational servitude applies will be invoked for the project. Any contractor bidding this project will be required to make their own private arrangements for waterside berth access for survey and work boats and tugs, including shore side access for contractor personnel and inspectors via commercial piers in the vicinity of Portsmouth Harbor or they may potentially utilize the New Hampshire State Pier which is managed by the local sponsor. While more specific opportunities for access may be developed during the project's design phase, at this time the Corps will not dictate the specific location for the access points to the river. As an alternative, waterside birth access could be provided at the New Hampshire State Pier, which is managed by the non-Federal Sponsor. The location of this pier is labeled, "NH State Pier" on Figure 3 of the Main Report. As the berths and piers are subject to navigation servitude no credit would be due the non-Federal Sponsor for this use of their pier.

Description of Recommended Plan:

The recommended plan is supported by the non-Federal Sponsor. The plan accomplishes the objectives of reducing safety hazards and grounding damages, decreasing turning costs, and reducing waterborne transportation costs for carriers and shippers utilizing the two upper Piscataqua River terminals identified as beneficiaries of the project. Cost sharing of the recommended plan is based on sharing the costs of the Federal base plan between the Federal government and the non-Federal Sponsor. The estimated project first cost for the Federal base plan is $20,367,000 (October 2013 price level). That cost escalated to the programmed budget year (Fiscal Year 2015) is $20,774,000. Costs escalated to the assumed fully funded mid-point of construction of February 2016) would be $21,295,000. The Federal share would be 75 percent and the non-Federal sponsor's share would be 25 percent. The non-Federal Sponsor would also be responsible for an additional contribution equal to 10 percent of the project cost after construction to be paid over a period not to exceed 30 years. O&M requirements are Federal responsibility, in accordance with the existing project as modified by this proposed turning basin widening. Long term O&M disposal for this project has always been in-river in deep holes within the existing Federal channel and this practice is expected to continue for the project as modified for the full project life.

Figure H-1 Federal Navigation Project Improvements



2. REAL ESTATE REQUIREMENTS: Land, Easements, Rights-of-Way, Relocations, Borrow Material, and Dredged or Excavated Material Disposal Requirements

The Project Delivery Team (PDT) confirms that the proposed navigation improvements and dredged material disposal sites do not require the acquisition of any real property interests based on application of Navigation Servitude (Federal riparian rights below MHWL).

Plan details referenced below depict the limits of construction (and operation) within the existing federal navigation channel. Therefore, no Temporary Work Area, Road/Access Easements, or permanent easements are required for construction or maintenance. If limited temporary access or staging areas are determined to be needed in the future, this will be a contractor requirement or we will work with non-Federal Sponsor to accomplish. As previously referenced, the total project foot-print has been defined as adding approximately 20+/-acres to the existing basin improvements located in the federal navigation channel. The disposal area has been identified as one nautical mile in diameter and located over 10 miles from the mainland. See Figure H-3 referenced below.

Figure H-2: Federal Navigation Improvement Plan

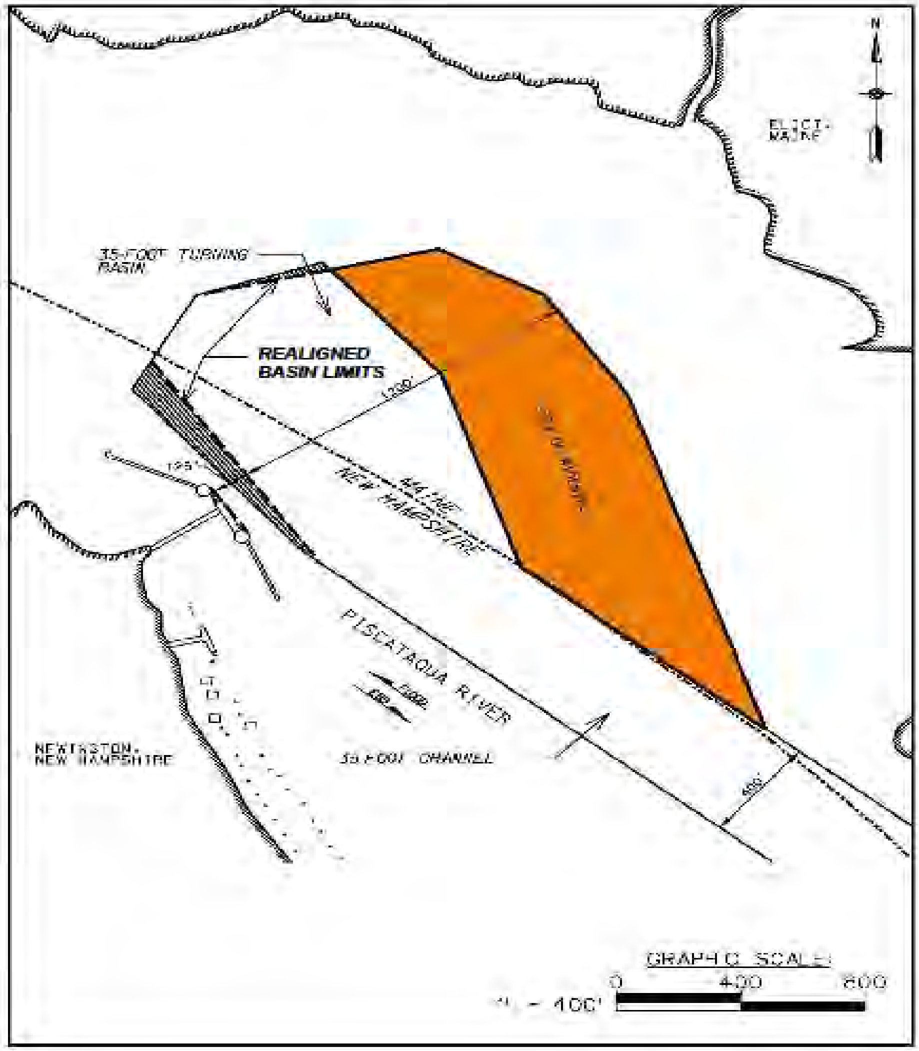
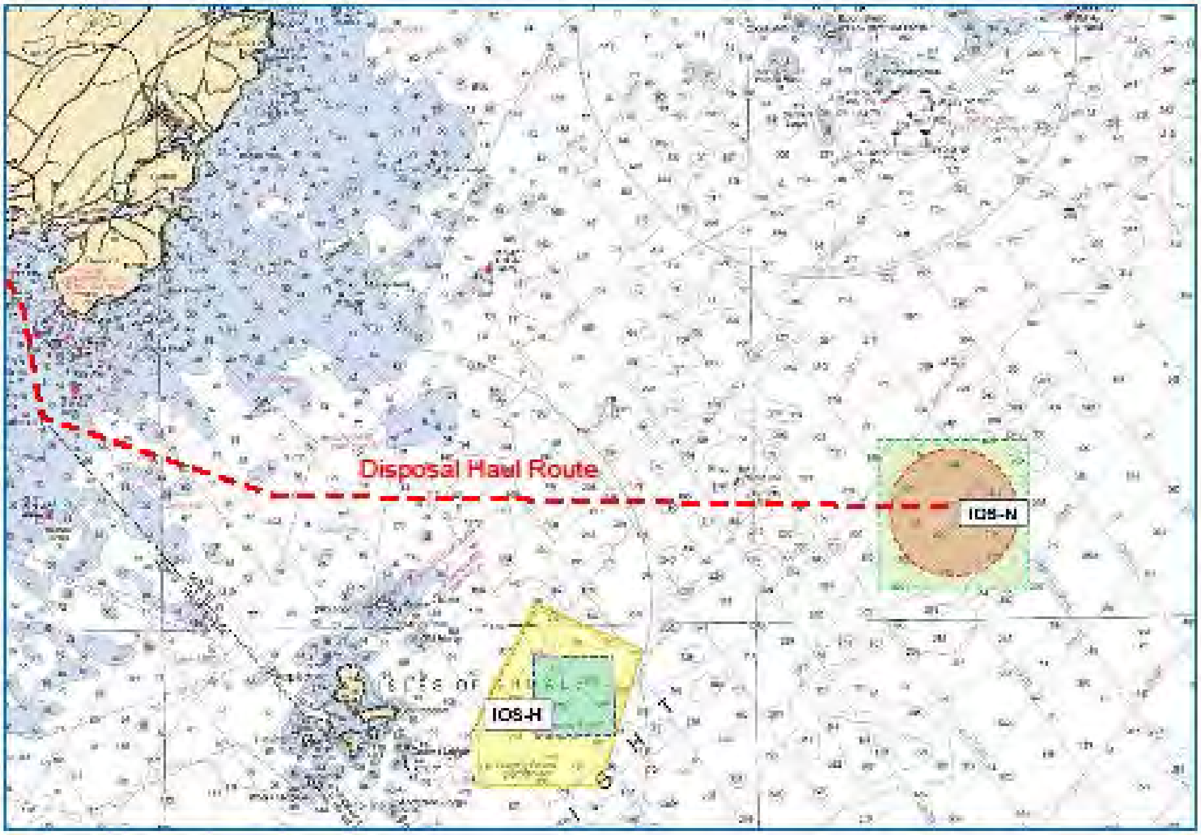


Figure H-3: Isle of Shoals Ocean Placement Sites



Dredging of sand and gravel will be accomplished using a mechanical dredge. Dredging is expected to take four to six months, including one –two months for removal of the bedrock to design depth. It is likely the rock will need to be drilled and blasted. The Corps will incorporate all applicable best management practices to minimize negative effects of the proposed dredging, blasting, and disposal actions.

Several alternatives and options for dredged material disposal (approximately 728,100 cubic yards sand and gravel and 25,300 cy of rock), including beneficial use, have been analyzed. For project cost and approval purposes, Isle of Shoals-North is the likely selectable site for one-time use for placement of dredged materials (if no nearshore beneficial use sites are implemented). This ocean site is located seaward of the three nautical mile limit of the territorial sea in federal waters, just northeast of the Isle of Shoals. No real estate interest will be required.

The Corps has coordinated with communities along the coastlines of Maine, Massachusetts, and New Hampshire regarding beneficial use opportunities for the dredged materials from the project. Several communities have expressed interest in having this material. Excavated rock may be off loaded at the New Hampshire State Terminal along the Piscataqua River and used for upland public works projects. The locations for nearshore placement are identified in the study report and state and federal agency coordination has been initiated. The recommended plan is the Federal Base Plan which includes the disposal of all materials, including sand and rock, at the Isle of Shoals-North Ocean Placement Site. USACE and EPA have conducted studies of the proposed ocean placement site and concluded that is likely selectable under Ocean Dumping Act criteria. Should the locally proposed beneficial use plans not come to pass, then PED phase includes preparation of a site selection memo for the ocean placement site that will be coordinated with the EPA.

3. EXISTING FEDERAL PROJECTS

This project is a modification to the existing federal navigation projects (1962 and 1986) for the purpose of widening the turning basin at the upstream end of the federal channel near Newington, New Hampshire and Eliot, Maine from 800 feet to 1200 feet in width and 35-feet deep at MLLW. Reference 1.4.1 Construction History of the Navigation Project in main report.

4. EXISTING FEDERALLY OWNED LANDS

The project area is within a navigable waterway and contains no lands owned by the federal government.

5. LANDS OWNED BY THE NON-FEDERAL SPONSOR

Project construction does not require the non-Federal Sponsor to provide any land areas. However the non-Federal Sponsor owns the New Hampshire State Pier in Portsmouth Harbor, which potentially could be utilized in conjunction with project construction requirements. (Figure 3 of the Main Report). A final land ownership determination will be completed in PED, if required.

6. NAVIGATIONAL SERVITUDE

The CENAE Office of Counsel has reviewed this navigation improvement feasibility study and has determined that project improvements meet the test of legal sufficiency. Navigational servitude is the right of the federal Government under the Commerce Clause of the U.S. Constitution to use, control, and regulate the navigable waters of the United States and the submerged lands thereunder for various commerce-related purposes including navigation and flood control. In tidal areas, the servitude extends to all lands below the mean high water mark. In non-tidal areas, the servitude extends to all within the bed and banks of a navigable stream that lie below the ordinary high water level. As this project is for navigation purposes, the Government will exercise its rights under the doctrine of Navigational Servitude for this project for all areas below MHWL, in order to maintain and improve the navigation channel, in accordance with Federal policy and regulations.

7. INDUCED FLOODING

There is nothing in the main feasibility report to indicate that the constructed project features will induce flooding in new areas or increase flooding in existing flood prone areas. Accordingly, there will be no construction or project induced flooding.

8. BASELINE COST ESTIMATE FOR REAL ESTATE

As referenced throughout this report, based on the feasibility plan there are no real property acquisition requirements or baseline real estate costs, as all constructed improvements and disposal areas will be located in lands subject to Federal Navigation Servitude.

9. PUBLIC LAW-646 RELOCATIONS

There are no facilities or utilities within the project boundaries requiring relocation. This will be reviewed and confirmed at PED phase.

10. MINERAL ACTIVITY

The Project Delivery Team (PDT) confirms there is no present or anticipated mining and drilling activity in the vicinity of the project that may affect project purposes and the operation thereof.

11. TIMBER RIGHTS

The Project Delivery Team (PDT) confirms that there are no timber rights required. The project lands are within the navigable waterway.

12. ASSESSMENT OF NON-FEDERAL SPONSOR ACQUISITION CAPABILITY

There are no real estate acquisition requirements. However if the project requirements change, the Non-Federal Sponsor, NH Pease Development Authority, Division of Ports and Harbors, is vested with sufficient power to acquire and hold title, and to condemn lands as needed for public purposes. The non-Federal Sponsor has previously participated in other Corps of Engineers' Local Cooperation Projects and has demonstrated their capabilities in acquiring real estate and performing the related obligations of a Non-Federal Sponsor.

13. ZONING

There are no zoning considerations associated with this project.

14. ACQUISITION SCHEDULE

There are no real estate acquisition requirements since navigation servitude will be asserted.

15. UTILITY AND FACILITY RELOCATIONS

The Project Delivery Team (PDT) confirms that there are no utility or facility relocation requirements. Confirmation will occur during PED phase.

16. ENVIRONMENTAL CONCERNS

The Project Delivery Team (PDT) confirms that there are no known or suspected contaminants (HTRW) located in the construction or the disposal areas. For additional information on environmental findings please reference the Environmental Assessment and Finding of No Significant Impact.

17. ATTITUDES OF THE LANDOWNERS

The Non-Federal Sponsor reports overall community support for this navigation improvement project. The record does not indicate any known opposition or public concerns.

The proposed navigation improvement project was coordinated with the Penobscot Tribe, the Passamaquoddy Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah), Tribal Historic Preservation Officers.

18. NOTIFICATION TO NON-FEDERAL SPONSOR

The Non-Federal Sponsor has executed a feasibility cost share agreement dated June 12, 2006, and if the project is approved, a Project Partnership Agreement will be required. At this time, the non-Federal Sponsor will not be required to acquire any land interests for project purposes.

19. RISK ANALYSIS

Currently, there are no known significant risks associated with this project involving real estate. As referenced throughout this report, there are no real estate acquisition requirements based on application of Navigation Servitude.

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX I
CULTURAL RESOURCE INVESTIGATIONS
AND COORDINATION

TECHNICAL REPORT

MARINE ARCHAEOLOGICAL SURVEY
PISCATAQUA RIVER

Eliot, Maine

CONTRACT NO. DACW33-03-D-0002 IDIQ
TASK ORDER NO. 0012

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PAL Report No. 2019 December 2008

PAL Publications

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SF 298 (Face)

REPORT DOCUMENTATION PAGE	*Form Approved* *OMB No. 0704–0188*

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE January 2009	3. REPORT TYPE AND DATES COVERED

4. TITLE AND SUBTITLE MARINE ARCHAEOLOGICAL SURVEY PISCATAQUA RIVER, ELIOT, MAINE	5. FUNDING NUMBERS Contract No. DACW33-03-D-0002 IDIQ
6. AUTHOR(S) David S. Robinson, M.A., R.P.A. (with contributions by Jeffrey D. Gardner, M.S., P.G.)	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) PAL, 210 Lonsdale Avenue, Pawtucket, Rhode Island 02860	8. PERFORMING ORGANIZATION REPORT NUMBER PAL Report No. 2019
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751	10. SPONSORING /MONITORING AGENCY REPORT NUMBER Task Order No. 0012
11. SUPPLEMENTARY NOTES	
12a. DISTRIBUTION/AVAILABILITY STATEMENT Restricted to official use only	12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

PAL, under contract with the U.S. Army Corps of Engineers, New England District, conducted a remote sensing archaeological survey of the proposed navigation improvement project area in the Piscataqua River, Eliot, Maine. The archaeological work was conducted to identify and document remote sensing target areas with potential to be significant archaeological deposits (i.e., shipwecks) or intact paleosols with archaeological sensitivity for containing pre-contact sites within the project area. The survey consisted of archival research and field investigation using differential GPS, side scan sonar, a marine magnetometer, and sub-bottom profiler to acquire 100 percent coverage within the project area along a series of parallel surveyed track lines spaced 50 feet apart.

Systematic, multidisciplinary archival research, remote sensing archaeological field survey, and geotechnical data analysis of the Piscataqua River navigation improvement project area documented no targets with potential to be National Register-eligible post-contact archaeological deposits and no areas of buried paleosols with archaeological sensitivity for potentially containing pre-contact period archaeological deposits. Based on the results of this study, no additional archaeological investigations within the project area are recommended.

14. SUBJECT TERMS marine archaeological remote sensing survey, Piscataqua River, Eliot, Maine	15. NUMBER OF PAGES 158
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	18.SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT SAR

NSN 7540–01–280–5500

Standard Form 298 (Rev 2–89)
Prescribed by ANSI Std. 239–18
298–102

MANAGEMENT ABSTRACT

PAL has completed a remote sensing archaeological survey of the proposed navigation improvement project area in the Piscataqua River, Eliot, Maine. The archaeological work was conducted to identify and document any remote sensing target areas with potential to be significant archaeological deposits (i.e., shipwrecks) or intact paleosols with archaeological sensitivity for containing pre-contact sites within the project area. The survey was authorized and conducted under contract with the U.S. Army Corps of Engineers, New England District to comply with Section 106 of the National Historic Preservation Act of 1966 (16 USC 470f), as amended (1976, 1980, 1992, 1999), and implementing regulations of the Advisory Council on Historic Preservation (36 CFR 800).

The remote sensing survey consisted of archival research and field investigation using differential GPS, high frequency side-scan sonar, a cesium-vapor marine magnetometer, and a seismic sub-bottom profiler to acquire 100 percent coverage within the proposed navigation improvement area along a series of parallel surveyed track lines spaced 50 feet apart.

Systematic, multidisciplinary archival research, remote sensing archaeological field survey, and geotechnical data analysis of the Piscataqua River navigation improvement project area documented no targets with potential to be National Register-eligible post-contact archaeological deposits and no areas of buried paleosols with archaeological sensitivity for potentially containing pre-contact period archaeological deposits.

Based on the results of this study, no additional archaeological investigations are recommended within the Piscataqua River navigation improvement project area.

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CHAPTER ONE

INTRODUCTION

This report presents the results of a remote sensing marine archaeological survey of the U.S. Army Corps of Engineers, New England District's (NAE) proposed navigation improvement project area in the Piscataqua River, Eliot, Maine (Figures 1-1 and 1-2). The NAE is preparing to expand a turning basin in the River to provide improved access to piers located east of Newington Station, Newington, New Hampshire. The archaeological work was conducted to identify and document any remote sensing target areas with potential to be contact or post-contact period archaeological deposits (i.e., shipwrecks) or intact paleosols with archaeological sensitivity for containing pre-contact archaeological deposits. The survey was conducted under contract with the NAE, in accordance with approved work and safety plans for the investigation.

Scope

As a federal undertaking, the NAE turning basin expansion project is subject to review under Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended (36 CFR 800). Section 106 requires that all federal agencies take into account the effect of their undertaking on cultural resources listed or eligible for listing in the National Register of Historic Places (National Register) (36 CFR 60). The agency must also afford the Advisory Council on Historic Preservation the opportunity to comment on the undertaking. The Section 106 process is coordinated at the state level by the State Historic Preservation Office (SHPO), which in Maine operates within the office of the Maine Historic Preservation Commission (MHPC).

The scope of the archaeological investigations (Appendix A) included archival research and fieldwork consisting of a marine geophysical survey utilizing a magnetometer, side-scan sonar, and a sub-bottom profiler. The fieldwork and report will assist NAE in complying with Section 106 of the NHPA of 1966, as amended (1976, 1980, 1992, 1999), for the proposed channel deepening project. The report will also be a scholarly document that fulfills the mandated legal requirements, and serves as a scientific reference and planning tool for future professional studies.

Authority

The survey was authorized by NAE to comply with the National Historic Preservation Act of 1966 (P.L. 89-665; 80 Stat. 915) as amended (16 U.S.C. 470 et seq.); the National Environmental Policy Act of 1969 (P.L. 91-190; 83 Stat. 852; 42 U.S.C. 4321 et seq.); the Archaeological Resources Protection Act of 1979 (P.L. 96-95; 93 Stat. 721; 16 U.S.C. 470 et seq.); the Abandoned Shipwreck Act of 1987 (P.L. 100-298; 102 Stat. 432; 43 U.S.C. 2102); the National Maritime Heritage Act of 1994 (P.L. 103-451; 108 Stat. 4769; 16 U.S.C. 5401); the Advisory Council on Historic Preservation, Protection of Historic Properties (36 CFR 800); the National Register of Historic Places, Nominations by States and Federal Agencies (36 CFR Part 60); the

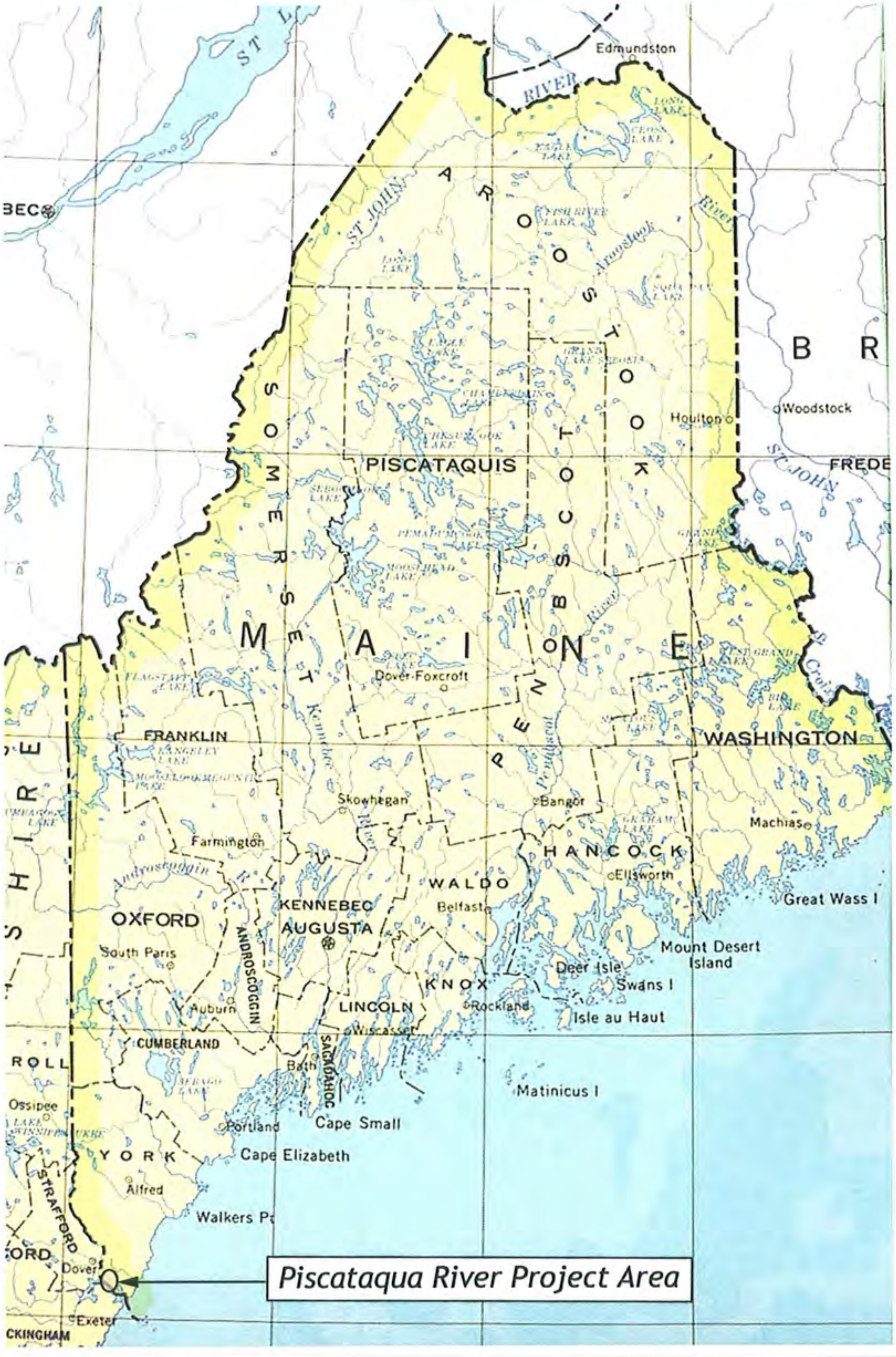


Figure 1-1. 1972 (rev. 1990) USGS Maine state map (1:2,500,000 scale) showing the general location of the Piscataqua River project study area in York County.

Marine Archaeological Survey, Piscataqua River, December 2008

Figure 1-2. Map showing the location of the Piscataqua River project study area in relation to Eliot and Kittery, Maine, Newington and Portsmouth, New Hampshire, Frankfort Island, and Great Bay (source: Google Earth 2008).

U.S. Army Corps of Engineers' Regulations ER 1105-2-50, Planning, Environmental Resources, Chapter 3, Historic Preservation; the Secretary of the Interior's Standards and Guidelines for Identification (1983); the MHPC's Contract Archaeology Guidelines; and the Maine Department of Educational and Cultural Services State Historic Preservation Officer's Standards for Archaeological Work in Maine (27 MRSA S.509).

The remote sensing archaeological survey was approved by the NAE district archaeologist, and performed in consultation with the state archaeologist at the MHPC. No state permit was required to conduct the non-disturbance remote sensing survey.

All fieldwork was conducted in accordance with the Accident Prevention Plan (APP) and the Activity Hazards Analyses (AHAs) prepared by PAL, and their marine survey subcontractor, Ocean Surveys, Inc. (OSI), for the project. Both the APP and AHAs were approved in writing by the NAE Safety Office prior to commencement of field activities.

Project Description

One of the closest US ports to Europe, the deep water port of Portsmouth Harbor and the Piscataqua River are used by domestic and international commercial vessels throughout the year (http://www.des.state.nh.us/Coastal/documents/PiscataquaRiverUses.pdf). The River's 400 foot (ft)-wide (122 meter [m]) navigation channel and approximately 750 ft-wide (229 m) turning basin at the channel's northern end are federally maintained at a charted authorized depth of 28 ft (8.5 m) below Mean Low Low Water (MLLW). The present size of the turning basin impedes the maneuverability of commercial vessels using the River Road Sprague Energy terminal in Newington Station. Therefore, the NAE is currently considering the feasibility of removing sediments from the river bed to expand the turning basin from approximately 750 to 1,250 ft (229 to 381 m) and dredging the area to a maximum depth of 45 ft (14 m) below MLLW, as outlined in the USACE's project scope-of-work dated November 6, 2006 (Figure 1-3).

Nature of Study

This marine archaeological study was conducted as part of a larger investigation designed to assess the proposed project's effects on submerged archaeological deposits as well as to evaluate geologic conditions in the depth of interest for the project. To record the data necessary for this archaeological assessment and evaluation, PAL and its sub-consultant, Ocean Surveys, Inc. (OSI), performed a vessel-based non-disturbance survey using a towed array of remote sensing instruments to document geological and potential cultural features on the seafloor, in accordance with the field methodology approved in advance by NAE. Archival research of primary and secondary sources and informal informant interviews were also performed as part of the archaeological task to obtain the necessary information for preparing environmental and historical context narratives of the survey area, and to preliminarily assess the potential National Register eligibility of identified resources.

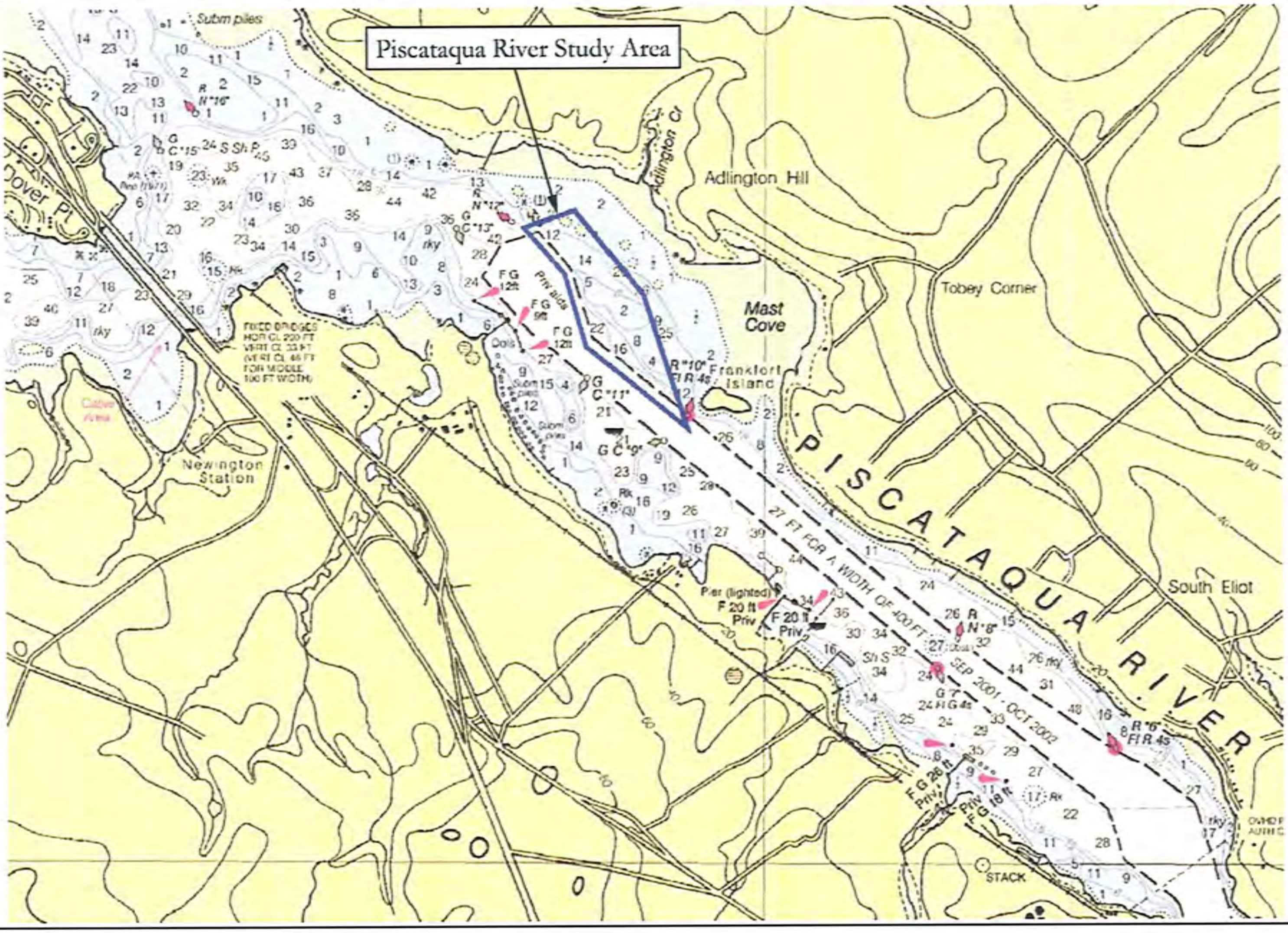


Figure 1-3. Excerpt of NOAA Chart No. 13285 showing the limits of the project study area within the Piscataqua River, Eliot, Maine (map courtesy of NAE).

Project Personnel

PAL staff involved in the project included David S. Robinson (project manager/principal investigator/site safety and health officer), and Suzanne Cherau (corporate safety and health officer). OSI project staff included Thaddeus A. Nowak (general manager), John D. Sullivan (geophysical surveys program manager), Jeffrey D. Gardner (senior geophysical scientist/project manager), and Greg Schulmeister (marine electronics technician/boat operator).

Disposition of Project Materials

All project information is currently on file at PAL, 210 Lonsdale Avenue, Pawtucket, Rhode Island. PAL serves as a temporary curation facility for these materials until such time as the U.S. government designates a permanent repository that meets the requirements under 36 CFR 79.

CHAPTER TWO

METHODOLOGY

The systematic, interdisciplinary research methodologies employed in this investigation followed those outlined in the NAE project scope-of-work (SOW) (see Appendix A) and did not deviate from the project work plan. The two principal goals of this investigation were:

1) assess the archaeological sensitivity of the Piscataqua River project area and;

2) determine the presence or absence of archaeological properties within it.

These goals were met through a combination of archival research and remote sensing archaeological field survey.

Archaeological sensitivity is defined as the likelihood for archaeological sites to be present within a particular area based on different categories of information. In the case of the Piscataqua River project area, such sites could potentially include submerged pre-contact period Native American settlement sites, fishing gear, and watercraft, as well as contact and post-contact period Native and Euro-American fishing gear and watercraft.

Assessment of the Piscataqua River project area's archaeological sensitivity involved conducting archival research to identify and consider previously documented offshore archaeological resources, the environmental and geomorphological history and sedimentary environment of the Piscataqua River within the context of regional/local pre-contact through post-contact period settlement, subsistence, and maritime activity patterns. For this aspect of the investigation, a review of the following sources was completed

- National and State Registers for any archaeological properties in the proposed Piscataqua River project area that have been listed on or are potentially eligible for nomination to be listed;

- National Oceanic and Atmospheric Administration's (NOAA) on-line Automated Wreck and Obstruction Information System (AWOIS);

- Northern Maritime Research's Northern Shipwreck Database (NSWDB) (Version 2002);

- Paul Sherman's Collection of Shipwreck Notes and Information on file at the Massachusetts Board of Underwater Archaeology;

- Environmental studies providing information about the geomorphological history of coastal Maine and the effects of the Holocene marine transgression;

- Published and unpublished primary and secondary sources held in the Maine State Library, and in the research library at PAL; and

- Informal informant interviews with: Maine State Archaeologist, Arthur Spiess; University of Maine Darling Marine Center Research Associate Professor, Warren Riess; and Massachusetts Board of Underwater Archaeological Resources Deputy Director, David Trubey.

In addition to the archival research that was performed, a marine archaeological reconnaissance field survey was completed December 20 and 21, 2006. The field investigation methodology followed the specifications outlined in the NAE's project SOW and consisted of non-disturbance marine remote sensing survey performed by PAL and its subcontractor (OSI) to aid in determining the presence/absence of potential archaeological properties within the Piscataqua River project area.

Survey operations were conducted from OSI's research vessel (R/V *Ready II*), a 26-ft (8 m) motorboat equipped with dual outboard engines, a fully enclosed cabin, and an array of survey and support equipment (Figure 2-1). A differential satellite global positioning system (DGPS) interfaced with an onboard computer was used to precisely navigate the vessel throughout the survey area and record positioning data. Differential satellite corrections transmitted to the survey vessel via a radio link at a frequency and rate of 288 kilohertz (kHz)/100 bits per second (bps) from the U.S. Coast Guard DGPS beacon at Portsmouth, New Hampshire provided reliable survey control of the vessel throughout the survey area. The computer navigation software utilized onboard the survey vessel converted the geodetic coordinates (latitude-longitude) to State Plane coordinates (easting-northing) for navigation while logging these position data at one-second intervals along survey track lines. The survey was conducted in the Maine State Plane Coordinate System - West Zone 1802, referencing the North American Datum of 1983 (NAD 83) with all coordinates in feet. The accuracy of the positioning system was verified by performance of navigation checks at the start and end of each survey day at a horizontal check point ("Great Bay Marina Slip 1A") established at the Great Bay Marina dock. The recorded position of this check point was N 103845 / E 2774061 (Maine State Plane Coordinate System - West Zone 1802, referencing the NAD 83). According to Trimble, this DGPS configuration typically provides repeatable position accuracies of less than 3 ft (1 m).

Prior to beginning field investigations, coordinates were obtained from the NAE for the boundaries of the Piscataqua River project area (Table 2-1).

Figure 2-1. Piscataqua River Project survey vessel R/V *Ready II.*

Table 2-1. Piscataqua River Survey Area Limits

Point	Easting (feet)*	Northing (feet)*
1	2781542.5	105206.7
2	2782299.3	104257.0
3	2782784.7	102743.9
4	2781666.7	103670.2
5	2781430.9	104492.0
6	2780980.4	105009.4

*Coordinates for survey area limits are in the Maine State Plane Coordinate System - West Zone 1802, referencing the NAD 83.

Survey equipment used to complete the field investigation included:

- Trimble 4000 and ProBeacon Differential GPS;
- HYPACK MAX Navigation Software;
- Klein 3000 Dual Frequency Side-Scan Sonar System (Figure 2-2);
- Geometrics G-882 Marine Cesium Magnetometer (see Figure 2-2);
- Applied Acoustics Engineering "Boomer" Seismic Reflection System (see Figure 2-2).

The side-scan sonar towfish and magnetometer sensor were deployed off the sides of the vessel and each towed off a davit and winch to allow modification of sensor height along tracklines. The side-scan sonar system was set at a 164 ft (50 meter) sweep range to obtain high resolution data with more than 200 percent overlapping coverage of the bottom. Side-scan sonar data were collected on parallel lines spaced 150 ft (46 m) apart. The altitude of the side-scan sonar towfish above the riverbed was maintained at 10 to 15 percent of the range where water depth and operational safety parameters allowed.

To ensure detection of even the smallest targets of potential archaeological interest, the magnetometer sensor was towed at a nominal altitude above the riverbed of not more than 20 ft (6 m) and measurements of the Earth's magnetic field were recorded along every one of the survey track lines, which were offset at a 50 ft (15.25 m) interval (Figure 2-3).

The "boomer" sound source (catamaran with boomer plate) and receiver (hydrophone array or "eel") were towed off the vessel's stern outside the boat propeller wash to minimize acoustic noise. Sub-bottom profile data were recorded along every third track line, at the same 150 ft (46 m) interval as the side-scan sonar. The "boomer" seismic system recorded data at a 100 millisecond scan rate to record a total depth profile (water and stratigraphic column) of

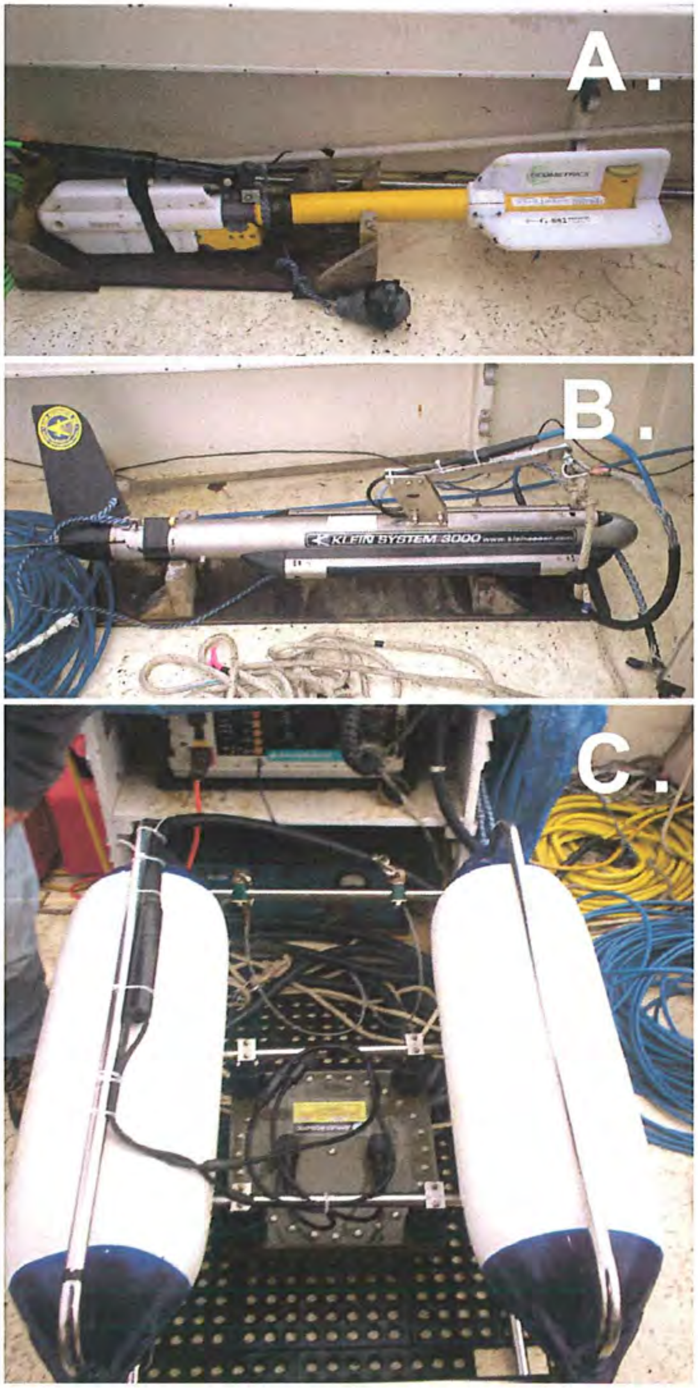


Figure 2-2. Piscataqua River Project survey instrumentation: A) Geometrics 882 cesium-vapor marine magnetometer sensor; B) Klein 3000 dual frequency digital side-scan sonar towfish; and C) Applied Acoustics Engineering seismic reflection system (power supply and catamaran with boomer plate – hydrophone array not shown).

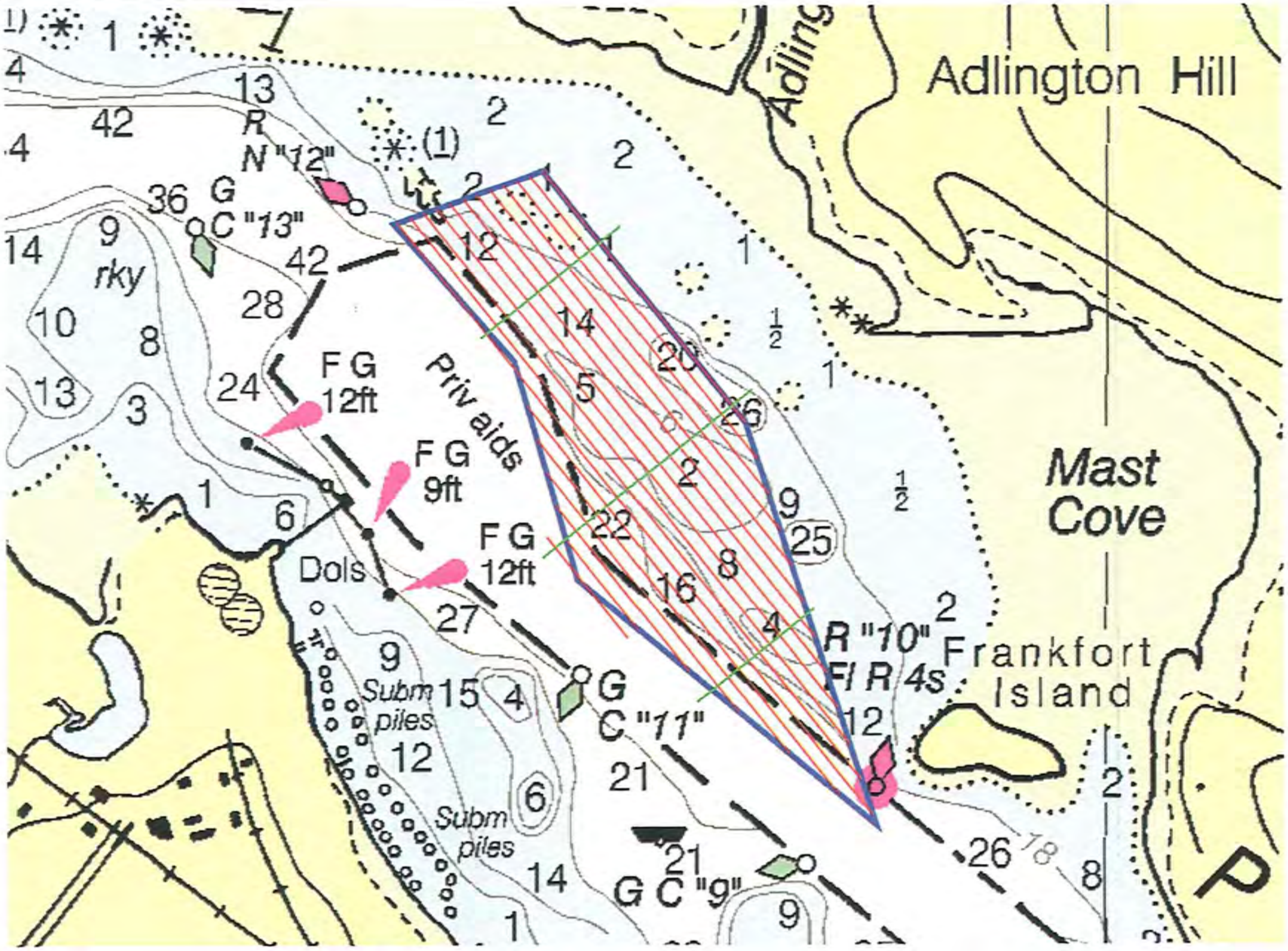


Figure 2-3. Piscataqua River Project planned survey track lines and tie-lines (magnetometer line interval - 50 ft [15.25 m]; side-scan sonar and sub-bottom profiler line interval – 150 ft [46 m]) (plot courtesy of OSI).

approximately 250 ft (76 m) (assuming 5,000 ft (1,524 m) per second sound velocity in sediments). The system collects raw seismic signals in the 0 to 10 kHz range, with filtered frequencies of 0.08 to 4 kHz used for final display and interpretation. Laybacks and offsets to sensors were recorded in the field for application during post-survey processing.

Lines were numbered and identified to allow ease of use. As an additional means of providing data quality control, three "tie lines" (i.e., track lines running perpendicular to the primary track lines) were also surveyed. Data generated by the survey were reviewed by the project archaeologist, both as they were recorded in the field and after post-processing. Post-processing of the data involved reconstructing survey track lines to include adjustments for sensor layback and offset, and plotting the x/y coordinates logged at each "fix" point along each track by the HYPACK MAX software package.

Criteria utilized for interpreting the various types of survey data (both during and after the survey) and selecting anomalies as targets of potential archaeological interest, either individually or collectively with other anomalies, relied on a combination of factors. These factors included the type of data being considered, environmental conditions, predicted types of resources likely to be encountered, survey-design parameters employed, and the scientific knowledge and practical experience of the project archaeologist.

Consideration and interpretation of acoustic data produced by the side-scan sonar and sub-bottom profiler is relatively straightforward. Acoustic targets appear as visual anomalies in the ambient visual field of the riverbed in either plan view (as in the case of a side-scan sonar record) or in profile (as in the cases of sub-bottom profiler and fathometer records). Side-scan sonar targets are selected as possible archaeological targets based on their appearances, that is, whether or not they appear to be a shipwreck or cannot otherwise be eliminated as a possible shipwreck. The sizes of targets, their relief above the riverbed, and the relative density of their constituent parts are all obtainable from the sonar record.

Sub-bottom profiler targets generally fall into two categories of archaeological interest: those that appear to be shallowly buried, discrete, anthropogenic deposits, and those that appear to be buried geological features. The former can be associated with shipwrecks, and if so, often have corresponding anomalies within the magnetometer data and side-scan sonar data (e.g., low to moderate intensity and moderate duration magnetic signatures and subtle, yet distinct, changes in bottom composition). The latter are sometimes associated with anomalies in the magnetic data and/or changes in riverbed that are visible in the acoustic data sets. Sub-bottom reflectors that are geological in nature and buried beneath the surface of the riverbed result from changes in sediment density caused by post-inundation marine sedimentation processes, inundation sequences, pre-submergence depositional events, or older geological processes. Some reflectors have characteristics that are readily identifiable as relict elements of the pre-submergence paleolandscape, such as paleochannel features, beach/shoreline features, upland terraces, etc. However, conclusive determination of the nature of a reflector requires physical evidence obtained through geotechnical surveying (i.e., vibratory cores or deep borings).

Interpretation of magnetic data is less straightforward. Anomalies of archaeological interest can range from several to thousands of gammas in intensity, and extend tens or hundreds of feet or meters in duration, depending on the characteristics of the source and its distance from the point of measurement (i.e., the magnetometer sensor). Even though a considerable body of magnetic signature data for shipwrecks is now available, it is impossible to positively associate any specific magnetic signature with a particular type or age of shipwreck or any other feature (Pearson and Saltus, Jr. 1991:49). Variations in iron content, condition, and distribution of a ship's wrecked remains, as well as the survey's design parameters (particularly track line interval and sensor tow depth) combine to influence the intensity and configuration of the anomaly.

Marine remote sensing archaeological surveys conducted at a tight survey track line interval (e.g., 50 ft [15.25 m] or less, as in the case of this survey) provide magnetic data that is comprehensive in its coverage and of adequate resolution to differentiate patterns in the data that are indicative of potential shipwrecks, geological deposits, or isolated modern debris. Since shipwreck sites commonly consist of a centrally concentrated area of large (possibly buried) debris associated with primary hull remains trailed or surrounded by a more diffuse distribution of relatively smaller debris (e.g., displaced secondary hull components, cargo, armament, etc.), such deposits are generally detectable as "complex" anomalies (i.e., a cluster of magnetic anomalies with signatures consisting of dipolar and/or monopolar anomalies) occurring on multiple adjacent survey track lines. Magnetic targets associated with shipwrecks are also often accompanied by correlating side-scan sonar and/or sub-bottom profiler anomalies, although there are circumstances when such correlating anomalies are absent or difficult to detect. By comparison, magnetic anomalies associated with geological deposits are often distributed in regular patterns extending over broad areas of the riverbed, while those associated with modern isolated debris can exhibit high intensity magnetic signatures, but typically are detected for only brief durations and/or on just a single track line.

By contrast, in instances when a survey is conducted at track line interval wider than 50 ft (15.25 m) and the magnetometer sensor is more likely to be farther away from a magnetized source, anomalies associated with shipwrecks are typically lower in intensity, less complex in signature, and may be detectable on just a single line or missed altogether between lines. The reasons for these differences, the magnetometer's limited range of detection, and its implications for archaeological surveys are discussed fully by Aneskiewicz (1986), Bell and Nowak (1993), and Breiner (1973).

In all cases, interpretation and the target selection process are significantly enhanced by the ability to cross-correlate data collected simultaneously from multiple instruments with different detection capabilities and data gathered from adjacent track lines. Rather than select potential cultural targets from a single data set or individual track lines, all of the data are examined simultaneously as they are recorded in the field and after post-processing for the presence of any correlations between data sets and across multiple track lines that provide clues regarding the possible identity of a particular target. Additionally, data associated with modern and/or spurious sources can be recorded as such in the field and eliminated from further consideration as a target of potential archaeological interest.

The remote sensing data recorded during this survey were used in conjunction with the results from the study's archival research component to determine the presence/absence of targets potentially representing archaeological deposits (e.g., shipwrecks) or archaeologically sensitive areas (i.e., contextually intact elements of the inundated paleolandscape or "paleosols") within the Piscataqua River study area. The data were also used to formulate preliminary statements of resource significance and project impacts that should be avoided regarding these deposits, and provide recommendations regarding further archaeological investigation of these deposits.

CHAPTER THREE

ENVIRONMENTAL CONTEXT

The project area is located in the Seaboard Lowland section of the New England Province, within Maine State waters of the Piscataqua River, between Eliot, Maine and Newington Station, New Hampshire, at the northern end of the federally maintained navigation channel west of Adlington Creek and Mast Cove (see Figure 1-3). The Piscataqua River is a 12 mile- (19.3 kilometer [km]) long, ocean-dominated system that extends from the Gulf of Maine at Portsmouth Harbor and forms a portion of the border of New Hampshire and Maine to the fork of its tributaries, the Salmon Falls and Cocheco rivers. The Piscatagua River provides a fairly narrow channel to the ocean for six different rivers as well as one of the largest estuaries on the Atlantic Coast formed by Great and Little Bays, which join the river less than 3 miles (4.8 km) upstream from and northwest of the project area.

The tidal Piscataqua is the third fastest moving navigable river in the world with tidal currents in the vicinity of the project area averaging 4 knots (kts) (2 m per second [mps]). Together with its tributaries (the Winnicut, Swamscott, Lamprey, Oyster, Bellamy, Cocheco, and Salmon Falls rivers), the Piscataqua River drainage and region occupy an approximately 120 square (sq) mile (311 sq km) area. Charted MLLW depths in the study area range from 0 ft (0 m) in places along its northeast corner to a minimum maintained depth of approximately 28 ft (8.5 m) within the navigation channel situated along the survey area's western limit. The maximum tidal range within the Project area is approximately 9.4 ft (2.9 m). The area's varied topography, fresh and salt water resources, and abundant floral and faunal species together comprise a wide range of onshore ecozones, some of which actually would have extended into the project area when it was sub-aerially exposed at around 9500 B.P., prior to inundation by postglacial sea level rise (Belknap et al. 1989:31–32; Crock et al. 1993:182).

Bedrock in the project area is composed primarily of Eliot Formation ("Sze" on the Maine Bedrock Geology map) of the Merrimack Group, which covers much of southeastern New Hampshire and the southern end of Maine (Anderson 1985; Billings 1980). Rock comprising the Eliot Formation is characterized as a system of belts and sub-belts, consisting of variably metamorphosed, argillaceous, sedimentary rocks with thin-bedded alternations between medium-gray buff-weathering calcareous and ankeritic quartz-mica phyllite and dark gray phyllite that are Silurian-Pre-Cambrian in age. Quartzose and calcareous slates are among the least metamorphosed elements of the Eliot Formation, while the more metamorphosed rock in the formation includes biotite, biotite schist, quartz-mica schist, biotite-actinolite schist, and green-gray actinolite granulite (Billings 1980). Approximately 15 percent of the Eliot Formation consists of quartzites (Freedman 1950).

The uppermost section of the Eliot Formation consists of the Calef Member, which is primarily recognized as a black phyllite with some green quartz-chlorite phyllite. Maximum thickness of the Calef Member is estimated at 800 ft (m), while maximum thickness of the entire Eliot Formation in the vicinity of the project area is believed to extend as much as 6,500 ft (m) deep

(Freedman 1950). Outcrops of the Eliot Formation consist of a mix of the rock types described above in alternating beds that are a few inches (cm) to a few ft (m) thick.

The composition of the surficial sediments on the bottom of the Piscataqua River within the project area encompasses an extremely wide range of material types. These different materials include everything from fine-grained sediments (e.g., silt is present in the nearshore portion of the project area, outside the reach of the channel's stronger current flow) to coarse glacial till (including gravel, cobbles, and, possibly, boulders). The extreme tidal velocity in the project area generates strong currents that inhibit deposition of finer materials and leaves only coarser deposits on the riverbed.

Colonization of the region by flora during and after deglaciation is characterized by continuous changes, particularly between 14,000 and 9,000 years ago. This time frame is considered to be a marker of a transition from an open tundra-like environment to a woodland environment, and eventually a closed forest environment across much of the New England region (Davis and Jacobson 1985). Pollen and macrofossil studies from regional lake cores suggest species responded individually to climatic changes over time as the ice front retreated northward. Woodland vegetation, dominated by poplar and spruce, is believed to have spread along the coastal lowlands up to New Brunswick by ca. 12,000 years ago, and pushed into interior portions of the region by 11,000 years ago. As archaeologist Bruce Bourque notes, "An observer in Maine 11,000 years ago would have seen a mosaic environment of tundra, shrubs, and trees arranged in patterns determined by latitude, elevation, local soil conditions, drainage, and exposure" (Bourque 2001:16).

The transition from woodlands to closed forests initially began in southern Maine around 12,000 years ago, and then developed rapidly over the region between 11,000 and 10,000 years ago. The closed forests were initially dominated by spruce, balsam fir, birch, and poplar, but pine emerged as the dominant species approximately 1,000 years after closure of the forests. The simultaneous emergence of pine and the demise of spruce signaled a warming trend that reached its peak sometime around 5,000 years ago. Studies from lake cores suggest this warming trend was characterized by a drier climate and lower water levels, particularly between 8,000 and 6,000 years ago (Almquist et al. 2001). Cooler, wetter conditions prevailed after about 4,500 years ago, resulting in an increase in birch, followed by a return of spruce after around 2,000 years ago (Almquist-Jacobson and Sanger 1995).

Past archaeological research in northern New England has provided some indication regarding the range of environmental variables that most often correlate with human settlement and land use patterns during both the pre-contact and post-contact periods. Contemporary modeling of pre-contact archaeological site locations has considered several environmental variables (e.g., proximity to water, topographic setting, soil type, and availability of natural resources), of which proximity to water ranks among the highest for predicting site location. To date, more than 95 percent of the recorded pre-contact sites in Maine have been identified along the margins of water bodies (Spiess 1992). Evidence for pre-contact human activity in the interior of Maine has commonly been found on level, moderately well-drained land surfaces near the shores of rivers, lakes, streams, and sometimes overlooking marshes and wetlands. These bodies of water would likely have represented important resource areas and transportation routes for pre-contact peoples. Along the coast, hundreds of pre-contact sites have been identified in Maine. Typically, these sites are located on southern or protected exposures adjacent to both fresh water and resource-rich areas, such as mud flats. The location of the proposed Piscataqua River project fits the model for high potential pre-contact land use, because of its location in a resource-rich, protected estuarine setting near the confluence of multiple rivers, embayments, and the open ocean. The strong tidal river currents that regularly sweep across most of the project area are likely to have destroyed through erosion any vestiges of a contextually intact, formerly exposed, relict landscape.

Many of the same environmental factors that were attractive to pre-contact inhabitants were also attractive to Euro-American people visiting and settling in the area during the post-contact period. Early in the contact period, the area was favored as an excellent place to log, hunt, fish, trap, and trade with local Native populations. Rich fishing opportunities afforded by the convergence of fresh and salt waters near the mouth of the Piscataqua River encouraged Euro-American exploration and exploitation of that resource as early as the 1500s. Seemingly limitless forests of pine, spruce, oak, and tamarack, and the region's vast system of lakes, rivers, and streams that provided easily obtainable sources of power for the milling and transportation of lumber to deep water ports and shipyards along the coast, provided the necessary ingredients for the extensive shipping and shipbuilding industries that fueled Portsmouth and Eliot's early economies and supported their resident human populations.

CHAPTER FOUR

CULTURAL CONTEXT

An understanding of regional long-term human settlement and subsistence practices is critical to assessing and interpreting the archaeological sensitivity and record of any project study area. The following chapter provides a brief summary overview of the pre- through post-contact culture history of the Piscataqua River project area. This review is by no means exhaustive, but provides a general framework from which to predict and interpret archaeological deposits encountered during the marine archaeological survey of the project study area. The information for this context has been drawn from the review and synthesis of pre- through post-contact culture histories and previous archaeological investigations completed in the area.

Pre-Contact Period Culture History

The current inventory of known pre-contact sites documents a lengthy sequence of Native American settlement in coastal Maine and the nearby Maritime Provinces of Canada. The region is part of the larger Maritime Peninsula, a geographic formation and culture area stretching from the border between Maine and New Hampshire across southeastern Quebec and the Maritime Provinces to Cape Breton Island that has been home to human populations for more than 10,500 years, and whose unique, supposedly isolating, ecology of mountains and sea helped shape the cultures of pre-contact human groups who lived there (Bourque 2001:xvi, xvii). Maine's archaeological record suggests a regional cultural history that is both complex and dynamic, which is strongly linked to the resource-rich sea and the region's major rivers, including the Piscataqua (Bourque 2001). This is particularly true of the Native groups that lived on Maine's coasts beginning about 7,000 years ago (Bourque 2001:xvi). The importance of the sea to Maine's Native peoples continued even long after the initial contact period, as Native mariners were quick to adopt European nautical technologies and use sailing vessels for conducting trade and warfare far from their home territories (Bourque 2001:xvi; Duncan 1992:129–130; 144–147). Far from presenting an obstacle to significant cultural contacts with other regions, the sea, and Maine's coastlines in particular, actually appear to have facilitated inter-regional interaction among Native peoples (Bourque 2001:xvii).

There is a considerable degree of consensus among archaeologists regarding broad patterns of regional cultural history throughout the Northeast, although debates continue about how and to what extent these patterns are related to each other over space and time. As a result of this consensus, the archaeological record of Maine has been organized into three major cultural periods: the PaleoIndian Period (11,500–9500 B.P.); the Archaic Period (9500–3000 B.P.); and the Ceramic Period (3000–450 B.P.). These periods are further subdivided based on similarities in artifact forms and cultural adaptations over broad regions (Table 4-1) (Spiess 1990).

Table 4-1. Maine's Comprehensive Planning Pre-Contact Period Archaeological Study Units (after Spiess 1990).

Time Period	Study Unit
11,500 - 10,200 B.P.	Fluted Point Paleoindian Tradition
10,200 – 9,500 B.P.	Late Paleoindian Tradition
10,000 – 6,000 B.P.	Early and Middle Archaic Traditions
6,000 – 4,200 B.P.	Late Archaic: Laurentian Tradition
6,000 – 2,000 B.P.	Late Archaic: Small-Stemmed Point Tradition
4,500 – 3,700 B.P.	Late Archaic: Moorehead Phase
3,900 – 3,000 B.P.	Late Archaic: Susquehanna Tradition
3,000 – 450 B.P.	Ceramic Period

The PaleoIndian Period in Maine corresponds with a time when much of the landscape was vegetated in a mosaic environment of tundra, shrubs, and trees, the locations of which were patterned by latitude, elevation, local soil conditions, drainage, and exposure (Bourque 2001:16, 17). As the Piscataqua River project area became free from its ice and water overburden, tundra vegetation (mosses, lichen, grasses, and sedge) appeared, followed by thickets of willow and alder, then stands of hardier trees, such as poplar and spruce. By about 12,000 B.P., an intermediate woodland environment consisting of a mix of open areas of tundra and stands of closed-canopy poplar, spruce, and birch forest would have likely prevailed in the area (Bourque 2001:15).

Although much of Maine's late Pleistocene environment was generally similar to today's subarctic taiga (i.e., near tree line) or arctic tundra zones, it was probably biologically richer (Bourque 2001:17). In addition to its vegetation, Maine and the rest of the Northeast at this time supported a large and varied population of late Pleistocene mammal species that included mammoth, mastodon, horse, musk ox, moose, caribou, and whitetail deer, as well as walrus, bearded seal, and cold-water species of shellfish, suggestive of a marine environment that was similar to that of the southern Labrador coast today (Bourque 2001:16).

Understanding of subsistence and settlement patterns of PaleoIndians in Maine is growing and becoming more refined, although some of the even basic aspects, such as diet, geographic range, and dating of sites remain unclear (Bourque 2001:20). Part of the reason for this may be attributed to the poor preservation of organic remains in most terrestrial contexts in the Northeast, which has left a frustratingly small archaeological record, consisting of just stone, wood charcoal, and calcined bone cultural materials available for interpretation. As Petersen et al. (2000:131) conclude in their discussion of the Late PaleoIndian period, ". . . we sorely need more . . . sites in the Northeast to elucidate further details and refine our attendant reconstructions." Another part of the reason may also lie in the paucity of marine archaeological research conducted to date focusing on the inundated paleolandscape and the pre-contact period submerged archaeological deposits it contains. Ironically, it is the least-studied landscape – the intact elements of the coastal environment of the PaleoIndian and Early to Middle Archaic periods - that now lies offshore of the present Maine coast, and which, because of the submerged environment's uniquely preservative qualities, may hold some of the best evidence of Maine's earliest inhabitants.

Based on the currently available archaeological data recovered solely from the terrestrial context, archaeologists have characterized PaleoIndians as highly mobile hunter-gatherers who were largely reliant on caribou that were presumably abundant at that time (Spiess et al. 1998). While caribou would have been a principal focus for Maine's PaleoIndian population, they also invariably would have exploited a broad range of other resources that would have been available to them at the time (e.g., small mammals, fish, birds, and plants) (Bourque 2001:36).

Generally speaking, PaleoIndian Period peoples crafted tools from very fine lithic materials obtained from a limited number of sources scattered widely throughout the region. An abundance of exotic lithic materials at early PaleoIndian sites suggests frequent long-distance movement and/or broad-ranging exchange networks. Most PaleoIndian site locations that have been documented to date are quite different from those of later time periods, and are typically removed from present-day water bodies (Spiess et al. 1998). However, some of the more studied PaleoIndian archaeological deposits (e.g., the Munsungan Lake, Michaud, and Varney Farm sites), as well as the Magalloway Valley PaleoIndian Complex (the Vail and Adkins sites), described by archaeologist Bruce Bourque as one of the "richest clusters of PaleoIndian sites known anywhere in the Northeast" (Bourque 2001:27), are all proximal to areas with (or that once held) lakes, rivers, streams, brooks, or bogs.

Previous research suggests PaleoIndian Period peoples preferred locating their settlements on sandy soils. Such locations may have been chosen simply because they were relatively dry and well-drained, as compared to the otherwise wet early postglacial terrain (Bourque 2001:35), or may have been based on reasons more directly associated with the logistics of resource procurement. Site locations seem to be strategically located at points above low-lying terrain that may have been suitable habitat for caribou and other game animals. Maine's PaleoIndian archaeological deposits are typically indicative of short-term habitations by small groups of people, perhaps in some cases by even a single extended family. While smaller sites prevail, a handful of larger PaleoIndian sites are known to exist in the region as well, such as the Magalloway Valley PaleoIndian Complex (Vail and Adkins sites) in northwestern Maine (Gramly 1982, 1988), the Debert Site in Nova Scotia (MacDonald 1968), and the Bull Brook Site in Massachusetts (Grimes 1979; Grimes et al. 1984). It is hypothesized that these sites possibly represent seasonal gathering places for larger groups, which were an integral part of the PaleoIndian cultural system's highly structured migration and colonization behaviors (Spiess et al. 1998).

The end of the PaleoIndian Period and subsequent transition into the Early Archaic is poorly understood, although increasing perceptions of subtle cultural changes during the transition have led some archaeologists to suggest a three-phase PaleoIndian occupation in Maine that may help explain some of these differences (Bourque 2001:34–36; Wilson and Spiess 1990). Archaeological evidence indicates that during the later PaleoIndian Period, fluted spear points were replaced by smaller, unfluted points. Other point styles also emerge in the region, most notable of which are long, slender lanceolate points with a distinctive parallel flaking technology (Cox and Petersen 1997; Doyle et al. 1985; Will and Moore 2002). These technological changes coincide with the transformation of the environment from relatively open woodlands to more closed forests. By the Early Archaic Period, the archaeological record contains a dramatically different material culture than that recovered from sites dating to the PaleoIndian Period (e.g., abundant use of quartz, barbed bone spears, and a new range of implements [i.e., adzes, gouges, and whetstones] created by pecking and grinding less-brittle granular rock types) (Bourque 2001:37–74).

No PaleoIndian Period sites have been reported within the Piscataqua River study area. However, the presence of an important PaleoIndian site (the Debert Site) off the Bay of Fundy coast in Nova Scotia (MacDonald 1968), suggests that PaleoIndians were present and familiar with the coastal Maritimes region. If such sites existed within the Project study area, rising sea levels have long since drowned them, or, the river's strong tidal currents have very likely eroded them.

Archaic Period (9500–3000 B.P.)

Spanning around 6,500 years, the Archaic Period represents the longest archaeologically defined cultural period in the region, and is divided into three sub-periods (Early [10,000–8000 B.P.), Middle [8000–6000 B.P.], and Late [6000–3500 BP]). Based on inferences from artifact assemblages, the Archaic Period consists of a complex mosaic of cultures with varied lifestyles and wide reaching external relations (Bourque 2001:74). In general, the period is characterized by archaeologists as one in which there are important elements that remain continuous, but also sharp discontinuities as well, with evidence of arrivals and departures of distinct groups, and important changes in subsistence, mortuary practices, technology, and other patterns that are still being identified in the archaeological record.

In addition to the cultural changes that occurred during the Archaic Period, there were also dramatic changes in Maine's flora and fauna during this time. Paleontological studies indicate a time of global warming accompanied by a drop in precipitation known as the "Hypsithermal" period, which occurred between about 9000 and 5500 B.P. (McWeeney 1999:8). During the Archaic Period, woodlands replaced tundra over large parts of Maine, and boreal tree species (spruce, poplar, and birch), which declined, were followed by oak and eastern hemlock. Animal species that had sustained PaleoIndian hunters diminished and then disappeared altogether, to be replaced by fauna from areas south and west of the region (e.g., moose, deer, bear, and other smaller mammals) that were deglaciated at earlier times (Bourque 2001:37).

Marine conditions in the Gulf of Maine also became increasingly favorable for biological productivity during the middle of the Archaic Period, as lower sea levels and shifts in the Gulf Stream and Labrador currents probably increased water temperatures, while decreasing tidal amplitudes, making them lower than today's (Bourque 2001:45). Paleontological evidence recovered from the eastern Gulf of Maine indicates that marine animal communities of the Middle Archaic were significantly different than today's, with warm-water species, such as oysters and quahogs, present in abundance (Bourque 2001:45).

The Gulf of Maine region may contain the largest number of radiocarbon-dated Early and Middle Archaic archaeological sites in New England, among the most diverse eighth millennium ground-stone technologies in North America, and a well-established mortuary tradition of elaboration dating from as early as 8000 to 7000 B.P. (Robinson and Petersen 1993:61). Subsistence and settlement patterns and the assemblages they produced were different from those of the PaleoIndian Period. Many sites dating from the Early Archaic occur along present-day water bodies and inland waterways, suggesting waterborne travel and fishing, with an apparent spring seasonal emphasis on spawning runs, important activities of Archaic Period peoples (Bourque 2001:42). Such sites include evidence of fishing for perch, sucker and eels, some hunting of large mammals, hunting or trapping of beaver, muskrat, woodchuck, various birds, and turtles, and the collection of a variety of plant resources, as evidenced by charred nutshells and seeds. The lithic tool assemblages include quartz cores and unifaces, ground-stone tools, such as abraders, choppers, stone rods, full channeled gouges, and low numbers of bifacially flaked lithic tools.

Unlike the prevalence of exotic lithic materials found in PaleoIndian assemblages, tools of the subsequent Archaic Period were typically produced from local stone, often collected in cobble form, and lack the finely crafted, chipped-stone spear points that characterize the PaleoIndian Period. Instead, scrapers, flake tools, and minimally modified unifacial tools made from quartz dominate the assemblages. Projectile points resembling forms common in the Carolinas, where they may have originated, appear during the Early Archaic, and include "bifurcate" points with notched bases as well as small amounts of the Kirk Corner Notched type (Bourque 2001:41). Additionally, a new stone tool technology (i.e., adzes, gouges, and stone rods used for whetstones) manufactured from less-brittle granular rock types through pecking and grinding techniques appears for the first time in Maine's archaeological record during the Early Archaic. This pecking and grinding technology becomes increasingly elaborate through the period (Bourque 2001:42; Robinson 1992). Given that these stone tools are intended for woodworking, it may be inferred that their appearance and increased presence in the archaeological record reflects an expansion of wood technology that would presumably have included dugout log boats, food vessels, and fish weirs (Bourque 2001:42). In addition to tools manufactured from stone, tools made from bone and antler, including barbed spears, have also been found in small numbers from Early Archaic sites in Maine (Bourque 2001:41).

Mortuary practices first appear in the archaeological record of the Maritime Peninsula region during the Early Archaic Period, with three mortuary sites dating from ca. 8500 B.P. found in northern New England: 1) the Tableland Site on the Merrimack River, Manchester, NH; 2) the

Morrill's Point Site at the mouth of the Merrimack River, Salisbury, MA, and 3) the Ormsby Site on the Androscoggin River, Brunswick, ME. All three sites contained cremation burials, although grave furnishings (i.e., red ocher and stone tools) were present just at the Tableland and Morrill's Point sites (Bourque 2001:43).

By the Middle Archaic Period, chipped-stone spear points, bifurcate projectile points, and heavy woodworking tools (occasionally supplemented by a southern type of grooved axe), all of which were present during the Early Archaic, become increasingly more abundant. Finely ground and polished winged spear-throwing weights, and stylistically local ground slate lance points and "ulus," which are a semi-lunar stone knife, also appear.

Middle Archaic sites occur in Maine's interior as well as along its coast, but even then are nearly always associated with bodies of water, suggesting a continued or growing dependence on fishing as an important subsistence strategy and a strong maritime focus. Most sites from the period are small and represent brief seasonal encampments of 25–50 individuals. Archaeological evidence of a coastal focus during the Middle Archaic is concentrated along the central Maine coast, where even islands were occupied — another clear indication for manufacture and use of reliable watercraft.

Mortuary practices of Middle Archaic peoples are poorly represented in the archaeological record of Maine and in New England in general, with only about five such sites identified (three of which are in Maine). The use of red ocher and inclusion of burial furniture (i.e., projectile points, spear-thrower weights, adzes, gouges, and stone rods) in Early Archaic burials continues in the Middle Archaic, as well. Taken together, these various technological and mortuary attributes of the central Gulf of Maine's Early and Middle Archaic cultures form a core of cultural traits that are distinct from cultural assemblages to the north and south. This distinctive nature has led archaeologists to label this Early and Middle Archaic pattern as the "Gulf of Maine Archaic Tradition" (Robinson and Petersen 1993:68).

The archaeological record of the Late Archaic Period in Maine is sparse for the sixth and fifth millennia B.P.; however, archaeological evidence of human occupation dating from about 5000 B.P. is much more abundant in the form of two distinct cultures from this period in Maine's pre-contact history: 1) the Vergennes phase, and; 2) the Small Stemmed Point tradition.
Vergennes phase culture sites are fairly common at interior locations between the Kennebec River and St. John drainages, and a few typical artifacts have been found as far northeast as Nova Scotia. The relative scarcity of Vergennes sites in New Hampshire, western Maine, and along Maine's coast, suggest that this culture's influence came primarily from the St. Lawrence Valley, and had an insignificant impact on the White Mountains region and coastal New England (Bourque 2001:46–49).

The robust Otter Creek spear point typifies the phase, and suggests reliance upon large terrestrial game, which is supported by the fact that Vergennes sites are confined to interior sections of the Northeast. Additional artifacts typically found on Vergennes sites include plummets, gouges, ulus, and flat rocks expediently chipped around their edges to create what archaeologists have termed "choppers." The significance of the Vergennes phase and its influence in Maine archaeology is debated, with some archaeologists seeing it as an intrusive culture of small, mobile hunting population that originated in the St. Lawrence River valley, while others equate the culture's less formal tool styles and beautifully polished ulus as a technological continuation of those of Maine's coastal and near coastal Middle Archaic sites (Bourque 2001:46–49).

While Vergennes phase people mainly occupied Maine's interior upland areas and focused on terrestrial game, the Small Stemmed Point or narrow point tradition peoples mainly occupied the Gulf of Maine coast, where they practiced a mixed economy that included pursuit of large fish, such as cod and swordfish. The Small Stemmed tradition is characterized by archaeological deposits that have yielded thousands of small, narrow-stemmed projectile points, often found along with triangular points, both of which are generally made of quartz. Other associated stone artifacts include adzes, gouges, plummets, spear-thrower weights, and fully-grooved net weights. All of these artifact forms appear to have origins in the Middle Archaic. Small Stemmed sites found east of the Kennebec River pre-date by about 1,000 years the same types of sites located in southern New England. The earliest dated Small Stemmed sites in Maine occur in the central coastal region of the state. The oldest coastal archaeological site in Maine (the ± 5290 B.P. Occupation 1 deposit at the important Turner Farm Site) is located in Penobscot Bay, on North Haven Island, approximately 120 miles (190 km) northeast of the Piscataqua River Project area (Sanger and Kellogg 1989:119).

Available archaeological evidence indicates that between 5000 and 4500 B.P., the Small Stemmed tradition produced a striking new culture named for the pioneering Maine archaeologist, Warren K. Moorehead, who worked extensively on sites of this period. Termed the "Moorehead Phase," the most extensively studied site produced by this culture is the second component of the Turner Farm Site (Occupation 2), the contents of which were subjected to intensive analysis by Spiess and Lewis (2001) and provide a detailed record of coastal subsistence activities during the centuries between ca. 4500 and 4000 B.P. The most striking element of the faunal assemblage from Occupation 2 is the abundance of swordfish remains, which although present on other sites, were first found at Turner Farm, and thereby provided the original indication of this formidable prey's importance. Other major food resources present at Occupation 2 included cod, deer, and shellfish – both the soft-shelled clam and the locally extinct quahog or hardshell variety. Noticeably absent from the assemblage were shallow-water fish species and sea mammals, such as seals and porpoise, which apparently were little used. Together, the evidence examined at Occupation 2 indicates the presence of a substantial year-round population at the site, who used it as a home base. Generally speaking, Moorehead Phase sites are only found east of the Kennebec River.

In addition to its distinctively coastal settlement pattern, the Moorehead phase is primarily known for its mortuary practices, which included the lavish use of red ocher, giving rise to the term "the Red Paint People," and the offering of grave goods, such as gouges, slate spear points, and stone rods (Moorehead 1922; Robinson 1992; Willoughby 1898). Present understanding of how the Moorehead phase culture may have developed focuses on its relationship to the marine environment. Sometime between 6000 and 4000 B.P., as the biological productivity of the Gulf of Maine reached high levels, a local population settled along the coast of central and eastern Maine to exploit the region's rich resources and growing stocks of cod and swordfishes, developing a highly distinctive material culture and unprecedented mortuary ceremonialism along the way (Bourque 2001:51–61). The innovative and highly successful Moorhead phase maritime hunting peoples disappear abruptly from the archaeological record at around 3800 B.P., and don't appear to leave any vestiges of their culture in those that succeeded them locally.

The Moorehead phase was replaced at the close of the Late Archaic Period by another distinct cultural tradition, known as the Susquehanna tradition. Susquehanna tradition sites appear in Maine's archaeological record between 3700 and 3400 B.P. (Bourque 1995, 2001; Sanger 1979). Initially recognized by archaeologists working in the Susquehanna River valley region of southern New York and eastern Pennsylvania, Susquehanna tradition sites are widespread throughout eastern North America and are common in Maine, occurring as far east as the St. John River in New Brunswick, with a few Susquehanna tradition artifacts recently recognized from sites across the Bay of Fundy in southern Nova Scotia (Bourque 2001:62).

Once again, the Turner Farm Site proves to be the best source of data about this distinctive culture, with the largest and richest Susquehanna archaeological deposit in Maine comprising Occupation 3 (Bourque 2001:62). The Susquehanna tradition's technology, subsistence practices, and mortuary rituals are striking in their uniformity and marked difference from those of preceding cultures. Diagnostic tool forms of the Susquehanna tradition are the largest and most skillfully manufactured stone artifacts of the pre-contact period. Susquehanna artisans excelled not only in their production of chipped-stone tools, but also worked bone by grinding, as opposed to scraping with a stone tool, as was done during the Moorehead phase. Susquehanna craftspeople also produced ground- and pecked-stone tools such as adzes and gouges, which were functionally similar to those of earlier cultures, but were different in their detail and in their use of different lithic materials, and lithic bowls sculpted from steatite, a soft, easily worked, metamorphic stone.

The Susquehanna culture was also distinctly different from the Moorehead phase in its diet, preferring terrestrial game and "mast" resources (i.e., nuts: acorns, beech nuts, butternuts, hickory nuts, and walnuts) to maritime resources. This difference is evident in the faunal refuse remains and diet indicators resulting from isotopic analysis of the site's human skeletal population from the Turner Site Occupation 3 (Bourque 2001:62–66).

The Susquehanna tradition's elaborate mortuary rituals differed dramatically from those of the Moorehead phase's Red Paint People. Despite a very large number of Susquehanna habitation sites throughout Maine, only a half-dozen or so Susquehanna cemeteries have been identified in the state, as compared to the 44 known cemeteries associated with the Moorehead phase culture. This difference may be attributed to two factors: Susquehanna occupation of the region was too brief to generate a larger number of burials, and/or, unlike the Moorehead cemeteries which included all members of their populations, the Susquehanna tradition's burial practices were more exclusive; however, age and sex do not appear to have been a basis for burial in the Susquehanna cemetery at Turner Farm. Other major distinctly different elements of the

Susquehanna tradition burials are the "ritualized manipulation of the dead," consisting of the removal of whole or partial human remains from their place of initial interment to combine them with the remains of other individuals for ceremonial use in bundle burials or commitment to cremation pyres along with rich arrays of grave furnishings (Bourque 2001:62–66).

Archaeological evidence of the Susquehanna tradition disappears from the archaeological record in Maine by about 3400 B.P. This disappearance coincides with a "Little Ice Age" (McWeeney 1999:10) and a transition in the temperate southern character of Maine's woods back to northern hardwoods and hemlock of a colder climate, which may have resulted in a southward territorial contraction of Maine's Susquehanna tradition population.

The relationships between the various Late Archaic traditions continue to be a source of debate among Maine archaeologists. At the root of the discussion is whether the various archaeological assemblages of the Late Archaic reflect local, long-term cultural adaptations, or movement of people into the region with different cultures. Whatever the origins of the cultural changes observed, they again roughly coincide with increasing changes in the environment that provided more favorable habitat for deer and possibly other modern species of fauna as well.

No Archaic Period archaeological sites are documented within the Project study area. As in the case of PaleoIndian Period sites, rising sea levels and the river's extremely strong tidal currents have very likely drowned and eroded whatever sites may have been present within the study area.

Ceramic Period (3000–450 B.P.)

The introduction of pottery manufacture and use in Maine defines the onset of what Maine archaeologists call the Ceramic Period (Sanger 1979). In other parts of the Northeast, this cultural period is referred to as the Woodland Period. The differences between the two terms is mainly that hunting and gathering for food remained the primary means of subsistence throughout much of Maine and the Maritimes, while a reliance on horticulture and a tendency toward larger, more permanent settlement patterns developed in other regions during the same time period. Ceramics first appear in the archaeological record of Maine around 3,000 years ago and they persist until contact with Europeans when clay pots were replaced in favor of iron and copper kettles that were traded for beaver pelts and other animal furs. Bourque's report of archaeological evidence and Samuel de Champlain's documented observations of the Maine coast indicate maize was being cultivated in western Maine as early as 1000 B.P., and along the Maine coast as far east as Saco by the first decade of the seventeenth century (Bourque 2001:87).

The picture that emerges from Ceramic Period sites is one showing long-standing cultural adaptation to the diversified use of local resources. In addition, the nature of artifact forms and certain types of stone recovered from Ceramic Period sites indicate broad trade and communication networks with peoples located far to the north, south, and west. By the end of the period, historical and archaeological evidence suggests horticulture was practiced in southern Maine. The Ceramic Period ends with European contact around 450 years ago. At this time, most of the artifacts attributable to pre-contact inhabitants of Maine disappear from the archaeological record.

During the Ceramic Period and at the time of European contact, New England and the Maritime provinces were populated by Eastern Algonquian speakers. Maine's major river drainages north of the Piscataqua River, including the upper Saco and many smaller coastal drainages, were occupied by the Eastern Abenaki (Snow 1978a:67). The name of the Eastern Abenaki derives from *wapanahki*, their own name for themselves, which means "dawn land people" or "easterners" (Snow 1978b:137). The territory of the Eastern Abenakis was covered by a mixed white pine, hemlock, and hardwood forest along the coast, transitioning to a spruce and fir forest in the interior. Neither the soil nor the climate was adequately warm enough to allow for cultivation of the available domesticates within most of Maine (Snow 1978b:138). Consequently, the subsistence pattern of the period primarily involved a seasonal round of hunting and gathering with summer residences based along the coast and winter residences in the interior.

Ceramic Period archaeological evidence indicates a strong maritime focus over much of the Maine coast, which did not exist during the preceding Susquehanna tradition (Bourque 2001:84). Native peoples living along the coast were heavily reliant on marine resources and exploited springtime runs of alewives, salmon, shad, eel, smelt, and other fish with hooks, leisters, purse-nets, and weirs. Some fishing was done with harpoons, particularly for sturgeon, which were attracted to the surface by torches at night. Harpoons were also used to hunt harbor seals, porpoise and various water fowl. Lobsters and crabs were caught in shallow water using spears. Shellfish, particularly clams, were a staple of native coastal inhabitants (Snow 1978b:139). Cod was taken, but in insignificant numbers relative to the amount of smaller fish that were sought, such as winter flounder and longhorn sculpin (Bourque 2001:84). Swordfish are markedly absent from Ceramic Period faunal assemblages, possibly as a result of becoming locally extinct due to cooling water temperatures in the Gulf of Maine (Bourque 2001:84). Two extinct species of animal were also exploited by Ceramic Period People – the great auk, a flightless, penguin-like relative of the puffin, and the sea mink, both of which were hunted into extinction during the nineteenth century (Bourque 2001:85).

Coastal peoples were quite mobile as compared to other Eastern Algonquians, and utilized watercraft for travel, hunting, and fishing. The first Europeans to arrive in the Northeast recorded three basic types of watercraft: dugout canoes, birch bark canoes, and hide-covered kayaks. Throughout northern New England and the Maritime Peninsula, birch bark canoes were used exclusively for interior travel, while dugouts made from large trees were used in coastal waters.

Ceramic Period sites are abundant in Maine, along both the coast and in the Maine interior (Sanger 1979). Along the coast, they are most visible in the form of shell middens, which have attracted the attention of professional and amateur archaeologists since the late nineteenth century (Wyman 1868). Shell midden sites contain discarded shells of clams, oysters, mussels, and quahogs, bones of both terrestrial and marine animals, as well as broken pottery sherds and discarded stone and bone tools. Sites in the interior are most common along waterways, ponds, and lakes. Assemblages from the interior differ from coastal sites in that bone assemblages are poorly represented because of differences in preservation.

No Ceramic Period archaeological sites are documented within the project study area. Sites from this period would be maritime, rather than terrestrial, in nature, as sea level rise would have inundated most or all of the project study area prior to the start of the Ceramic Period.

Contact/Post-Contact Period Culture History

The project study area lies on the eastern (Maine) side of the Piscataqua River adjacent to the town of Eliot. Eliot is situated in the southwestern corner of York County and along with the Berwicks, was a part of Kittery, Maine's oldest town, which was settled in 1623 and incorporated in 1647. Located opposite Portsmouth, New Hampshire, Kittery and Elliot developed into a center for trade and shipbuilding. Originally called Sturgeon Creek in the 1630s and 1640s, Elliot remained a part of Kittery up until 1810, when it was incorporated, and, like the rest of Maine, was part of the Commonwealth of Massachusetts until 1820.

The initial documented European incursions up the Piscataqua were those of Englishmen Martin Pring in 1603 and John Smith in 1614 (Aldrich 1917:1–3). Before English settlers arrived to the shores of the Piscataqua, there were active fishing communities on the abutting offshore islands, particularly the Isle of Shoals. On this cluster of islands 10 miles (16 km) outside of the mouth of the Piscataqua, English west-country fishermen set up temporary bases to fish the rich coastal waters during the spring and fall fishing seasons (Heffernan and Stecker 1986:19). European settlement of Eliot was initiated in the 1630s through a series of land grants stemming from a charter by King James to John Mason and Sir Ferdinand Gorges, for properties comprising part of the Piscataqua Plantation (i.e., a land area that was later named Kittery), situated along the riverfront on the town's western edge. Mason and Gorges began issuing land grants through their agent, Walter Neal, around 1632 (Varney 1886). By 1636, this large Plantation (encompassing today's Eliot, as well as the Berwicks and Kittery), was populated by approximately 200 people. One of the area's earliest settlers was Nicholas Frost, who arrived at Sturgeon Creek (i.e., Elliot) about 1636. Other early settlers were Anthony Emery (about 1652), the Hills (1670s), James Tobey (about 1675), John Heard (no date), and Nathan Bartlett and his brother (1713). Reportedly, the first settlers were allowed to take up as much land as they could fence, on the condition that they paid 2 to 2½ shillings per acre for 100 years (Varney 1886).

While much of the colony's energy in the seventeenth century focused on achieving permanent, stable, and governable settlements, the natural advantages and attractions of the Piscataqua region began to be developed and exploited – initially in the fur and fishing trades, and then in the timber trade (Heffernan and Stecker 1986:29). The area's early settlers established riverfront farms on 10- to 200-acre tracts of land and extracted timber from the surrounding area's heavily forested interior. Plentiful land, timber, and fish resources, a deepwater river harbor providing access to the interior and the sea, as well as riverine waterpower, attracted shipbuilders, sailors, and fishermen alike to York County, and the area's agrarian, maritime-based, and early industrial economies and population both began to flourish and grow (Macpherson et al. 1997). Eliot's fledgling timber industry became a lucrative one following the establishment of the town's first sawmill in 1650. By the end of the seventeenth century, the export of timber on the Piscataqua had increased four-fold from the mid-century total (Heffernan and Stecker 1986:31).

One of the principal consumers of the region's timber was the British navy, who facing shortages from Baltic sources, relied increasingly on the more abundant North American timber. The region's stands of giant first-growth white pine, in particular, were appealing to the navy for use as masts in its warships. The first cargo of masts was shipped from the Piscataqua River in 1634 (Duncan 1992:180).

To ensure a dependable supply of mast timber, the Royal Navy Board inserted clauses in colonial charters restricting the cutting of pine and appointed Surveyors of His Majesty's Woods and Forests to police and control the resource. Trees were reserved for purchase by the Crown with a "Broad Arrow" mark, an old symbol of naval property, cut into them by the Surveyors. Trees were sought by the Royal Navy for use as warships' masts, by merchants for conversion into lumber for the lucrative West Indies trade, and local settlers for use as building material and home heating fuel. As the number of suitable pine trees decreased, competition for them intensified, and the resource took on more focused political and economic significance. Ultimately, the tension between English timber imperialism and the colonial settlers' desire to turn a profit affected every level of the social, political, and economic life of the Piscataqua frontier and contributed to the region's participation in the American Revolution. In 1775, with the beginning of the American Revolution, the Colonies refused to ship more masts to Britain (Duncan 1992:187).

As settlement increased, dams and mills were built at strategic points along the river to harness and control its power. Abundant clay deposits along the river's banks were also utilized for brick-making during this early period. Brick served as the primary material used in the foundations of buildings constructed in Eliot and elsewhere locally during this period. While most early farms were subsistence farms, raising food for personal consumption, Eliot's larger farms produced crops of wheat, oats, corn, hay, grass, malt, peas, and apples for milling and export to colonial and European ports.

A map of "The Middle Parrish of Kittery (Now Elliot)," depicts the town between 1632 and 1700, and shows that the land north of and adjacent to the project area was among Elliot's first to be settled (Figure 4-1). Among the town's earliest settlers was James Tobey, mentioned above, who came to own a property in 1675 described as being "near Frank's Fort" (named after Francis "Frank" Williams, overseer of a company doing experimental work in the salt industry), a small island located in the Piscataqua River at the southern end of the Project study area (now called "Frankfort Island"). A string of properties depicted on the map east of the Project area is labeled as belonging to James's eldest son, Stephen Tobey, as well as David Libby, Matthew Libby, Daniel Fogg, and Joseph Hammond. This land, called the "Bay Land," extended from Frank's Fort to Watt's Fort along the river and east to Marsh Hill. Stephen Tobey reportedly built ships on the waterfront of his property in what is called "Mast Cove" (Stearns 1908:1331).

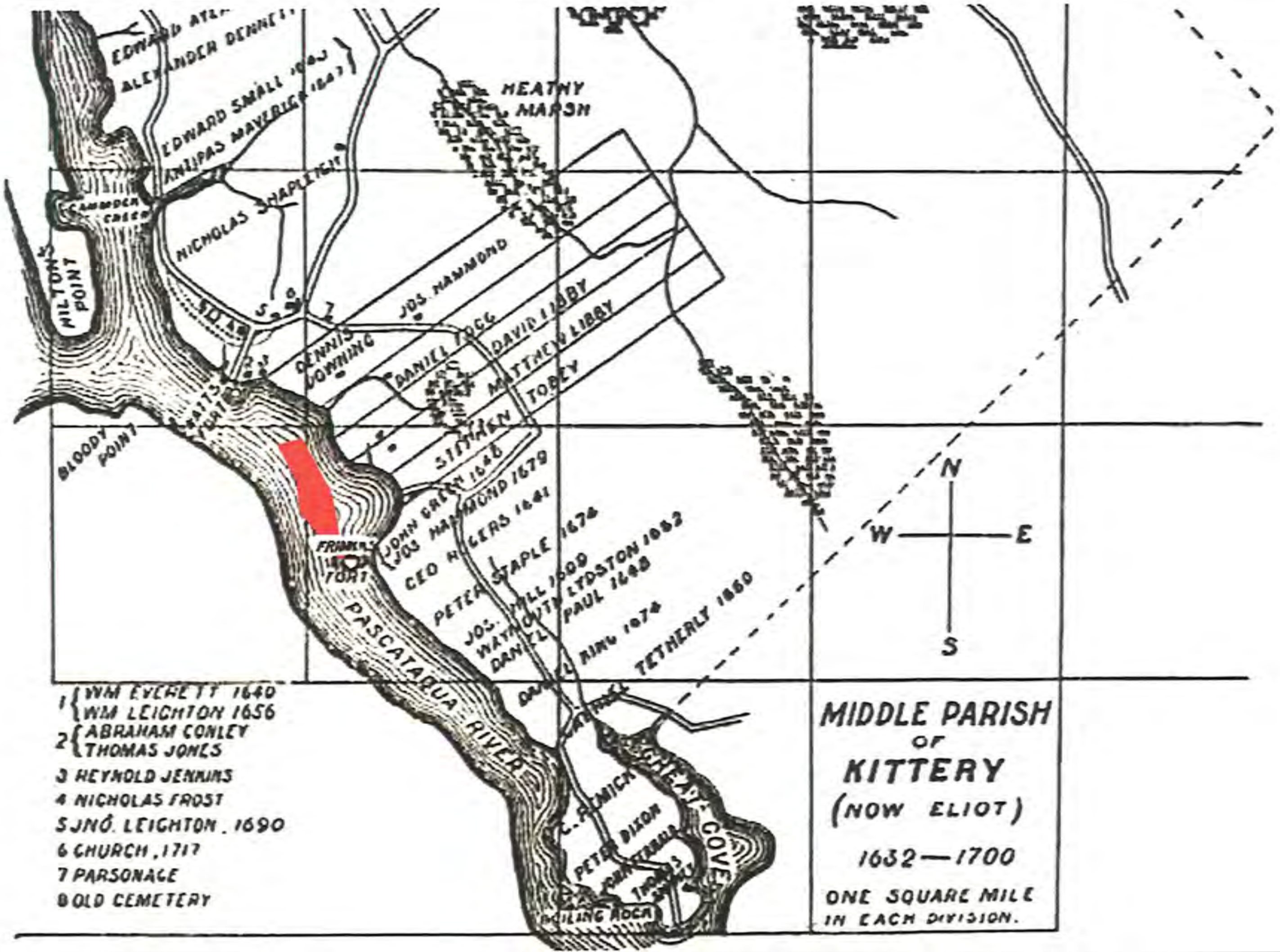


Figure 4-1. Map of the Middle Parish of Kittery (Now Eliot) 1632-1700 (source: Stackpole 1903:106).

While the 1713 Treaty of Utrecht ceased open hostilities between England and France, sporadic attacks on Maine's English settlers by Indians and the French continued. These attacks, however, were not enough to stem the tide of English settlement into the vast lands opened to them in Maine and elsewhere by France's ceding of their North American holdings in Acadia, the Maritimes, and Hudson Bay. Existing villages in Maine grew rapidly during the period. By 1750, Kittery's three parishes contained 270 dwellings and six grist- and sawmills (Macpherson et al. 1997). Shipbuilding got its start during this period, as well, as coastal vessel types such as "shallops," "ketches," and "pinkies" needed by local fishermen were produced in considerable numbers. By the end of the period, Eliot's population (1,457) comprised nearly half of Kittery's total population.

Over the course of the Federal Period, Kittery's three parishes began to take on distinctive socioeconomic characteristics. Eliot, Kittery's Second Parish, was inhabited primarily by farmers, and, thus, retained a distinctly agrarian character as the "Garden of Kittery." The other two parishes west and east of Eliot, however, were populated more by mechanics, traders, seamen, and fishermen, and had more of an industrial character.

During the Revolutionary War, Kittery organized a militia composed of six companies that were commanded by Colonel John Frost of Eliot, and served in the Second Regiment of Infantry of York County. Frank's Fort Island, at the southern end of the project area, was the scene of war-related activity at the start of the Revolution. Guns and powder from Fort William and Mary in New Castle, New Hampshire were seized by a group of men from Durham and Portsmouth and shipped to Frank's Fort Island where they were buried to hide them. The arms and powder were subsequently uncovered and sent to Charlestown, Massachusetts for use by Continental forces during the Battle of Bunker Hill (Macpherson et al. 1997).

Adjustment of the Piscataqua's maritime economy to the war resulted in a shift away from the international timber trade to internal transportation and shipbuilding. Recognized for their skill at building fishing vessels and larger cargo ships, the region's carpenters would become a major force in the Revolutionary War. Between 1775 and 1783, the region contributed more than 100 vessels and several thousand men to the "marine militia" of Continental privateers, and produced the first warships of the U.S. Navy at Portsmouth, New Hampshire, site of the nation's first federal navy yard (established in 1800 on Fernald's Island). These vessels included the 32-gun *Raleigh*, the 18-gun *Ranger*, and the 74-gun *America*, all of which saw considerable and successful naval action and greatly impressed their rivals (Heffernan and Stecker 1986:70).

In addition to their successes building and refitting ships for both a private and the Continental ocean-going navy during the war, the region's farmers and jacks-of-all-trades could claim success in developing and perfecting yet another essential, but unassuming coastal watercraft – the "gundalow" (Figure 4-2). The gundalow was a crudely designed, quick-to-build, broad-beamed nautical workhorse particularly well-suited to carry heavy loads in shallow waters along narrow river banks, although nimble and fast enough to negotiate the swift-moving, river and open-water tidal currents that prevailed on the Piscataqua. Gundalows provided a crucial link in

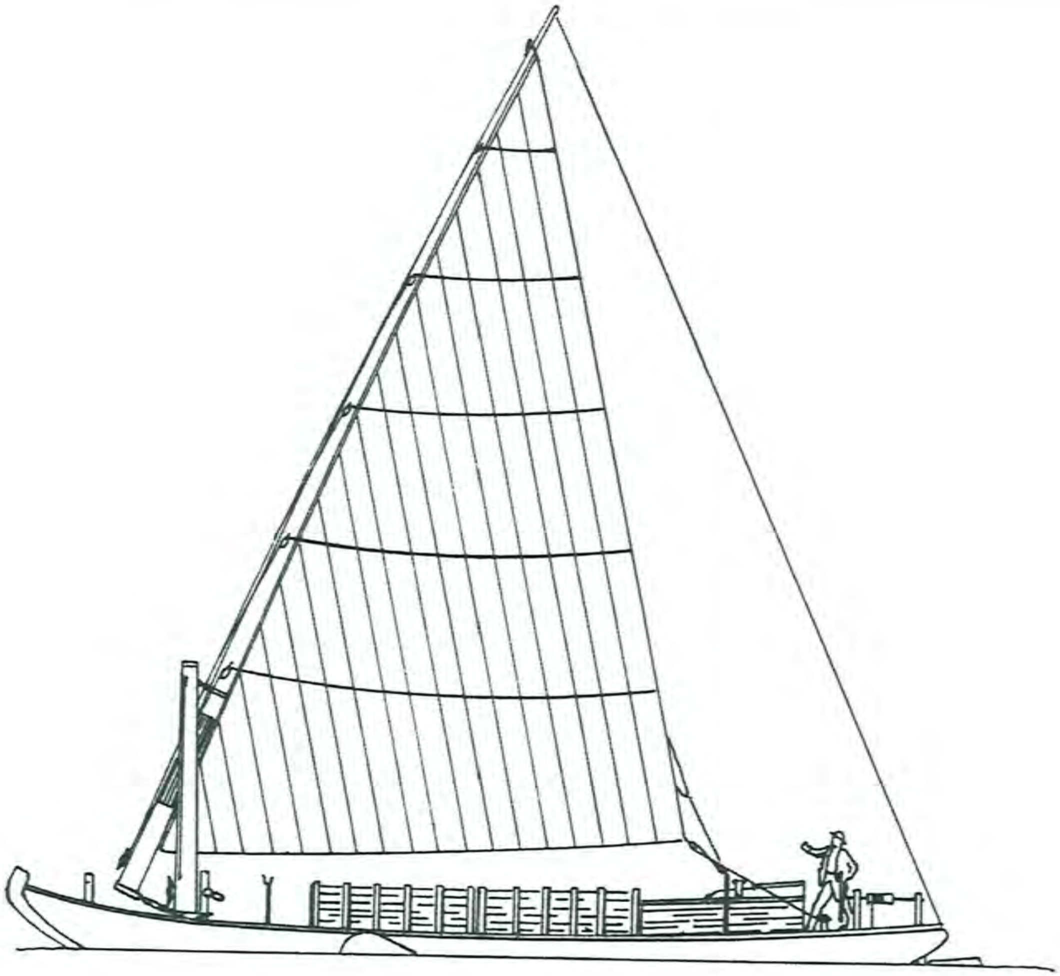


Figure 4-2. Drawing showing the 1886 Piscataqua River "gundalow" *Fannie M.* in profile while under sail. (The Piscataqua River gundalows used a modified Mediterranean-derived lateen sail rig from the nineteenth century onward to make passing under the area's bridges faster and easier.) (source: Grimwood 1942:Plate II).

the regional transportation system for more than 200 years hauling cargoes of local bricks and granite, cord wood, coal, cotton and other raw materials for the area's mills, and marsh hay and grass cleared from the area's fields between Piscataqua towns (Heffernan and Stecker 1986:70–72). Well adapted to the Piscataqua's geography and economy, it was the last of the region's commercial sailing vessels to ply the river's waters into the twentieth century.

Following the war, increasing differences in livelihoods, economics, and politics, led residents of Kittery's Second Parish to establish Eliot as an independent township, resulting in its incorporation in 1810. Maine itself gained independence from Massachusetts 10 years afterward in 1820. In the absence of British restraints, old overseas trade patterns revived and expanded, and Piscataqua's commerce and shipbuilding thrived for a 30-year period following the American Revolution. The early years of the nineteenth century witnessed more lumber and fish exports, more ships launched, and more fortunes made than in any preceding period in the Piscataqua region's history. The Piscataqua's docks were jammed with schooners and other types of ships loading and unloading pine lumber, barrel staves, dried fish, cattle, sheep, horses, bricks, cider, flaxseed, molasses, rum, sugar, cocoa, coffee, cheese, and salt (Heffernan and Stecker 1986:109).

The Embargo Act of 1807 and the War of 1812 disrupted the surge in prosperity; however, engagement in privateering (at a smaller scale than during the Revolutionary War) cushioned some of the trade losses. Ironically, it was in the peacetime that followed the War of 1812 that overseas trade declined significantly, as most of the foreign goods brought into the Piscataqua during the 1830s and 1840s supplied the growing railroad industry (Heffernan and Stecker 1986:109). Historically successful enterprises such as fishing and shipbuilding continued to be important, as the region returned its focus on local and coastal markets to compensate for the loss of foreign markets. Piscataqua's clipper ships, built in the decade before the Civil War, were the last "stars" of the region's shipyards. Although competition with the ascendant shipyards and merchants in the ports of Boston and New York led eventually to the decline of those on the Piscataqua, which generally didn't have deep enough harbors or large enough facilities to build bigger craft that were increasingly in demand. At least four clipper ships were built in the Kittery area, although registered in Portsmouth. The 1,060-ton clipper *Nightingale*, designed and built by Samuel Hanscom, Jr., was launched in Eliot in 1851 and towed to Portsmouth for outfitting (Duncan 1992:296) (Figure 4-3).

Farming also went into decline in the nineteenth century, because the region's small farmsteads could not compete with the growing agribusinesses of the Midwest and West. Fishing remained the principal business of coastal Maine and the Piscataqua. By the late nineteenth century, tourism began to replace most traditional economic activities in the area, as summer visitors were drawn to the coast for its cool climate, beaches, scenic shores, and relative lack of development. While Kittery has the Portsmouth Naval Shipyard, York its tourism and sandy beaches, Portsmouth its rich history, Eliot remains largely rural in character and has retained its identity as one of coastal Maine's quiet, residential communities.

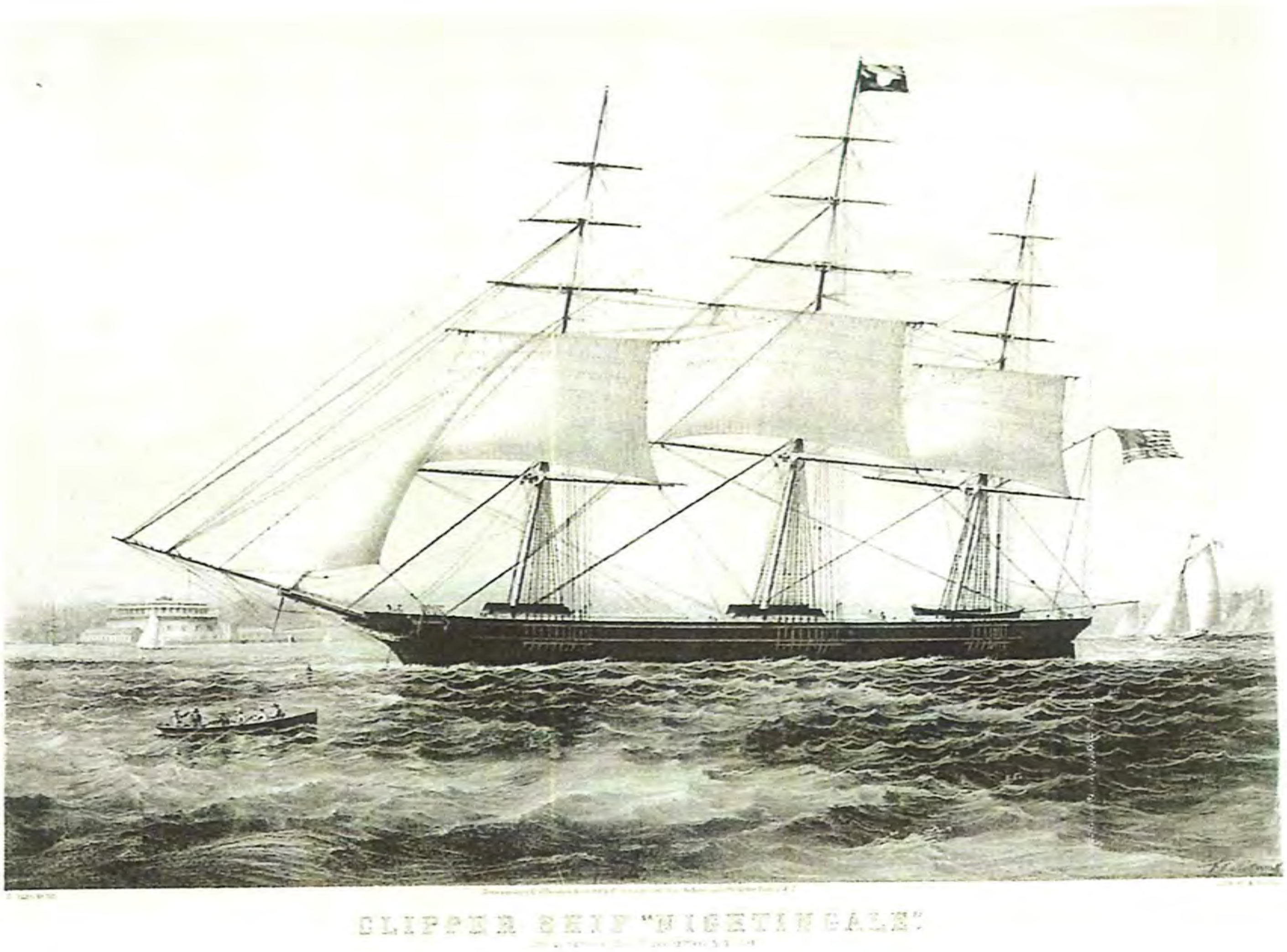


Figure 4-3. Eliot, Maine-built clipper ship *Nightingale* (1851) (source: Svardskog 2005:6).

CHAPTER FIVE

RESULTS AND RECOMMENDATIONS

Archival research conducted for this investigation recorded data useful for predicting the locations and types of pre- through post-contact period underwater archaeological deposits possibly present in the Piscataqua River project area. The field investigations conducted for this study produced geophysical (i.e., remote sensing) data used for the dual purposes of assessing the area's geology and potential hazards to the proposed navigation improvements within the project study area, and for identifying and inventorying anomalous targets with the potential to be National Register-eligible shipwrecks or areas of potential archaeological sensitivity. This chapter presents the results of this study's research and field survey tasks, and provides recommendations regarding the need for any additional archaeological investigations.

Archival Research Results

Archaeological Sensitivity - Submerged Pre-Contact Archaeological Deposits

The Piscataqua River Project study area is situated on the coastal plain within a resource-rich, protected estuarine setting, between Great Bay (one of the largest estuaries in the Northeast) and the Gulf of Maine/Atlantic Ocean. The project study area is located on the submerged eastern margin of the drowned Piscataqua River valley, which was inundated by rising sea level and coastal subsidence. Prior to its submergence, this environmental setting would have been a particularly attractive area for Native American resource-procurement and settlement during the pre-contact period.

Review of the available environmental data and sea level rise curves for the western Gulf of Maine indicate that the Piscataqua River study area was exposed land available for human habitation from the beginning of the Fluted Point PaleoIndian Period (11,500 B.P.) until some time during the Middle Archaic Period (circa [ca.] 7500–5000 B.P.), at which point the area would likely have been inundated by rising sea level. Available literature produced by archaeological research conducted to date on the pre-contact period for the southwestern Maine coastal area (i.e., from the New Hampshire border to Cape Elizabeth at the western end of Casco Bay) indicates that this section of the coast was occupied at least as early as the Late Archaic period (ca. 5000 B.P.) (Sanger and Kellogg 1989:113).

The Piscataqua River project area and its surrounding environs fit the prevailing predictive model as a productive ecological zone that would have been highly attractive for pre-contact land use from the Archaic Period through the contact period. No National Register or National Register-eligible archaeological properties or Maine site survey file archaeological sites are recorded in the project's underwater study area or on the shores directly adjacent to it. This absence is probably as much attributable to the negligible amount of underwater archaeological research on the pre-contact period that has been conducted to date in Maine and throughout the Northeast, as it is the low probability that the former subaerially exposed soils in which pre-contact archaeological deposits could be present are unlikely to remain or be undisturbed within the limits of the rapidly flowing river. For stratified archaeological deposits preserved in meaningful contexts to exist within the Piscataqua River Project study area, intact elements of the paleo-landsurface in which they were deposited must be present. Such deposits would need to have survived the postglacial marine transgression of the Piscataqua River valley and the subsequent disturbances from the river's fluvial processes and/or human activities.

Preservation of any inundated pre-contact archaeological deposits that potentially exist in the study area is dependent upon their location and depth of burial relative to natural and human impacts on sediments. Recognizing the erosional effects of the river's extremely strong tidal flow, the Piscataqua River study area is considered to possess a low potential for containing formerly terrestrial archaeological deposits of the pre-contact period. Instead, it would be more probable that pre-contact Native American archaeological deposits present in the study area would be of a maritime nature (e.g., watercraft or fishing weirs) and date to the later pre-contact period.

Archaeological Sensitivity - Submerged Contact/Post-Contact Archaeological Deposits

Available information for the Piscataqua River contact/post-contact period history (i.e., National and State registers of archaeological properties; vessel casualties in NOAA's AWOIS and the NSDB; previous CRM investigations, secondary sources, and local informant interviews) documents an extensive 400-year history of native and non-native fishing, shipbuilding, and maritime commerce in the lower Piscatacqua River. As noted above, the towns of Eliot, Maine and Newington, New Hampshire, as well as nearby Portsmouth, New Hampshire, reached their commercial zenith during the nineteenth century, as Maine became the "foremost builder of wooden ships in the country" (Allin 1995).

The relatively broad, straight section of the Piscataqua where the study area is located is north of an area known among mariners as, "Long Reach." Research conducted for this study produced no record of vessel casualties, nor any charted shipwrecks or submerged structures or obstructions within the project study area. Recognizing these facts, plus the protected inland nature of the study area and its proximity to the river's shore, the project study area is considered to have a moderate archaeological sensitivity for containing the remains of contact/post-contact period vessels and/or coastal structures that would be associated with the brief, early-seventeenth-century British establishment and occupation (ca. 1631–1634) of "Frank's Fort" Island (Frankfort Island), and lumber extraction activities presumably conducted in "Mast Cove," as part of the significant masting industry carried out on the Piscataqua from ca. 1640 to 1815.

Field Survey Results

Geophysical remote sensing survey performed by OSI and PAL recorded side-scan sonar, magnetometer, and sub-bottom profile data covering the entire Piscataqua River project study area. The recorded data was reviewed after post-processing to identify and inventory areas with potential to be archaeologically sensitive paleosols or targets likely to be associated with contact/post-contact period National Register-eligible archaeological deposits (e.g., shipwrecks and coastal infrastructure). Data sets reviewed by PAL included:

- Post-plot drawings of surveyed track lines and anomalies;
- All-inclusive anomaly inventories produced for the geological characterization and hazards survey;
- Sub-bottom profiles of each surveyed track line; and
- Side-scan sonar mosaic of the entire study area.

A total of 18 track lines spaced 50 ft (m) apart, plus three cross-tie lines (surveyed with just the sub-bottom profiler), were surveyed across the study area (Figure 5-1).

Pre-Contact Submerged Archaeological Deposits

The side-scan sonar and sub-bottom profiler produced a clear visual record from which to interpret and estimate the nature of the Piscataqua River project area's geomorphology. No geotechnical data (i.e., grab samples, vibratory cores, or borings) were obtained as part of this study for ground-truthing the geophysical data, so the surficial and subsurface sediment types described below are necessarily estimates based on the interpretation of the geophysical data alone (OSI 2007:12). The side-scan sonar and sub-bottom profiler records contain acoustic evidence suggestive of bedrock, coarse glacial till, and Holocene silts and gravel. A large percentage of the riverbed within the Piscataqua River study area appears to consist of coarse glacial till and bedrock outcrops (OSI 2007:12). Sand and gravel is the suspected material infilling depressions between outcrops, and covering the steeply sloped margin of the navigation channel on the study area's western edge. Sediments interpreted as silt appear to be present in deeper areas close to the river's Maine shoreline. A shoal in the central portion of the study area appears to be composed primarily of coarse glacial till and bedrock. The side-scan sonar and sub-bottom profiler data suggest that the Piscataqua River's extremely strong tidal currents have removed or redistributed any silt that may have been associated with formerly exposed paleolandforms in the study area; thus, it appears from the recorded data that there is virtually no potential for contextually intact archaeological deposits to be present within the Piscataqua River study area.

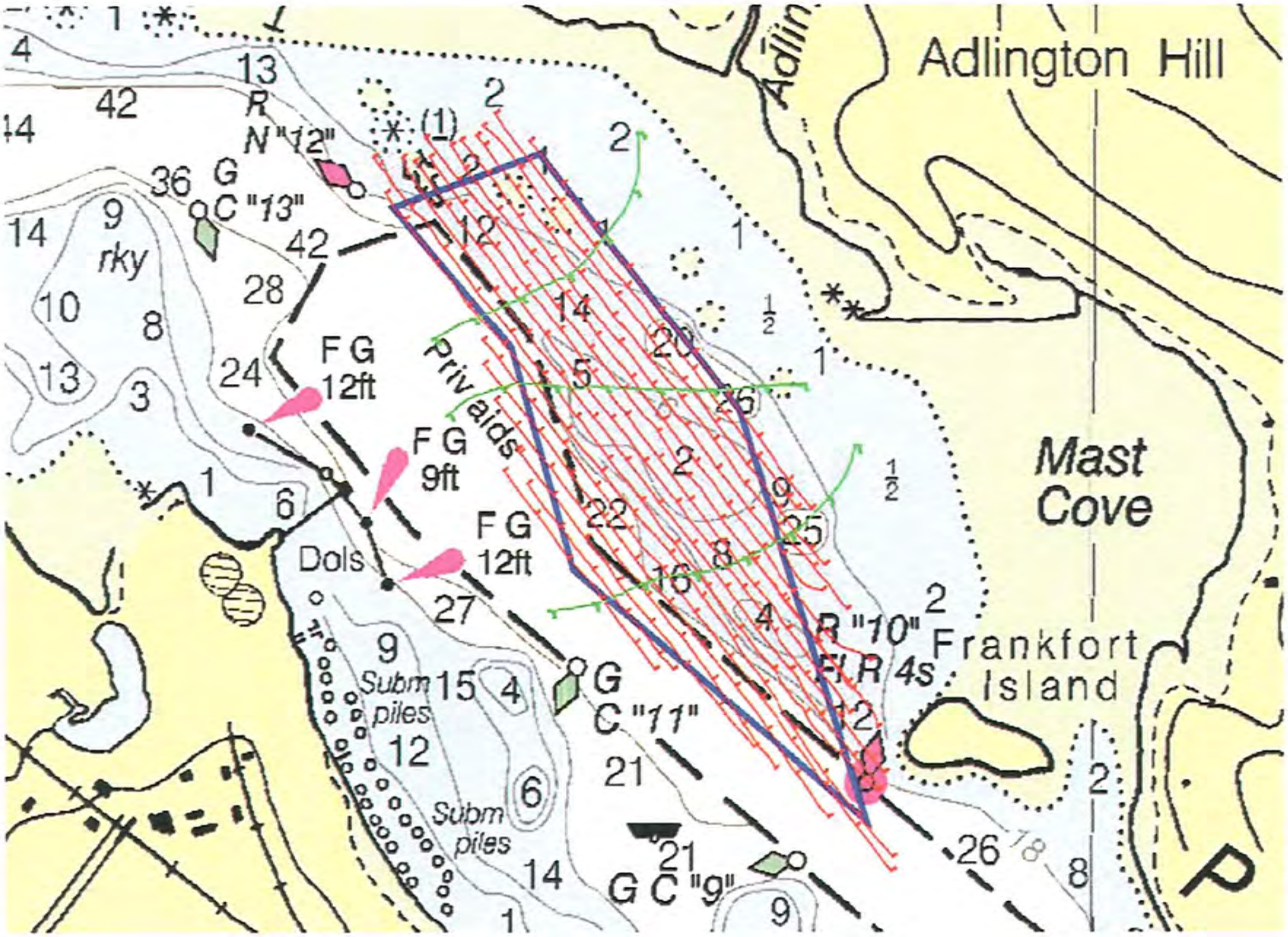


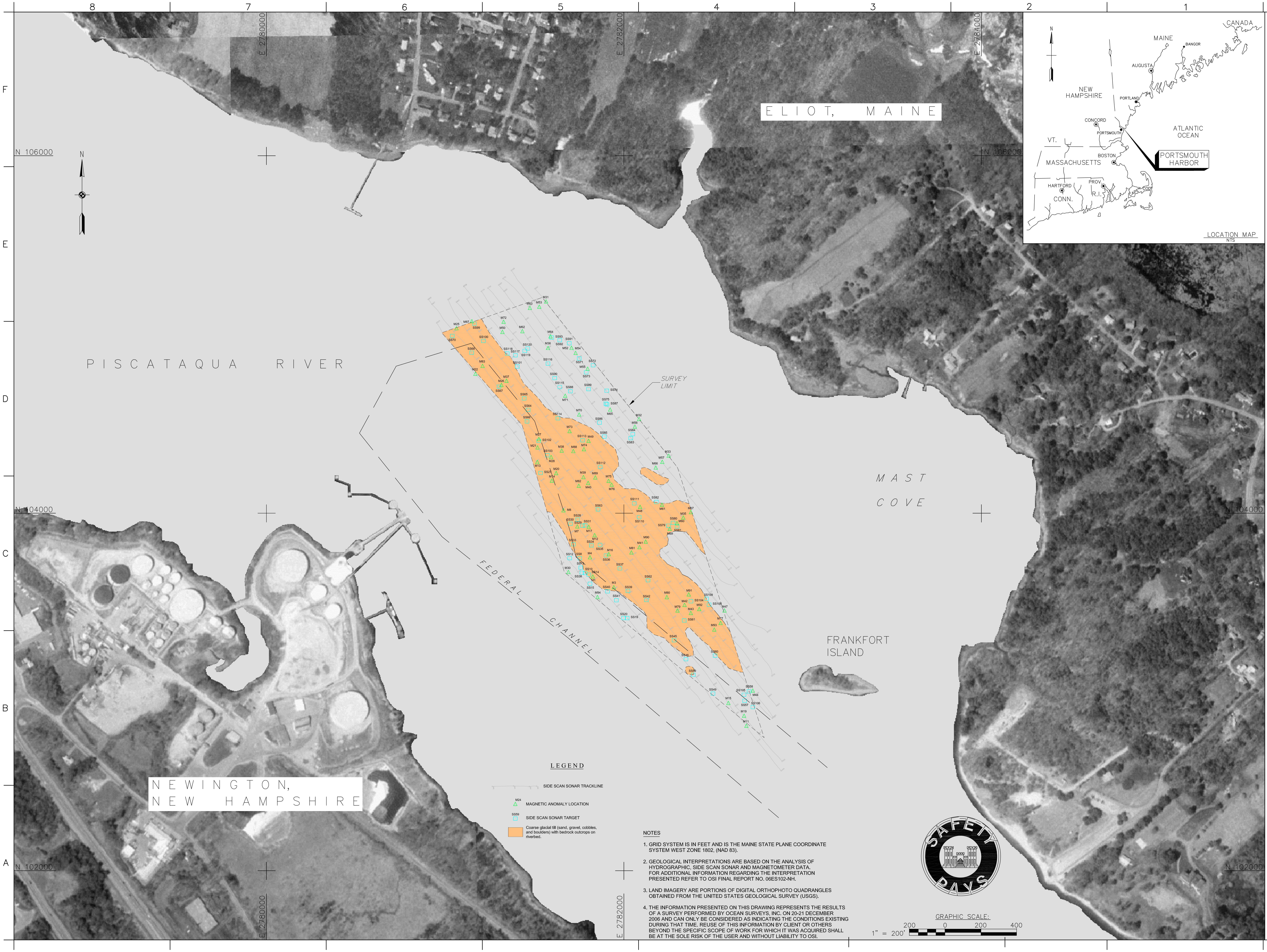
Figure 5-1. Location of surveyed track lines and anomalies within the Piscataqua River study area (plot courtesy of OSI).

Contact/Post-Contact Period Submerged Archaeological Deposits

Analysis of the remote sensing data recorded along these track lines documented 80 side-scan sonar anomalies (Appendix D) and 74 magnetic anomalies (Appendix E). The inventoried magnetic anomalies ranged in amplitude from 2 to 250 gammas and from 7 to 225 ft (2 to 69 m) in detected duration. The inventoried side-scan sonar anomalies ranged between 4 to 36 ft (1 to 11 m) in length, less than 1 to 27 ft (0.3 to 8 m) in width, and up to 6 ft (2 m) in elevation. Ten of the side-scan sonar anomalies (SS-14, -36, -58, -67, -73, -79, -80, -93, -99, and -102) were associated with magnetic anomalies. All of the detected side-scan sonar and magnetic anomalies appear to derive from geological sources (mafic and non-mafic bedrock and coarse glacial till) or widely scattered isolated occurrences of modern debris (Figure 5-2, Back Pocket) that are typical for a heavily utilized industrial waterway. Results from the remote sensing archaeological survey produced no indication of there being any potentially National Register-eligible post-contact period cultural targets on or embedded in the surface of the riverbed within the Piscataqua River project study area. A detailed description of the field survey's geological results is provided in the project's marine geophysical report prepared by PAL's sub-consultant, OSI (OSI 2007).

Recommendations

The region surrounding the Piscataqua River study area has a long history of intensive maritime activity spanning the pre- and post-contact periods. However, combined archival research and a systematic remote sensing archaeological field survey of the study area documented no listed submerged archaeological properties or any potentially National Register-eligible cultural targets on the surface of the riverbed. In addition, no sub-bottom profiler reflectors indicative of intact elements of an archaeologically sensitive paleolandscape were recorded within the survey area. Based on the results of this study, no additional archaeological investigations within the Piscataqua River project study area are recommended.



LEGEND

- SIDE SCAN SONAR TRACKLINE
- M24 △ MAGNETIC ANOMALY LOCATION
- SS59 □ SIDE SCAN SONAR TARGET
- 🟧 Coarse glacial till (sand, gravel, cobbles, and boulders) with bedrock outcrops on riverbed.

NOTES

1. GRID SYSTEM IS IN FEET AND IS THE MAINE STATE PLANE COORDINATE SYSTEM WEST ZONE 1802, (NAD 83).
2. GEOLOGICAL INTERPRETATIONS ARE BASED ON THE ANALYSIS OF HYDROGRAPHIC, SIDE SCAN SONAR AND MAGNETOMETER DATA. FOR ADDITIONAL INFORMATION REGARDING THE INTERPRETATION PRESENTED REFER TO OSI FINAL REPORT NO. 06ES102-NH.
3. LAND IMAGERY ARE PORTIONS OF DIGITAL ORTHOPHOTO QUADRANGLES OBTAINED FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS).
4. THE INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 20-21 DECEMBER 2006 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING DURING THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

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Plot date: 09/15/08
Plot scale: 1" = 200'

PISCATAQUA RIVER
PORTSMOUTH, NEW HAMPSHIRE
SIDE SCAN SONAR TARGETS,
MAGNETIC ANOMALIES &
SURFICIAL FEATURES

Reference number:
V-2
Sheet 1 of 1

Figure 5-2. Plot showing locations of magnetic and side-scan sonar anomalies detected within the Piscataqua River study area (plot courtesy of OSI).

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APPENDIX A
PROJECT SCOPE OF WORK

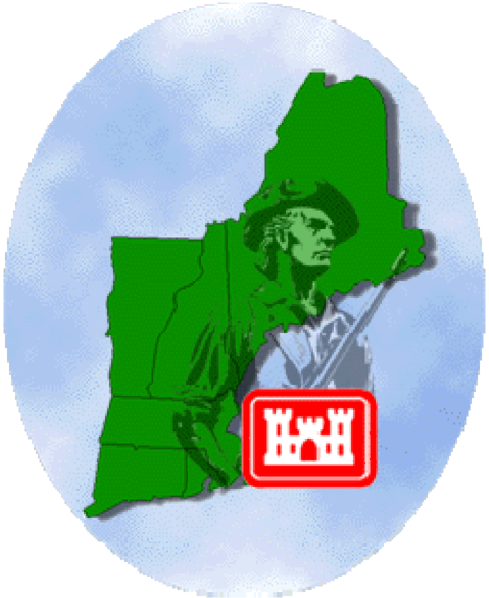
US Army Corps
of Engineers®

STATEMENT OF WORK
MARINE ARCHEOLOGY AND MARINE GEOPHYSICS
SEARSPORT HARBOR MAINE
AND
PORTSMOUTH HARBOR, PISCATAQUA RIVER, NEW HAMPSHIRE AND MAINE

Prepared for

Planning Branch

by



Geo-Environmental Branch
New England District
Concord MA

6 November 2006

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AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
DQO	Data Quality Objective
EM	Engineer Manual
ft	Feet
GDA	Government Designated Authority
MLLW	Mean Lower Low Water
MLW	Mean Low Water
NAD	North American Datum
NOAA	National Oceanographic and Atmospheric Administration
THFZ	Turtle Head Fault Zone
USACE	United States Army Corps of Engineers

1.0 INTRODUCTION

1.1 Project Description

The United States Army Corps of Engineers New England District (USACE) is preparing to undertake a channel deepening project at Searsport Harbor in Maine (Figure 1). As part of this effort, a marine archaeological and geophysical survey will be conducted to assess site conditions.

An optional effort is additional marine archaeological and geophysical survey on a portion of the Piscataqua River (Figure 2) during the same mobilization.

1.2 Task Overview

Services to be performed under this scope of work are described in this document. This is a firm fixed-price contract. Costs shall be priced on a per task/option basis. Contractor effort shall include reasonable time for delay due to coordination with navigation traffic and Harbor Master, logistics, set-up, etc. Contractor shall sequence executable work to minimize potential for downtime or delay**.**

1.2.1 Base Tasks

TASK 1 - Preparation of Work Management Plan, Health and Safety Plan, and Activity Hazard Analysis

TO BE COMPLETED BEFORE MOBILIZATION

Prepare draft and final Health and Safety Plan and Activity Hazard Analysis for tasked and optional fieldwork, and mobilization and demobilization with the exception of Task 9 where the Health and Safety Plan and Activity Hazard Analysis will be included as part of the Task 9 deliverables. See Section 6.0 for details.

Prepare draft and final work management plan to cover field tasks at Searsport Harbor and Optional field tasks on the Piscataqua River. See Section 8.2 for details.

TASK 2 - Searsport Harbor Marine Geophysical and Remote Sensing Archaeological Survey

Perform marine geophysical and remote sensing archaeological survey, consisting of seafloor imaging (sidescan sonar and magnetometer), and subbottom profiling (seismic reflection) within the areas being studied in/along the Searsport Harbor Navigation Channel.

See Section 4.0 MARINE GEOPHYSICS, of this Statement of Work for general requirements for magnetometer, sidescan sonar, and subbottom profiling (seismic reflection). For this task , magnetometer line spacing not exceeding 50 feet would result in a total of approximately 73 nautical miles of linear magnetometer data. Cross lines for subbottom profiling shall be run where they can intersect existing boring data, and shall not exceed 6 lines total.

Bottom elevations within the study area range between -10 and -53 ft below MLLW (Figure 1).

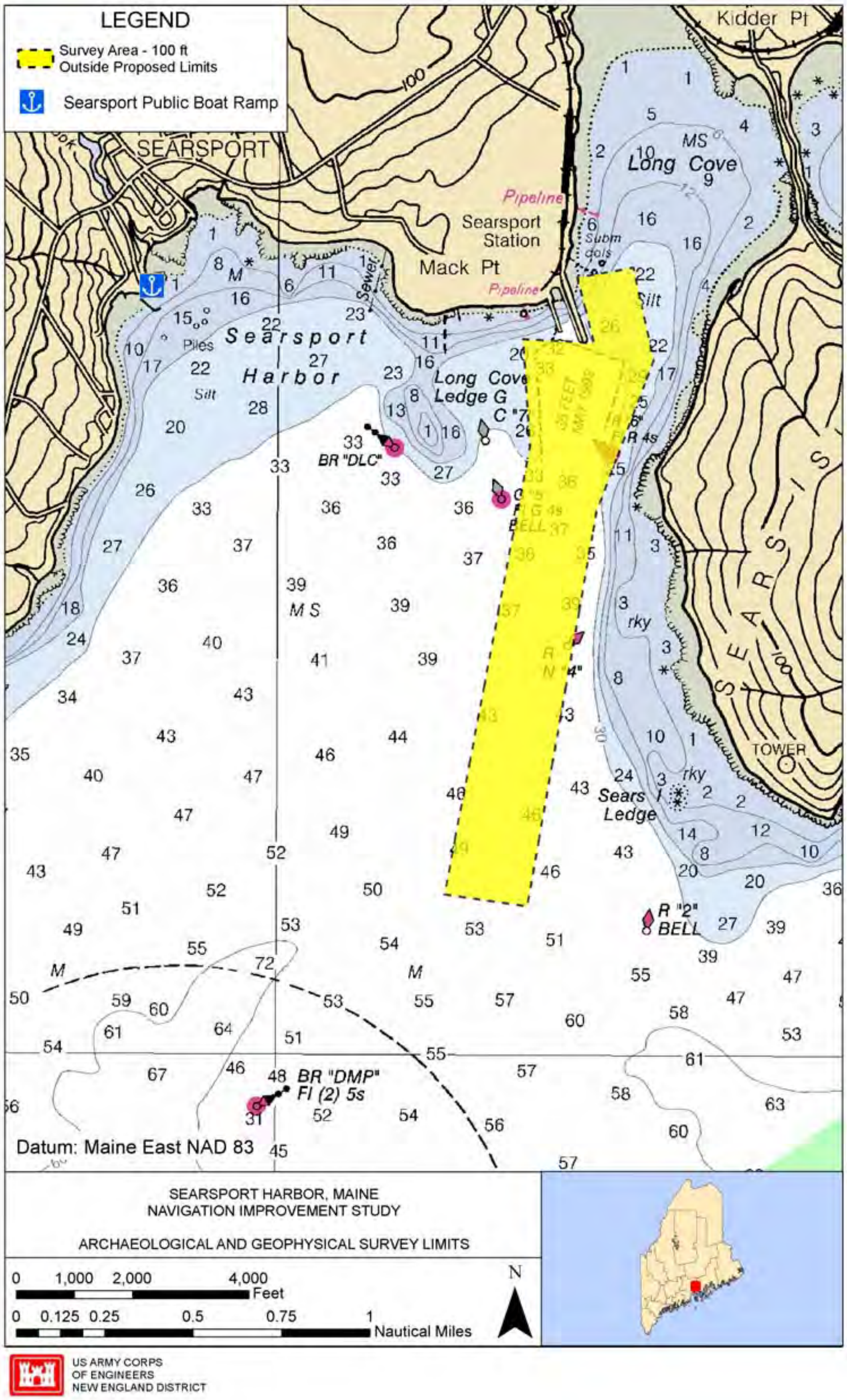


Figure 1. Searsport Harbor Maine study area and nearby public dock (soundings are ft below MLLW).

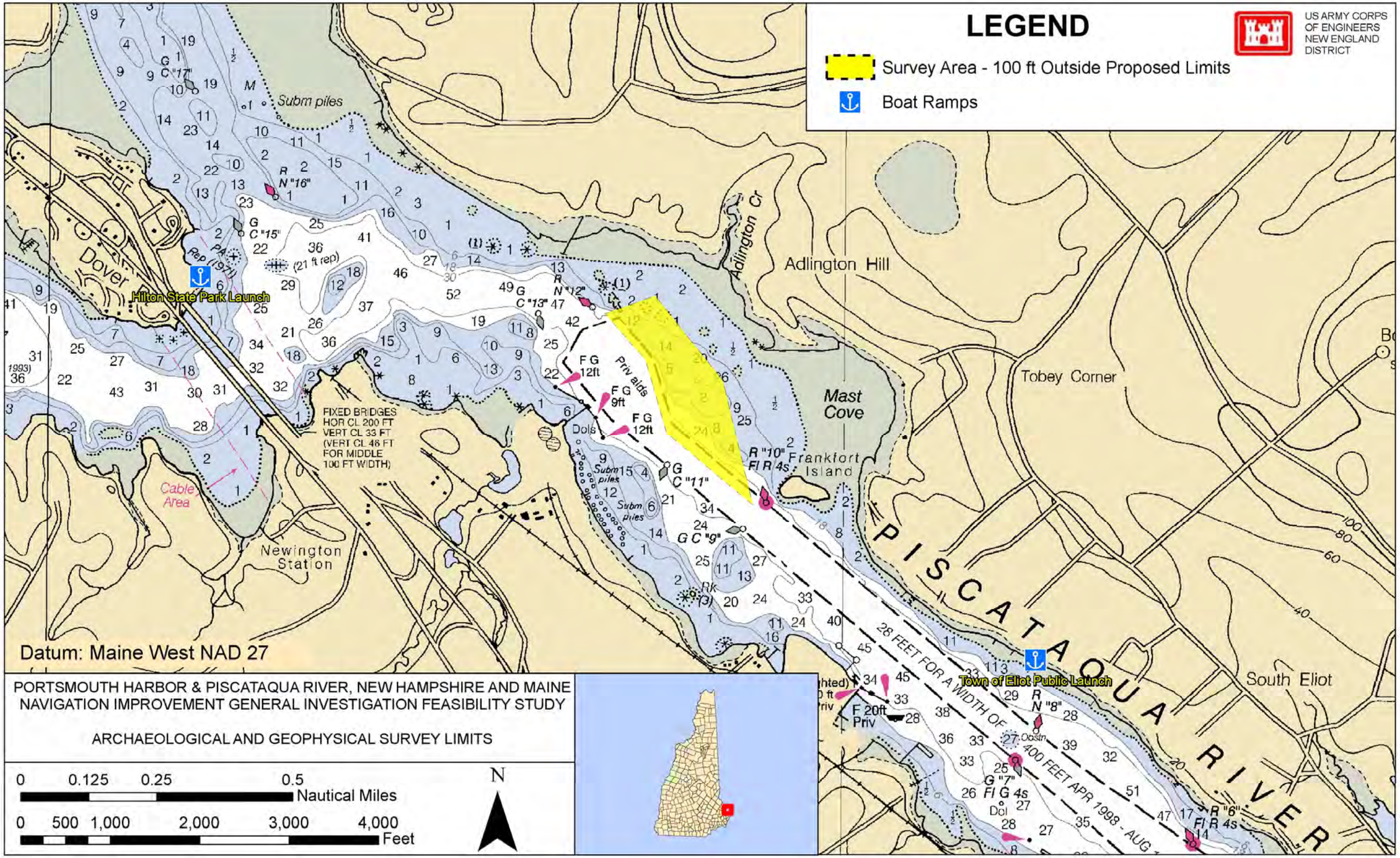


Figure 2. Location of the Piscataqua study area and nearest public boat ramps (soundings are ft below MLLW).

1.2.2 Optional Tasks – To Be Completed At USACE Direction

OPTIONAL TASK 3 - Piscataqua River Marine Geophysics and Remote Sensing Archaeological Survey

Perform marine geophysics and remote sensing archaeological survey, consisting of seafloor imaging (side scan sonar and magnetometer), and subbottom profiling (seismic reflection) within the areas being studied in/along the Piscataqua River Navigation Channel.

See Section 4.0 MARINE GEOPHYSICS, of this Statement of Work for general requirements for magnetometer, sidescan sonar, and subbottom profiling (seismic reflection). For this task, magnetometer line spacing not exceeding 50 feet would result in a total of approximately 7 nautical miles of linear magnetometer data. Cross lines for subbottom profiling shall be run where they can intersect existing boring data, and shall not exceed 3 lines total.

Bottom elevations range between -2 and -24 ft below MLLW (Figure 2).

OPTIONAL TASK 4 - Searsport Harbor Marine Archeology Report (Technical Evaluation, Literature Review and Assessment, Data Processing and Post Processing)

Prepare and submit report, including (1) discussion of field work and presentation of results (field reports, magnetometer results, side scan sonar images, profiles, electronic data files, discussion of equipment and methods, etc.), (2) and archaeological assessment and survey findings, including resources identified, magnetic anomalies encountered, and, if necessary, recommendations for further investigations.

Work includes preliminary interpretation of geophysical data, technical evaluation of results with respect to project objectives, tabulated locations of wrecks, suspected wrecks, debris and debris fields. Any significant archaeological findings shall be presented, including an assessment of the current project area, preliminary statements of resource significance and the identification of anomalies requiring additional evaluation. A qualified archaeologist familiar with the area and underwater prehistoric resources shall provide an assessment of the prehistoric potential of the study area.

General research guidelines for literature review and assessment (archaeological and historic resources):

a. A literature search shall be conducted of the project area not to exceed 1 man day. This should be geared toward obtaining information pertaining to the cultural resources in the area and/or the potential of their existence. Information and data for the literature search shall be obtained but not be limited to the following sources:

(1) Published and unpublished reports such as books, journals, theses, manuscripts and dissertations.

(2) Maritime archaeological site files at local universities, the State Historic Preservation Offices, and local historical societies and museums.

(3) Consultation with qualified professionals familiar with the underwater cultural resources in the area, as well as consultation with professionals in associated areas such as history or geology, as deemed necessary.

b. Information should be included concerning any cultural resources in the proposed area that have been listed on or are potentially eligible for nomination to the National Register of Historic Places. Information gathered during the literature review may be tailored to meet the needs of the presentation required above, however, the bulk of the data shall be included in the report.

OPTIONAL TASK 5 - Searsport Harbor Marine Seismic Report (Technical Evaluation, Literature Review and Assessment, Data Processing and Post Processing)

Prepare and submit report, including (1) discussion of fieldwork and presentation of results (field reports, magnetometer results, seismic reflection profiles, electronic data files, discussion of equipment and methods, etc.), (2) finalized geologic interpretation of geophysical data and technical evaluation of results with respect to project objectives, including bedrock topographic maps and recommendations for future subsurface investigations, and (3) table of proposed boring locations, estimated total depth, and rationale (verify interpretation, investigate anomalous bedrock zone, fill in area where bedrock data is missing due to gas-bearing sediments).

Work includes preliminary interpretation of geophysical data, technical evaluation of results with respect to project objectives, identification of areas considered questionable or likely to have hard material (bedrock, cobbles, etc.) within the dredge limits and recommend actions for future subsurface investigations. Other items of interest include areas having large expanses of mud/fines (greater potential for contamination), and areas where depth to bedrock would preclude excavation.

General research guidelines for literature review and assessment:

a. A literature search shall be conducted of the project area not to exceed 1 man day. This should be geared toward obtaining information pertaining to the geology of the area and/or past geophysical surveys. Information and data for the literature search shall be obtained but not be limited to the following sources:

(1) Published and unpublished reports such as books, journals, theses, manuscripts and dissertations.

(2) United States and Maine Geological Surveys, and files at local universities.

(3) Consultation with qualified professionals familiar with the underwater and shore geology, as deemed necessary.

OPTIONAL TASK 6 - Piscataqua River Marine Archeology Report (Technical Evaluation, Literature Review and Assessment, Data Processing and Post Processing)

Prepare and submit report, including (1) discussion of field work and presentation of results (field reports, magnetometer results, side scan sonar images, profiles, electronic data files, discussion of equipment and methods, etc.), (2) and archaeological assessment and survey findings, including resources identified, magnetic anomalies encountered, and recommendations for further investigations.

Work includes preliminary interpretation of geophysical data, technical evaluation of results with respect to project objectives, tabulated locations of wrecks, suspected wrecks, debris and debris fields. Any significant archaeological findings shall be presented, including an assessment of the current project area, preliminary statements of resource significance and the identification of anomalies requiring additional evaluation. A qualified archaeologist familiar with the area and underwater prehistoric resources shall provide an assessment of the prehistoric potential of the study area.

General research guidelines for literature review and assessment (archaeological and historic resources):

a. A literature search shall be conducted of the project area, and not exceed 1 man day. This should be geared toward obtaining information pertaining to the cultural resources in the area and/or the potential of their existence. Information and data for the literature search shall be obtained but not be limited to the following sources:

(1) Published and unpublished reports such as books, journals, theses, manuscripts and dissertations.

(2) Maritime archaeological site files at local universities, the State Historic Preservation Offices, and local historical societies and museums.

(3) Consultation with qualified professionals familiar with the underwater cultural resources in the area, as well as consultation with professionals in associated areas such as history or geology, as deemed necessary.

b. Information should be included concerning any cultural resources in the proposed area that have been listed on or are potentially eligible for nomination to the National Register of Historic Places. Information gathered during the literature review may be tailored to meet the needs of the presentation required above, however, the bulk of the data shall be included in the report.

OPTIONAL TASK 7 - Piscataqua River Marine Seismic Report (Technical Evaluation, Literature Review and Assessment, Data Processing and Post Processing)

Prepare and submit report, including (1) discussion of field work and presentation of results (field reports, magnetometer results, seismic reflection profiles, electronic data files, discussion of equipment and methods, etc.), (2) finalized geologic interpretation of geophysical data and technical evaluation of results with respect to project objectives, including bedrock topographic maps and recommendations for future subsurface investigations, and (3) table of proposed boring locations, estimated total depth, and rationale (verify interpretation, investigate anomalous bedrock zone, fill in area where bedrock data is missing due to gas-bearing sediments).

Work includes preliminary interpretation of geophysical data, technical evaluation of results with respect to project objectives, identification of areas considered questionable or likely to have hard material (bedrock, cobbles, etc.) within the dredge limits and recommend actions for future subsurface investigations. Other items of interest include areas having large expanses of mud/fines (greater potential for contamination), and areas where depth to bedrock would preclude excavation.

General research guidelines for literature review and assessment:

a. A literature search shall be conducted of the project area, and not exceed 1 man day. This should be geared toward obtaining information pertaining to the geology of the area and/or past geophysical surveys. Information and data for the literature search shall be obtained but not be limited to the following sources:

(1) Published and unpublished reports such as books, journals, theses, manuscripts and dissertations.

(2) United States and Maine Geological Surveys, and files at local universities.

(3) Consultation with qualified professionals familiar with the underwater and shore geology, as deemed necessary.

OPTIONAL TASK 8 - Weather Day

TO BE EXERCISED DURING FIELD PROGRAM IF NEEDED.

Item shall include costs incurred due to one down day due to weather, with vessel and equipment idle, and crew not working.

OPTIONAL TASK 9 - Searsport Harbor Wreck Assessment

Field Work

a. All sites are to be drawn, photographed, videotaped or documented by any other means, as is common archaeological practice for the identification and evaluation of submerged cultural resources. The purpose of this fieldwork is to provide a preliminary assessment of submerged cultural resources; no formal National Register eligibility documentation or field survey will be required at this time. Any sites of potential significance are to be recorded, documented and left in-situ for purposes of further coordination and consultation.

Inspection of the wreck site will include the dropping of an anchored buoy followed by the diving to the area to conduct a systematic search and recording of the target. This work should be undertaken with the use of an archaeological diving crew, as opposed to a commercial diving unit, although commercial divers may assist under the supervision of the Underwater Archaeologist. **The minimum dive team is a four-person crew. This may not include the boat operator, unless the operator is part of the normal dive team and precautions are in place.**

b. All work to be accomplished will be in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716, September 29, 1983) and the Advisory Council on Historic Preservation's Handbook "Treatment of Archaeological Properties" (1980). The qualifications for leading an historic shipwrecks project must be met, as specified by the National Park Service in the “Abandoned Shipwreck Guidelines” published in the Federal Register, Volume 50, Number 233, on December 4, 1990.

c. The Contractor will be responsible for the obtaining of a permit for the performing of underwater archaeological explorations as required by the Maine Historic Preservation Commission, prior to the implementation of fieldwork. No subsurface excavation will be conducted.

d. An accident prevention plan (APP) and site-specific detailed diving plan should be prepared and be available for review and approval by the Government prior to the initiation of fieldwork. Special attention shall be focused on the requirements of the US Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1 (dated 3 September 1996), and particularly Appendix A, (Minimum Basic Outline for Accident Prevention Plan), and Section 30 (Contract Diving Operations). A copy of the Appendix A requirements and Section 30 will be provided by Corps upon request. Work **shall not** proceed until the APP has been reviewed by the Corps and accepted by the Contracting Officer Representative. **Diving may not take place unless a USACE Certified Diving Inspector is present on-site.**

Report and Graphics Production

a. Draft Report. The Contractor shall prepare, within 30 days of completion of fieldwork, a draft report of the wreck inspection survey results and recommendations for further research and evaluation, if necessary. Upon completion of the draft report, the Contractor shall submit 10 copies to the Government for review and comment. The review of the report will focus on format, method of preparation and compliance with applicable contract requirements. The Government will provide the Contractor consolidated review comments within 20 days of the submittal of the draft report. Upon receipt of the review comments, the Contractor shall make all necessary changes or corrections and develop a Final report within twenty (20) calendar days.

b. Final Report. The Contractor shall submit ten (10) copies of the Final report version, including one unbound copy, a copy of the electronic files in Microsoft Office format, original black and white photographs and/or a copy of the DVD, no later than twenty (20) days after the receipt of any Government review comments from the draft report. Comments should be addressed within the final version of the report; otherwise reference to other resolution should be included.

All data, reports, and related materials obtained as a result of this contract shall become the property of the U.S. Government and shall be turned over to the Contracting Officer, upon completion of the contract, **with the exception of any cultural remains or artifacts recovered as a result of the study**. **These resources are the property of the State of Maine, except in cases stipulated within the Standards and Guidelines for Abandoned Shipwrecks Investigations.**

1.3 Background Geology

1.3.1 Searsport Harbor

Bedrock underlying the study area consists of thick-bedded biotite, quartzites, schists, massive meta-graywacke or andesite tuffs of the Penobscot Formation (Kasuba and Simpson, 1989). The northeast-southwest trending Turtle Head Fault Zone (THFZ), located southeast of Sears Island (Figure 1), separates the Penobscot Formation to the north from the Ellsworth Formation and coastal volcanics to the south (Hogan and Sinha, 1989). The Ellsworth Formation and coastal volcanics units consist of bedded, buff-weathered quartzite; some metamorphosed mafic volcanics, as well as some rusty weathering pellites and minor limestones. The bedrock surface about 1.5 nautical miles south of Sears Island contains bedrock pinnacles exceeding 60 feet in amplitude (Belknap, Kelley and Gontz, 2002).

Till sequences overly most of the bedrock, except where bedrock pinnacles reach 60 feet or more above the bedrock base. The Waldoboro moraine runs along the north-western coastline of Penobscot Bay. End moraine deposits are found running east to west. The southern part of Sears Island (Figure 1) contains various types of till and outwash sand deposits (Gerber, 1976), which are likely present in the harbor sediments west of the island.

The Presumpscot Formation overlies the till units, and consists of mostly glaciomarine mud with sand layers and gravel dropstones (Belknap, Kelley and Gontz, 2002). Fine grained sediment eroded from glaciomarine and till bluffs north of the study area are carried by the Passagassawakeag River and deposited in Penobscot Bay. Sediment cores south of Sears Island show thick Quaternary sediment beds of sand, gravel and estuarine mud. Detrital organic material (wood, bark and grass fragments) was retrieved from 1 vibracore south of Sears Island (Belknap, Kelley and Gontz, 2002).

Numerous large pits are present in the Belfast Harbor sediments about five miles west of Sears Island, and have a typical size of 500-foot diameter by 50-feet deep. Sidescan sonar shows these pits to be present as far east as the midpoint between Sears Island and the mainland to the west (NOAA, 1999). It is not known if source of decaying organic matter is related to peat in glacial till or sawmill waste materials (Caldwell, 1998). Marine seismic reflection data suggest the uppermost unit of the harbor sediment sequence is natural gas-rich, and can negatively affect marine seismic data (Belknap, Kelley and Gontz, 2002).

1.3.2 Piscataqua River

The Piscataqua River is underlain by several Precambrian – Silurian sedimentary rocks (Caldwell, 1998). The oldest is the Rye Formation, which consists of deformed metasedimentary and felsic igneous rocks (blastomylonitic granite to granodioritic gneiss). The Eliot Formation, described as calcareous pellite, is comprised of a buff-colored, quartz-plagioclase-biotite phyllite and is strongly sheared throughout. Abundant carbonate at the lowest grades and calc-silicate minerals at higher grades are found. The Kittery Formation, calcareous feldspathic sandstone, is most commonly seen with variation in bedding thickness of tan quartzite alternating with phyllite. Grain size ranges from coarse sand at depth to fine mud closer to surface (Anderson, 1985a). Both the Eliot and Kittery Formations fall largely within the green schist facies as well as small portions of the epidote-amphibolite and low rank amphibolite facies. The Rye Formation, schists, phyllites and amphibolites, overlies sections of the Kittery and Eliot Formations (VanDiver, 1984).

The Norumbega fault, a strike-slip fault running NNE, is shown on the Maine Bedrock Geology map running North of the area (Caldwell, 1998).

The Piscataqua Riverbed is comprised mainly of glaciomarine sediment (fine grained facies) of silt, clay and sand with trace amounts of gravel, deposited by Wisconsinan glacial ice. It is not until farther upstream that coarser grained glaciomarine deposits are found. Some areas of till are present.

No references to organics gas-rich sediments were found.

1.4 Site Specific Data Acquisition and Analysis Problems

Cargo and fishing vessels actively use both areas.

Pre-glacial valley or valleys may underlie Searsport Harbor, potentially yielding a complex bedrock surface. Glacial till is likely present in the harbor, and may interfere with interpreting the bedrock surface.

Side scan sonar in Belfast Harbor and marine seismic data south of Sears Island indicate organics and gas are likely present in the sediments immediately west of Sears Island.

Mafic igneous intrusions, such as dikes, may be present in both study areas and create strong magnetic anomalies.

Limited boring data near the Piscataqua River study area suggest bedrock may be shallow.

2.0 PROJECT GOAL, OBJECTIVES, AND ASSUMPTIONS

2.1 Project Goal and Data Quality Objectives

The overall project goal is to collect archeological and design data for the Searsport Harbor channel deepening project and Piscataqua River navigation channel improvement project. The data quality objectives (DQOs) for this Marine Geophysics SOW are:

a) Assess subsurface conditions to –70 ft below MLLW
b) Locate objects or magnetic anomalies representing historic period and/or prehistoric archaeological resources and evidence of sunken vessels
c) Make recommendations for future archaeological studies based upon survey data and literature review to include inspection of identified anomalies at the intensive survey level and for the potential for submerged prehistoric resources,
d) Identify areas suspected of having material that is not easily dredged (bedrock, cobbles, dense till, hard pan, etc.) within the proposed dredge limits
e) Identifying pinnacles and large glacial erratics
f) Recommend areas for subsurface explorations (borings/probes) to verify presence of such material
g) Assess depth to bottom of water column
h) Discriminate between silt, sand, and till overburden units where geophysical contrasts permit
i) Locate potential buried utilities

This work effort will be accomplished by performing geophysical and remote sensing archaeological explorations (seismic, magnetometer, sidescan sonar, and subbottom profiling) in the areas being studied for potential navigation improvement. The data gathered from the exploration program will be used to scope intensive archaeological survey work (if warranted) and subsurface investigations in the future.

All work shall be done in accordance with USACE guidance (USACE, 2003, 2002, 2001a, 2001b, 1995).

2.2 Project Assumptions

- Searsport horizontal data shall be referenced to the Maine East State Plane NAD83 coordinate system.
- Piscataqua River horizontal data shall be referenced to the Maine West State Plane NAD83 coordinate system.
- All vertical data shall be referenced to mean lower low water (MLLW) as determined by the USACE tide gage.
- Searsport Harbor study area bedrock is deeper than 40 feet below MLLW, based on boring and probe data.
- Profiles will pass over or near existing borings to aid in the data interpretation.
- Organic-rich sediments are present in the Searsport Harbor area.
- The Contractor shall notify and brief the Harbor Master and Coast Guard prior to commencing field operations.

- The contractor will identify geophysical signatures suggesting utilities or other manmade features (charted and uncharted), but these interpretations shall not constitute a utility survey, which is beyond the scope of this effort.
- Preliminary draft and draft data plots and a brief write-up describing identified features, and are due 21 and 45 calendar days from the completion of fieldwork, respectively.
- The Contractor shall follow USACE safety requirement as spelled out in the Accident Prevention Plan.
- USACE shall provide:
    - The most recent condition survey plans (full-size) for the areas being studied in/along the navigation channel.
    - Description of Survey control points used for each hydrographic study
    - HYPACK electronic files containing the bathymetric data for the study areas compatible with Microstation.

3.0 PROJECT REQUIREMENTS

a. General. The Contractor shall provide all necessary labor, materials, and equipment necessary to complete the specified marine geophysics and remote sensing archaeological survey. The Contractor shall provide well-maintained and calibrated equipment, and a qualified crew experienced in all phases of marine geophysical and remote sensing archaeological explorations.

b. Qualifications. **Geophysical**: The lead geophysicist shall have at least five years experience conducting and interpreting results of marine geophysical explorations in New England. **Archaeological**: All work to be accomplished will be in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716, September 29, 1983), and the Advisory Council on Historic Preservation's Handbook "Treatment of Archaeological Properties" (1980). The qualifications for leading an historic shipwrecks project must be met, as specified by the National Park Service in the “Abandoned Shipwreck Guidelines” published in the Federal Register, Volume 50, Number 233, on December 4, 1990.

c. Coordination. All details presented in this document are subject to change by USACE as the work progresses. Close coordination with the USACE point-of-contact listed is required during the operations to determine final details.

d. Utilities. Prior to starting any field work, Contractor shall contact the necessary agencies (DIG-SAFE) and/or utility companies to identify any utilities or other features in the areas to be explored, so they can be avoided and protected from damage by any invasive activities that may be taken during the explorations (setting anchors, etc.).

4.0 MARINE GEOPHYSICS

4.1 General Requirements

4.1.1 Density of Coverage

The distance between remote sensing transects should be determined by background research and an expectation of the kinds of wrecks likely to be encountered. Parallel line spacing for the magnetometer should not exceed 50 feet. Parallel line spacing for marine seismic data acquisition shall not exceed 150 feet. The number of lines should be sufficient to acquire 100% sidescan sonar coverage of proposed dredge area, including some overlap along the edges, to generate a bedrock contour map and identify potential archeological targets. It is anticipated that geophysical lines will be run roughly parallel to the channel, with cross lines (perpendicular) approximately every 500 to 1,500 feet of channel length, as needed to aid in interpretation of the data. Lines should provide adequate coverage, extending slightly beyond the channel limits, to ensure that significant masses of bedrock, cobbles, etc. are not missed along the edges of the channel. Contractor shall propose geophysical track line array, because selection may be influenced by weather, logistics, geology, field findings, etc. Lines will be numbered and identified in a fashion that will allow ease of use, and will avoid mistaking lines made in different areas. Contractor shall propose nomenclature for identifying lines.

4.1.2 Vessel, Navigation, and Positioning

Vessel shall be sufficiently sized and equipped to conduct the required explorations, providing for protection of instrumentation and electronics, and able to accommodate the crew, captain, as well as visitors (1 to 2 Corps personnel). A Safe Boater certified captain shall captain the vessel. Contractor is responsible for making all Notices to Mariners, the Harbor Master, and other vessels operating in the area. The vessel shall be equipped with a Differential Global Positioning System (DGPS) with navigation software (HYPACK or equivalent) to enable the vessel captain to steer-to navigate, to stay on course and run straight and accurate data collection lines. Lines should be run as straight and on-course as conditions will allow. DGPS shall be accurate to within 5 feet horizontally, and 1 foot vertically. Geophysical instruments shall be integrated with the DGPS so that the data can be tagged with position and time information at regular intervals during data collection. All horizontal data shall be referenced to the site specific horizontal datums, and vertical data shall be referenced to Mean Lower Low Water (MLLW) to match datum currently being used in USACE drawings. Position and dimension results shall be provided in English units, to be consistent with existing USACE plans. Geophysical units shall be metric.

4.1.3 Marine Magnetometer

Magnetometer data (Geometrics G-881 or other suitable equipment) will be considered as part of this evaluation to identify any metallic features on the bottom that could represent cultural resources and/or could affect the navigation improvement dredging being considered.

4.1.4 Seafloor Imaging

An appropriate side scan sonar (Klein Model 540, EG&G Model 260 with Model 272-T towfish, EG&G Model DF-1000 in-water towfish, or equivalent) and data collection and processing system will be used to generate images of bottom conditions. Images will be interpreted by an experienced side scan sonar operator, to identify geologic material types present at the surface (mud, bedrock, etc.), and aid in identifying potential cultural resources that warrant further investigation and other features that could impact a dredging operation (utilities, pipes, debris, obstructions, shipwrecks, etc.).

4.1.5 Subbottom Profiling

Contractor shall mobilize to the site the appropriate seismic reflection equipment necessary to perform subbottom profiling of the Areas. Contractor shall select the most appropriate equipment to provide the appropriate balance between depth penetration and resolution for the conditions within each portion of the study area. Lower frequency equipment has greater depth penetration, but lower resolution (EG&G Uniboom, ORE Geopulse, Edgetech X-Star System with low frequency towfish, etc.), while higher frequency equipment gives higher resolution, but does not penetrate as deep (DataSonics 6600 Chirp System, Raytheon RTT 1000a, Edgetech X-Star System with high-frequency towfish, etc.). The maximum dredge depth being considered is –45-ft MLLW (-47-ft MLLW including 2 feet overdredge), but the exploration program should be geared to acquire high-quality data to –52-ft MLLW. If acoustically opaque gas (entrapped in mud) is encountered, the Contractor need not propose any extraordinary measures to penetrate the mud acoustically, but these areas should be identified and noted.

4.1.6 Interpretation

An experienced, qualified marine geophysicist shall interpret the geophysical data collected, and make best judgment assessments of the presence and limits (horizontally and vertically) of hard material within the dredging limits of the study area. The geophysicist shall also note the places in the geophysical data where there is greater uncertainty in the interpretation, and other places where subsurface investigations could add the most value (at cross-points of the geophysical lines, for example). See Section 2.1 for data interpretation and presentation requirements.

The project archaeologist shall evaluate both magnetometer and sidescan sonar results in tandem, as well as subbottom profiling, when identifying potential cultural resources.

4.2 Base and Optional Study Areas

4.2.1 Contract Base – Searsport Harbor

Coordinates for the entire study area shown in Figure 1 are listed in Table 1.

Table 1. Points defining the Searsport Harbor study area are listed below (Maine State Plane, NAD83).

Point	Northing	Easting
1	**287375**	**881678**
2	**286177**	**882106**
3	**283650**	**881159**
4	**277663**	**880108**
5	**277860**	**878712**
6	**283611**	**879806**
7	**285984**	**879651**
8	**285896**	**880773**
9	**286921**	**880407**

Figure 3 shows a portion of the Searsport study area and location of available boring and probe data. Boring and probe data is summarized in Table 2.

Table 2. Searsport Harbor boring data (coordinates in Maine State Plane NAD83).

Boring	Northing	Easting	Surface Depth (ft below MLW)	Total Depth of Boring (ft below MLW)	Details (depth units are in feet)
H-3	286015.161	880514.789	-22.5	-52	-22.5' to -35.5 (Mud); -35.5' to -43.5' (Gravel, rocks, clay); -43.5' to -52' (Loose sand and gravel with boulder obstruction on bottom)
M-4	285965.162	880652.789	-23.5	-60	-23.5' to -38.5' (Mud); -38.5' to -44' (Hard Clay); -44' to -60' (Sand and gravel with little clay)
W-5	286027.164	880839.786	-22	-64	-22' to - 32.5' (Mud); -32.5' to -52' (Hard Clay); -52' to -64' (Clay, sand & gravel)
FD-1	284477.17	879976.81	-30.1	-40.1	-30.1 to -40.1' (Organic SILT with occasional shells)
FD-2	284965.17	880514.8	-30.5	-40.5	-30.5' to -40.5' (Organic SILT with occasional shells)
FD-3	285615.17	881326.79	-30.9	-40.9	-30.9' to -38.9' (Organic SILT with occasional shells to organic SILT with occasional shells a trace of sand); -38.9' to -40.9' (CLAY in laminated layers)
FD-4	286040.16	880126.79	-23.2	-43.2	-23.2' to -31.8' (Organic SILT); -31.8' to -33.2' (CLAY); -33.2' to -35.2' (Organic SILT); -35.2' to -43.2' (CLAY)

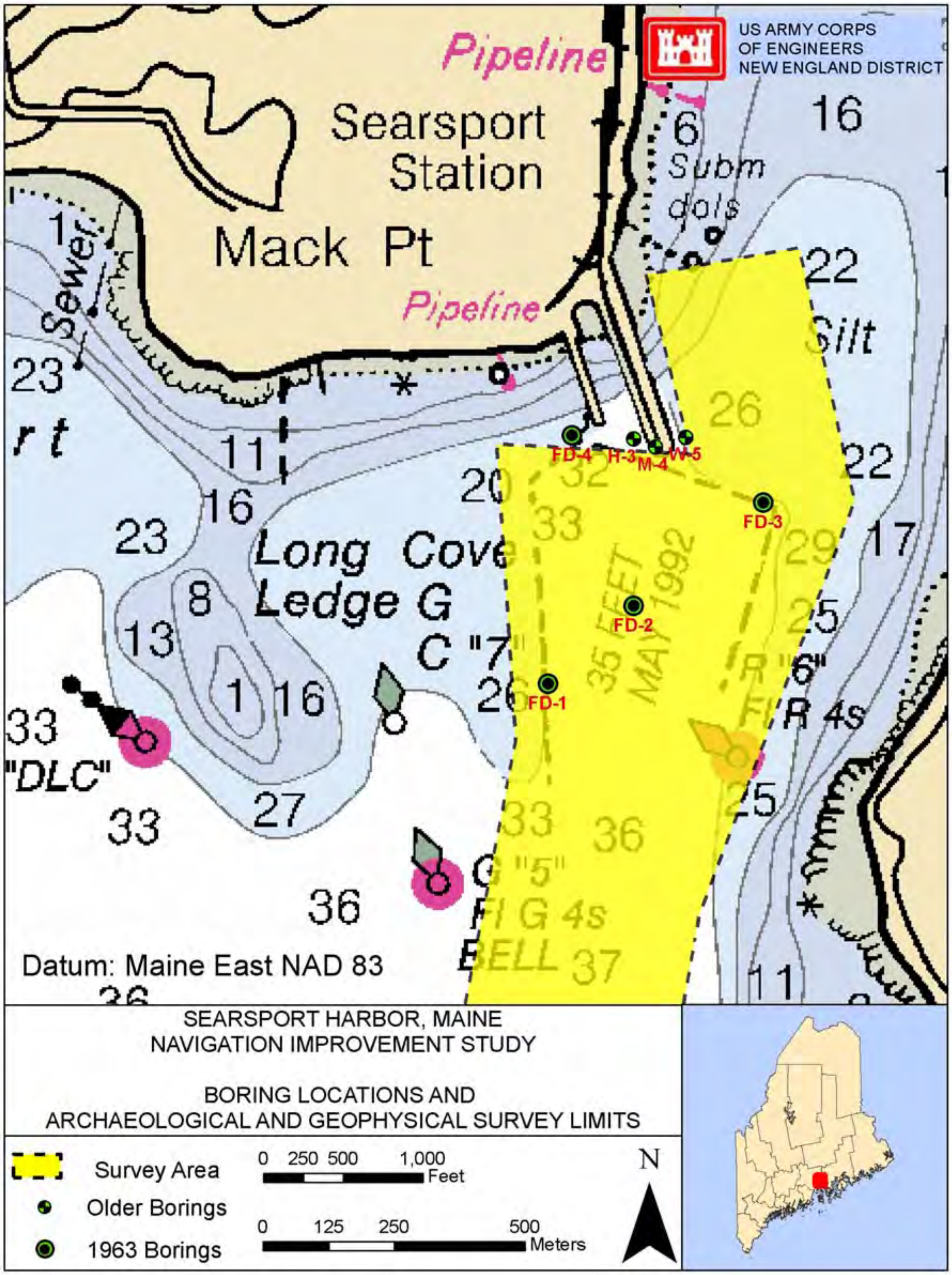


Figure 3. Northern portion of the Searsport study area and borings (see Table 2) (soundings are ft below MLLW).

4.2.2 Contract Option – Piscataqua River Turning Basin

Figure 4 shows the Piscataqua study area and location of available boring and probe data. Coordinates for the study area polygon are in Table 3.

Table 3. Points defining the Piscataqua River study area are listed below (Maine West State Plane, NAD27).

Point	Northing	Easting
1	**105174.757**	**328653.9**
2	**104225.074**	**329410.631**
3	**102712**	**329896**
4	**103638.256**	**328777.994**
5	**104460.107**	**328542.193**
6	**104977.482**	**328091.73**

Two probes completed near the proposed turning basin show mud, sand and loose stone in retrieved samples (Table 4, Figure 4). Probe Number 11 went to a depth of 37.4-ft below MLW and penetrated 6.1-ft before hitting refusal. Depth of water was 31.5-ft. Probe Number 18 went to a depth of 32.7-ft below MLW before hitting refusal after 8.9 feet. Depth of water was 29.4-ft. These probes were taken with a pointed ¾" iron pipe forced into the sediment by two men in a skiff. They were taken between August 31 and September 2, 1960 (USACE File No. 1505 D-8-3).

Table 4. Historic probe data near the proposed Piscataqua River turning basin shown in Figure 4 (Maine West State Plane NAD27).

Probe	Northing	Easting	Depth of Water (ft below MLW)	Depth of Probe (ft below MLW)	Penetration (ft)	Material
P-11	102879	329093	-31.5	-37.4	6.1	Mud & sand, Refusal
P-18	102800	329179	-29.8	-32.7	8.9	Loose stone - Gravel – Refusal

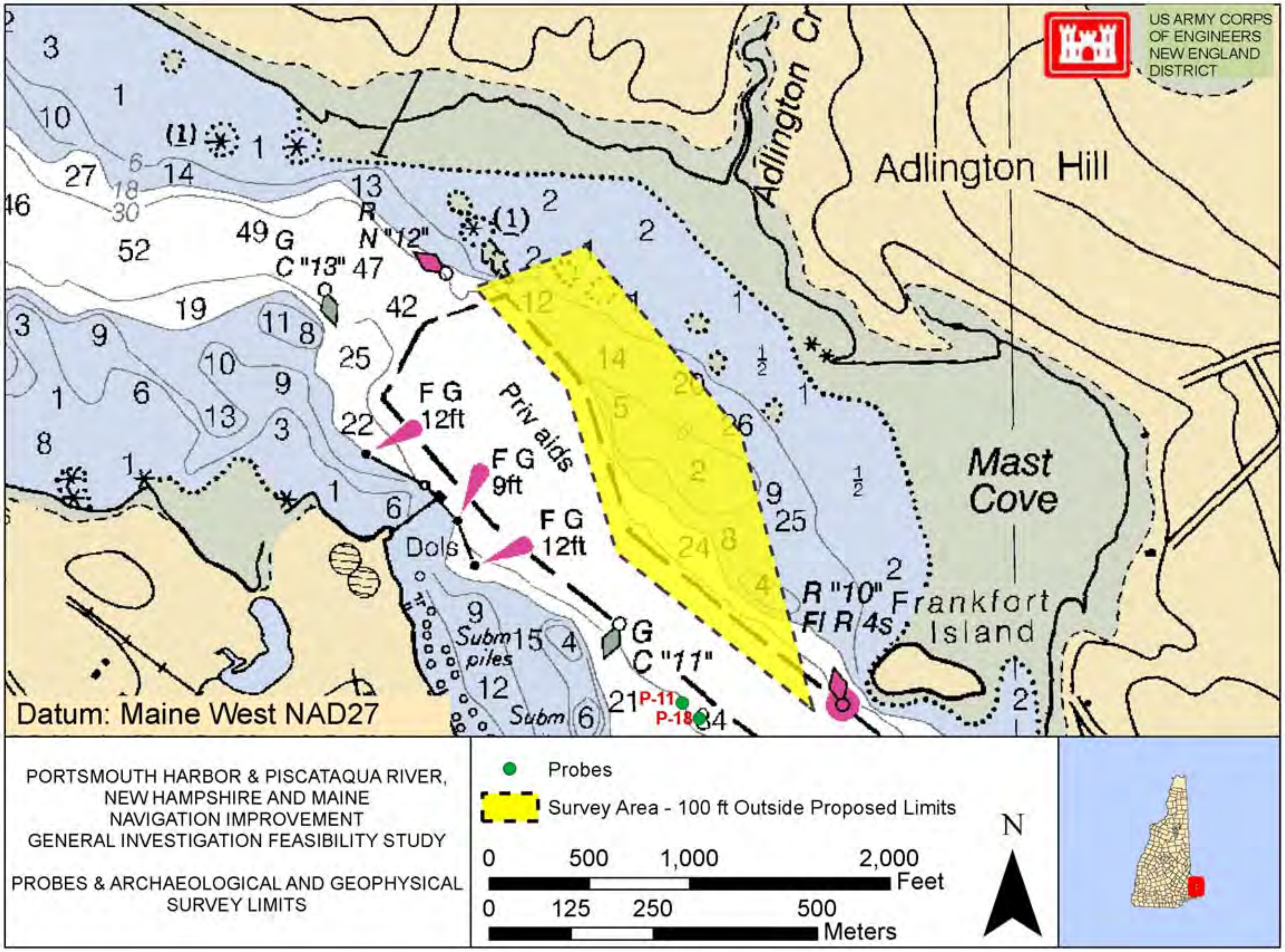


Figure 4. Location of existing probes near the proposed Piscataqua River turning basin (soundings are ft below MLLW).

5.0 REMOTE SENSING ARCHAEOLOGY

The Contractor shall utilize a systematic, interdisciplinary, synergistic approach to conducting the study. Specialized knowledge and skills will be used during the course of the study to include expertise in the disciplines of maritime archaeology, geology, history, marine architecture, and any other discipline as required. Techniques and methodologies used for the study shall be representative of the state of current professional knowledge and development.

Preliminary statements of resource significance and project impacts should be provided. A qualified archaeologist familiar with the area and underwater prehistoric resources should also provide an assessment of the prehistoric potential of the study area. Preliminary assessments of significance should be formulated.

Prepare a report describing the results of the survey, including archaeological resources identified, magnetic anomalies encountered and recommendations for further investigations. Recommendations should be made as to whether archaeological subsurface testing (i.e. vibracores) is warranted to determine the presence of submerged prehistoric deposits. Recommended locations shall be summarized in a table of prioritized proposed vibracore locations, estimated total depths, and rationales shall be included.

The report will serve several functions. It will assist USACE in fulfilling legal obligations under Section 106 of the National Historic Preservation Act of 1966 as amended and 36 CFR 800. It is also a scholarly document that not only fulfills the mandated legal requirements but serves as a scientific reference for future professional studies as well.

6.0 SAFETY AND HEALTH REQUIREMENTS

6.1 Accident Prevention Plan

The Contractor shall prepare an Accident Prevention Plan (APP) specific to the activities being performed (see Appendix A). It shall include an Activity Hazard Analysis (AHA) as described in 6.2 below. All work shall be conducted in accordance with the APP, the U.S. Army Corps of Engineers Safety and Health requirements Manual (USACE, 2003), and all applicable federal, state, and local safety and health requirements. A copy of EM 385-1-1 can be accessed electronically at www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1.

The APP shall detail how safety and health will be managed during the project. The APP shall address the requirements of applicable Federal, State and local safety and health laws, rules, and regulations. The Contractor shall comply with Federal Acquisition Regulation Clause No. 52.236-13 for Accident Prevention, which is added by reference. Special attention shall focus on the requirements of EM 385-1-1, specifically Section 01.A.11 through 01.A.18, Figure 1-1 AHA, and Appendix A, (Minimum Basic Outline for Accident Prevention Plan). The APP shall be developed by a qualified person. The contractor shall be responsible for documenting the qualified person's credentials. Work shall not proceed until the APP has been reviewed and approved by the Government Designated Authority (GDA) Sheila Winston (978-318-8159; sheila.m.winston@nae02.usace.army.mil) and deemed acceptable for use on the project.

The APP shall interface with the Contractor's overall safety and health program. Any portions of the Contractor's overall safety and health program referenced in the APP shall be included in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract, the penalties for noncompliance, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.

The Contractor shall conduct a safety meeting at the project site on the first day of work, whenever a new activity or phase of work begins, or at least weekly during the progress of work. All safety meetings shall be documented (See Figure 5 for an example). The attached safety meeting form or a similar contractor-prepared form shall be used. Records of the safety briefings shall be submitted to the GDA weekly.

WEEKLY SAFETY MEETING

Date Held: ________________________

Time: ____________________________

CONTRACTOR: _________________________ Contract No. DACW33-

PERSONNEL PRESENT (check): Contractor ____ Sub. ____ Government ____

SUBJECTS DISCUSSED (check items that were discussed during meeting):

USACE EM385-1-1 ______ (Specific sections: __________________________)
On-site Accident Prevention Plan (or Site Safety and Health Plan) ______
Individual protective equipment (steel-toed boots, safety glasses, etc..) _____
Prevention of slips/falls _____
Back injury/safe lifting techniques _____
Fire prevention _____
First aid _____
Tripping hazards _____
Equipment inspection and maintenance _____
Hoisting equipment, winch and crane safety _____
Ropes, hooks, chains, and slings _____
Water safety _____
Boat safety _____
HAZMAT, Toxic hazards, MSDS, respiratory, ventilation _____
Staging, ladders, concrete forms, safety nets, handrails ____
Hand tools, power tools, machinery, chain saws _____
Vehicle operation safety _____
Electrical grounding, temporary wiring, GFCI _____
Lockouts/safe clearance procedures _____
Welding, cutting _____
Excavation hazards/rescue _____
Loose rock/steep slopes _____
Explosives _____
Sanitation and waste disposal _____
Clean-up, trash _____

Other safety issues of concern specific to contract that was discussed during meeting:

All persons attending meeting the meeting must sign below or on the back of the form.

Contractor Representative Signature ____________________________ Date: _______
CE Inspector/QA (if present at meeting) __________________________ Date: __________

Figure 5. Example of weekly safety meeting form.

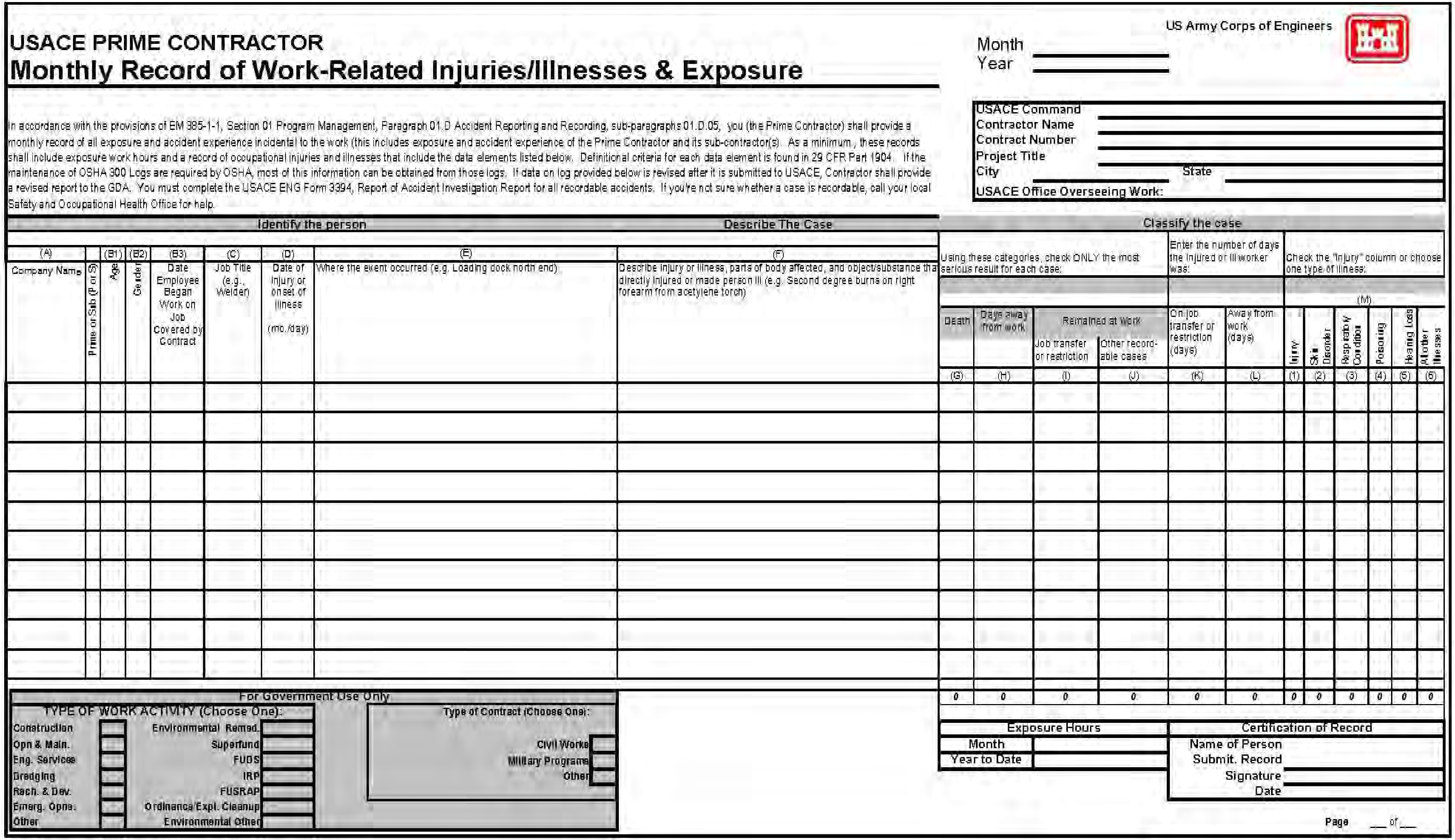
6.2 Activity Hazard Assessment

An AHA shall be submitted for each major phase of work. A major phase of work is defined as an operation involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform the work. The analysis shall define all activities to be performed, identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on a phase of work until the AHA has been accepted by the GDA. A preparatory meeting shall be conducted by the contractor to discuss the AHA contents with all engaged in the activity. The preparatory meeting shall be conducted by the prime contractor and shall include all subcontractors and Government on-site representatives. The AHA shall be continuously reviewed and revised to address changing site conditions or operations as appropriate.

6.3 Accident Reporting

All accidents and near misses shall be investigated by the Contractor. All work-related recordable injuries, illnesses and property damage accidents (excluding on-the-road vehicle accidents), in which the property damage exceeds $2,000.00, shall be verbally reported to the GDA within 24 hours of the incident. Serious accidents as described in EM 385-1-1 Section 01.D.02 shall be immediately reported to the GDA. ENG Form 3394 shall be completed and submitted to the GDA within five working days of the incident.

The Contractor shall complete the "USACE Contractor Monthly Summary Record of Injuries/Illness and Work Hour Exposure" (for prime and its subcontractors) shown in Figure 6, and forward the completed form to the GDA no later than close of business on the 10th calendar day of the following month. The method of transmission by the prime contractor to the GDA shall be electronically.



US Army Corps of Engineers

USACE PRIME CONTRACTOR
Monthly Record of Work-Related Injuries/Illnesses & Exposure

Month ____
Year ____

USACE Command ____
Contractor Name ____
Contract Number ____
Project Title ____
City ____ State ____
USACE Office Overseeing Work:

In accordance with the provisions of EM 385-1-1, Section 01 Program Management, Paragraph 01.D Accident Reporting and Recording, sub-paragraphs 01.D.05, you (the Prime Contractor) shall provide a monthly record of all exposure and accident experience incidental to the work (this includes exposure and accident experience of the Prime Contractor and its sub-contractor(s). As a minimum, these records shall include exposure work hours and a record of occupational injuries and illnesses that include the data elements listed below. Definitional criteria for each data element is found in 29 CFR Part 1904. If the maintenance of OSHA 300 Logs are required by OSHA, most of this information can be obtained from those logs. If data on log provided below is revised after it is submitted to USACE, Contractor shall provide a revised report to the GDA. You must complete the USACE ENG Form 3394, Report of Accident Investigation Report for all recordable accidents. If you're not sure whether a case is recordable, call your local Safety and Occupational Health Office for help.

Identify the person								Describe The Case	Classify the case												
									Using these categories, check ONLY the most serious result for each case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
(A)		(B1)	(B2)	(B3)	(C)	(D)	(E)	(F)			Remained at work									
Company Name	Prime or Sub (P or S)	Age	Gender	Date Employee Began Work on Job Covered by Contract	Job Title (e.g., Welder)	Date of Injury or onset of Illness (mo./day)	Where the event occurred (e.g. Loading dock north end)	Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	Death	Days away from work	Job transfer or restriction	Other record-able cases	On job transfer or restriction (days)	Away from work (days)	Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other Illnesses
									(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
									0	0	0	0	0	0	0	0	0	0	0	0

For Government Use Only

TYPE OF WORK ACTIVITY (Choose One):

Construction	☐	Environmental Remed.	☐
Opn & Main.	☐	Superfund	☐
Eng. Services	☐	FUDS	☐
Dredging	☐	IRP	☐
Rsch. & Dev.	☐	FUSRAP	☐
Emerg. Opns.	☐	Ordinance/Expl. Cleanup	☐
Other	☐	Environmental Other	☐

Type of Contract (Choose One):

Civil Works	☐
Military Programs	☐
Other	☐

Exposure Hours	
Month	
Year to Date	

Certification of Record

Name of Person Submit. Record ____
Signature ____
Date ____

Page ___ of ___

Figure 6. USACE Monthly Accident Reporting Form

7.0 QUALITY ASSURANCE AND QUALITY CONTROL

The contractor will be held responsible for the quality of their submittals and for all damages caused to the Government because of his/her negligence in the performance of any services furnished under this task order.

Although the Government reviews submissions required under this task order, it is emphasized that work must be scrutinized using proper internal controls and review procedures to meet USACE (2002, 2001a, 2001b, 1995) and company requirements. The letter of transmittal for each submission must indicate that the submission has been subjected to review and coordination procedures to ensure

a) Completeness for each discipline commensurate with the level of effort required for that submission.
b) Compliance with this SOW and USACE Guidance (USACE 2006, 2003, 2002, 2001a, 2001b, 1995)
c) Reviewed by an experienced technical writer or editor for grammar, punctuation, subject-verb agreement, paragraph organization, agreement between tables, text, figures, and plates.
d) Elimination of conflicts, errors, and omissions.
e) The overall professional and technical accuracy of the submission.

Documents, which are significantly deficient in any of these areas, will be returned to the contractor for correction and/or upgrading prior to Government review. Contracted submission due dates will not be extended if a resubmission of draft material is required for this reason. It is requested that the Contractor indicate in writing in the fee proposal letter their cognizance of this requirement and the contractor firm and its associates have the professional competency and technical expertise necessary to accomplish this project in a satisfactory manner. Reports and information, raw data and modeled results, generated under this task order shall become the property of the Government and distribution to any other source by the Contractor is prohibited.

8.0 SCHEDULE AND DELIVERABLES

8.1 Draft and Final APP, AHA, and Work Plan

The Contractor shall develop a written Work Plan describing the equipment and procedures to be used to collect geophysical data, and the Accident Prevention Plan (APP) and Activity Hazard Analysis (AHA). The intent of this work plan is to document to an audience with science and engineering backgrounds how data collection will occur, how data will be processed, and how it will be interpreted using existing Standard Operating Procedures, ASTM guides, etc. The work management plan shall included:

- Completing coordination tasks before, during, and after execution of fieldwork
- How geophysical data will be collected and managed in the field, including backups
- How positional data will be collected and managed in the field, including backups and minimum number of satellites needed for positional precision and accuracy
- Procedures and equations for data reduction and evaluation

This Work Plan shall be submitted to USACE for approval within seven days of receipt of the Notice to Proceed. Approval of this plan shall be received by the Contractor from USACE prior to the start of on-site work. USACE will provide a review response within five (5) days of receipt of this work plan. **All fieldwork shall be completed by 31 December 2006.**

8.2 Reporting Requirements

8.2.1 General Requirements

The report shall also contain the following items:

Discussion of equipment and methods used during field program, and explanation for any deviations from the Work Plan.

The daily narratives of field operations as written in the field, including any additional field notes produced, and any records from the weekly safety meetings.

Full-size plans for the study areas investigated showing bathymetry, locations of lines, areas suspected of having hard material within dredging limits, locations of potential cultural resources and/or objects/obstructions identified by magnetometer and/or side scan sonar, etc. Plans shall be of a quality and at a scale suitable for use in scoping future subsurface investigations, during design, and for incorporation in dredging plans and specifications. Additional figures shall be prepared as needed, and other figures deemed necessary and appropriate for summarizing results (dense till extent and thickness map, for example, if encountered).

Draft and final bedrock maps (boat chart format) shall be in the project coordinate system, identify areas of uncertainty, or areas where coverage could not be obtained (holiday areas)..

Final seismic deliverables **for each QA profile** shall include:

- Portion of the processed seismic profile encompassing a boring

- Mud line identified
- All depths relative to MLLW in feet
- Compass quadrant assigned to each end of the profile
- Nearby boring results extrapolated onto the interpretation
- An Excel file containing location and elevation data for all bedrock picks

The Contractor shall prepare a transmittal cover letter when furnishing the final submittal for this project. The letter shall include a statement that all comments have been addressed and incorporated and all requirements have been met.

All data, reports, and related materials obtained as a result of this contract shall become the property of the U.S. Government and shall be turned over to the Contracting Officer, USACE Office, upon completion of the contract, **with the exception of any cultural remains or artifacts recovered as a result of the study**. **These resources are the property of the State of Maine, except in cases stipulated within the Standards and Guidelines for Abandoned Shipwrecks Investigations.**

All marine geophysics submittals to the Government shall be directed to the U. S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751, Attn: Mr. Drew M. Clemens.

All marine archeology submittals to the Government shall be directed to the U. S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751, Attn: Mr. Marcos Paiva.

8.2.2 Preliminary Draft Data Deliverables

Preliminary estimated top-of-bedrock interpretations are due to USACE within 28 calendar days following completion of field work for internal, USACE-only use (Table 5). All vertical and horizontal dimensions shall be in US feet. Data will be relative to the project horizontal and vertical datums specified in the USACE hydrographic surveys.

Table 5. Report deliverables and distribution of electronic and paper copies.

Deliverables	CD/FTP*	Paper*
Preliminary Draft Plots	FTP	0
Draft Plots and Report	FTP	12
Final Report	FTP	12 w/ Data CDs

* Documents shall not be sent to regulatory agencies by USACE or its team members until comments have been received and incorporated from internal USACE review or until the USACE has directed the team to do so.

8.2.3 Draft Report Deliverables

Draft QA profiles and maps shall be presented to USACE for internal review and discussion 45 calendar days after completion of the fieldwork phase (Table 5). These profiles shall have the borings plotted onto the panels along with the pertinent results (refusal, bedrock, sediment type), and presented with the draft map plots. Vertical and horizontal scales shall be in US feet. Profile intersections shall be noted on each profile.

Draft bedrock picks shall be submitted electronically in an Excel file format. Location and elevation shall be in the project datums. All data shall be qualified using a system selected by the contractor and explained in each data table.

Draft bedrock maps shall be submitted in PDF, AutoCAD, and Microstation compatible file formats. Holiday areas and areas where penetration was limited due to organics shall be identified. Basemap shall be the USACE 2005 conditions survey. Process the seismic data and make static corrections for delays, offsets, and velocities. Pick the acoustic basement (potential bedrock) reflector at a suitable spacing to depict the slope/shape of the surface. Export the picks to an ASCII file. Cross check the data output, and verify the data match up at cross lines or tie lines. Convert the ASCII XYZ file to the site's horizontal datum. **Submit the ASCII XYZ file (NAD 27) of the acoustic basement (CD or DVD).**

Contour the ASCII XYZ data file, where the acoustic basement, with a one-foot contour interval, using appropriate contouring software. Also use geologic background and professional judgment to correct for artifacts of the contouring program. Export the contoured surface to an ASCII XYZ file. **Submit the ASCII XYZ file in the site's horizontal datum of the contoured surface (CD or DVD).**

8.2.4 Final Report Deliverables

Final plots and an integrated interpretation incorporating USACE review comments shall be submitted in accordance with Table 5. All dimension units shall be in feet, and geophysics units shall be metric. Those profiles passing near existing borings shall have the borings plotted onto the panels along with the pertinent results (refusal, bedrock, sediment type), and presented with the final map plots and report text as supporting figures. The report shall include electronic copies of all seismograms, seismic and magnetic data, and scanned field notes. The final report is due 40 calendar days after receipt of USACE comments.

The professionally labeled CD or DVD accompanying the final report shall contain PDF files of all interpreted profiles and report text. Data files in each site's DVD shall be categorized using clearly labeled sub-folders. The DVD accompanying the final report shall contain raw seismogram data files in the SEG-2 standard established by the Society of Exploration Geophysicists (Pullan, 1990), travel-time arrival picks and shot-receiver geometry information in ASCII format. Data files will be categorized using clearly labeled sub-folders. A README file shall accompany the data, explaining positional and geophysical data integration steps used. Scanned copies of field notes taken in conjunction, or in lieu of, field forms shall also be included. A README file shall accompany the data, explaining positional and geophysical data integration.

9.0 COORDINATION

All field activities and site visits as appropriate for this project shall be coordinated by telephone at least five days prior to actual commencement of work with both Mr. Drew Clemens (978-318-8861) and Mr. Marc Paiva (978-318-8796) of the Engineering/Planning Division, New England District (NAE). At a minimum, during the progress of the fieldwork, the Contractor's inspector shall coordinate with NAE upon completion of work each day (phone call), and when any difficulties or questions arise requiring NAE input.

10.0 CLEANING AND WASTE HANDLING PROCEDURES

All solid and liquid wastes shall be containerized and properly disposed of on shore in accordance with harbor requirements.

11.0 REFERENCES

Abandoned Shipwreck Act of 1987 (P.L. 100-298; 102 Stat. 432; 43 U.S.C. 2102).

Advisory Council on Historic Preservation, Protection of Historic Properties (36 CFR 800).

Anderson, W. A., 1985a. Bedrock Geologic Map of Maine. Department of Conservation/Maine Geological Survey.

Anderson, W. A., 1985b. Surficial Geologic Map of Maine. Department of Conservation/Maine Geological Survey.

Archaeological Resources Protection Act of 1979 (P.L. 96-95; 93 Stat. 721; 16 U.S.C. 470 et seq.).

Belknap, D.F., Kelley, J.T., and Gontz, A.M., 2002. Evolution of the Glaciated Shelf and Coastline of Northern Gulf of Maine, USA. Journal of Coastal Research, Special Issue No. 36.

Caldwell, D.W., 1998. Roadside Geology of Maine. Mountain Press Publishing Company.

Gerber, B., 1976. Sears Island presentation reported in The Maine Geologist, Vol. 3, No. 1.

Hogan, J.P. and Sinha, Krishna, 1989. Compositional Variation of Plutonism in the Coastal Maine Magmatic Province: Mode of Origin and Tectonic Setting, in Tucker, R.D. and Marvinney, R.G. (eds), Studies in Maine Geology Volume 4: Igneous and Metamorphic Geology.

Kaszuba, J.P. and Simpson, C., 1989. Polyphase Deformation in the Penobscot Bay Area, Coastal Maine, in: Tucker, R.D. and Marvinney, R.G. (eds), Studies in Maine Geology Volume 2: Structure and Stratigraphy.

National Environmental Policy Act of 1969 (P.L. 91-190; 83 Stat. 852; 42 U.S.C. 4321 et seq.).

National Historic Preservation Act of 1966 (P.L. 89-665; 80 Stat. 915) as amended (16 U.S.C. 470 et seq.).

National Maritime Heritage Act of 1994 (P.L. 103-451; 108 Stat. 4769; 16 U.S.C. 5401).

National Oceanographic and Atmospheric Administration (NOAA), 1999. Hydrographic/Side Scan Sonar, Searsport to Turtle Island, Penobscot, Maine. Field Number RU-10-3-1999, Registry H10867.

National Register of Historic Places, Nominations by States and Federal Agencies (36 CFR Part 60).

Pullan, S.E., 1990. Recommended standard for seismic (and radar) data files in the personal computer environment: Geophysics, 55 (9), pp 1260-1271.

United States Army Corps of Engineers (USACE), 2006. Engineer Regulation (ER) 1105-2-100. Planning Guidance Notebook.

USACE, 2003. EM 385-1-1 Safety and Health Requirements Manual.

USACE, 2002. ER 1110-1-8157, Engineering And Design Geotechnical Data Quality Management For Hazardous Waste Remedial Activities.

USACE, 2001a. EM 200-1-3 Requirements for the Preparation of Sampling and Analysis Plans.

USACE, 2001b. EM 1110-1-1804 Geotechnical Investigations, Engineering and Design.

USACE, 1995. EM 1110-1-1802 Geophysical Exploration for Engineering and Environmental Investigations.

VanDiver, B. B., 1987 Roadside Geology of Vermont and New Hampshire. Mountain Press Publishing Company; Missoula.

APPENDIX A - MINIMUM BASIC OUTLINE FOR ACCIDENT PREVENTION PLAN

An accident prevention plan is a dynamic project specific safety and health policy and program document. The following areas are typically addressed in an accident prevention plan, but a plan will be **job-specific** and shall address any unusual or unique aspects of the project or activity for which it is written. The accident prevention plan shall interface with the employer's overall written safety and health program. Referenced sections of the employer's company General Safety Program, shall be included as appropriate.

1. SIGNATURE SHEET. Title, signature, and phone number of the following:
a. plan preparer (corporate safety staff person, QC);
plan approval, e.g. Certified Safety Professional or Certified Industrial Hygienist;
plan concurrence (provide concurrence of other applicable corporate and project personnel (contractor), e.g., Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional, project QC as warranted.

2. BACKGROUND INFORMATION. List the following:
a. contractor;
b. contract number;
c. project name;
d. brief project description, description of work to be performed, and location (map);
e. contractor accident experience (provide information such as EMR, OSHA 300 Forms, corporate safety trend analyses);
f. listing of phases of work and hazardous activities requiring activity hazards analyses.

3. STATEMENT OF SAFETY AND HEALTH POLICY. (In addition to the corporate policy statement, a copy of the corporate safety program may provide a significant portion of the information required by the accident prevention plan).

4. RESPONSIBILITIES AND LINES OF AUTHORITIES.
a. identification and accountability of personnel responsible for safety-at both corporate and project level (contracts specifically requiring safety or industrial hygiene personnel should include a copy of their resume - the District Safety and Occupational Health Office will review the qualifications for acceptance).
b. lines of authority

5. SUBCONTRACTORS AND SUPPLIERS. Provide the following: .
a. identification of subcontractors and suppliers (if known);
b. means for controlling and coordinating subcontractors and suppliers;
c. safety responsibilities of subcontractors and suppliers. It should be noted that the Prime Contractor is responsible for ensuring that all subcontractors have the necessary written health and safety programs in place, have provided their employees with the necessary training, and subcontractors conduct their work in accordance with all relevant Occupational Health and Safety Standards which includes OSHA, USACE and ANSI at a minimum.

6. TRAINING.
a. list subjects to be discussed with employees in the safety indoctrination.
b. list mandatory training and certifications which are applicable to this project (e. g., U.S. Coast Guard Licensed Captain etc. and any requirements for periodic retraining/recertification.
c. identify requirements for emergency response training.

d. outline requirements (who attends, when given, and who will conduct etc,) for supervisory and employee safety meetings.

7. SAFETY AND HEALTH INSPECTION. Provide details on:
a. who will conduct safety inspections (e.g., project manager, safety professional, QC, supervisors, employees, etc.), when inspections will be conducted, how the inspections will be recorded, deficiency tracking system, follow-up procedures, etc;
b. any external inspections/certifications which may be required (e.g., Coast Guard).

8. SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE.
a. the company's written safety program goals, objectives, and accident experience goals for this contract should be provided.
b. a brief description of the company's safety incentive programs (if any) should be provided.
c. policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified.
d. provide written company procedures for holding managers and supervisors accountable for safety.

9. ACCIDENT REPORTING. The contractor shall identify who shall complete the following, how, and when:
a. exposure data (man-hours worked);
b. accident investigation, reports and logs;
c. immediate notification of major accidents.

10. MEDICAL SUPPORT. Outline on-site medical support and off-site medical arrangements.

11. PERSONAL PROTECTIVE EQUIPMENT. Outline procedures (who, when, how) for conducting hazard assessments and written certifications for use of personal protective equipment.

PLANS (PROGRAMS, PROCEDURES) REQUIRED BY THE SAFETY MANUAL (as applicable). Written plans and/or procedures addressing the following project specific items shall be included in the Contractor's Accident Prevention Plan. It is the Contractor's responsibility to review the entire list and provide the appropriate information. If an item is not applicable to the project then the Contractor shall note it as such with a statement of: "not applicable." For those items which are applicable to the project, the Contractor shall ensure that the information and standard operating procedures are applicable to the work which will be performed.

hazard communication program (01.B.04);
emergency response plans:
  - procedures and tests (01E.01)
  - spill plans (01.E.01, 06.A.02)
  - firefighting plan (01.E.01, 19.A.04)
  - posting of emergency telephone numbers (01.E.04)

health hazard control program (06.A.02);
hazardous energy control plan (12.A.07);
contingency plan for severe weather (19.A.03);
floating plant and marine activities (section 19)
personal protection equipment (section 5, especially 05.I).

plan for prevention of alcohol and drug abuse (Defense Federal Acquisition Regulation Supplement Subpart 252.223-7004, Drug-Free Work Force);

13. OTHER. The contractor shall also provide information on how he will meet the requirements of other major sections of EM 385-1-1, not identified in a-h above, in the accident prevention plan. Particular attention shall be paid to medical and first aid requirements, sanitation, personal protective equipment, fire prevention, machinery and mechanized equipment and thermal extremes as they may apply to this project. Detailed site-specific hazards and controls shall be identified in the activity hazard analysis for each phase of the operation.

APPENDIX B

FIELD NOTES

FIELDNOTES

Prepared by
David S. Robinson, M.A., R.P.A.
The Public Archaeology Laboratory, Inc. (PAL)
Project Principal Investigator (Archaeology)

Prepared for
Department of the Army
New England District, Coprs of Engineers
Contract No. DACW33-03-D-002 IDIQ

Searsport Harbor, ME and Portsmouth Harbor, Piscataqua River, NH and Maine Marine Archaeology and Geophysics

December 13, 2006 (Wednesday)
Travel day: PAL to Searsport, ME

December 14, 2006 (Thursday)
0615: meet OSI and leave hotel for boat

0700: arrive at boat and perform inspection

0730: conduct & document project safety meeting;
Note: OSI is using a different make of boat than that specified in the Float Plan – a 25-ft Parker 25 w/twin 150-horse o.b. engines - CT Reg. # 8934 AX
conduct nav check at dock and prepare boat/survey equipment for in-water on-site testing & tuning
Weather conditions: Temp: 40F+; Wind: none; Seas: calm; Sky: overcast

Survey Equipment:
Hypack Hydrographic Survey Software
Side Scan Sonar (SSS) - Klein 3000
Sub-bottom Profiler (SBP) - Applied Acoustics/OSI "Boomer"
Marine Magnetometer (Mag) - Geometrics 882 (with altimeter)
Global Positioning System (GPS) - Trimble 4000 with Leica MX-52 Differential Receiver using the Brunswick, ME USCG beacon (transmitting at 316 kHz/100 BPS)

0755: arrive in PA; deploy instruments to begin on-site testing/tuning; have trouble with SBP; will survey with mag only while trouble-shooting SBP to identify & fix problem

Settings:
Events/Fixes: every 200 ft
20-gamma scale on mag readout
approx. 25 ft scale on SBP readout
SSS range set at 50 m (165 ft)

1330: running mag (only) in-fill lines because having trouble with SSS and SBP

1630: end surveying for the day; return to dock; call Barbara Blumeris @ USACE-NAE to give status report; OSI continues working on SBP problem; order new boomer plate and power supply as back-up in case problem can't be fixed
1700: leave boat for hotel

December 15, 2006 (Friday)

0600: leave hotel for boat

0630: arrive at boat and prep to get underway
Weather conditions: Temp: 33-35 F; Wind: none; Seas: calm; Sky: foggy, but can see across Searsport Harbor

0700: leave dock for project area

0715: arrive at PA and prep to survey – problems with SSS creating noise in mag data; note that water color is amber-brown color with underwater visibility appearing to be just 3 to 5-ft

0845: begin surveying – could not eliminate SSS noise in mag data, so continuing with mag (only) in-fill track lines;

1615: end surveying for day; return to dock

1630: call USACE-NAE with project status update; leave dock for hotel

December 16, 2006 (Saturday)

0600: leave hotel for boat

0630: leave dock for project area
Weather conditions: Temp: 35F; Wind: none; Seas: calm; Sky: partly cloudy

0645: begin surveying
Plan for today is to finish remaining mag (only) in-fill track lines and then start surveying the SSS/SBP/mag lines tomorrow

1145: note floating boom is in NE section of PA and will need to be moved prior to surveying; OSI contacts Wayne Hamilton (Searsport Harbormaster) for assistance in getting it moved; Hamilton directs OSI to contact Dwayne Seekings @ Sprague Energy (207) 548-2531 to get removed; Seekings directs OSI to contact Charles @ Clean Harbors (207) 852-9265, ext. 0100) to have the boom moved; Charles reports that only boom, not boom anchors & buoys can be moved and will call back to coordinate further

1205: mag re-rigged for surface tow to survey shallow NW section of PA

1310: Wade Henry from Clean Harbors calls; boom will be moved out of our way first thing Monday a.m.

1445: end surveying for the day
All of mag (only) infill track lines are essentially done in long section of PA as well as in nearly all of the NE section of the PA; OSI setting up new SBP to run tomorrow

1500: return to dock; transcribe fieldnotes & preliminary anomaly inventory to computer

1800: call USACE-NAE and leave project status update message on Barbara Blumeris's VM

1700: finish transcribing fieldnotes & preliminary anomaly inventory

December 17, 2006 (Sunday)

0600: leave hotel for boat

0630: leave dock for project area
Weather Conditions: temp: 30 F; wind: SW 5 kts; sky: partly cloudy

0700: arrive at PA; deploy & tune survey instruments
Plan for today is to run track lines with SBP, SSS & mag on every 3rd line, as all mag (only) in-fill lines are essentially done. Hopefully we can get everything done in the longer section of the PA and then do some of the shorter section track lines, leaving little to do tomorrow

0930: start surveying; have to run track lines with just SBP (only) due to noise & cross-talk between the mag , SBP, and SSS; this is unfortunate, as it now means we now have to re-run these lines with just SSS & mag

1200: Weather conditions change – Wind: SW 15-18 kts with maximum fetch across Penobscot Bay, Searsport Harbor and PA; Seas: 2-4 ft – too rough to continue surveying with SBP due to data drop-outs

1245: switched instrument configuration to just SSS and mag; continue surveying short lines in in more protected NE section of PA

1600: end surveying for the day

1630: return to dock; call USACE-NAE and speak with Barbara Blumeris re: project status update; continue transcribing fieldnotes and preliminary anomaly inventory to computer

December 18, 2006 (Monday)

0600: leave hotel for boat

0645: leave dock for PA
Weather conditions: Temp: 25F; Wind: light W-NW; Seas: 1 ft; Sky: overcast
Plan for day is to start with SBP (only) track lines in shallow northern end of PA because tide is high and seas are relatively calm

0730: Clean Harbors crew on-site to remove boom from NE section of PA

0745: Second (back-up) SBP power-supply fails and needs to be replaced; switch instrument configuration to continue surveying with just mag and SSS

1430: snagged SSS and mag tow cables in line attached to “ghost trap” (i.e., unmarked lobster trap); mag cable damaged and needs replacement

1500: mag cable replaced and tested; surveying continues; we “see” charted wreck – appears to be a larger (100-ft+) wooden-hulled sailing vessel

1630: end of surveying; retrieve instruments and return to dock
OSI has ordered another (#3) SBP power supply; earliest we can get it in Searsport is by 1500 hrs tomorrow, or at 1000 at the Fedex center in Bangor; I decide to drive to Bangor in the a.m. to pick up the power supply so we can survey with the SBP later in the day, while OSI is going to survey remaining mag & SSS lines, any “holidays” that need to be covered, and get more refined SSS images of the wreck to assist with planning of future diving/mapping task (i.e., Optional Task 9 of the USACE-NAE’s SOW).
Call USACE-NAE with project status update – given SBP problems, it’s going to be very difficult to complete Searsport and Portsmouth surveys during this deployment.

December 19, 2006 (Tuesday)

0600: meet with OSI; leave for Fedex center in Bangor

0930: get SBP power supply from Fedex; OSI completes all remaining mag and SSS surveying and gets great SSS images of wreck from multiple angles; need to get run, line, and events data from OSI and review data from these track lines

1035: arrive back in Searsport and meet boat at dock

1100: arrive at PA and prep to begin surveying with SBP

Conditions: Temp: 33F; Wind: W-NW 15 kts; Seas: 1-2 ft; Sky: clear-partly sunny

1645: end of surveying for day; retrieve instruments and return to dock; call USACE-NAE with project status update – barring any unforeseen problems, should finish survey at Searsport tomorrow a.m. and be on site in Portsmouth tomorrow afternoon ready to begin surveying following day (December 20 – Thursday)

Email SSS images of wreck to USACE-NAE and PAL Project PM Deborah Cox

December 20, 2006 (Wednesday)

0600: check out & leave hotel for boat

0630: leave dock for PA

0655: arrive in PA; equipment deployed; ready to survey

0915: Searsport survey complete; retrieve equipment and return to dock; prep. and haul boat for travel to Portsmouth, NH for USACE-NAE Piscataqua River survey; call USACE-NAE re: project status update; meet with Penobscot Marine Museum Executive Director, Niles Parker, re: assistance conducting research @ museum and knowledge re: the charted Searsport Harbor wreck in the PA that we imaged with the SSS; he says talk with the museum’s archivist, Ben Fuller (bfuller@penobscotmarinemuseum.org)

1345: call PAL President and overall Project PM Deborah Cox with project status update

1415: arrive at marina in Portsmouth (Great Bay Marine); boat launched

1500: transit to PA to assess environmental conditions to assist in formulating strategy for tomorrow’s surveying operations; site conditions present several challenges (large tidal differential, strong tidal currents, variable underwater topography (1-50 ft deep with steep rock ledge), vessel traffic, etc. and potential safety hazards that were not present in the Searsport PA – discuss with OSI

1645: arrive back at dock; call USACE-NAE with project status update; report results of reconnaissance assessment of PA and challenges it presents to completing survey in single day

1700: meet with OSI to formulate explicit survey plan to ensure greatest likelihood of success for completing survey tomorrow

Plan is to run all lines with just a single instrument deployed for enhanced safety; tide will be nearly dead low in the a.m., so we’re going to survey deep water track lines that are in the navigation channel with SSS first to get a better sense of the “lay of the land” underwater and identify and assess and potential submerged hazards on the river bed; then we’re running the mag lines in deep water, followed by the SBP deep water lines; tide should be high by the time we get done with the deep water work – so, we’ll move into the shallow water portion of the PA and run all the remaining lines with SBP and then SSS and mag

December 21, 2006 (Thursday)

0600: leave hotel for boat

0645: conduct weekly safety meeting; review general and site specific hazards; stress that safety is the foremost concern

0700: leave dock for Piscataqua River PA

0715: arrive at PA; deploy and tune SSS; prepare to survey

1000: deep water SSS and mag done; SBP deployed

1415: complete Pisctaqua River survey operations; retrieve instruments; return to dock to prep and haul boat for return travel to Old Saybrook, CT; fieldwork wrap-up meeting with OSI;

1700: call USACE-NAE and PAL Project Manager to report project field work complete; travel from Portsmouth, NH to RI

APPENDIX C

SIDE SCAN SONAR ANOMAY INVENTORY

Piscataqua River / Navigation Channel Improvement Project

Side Scan Sonar Targets

Date	***Run***	***Line***	***Event***	***Target ID #***	***Easting***	***Northing***	***Length***	***Width***	***Height or Relief***	***Comment***	***Associated Magnetic Anomaly***
					feet	feet	feet	feet	feet		
21-Dec	2	18	419.8	SS8	2781753	103748	3.6	1.6	1.3	curved	
			420.3	SS10	2781783	103665	3.0	2.3	1.0	rectangular, possible lobster pot	
			419.6	SS12	2781697	103749	40.0	0.3	<0.5	linear	
			420.1	SS13	2781759	103695	2.0	1.6	1.6	triangular	
			420.3	SS14	2781803	103656	35.4	2.3	1.0	broken linear	M1
			420.5	SS15	2781810	103605	4.9	3.6	1.3	rounded	
			422.0	SS19	2782018	103413	n/a	0.3	<0.5	long linear end	
			421.9	SS20	2781998	103413	2.3	1.0	0.7	small	
21-Dec	4	15	435.1	SS27	2781534	104225	13.1	6.6	5.2	possible angular, at edge of boulder field	
			436.7	SS28	2781741	103965	3.0	1.3	0.7	oval	
			436.9	SS29	2781769	103930	2.6	0.7	0.7	rectangular	
			436.7	SS30	2781701	103941	n/a	0.3	<0.5	long linear begin	
			437.0	SS31	2781784	103933	n/a	0.3	<0.5	long linear2 begin	
			437.3	SS33	2781717	103826	2.3	2.0	1.3	curved	
			437.6	SS34	2781818	103820	3.0	1.6	1.6	curved object	
			437.7	SS35	2781867	103823	n/a	0.3	<0.5	long linear2 end	
			438.0	SS36	2781900	103763	n/a	0.3	<0.5	begin long linear4	M16
			438.6	SS37	2781977	103691	13.1	2.0	0.3	wide linear	
			438.0	SS38	2781765	103667	5.6	3.9	0.7	curved	
			439.2	SS39	2782023	103565	4.6	3.0	3.9	angled, alonglong linear4 object	
			438.8	SS40	2781909	103563	5.9	0.7	0.7	2 linear approimately same size	
			439.2	SS41	2781958	103513	n/a	0.3	<0.5	approximate end of long linear3	
			439.7	SS42	2782126	103515	4.6	1.3	1.6	2 parallel rectangular	
			441.1	SS45	2782281	103289	7.2	4.6	1.3	rectangular	
			441.7	SS46	2782347	103184	1.3	1.0	1.0	small	
			447.7	SS49	2782498	102991	n/a	0.7	<0.5	end long linear4	
21-Dec	5	12	447.0	SS57	2782676	102950	n/a	0.3	<0.5	approximate beginning long linear	
			447.2	SS58	2782700	103003	5.6	1.0	1.0	2 objects, one oblong, one oval	M44

Piscataqua River / Navigation Channel Improvement Project

Side Scan Sonar Targets

Date	Run	Line	Event	Target ID #	Easting	Northing	Length	Width	Height or Relief	Comment	Associated Magnetic Anomaly
					feet	feet	feet	feet	feet		
			448.4	SS59	2782388	103096	8.5	0.7	0.3	linear	
			448.5	SS60	2782510	103203	3.3	1.3	1.3	small	
			449.8	SS61	2782338	103400	7.2	4.6	0.7	rectangular	
			451.3	SS62	2782135	103625	4.3	3.3	2.3	rounded	
			453.7	SS63	2781855	104021	n/a	0.7	<0.5	approximate end long linear	
			457.2	SS64	2781464	104578	6.2	4.6	5.2	angular, in boulder field	
			457.5	SS65	2781442	104642	5.6	7.5	<0.5	angular, in boulder field	
			456.9	SS66	2781458	104513	12.8	3.0	2.6	possible angular, in boulder field	
			458.2	SS67	2781301	104707	5.2	6.2	6.2	curved angular	M26
			459.4	SS68	2781148	104898	5.2	2.3	<0.5	rectangular	
			460.3	SS70	2781040	104992	4.9	2.6	5.9	oval	
21-Dec	24	1	663.4	SS71	2781750	104865	4.6	2.0	0.7	rectangular	
			663.7	SS72	2781827	104828	6.2	2.3	1.0	2 adjacent curved	
			663.7	SS73	2781789	104788	11.5	4.3	0.7	possible partially buried rectangular object	M55
			664.6	SS74	2781904	104685	17.4	<0.5	<0.5	linear depression	
			664.8	SS75	2781899	104613	5.2	2.0	1.0	3 oblong shapes	
21-Dec	25	4	674.0	SS79	2782249	103930	3.0	2.3	1.0	roughly rectangular	M69
			674.0	SS80	2782275	103946	3.9	3.9	1.0	square	M60
			673.8	SS81	2782298	103926	4.6	3.0	1.3	curved/round	
			674.7	SS82	2782181	104063	4.9	2.3	1.6	curved-angular	
			676.6	SS83	2782038	104420	3.3	2.6	1.0	oval	
			676.7	SS84	2782050	104443	3.9	1.6	1.0	linear	
			677.1	SS85	2781890	104429	4.9	1.3	0.7	2 objects approximate same size, oblong	
			677.5	SS86	2781864	104507	4.3	3.6	1.6	1 linear, 1 oblong	
			677.7	SS87	2781905	104608	8.2	5.6	3.3	curved	
			678.7	SS88	2781700	104682	4.6	3.6	1.0	angled	
			678.4	SS89	2781802	104694	12.1	3.0	1.0	curved angluar	
			679.3	SS90	2781613	104756	18.0	3.3	0.3	somewhat pointed	
			679.8	SS91	2781694	104951	18.4	3.6	<0.5	2 parallel linear	
			680.0	SS92	2781641	104968	3.6	4.6	0.7	rounded	
			680.2	SS93	2781596	104983	35.4	2.0	1.0	partially buried linear	M64
21-Dec	26	10	685.0	SS99	2781164	105060	6.2	0.3	<0.5	possible linear object	M87
			685.5	SS100	2781214	104964	4.3	1.0	1.3	curved next to round	

Piscataqua River / Navigation Channel Improvement Project

Side Scan Sonar Targets

Date	***Run***	***Line***	***Event***	***Target ID #***	***Easting***	***Northing***	***Length***	***Width***	***Height or Relief***	***Comment***	***Associated Magnetic Anomaly***
					feet	feet	feet	feet	feet		
			686.7	SS101	2781403	104821	8.5	1.3	1.3	possible curved-linear	
			688.7	SS102	2781524	104404	n/a	0.7	<0.5	begin linear	M27
			689.2	SS103	2781572	104324	n/a	0.7	<0.5	end linear	
			694.8	SS104	2782375	103507	5.6	2.6	1.3	oblong	
			697.8	SS105	2782672	102984	11.2	8.5	<0.5	area with curved and linear features	
			698.4	SS106	2782722	102915	<0.5	<0.5	<0.5	approximately 20m long striations with one rounded target	
21-Dec	28	7	706.7	SS108	2782477	103488	12.5	3.9	1.0	possibly partially buried object	
			706.9	SS109	2782462	103521	3.9	1.6	2.3	oblong	
			709.9	SS110	2782085	103978	17.4	27.2	3.6	oblong and curved-angular objects	
			710.3	SS111	2782058	104055	6.6	1.3	2.3	wide linear	
			711.7	SS112	2781867	104259	4.6	0.7	2.0	linear	
			712.6	SS113	2781769	104408	5.6	3.0	4.3	oval	
			713.5	SS114	2781631	104531	8.9	3.0	3.6	crescent-shape	
			714.2	SS115	2781641	104706	21.7	3.6	1.3	somewhat linear	
			714.8	SS116	2781575	104837	13.5	6.6	3.3	roughly rectangular	
			715.7	SS117	2781393	104883	5.9	2.6	1.0	oblong	
			715.8	SS118	2781347	104893	35.8	3.0	2.3	linear, possible partially buried object	
			715.6	SS119	2781445	104908	8.5	1.6	1.3	curved and linear	
			715.6	SS120	2781462	104922	8.9	2.0	3.0	possibly partially buried object	

NOTES:

1. Coordinates are referenced to the Maine State Plane system, West Zone 1802, NAD83, in feet.
2. Target sizes and dimensions are based on acoustic measurements only and have not been verified directly.
3. The side scan sonar method only identifies features located on (not below) the bottom.
4. Only targets evident on more than one side scan sonar image / trackline were mapped; targets located outside the survey areas were not mapped.
5. Target identification numbers are not sequential, as mutliple targets on overlapping images were removed from the data set.

APPENDIX D

MAGNETIC ANOMALY INVENTORY

Piscataqua River / Navigation Channel Improvement Project

Magnetic Anomalies

Date	***Run***	***Line***	***Event***	***Anomaly ID#***	***Easting***	***Northing***	***Size***	***Type***	***Duration***	***Sensor Altitude***	***Dipolar ferrous mass (lbs)***	***Monopolar ferrous mass (lbs)***	***Associated Side Scan Target***
					feet	feet	gammas		feet	feet	pounds	pounds	
21-Dec	7	16	472.0	M1	2781826	103643	12	D	67	45.7	1189.3	26.0	SS014
21-Dec	8	15	481.0	M3	2781944	103583	10	M+	25	45.5	978.2	21.5	
			482.0	M4	2781810	103750	15	M+	100	51.7	2152.5	41.6	
21-Dec	9	14	494.4	M7	2781739	103923	200	M+	60	29.9	5551.6	185.7	
			494.9	M8	2781662	104013	250	M-	25	35.6	11712.9	329.0	
21-Dec	10	13	500.4	M11	2782686	102808	110	M+	150	50.5	14710.9	291.3	
			507.3	M12	2781836	103874	190	M+	67	35.0	24514.8	491.3	
			509.9	M13	2781516	104283	50	M+	133	44.6	4606.3	103.3	
			509.3	M14	2781597	104180	20	M+	100	42.4	1583.1	37.3	
			501.3	M15	2782585	102936	18	M+	67	49.9	2322.5	46.5	
			506.6	M16	2781916	103768	20	M+	133	32.3	699.9	21.7	SS036
			507.6	M17	2781803	103921	20	M+	50	34.0	816.3	24.0	
21-Dec	11	12	514.5	M19	2782673	102864	150	D	225	47.8	17011.7	355.9	
			523.2	M20	2781621	104222	150	D	67	47.7	16905.2	354.4	
			524.0	M21	2781517	104365	40	M-	150	43.8	3490.2	79.7	
			526.8	M22	2781169	104777	140g	M+	133	47.7	15778.2	330.8	
21-Dec	38	11	825.4	M25	2781063	105032	8g	M-	40	27.1	165.3	6.1	
			827.4	M26	2781315	104715	75g	M+	200	39.8	4910.0	123.4	SS067
			829.2	M27	2781524	104412	10g	M+	33	42.9	819.9	19.1	SS102
			829.8	M28	2781593	104311	53g	D	100	38.9	3239.7	83.3	
20-Dec	1	18	413.3	M30	2781690	103669	100g	M+	225	18.6	668.2	35.9	
21-Dec	24	1	661.7	M31	2781565	105182	32g	D	133	7.3	12.9	1.8	
			665.8	M32	2782085	104524	20g	M-	133	26.0	365.0	14.0	
			667.2	M33	2782250	104319	35g	M+	133	28.4	832.5	29.3	
21-Dec	25	4	674.1	M35	2782332	103973	75g	M+	200	18.3	477.3	26.1	
			680.2	M36	2781576	104922	10g	M+	15	11.4	15.4	1.3	
21-Dec	26	10	686.9	M37	2781343	104738	40g	M+	200	21.5	412.8	19.2	
			689.4	M38	2781652	104348	5g	M+	18	10.1	5.3	0.5	
			690.4	M39	2781774	104199	12g	M+	29	6.8	4.8	0.7	
			690.6	M40	2781800	104167	10g	M+	33	7.3	4.0	0.6	
			692.9	M41	2782087	103807	30	M+	133	18.0	181.7	10.1	
			694.9	M42	2782339	103484	5	M+	67	8.6	3.3	0.4	
			695.3	M43	2782374	103439	15	M+	67	8.6	9.9	1.2	

Piscataqua River / Navigation Channel Improvement Project

Magnetic Anomalies

Date	Run	Line	Event	Anomaly ID#	Easting	Northing	Size	Type	Duration	Sensor Altitude	Dipolar ferrous mass (lbs)	Monopolar ferrous mass (lbs)	Associated Side Scan Target
					feet	feet	gammas		feet	feet	pounds	pounds	
			633.7	M44	879695	285016	33.9	M+	50	15.37	127.8	8.3	SS171
21-Dec	28	7	706.5	M47	2782563	103453	38	D	225	17.2	200.8	11.7	
			710.3	M48	2782091	104033	8	D	13	6.6	2.4	0.4	
			712.6	M49	2781802	104402	8	M+	33	5.9	1.7	0.3	
			716.5	M50	2781321	105012	15	D	100	30.2	429.0	14.2	
21-Dec	31	2	730.8	M52	2781707	104922	5	M+	20	6.6	1.5	0.2	
			729.3	M53	2781527	105153	10	M+	67	8.1	5.5	0.7	
			731.0	M54	2781730	104894	4	M+	20	6.8	1.3	0.2	
			731.6	M55	2781797	104806	20	M+	200	15.1	71.5	4.7	SS073
			733.7	M56	2782062	104482	30	M-	171	23.1	384.0	16.6	
			734.9	M57	2782215	104285	30	M+	133	24.0	430.7	17.9	
21-Dec	32	5	741.5	M60	2782297	103941	50	M+	200	24.8	792.0	31.9	SS080
			742.2	M61	2782213	104044	10	M+	67	14.4	31.0	2.2	
			748.4	M62	2781432	105016	18	M+	100	6.7	5.6	0.8	
21-Dec	33	3	752.3	M63	2781474	105146	35	M+	50	7.8	17.2	2.2	
			753.3	M64	2781590	104986	5	M+	17	6.8	1.6	0.2	SS093
			755.8	M65	2781923	104577	12	M+	100	22.7	145.8	6.4	
			757.9	M66	2782178	104252	15	M+	100	20.3	130.3	6.4	
			759.5	M67	2782375	104003	80	M+	175	11.0	110.6	10.1	
21-Dec	34	6	767.2	M69	2782256	103910	25	M+	200	21.9	272.7	12.5	SS079
			771.3	M70	2781749	104550	12	M+	150	19.9	98.2	4.9	
			771.8	M71	2781672	104655	25	M+	50	14.7	82.5	5.6	
			774.6	M72	2781327	105068	20	M-	125	6.3	5.2	0.8	
21-Dec	35	8	781.8	M73	2781696	104457	10	M+	50	7.4	4.2	0.6	
			782.5	M74	2781777	104355	5	M+	50	9.0	3.8	0.4	
			783.5	M75	2781914	104178	3	M+	25	7.3	1.2	0.2	
			783.7	M76	2781931	104157	5	M+	25	6.8	1.6	0.2	
			788.6	M77	2782541	103383	25	M+	200	14.8	84.2	5.7	
21-Dec	36	11	796.2	M79	2782300	103453	10	D	50	11.7	16.6	1.4	
			796.6	M80	2782240	103528	10	M+	67	12.4	19.8	1.6	
			798.2	M81	2782042	103778	20	M+	175	20.4	176.3	8.6	
			800.6	M82	2781748	104151	100	M-	50	6.1	23.6	3.9	
			804.9	M83	2781209	104821	50	M-	100	34.0	2040.7	60.0	
21-Dec	37	9	809.8	M87	2781149	105071	20	M+	50	6.1	4.7	0.8	SS099

Piscataqua River / Navigation Channel Improvement Project

Magnetic Anomalies

Date	***Run***	***Line***	***Event***	***Anomaly ID#***	***Easting***	***Northing***	***Size***	***Type***	***Duration***	***Sensor Altitude***	***Dipolar ferrous mass (lbs)***	***Monopolar ferrous mass (lbs)***	***Associated Side Scan Target***
					feet	feet	gammas		feet	feet	pounds	pounds	
			814.4	M88	2781717	104345	2	M+	7	8.4	1.2	0.1	
			815.4	M89	2781840	104197	15	M+	40	5.7	2.9	0.5	
			817.7	M90	2782122	103838	30	M+	100	12.5	60.8	4.9	
			819.5	M91	2782363	103543	10	M+	50	12.7	21.3	1.7	
			820.0	M92	2782422	103461	25	D	100	8.4	15.4	1.8	
			820.8	M93	2782506	103346	30	M+	175	11.3	45.0	4.0	
21-Dec	6	17	464.7	M94	2781852	103528	8	M+	29	20.2	68.5	3.4	

NOTES

1. Positions are referenced to the Maine State Plane Coordinate System, West Zone 1802, NAD83, in feet.
2. Estimated ferrous masses calculated using the following formulas:

$W = T r^2 / 963$ for monopoles

$W = T r^3 / 963$ for dipoles

where W = weight of ferrous object, T = anomaly amplitude, r = distance between magnetic sensor and object

*Magnetic moment is assumed at a median value of 963, but may vary by an order of magnitude between 175 and 1750.

3. Anomaly types: M+ = positive monopole, M- = negative monopole, D = dipole, CD = complex dipole
4. Anomaly identification numbers are not sequential, as those positioned outside the site limits were removed from the listing.

APPENDIX E

SUB-BOTTOM PROFILES & GEOTECHNICAL SAMPLING DATA

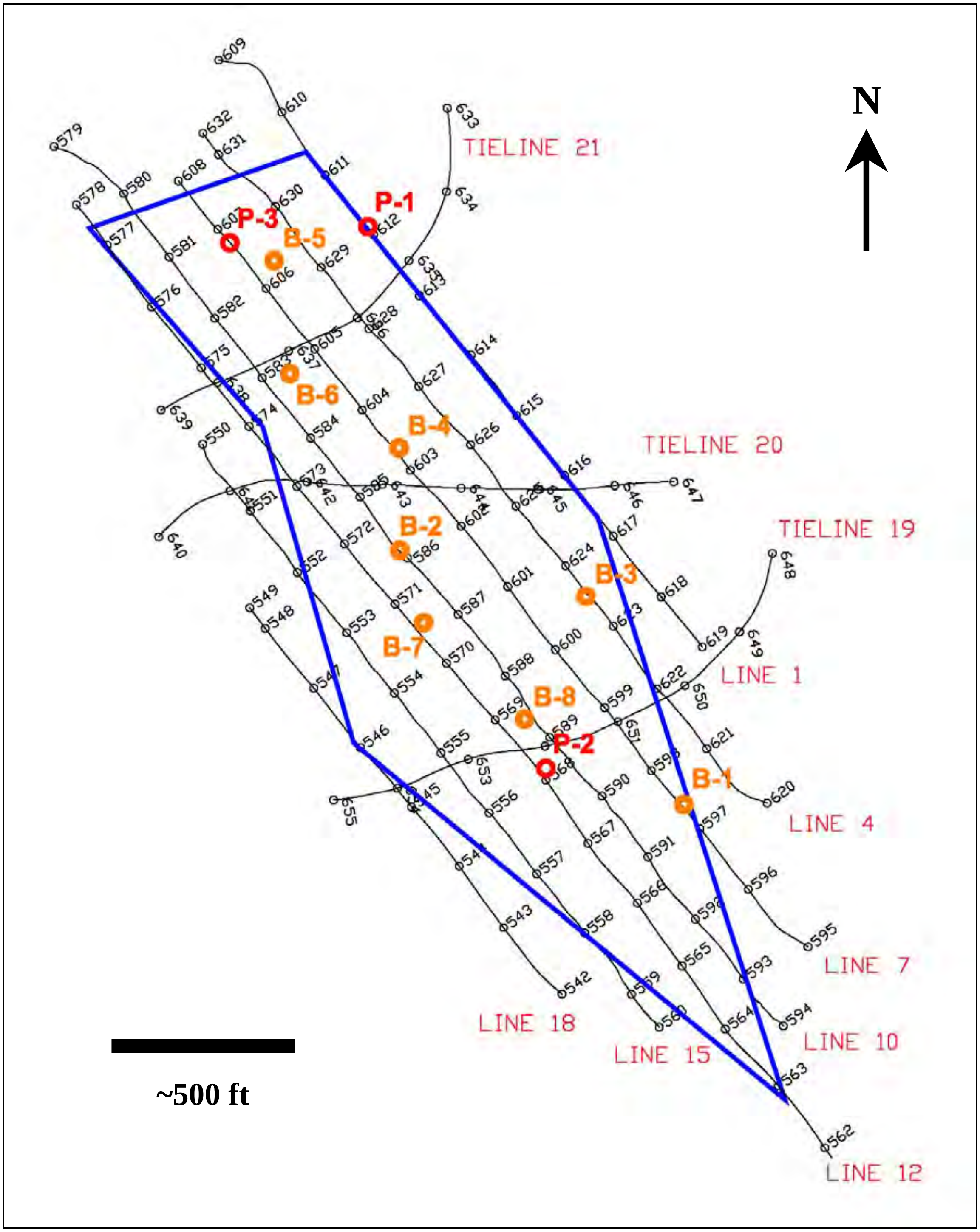
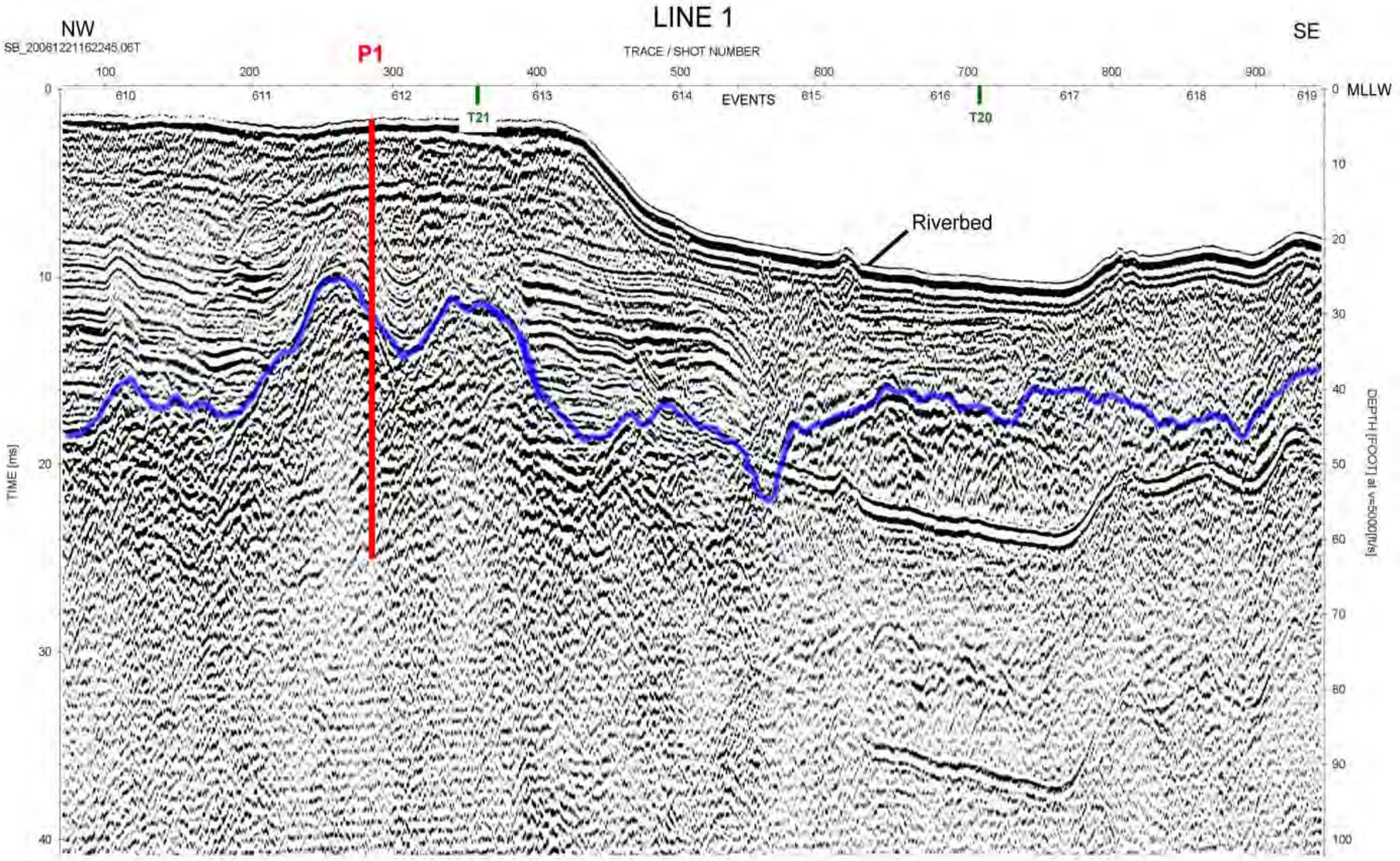


Figure showing the location of subbottom “boomer” profile lines and borings in the site.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NW
SE
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P1
TRACE / SHOT NUMBER
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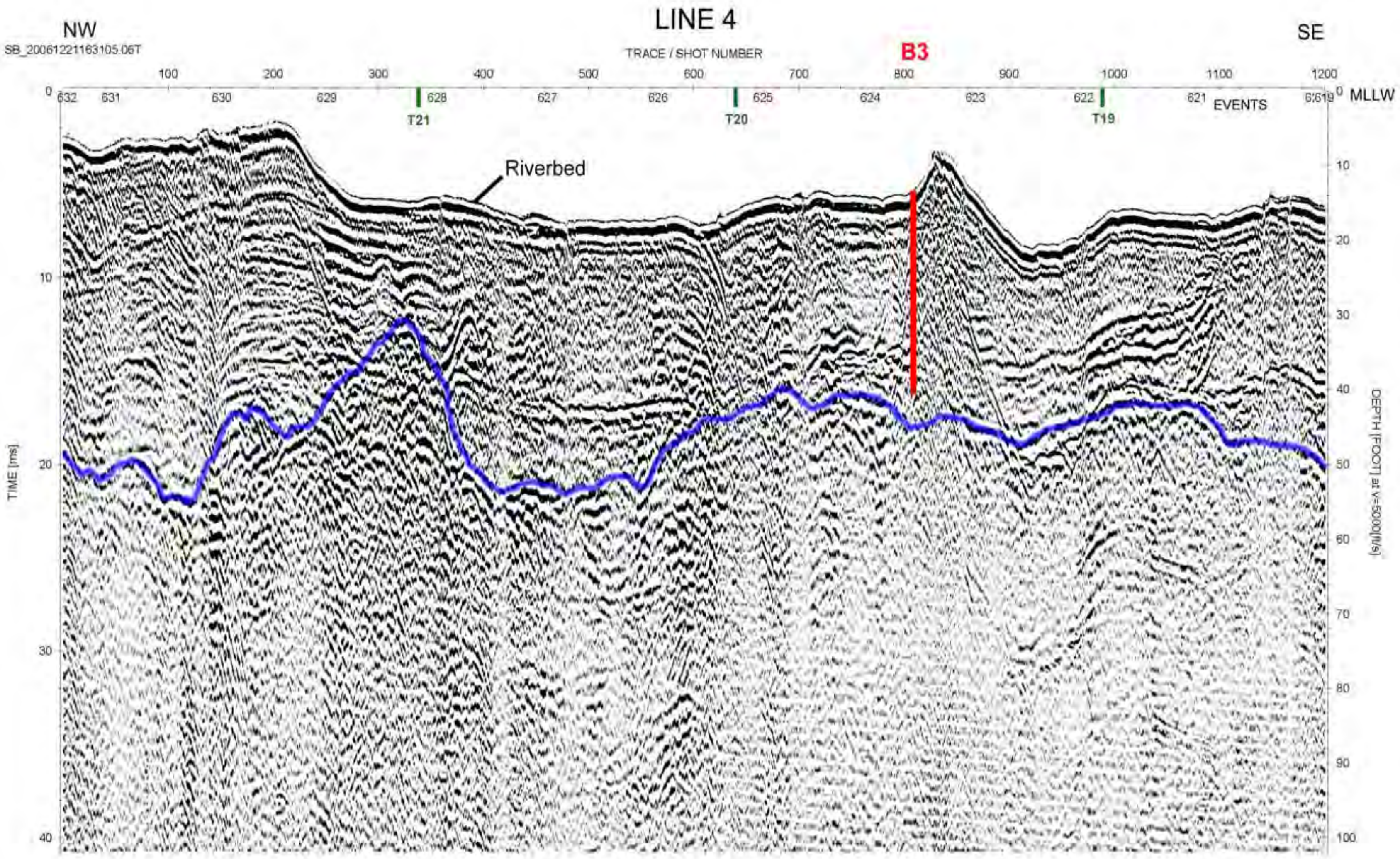
200
300
400
500
600
700
800
900
610
611
612
613
614
EVENTS
615
616
617
618
619
T21
T20
Riverbed
TIME [ms]
0
10
20
30
40
0 MLLW
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]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SB_20061221163105.06T
LINE 4
TRACE / SHOT NUMBER
B3
SE
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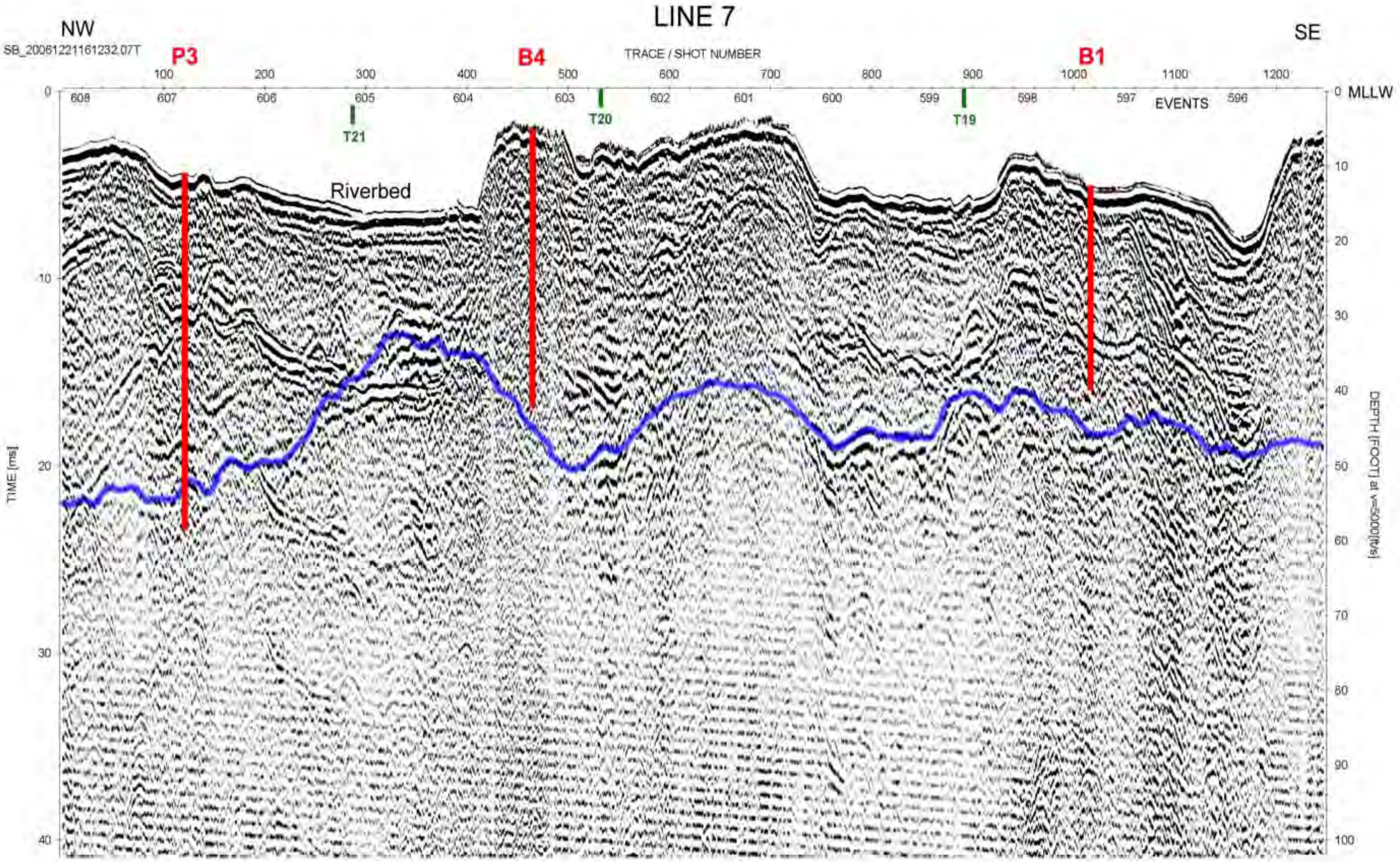
200
300
400
500
600
700
800
900
1000
1100
1200
632
631
630
629
628
627
626
625
624
623
622
621
619
EVENTS
T21
T20
T19
0 MLLW
Riverbed
0
10
20
30
40
TIME [ms]
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at V=5000[ft/s]


LINE 7
NW
SE
SB_20061221161232.07T
P3
B4
B1
TRACE / SHOT NUMBER
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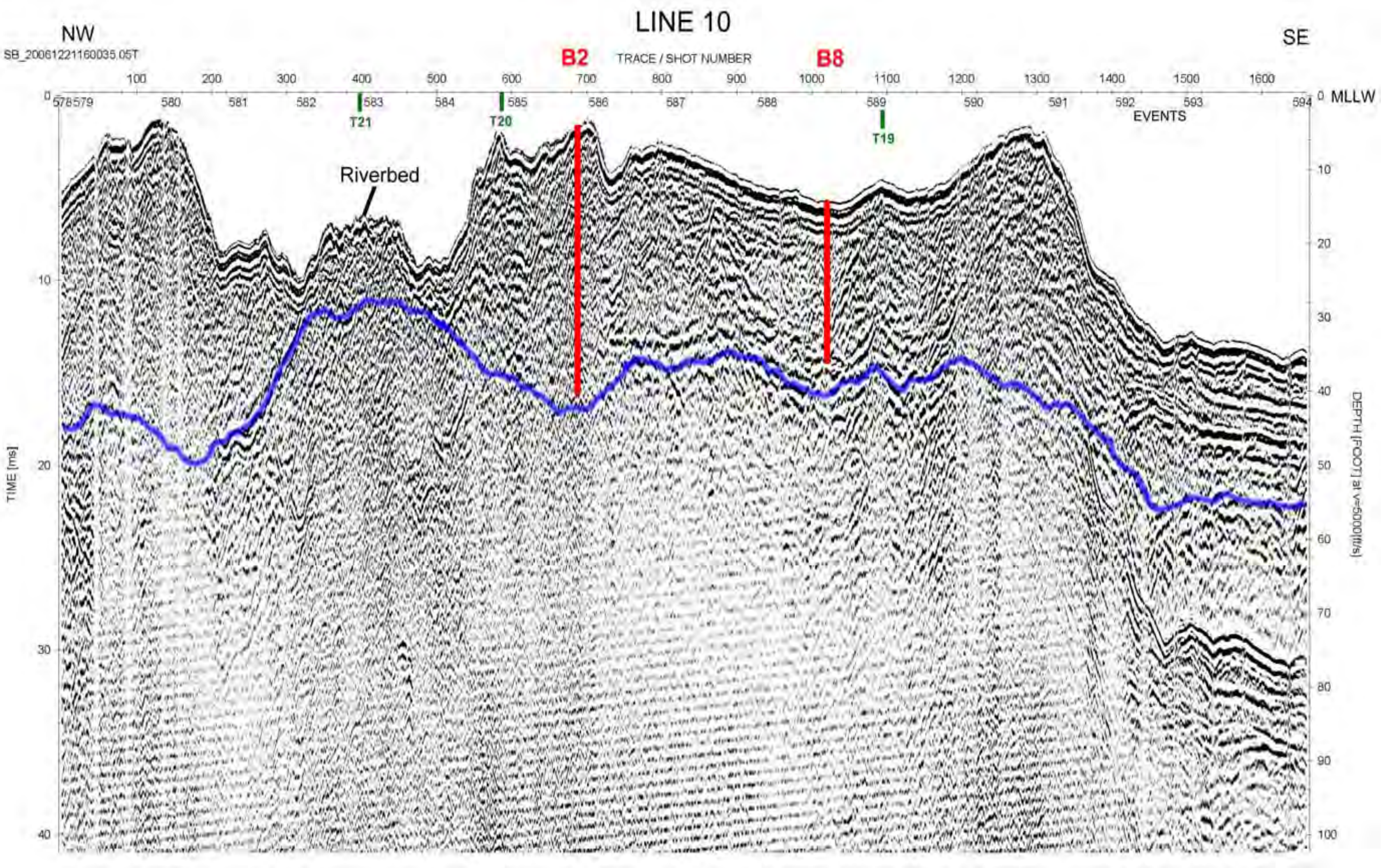
200
300
400
500
600
700
800
900
1000
1100
1200
608
607
606
605
604
603
602
601
600
599
598
597
596
EVENTS
T21
T20
T19
Riverbed
0 MLLW
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at v=5000[ft/s]
10
20
30
40
50
60
70
80
90
100


LINE 10
NW
SE
SB_20061221160035.05T
B2
B8
TRACE / SHOT NUMBER
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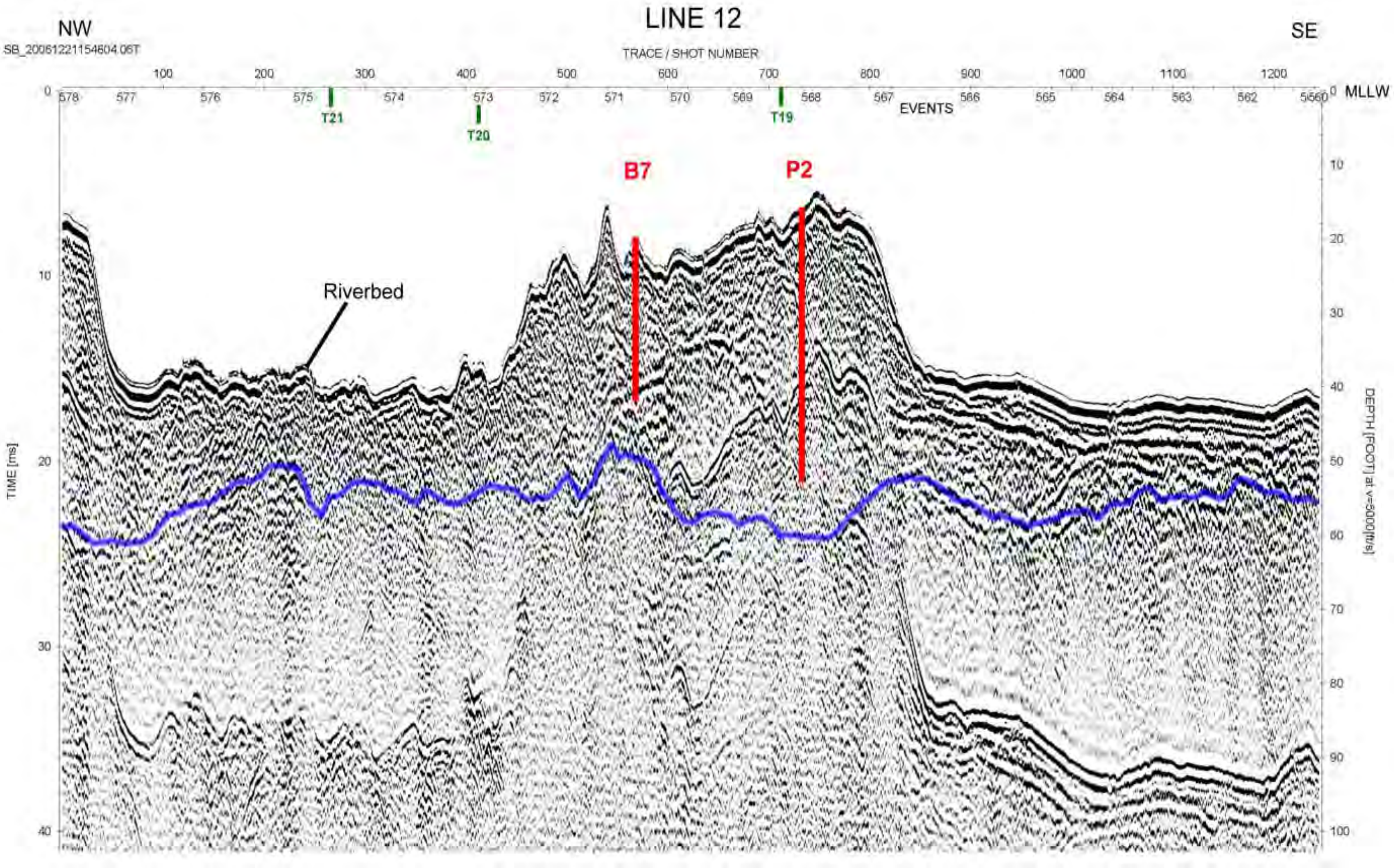
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
578579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
EVENTS
T21
T20
T19
Riverbed
TIME [ms]
0
10
20
30
40
0 MLLW
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]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NW
SE
SB_20061221154604.06T
TRACE / SHOT NUMBER
100
200
300
400
500
600
700
800
900
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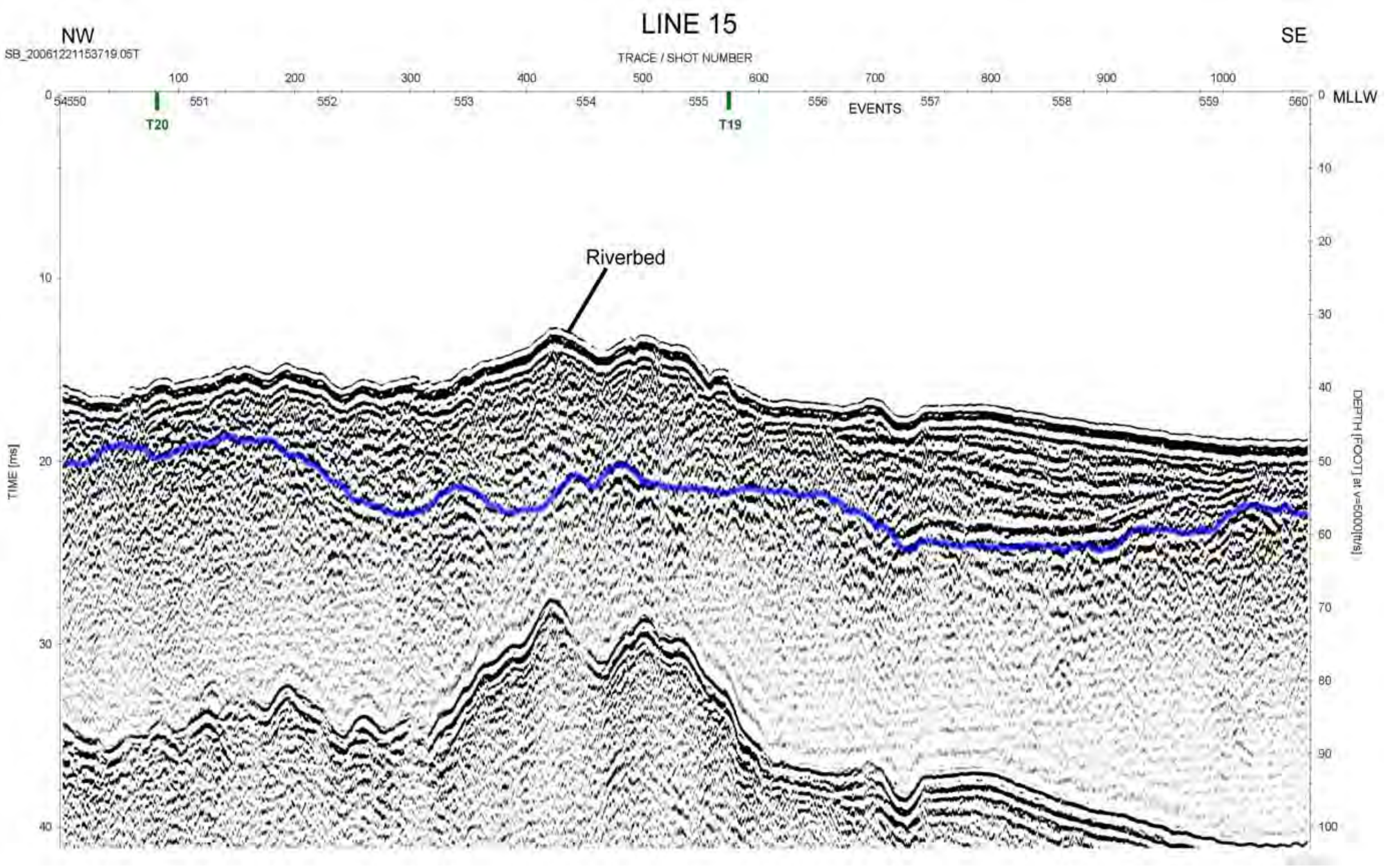
1100
1200
578
577
576
575
574
573
572
571
570
569
568
567
566
565
564
563
562
560
EVENTS
T21
T20
T19
B7
P2
Riverbed
TIME [ms]
0
10
20
30
40
0 MLLW
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]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NW
SE
SB_20061221153719.05T
TRACE / SHOT NUMBER
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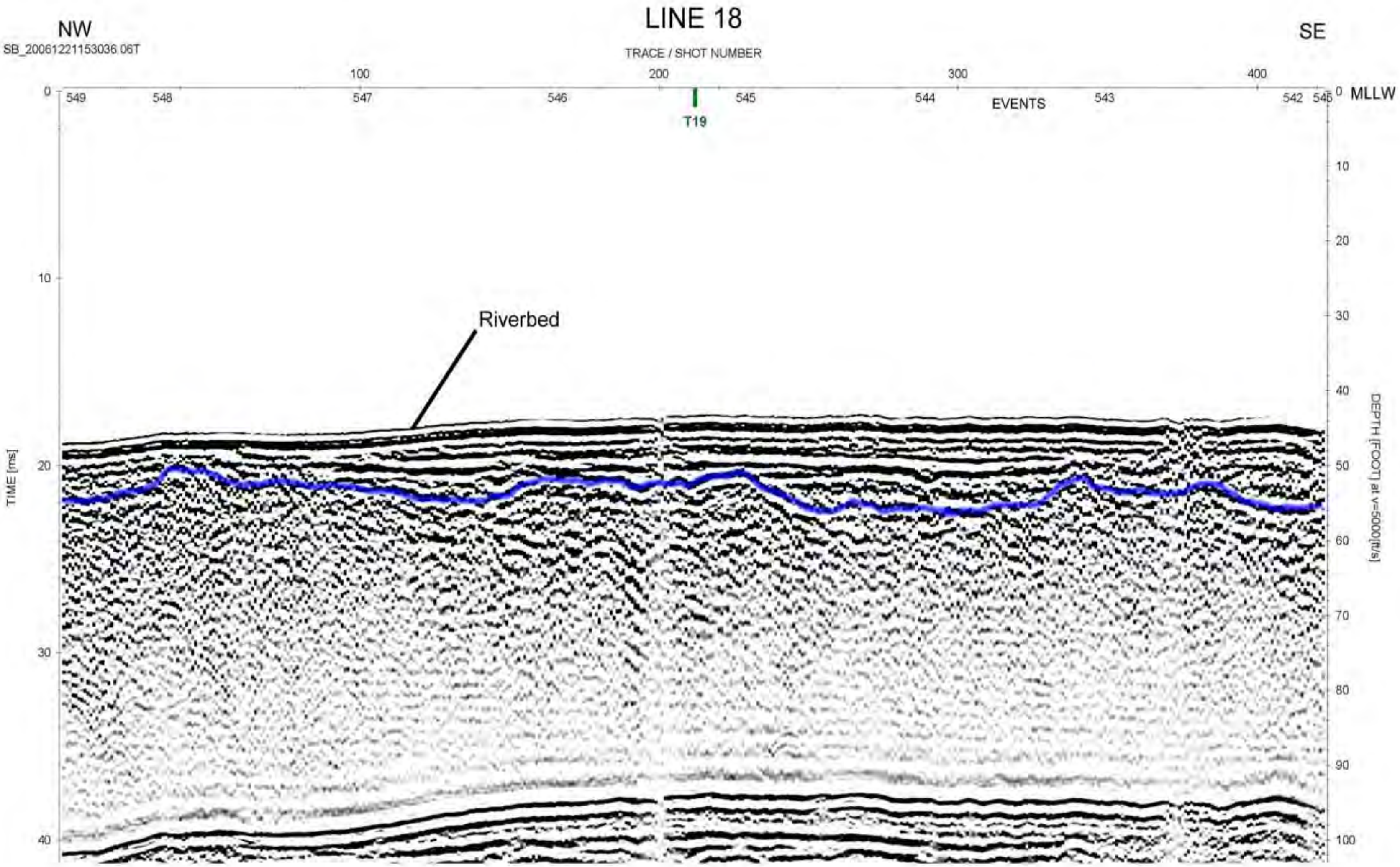
200
300
400
500
600
700
800
900
1000
EVENTS
54550
551
552
553
554
555
556
557
558
559
560
T20
T19
0 MLLW
Riverbed
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at v=5000[ft/s]
10
20
30
40
50
60
70
80
90
100


LINE 18
NW
SB_20061221153036.06T
SE
TRACE / SHOT NUMBER
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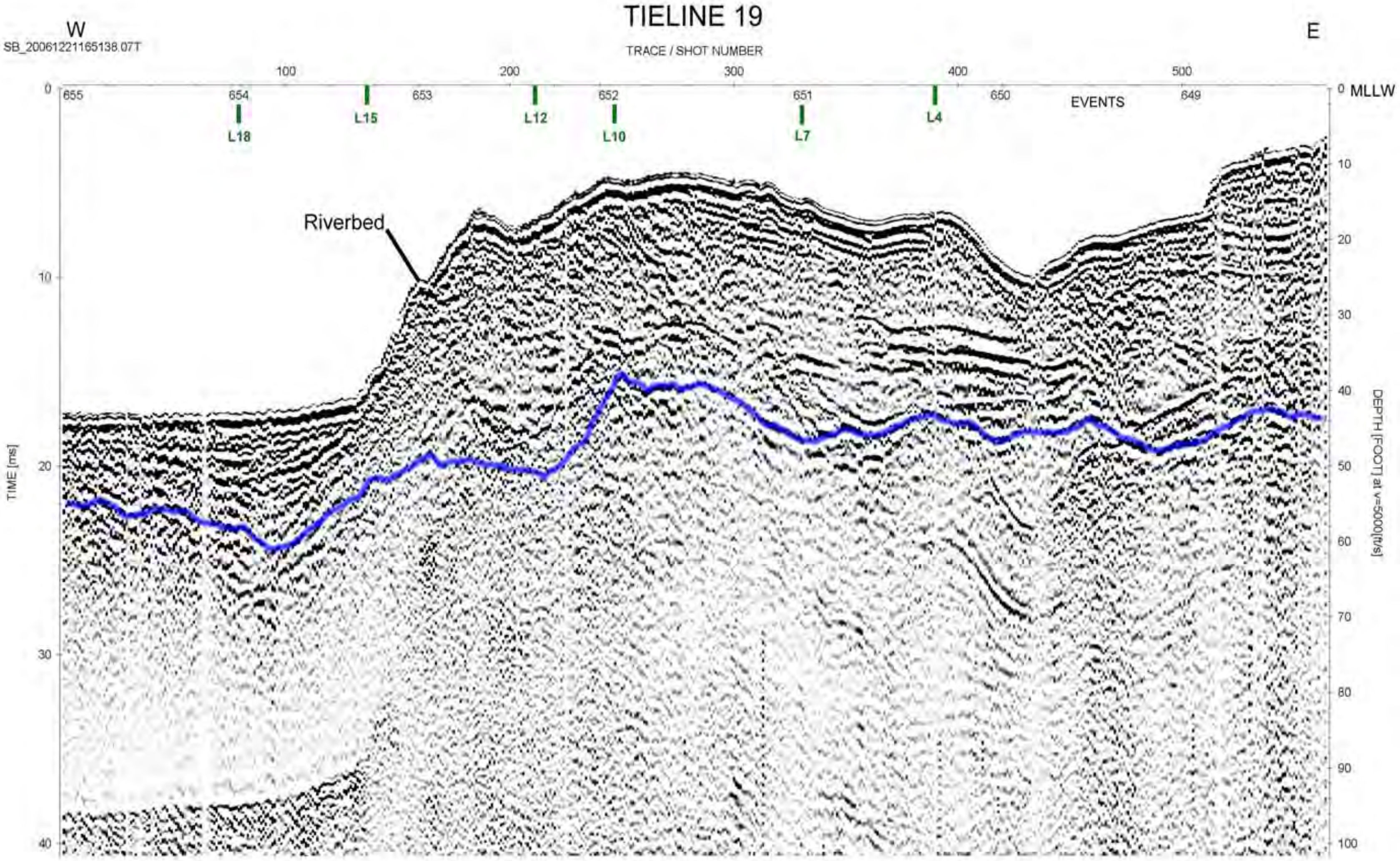
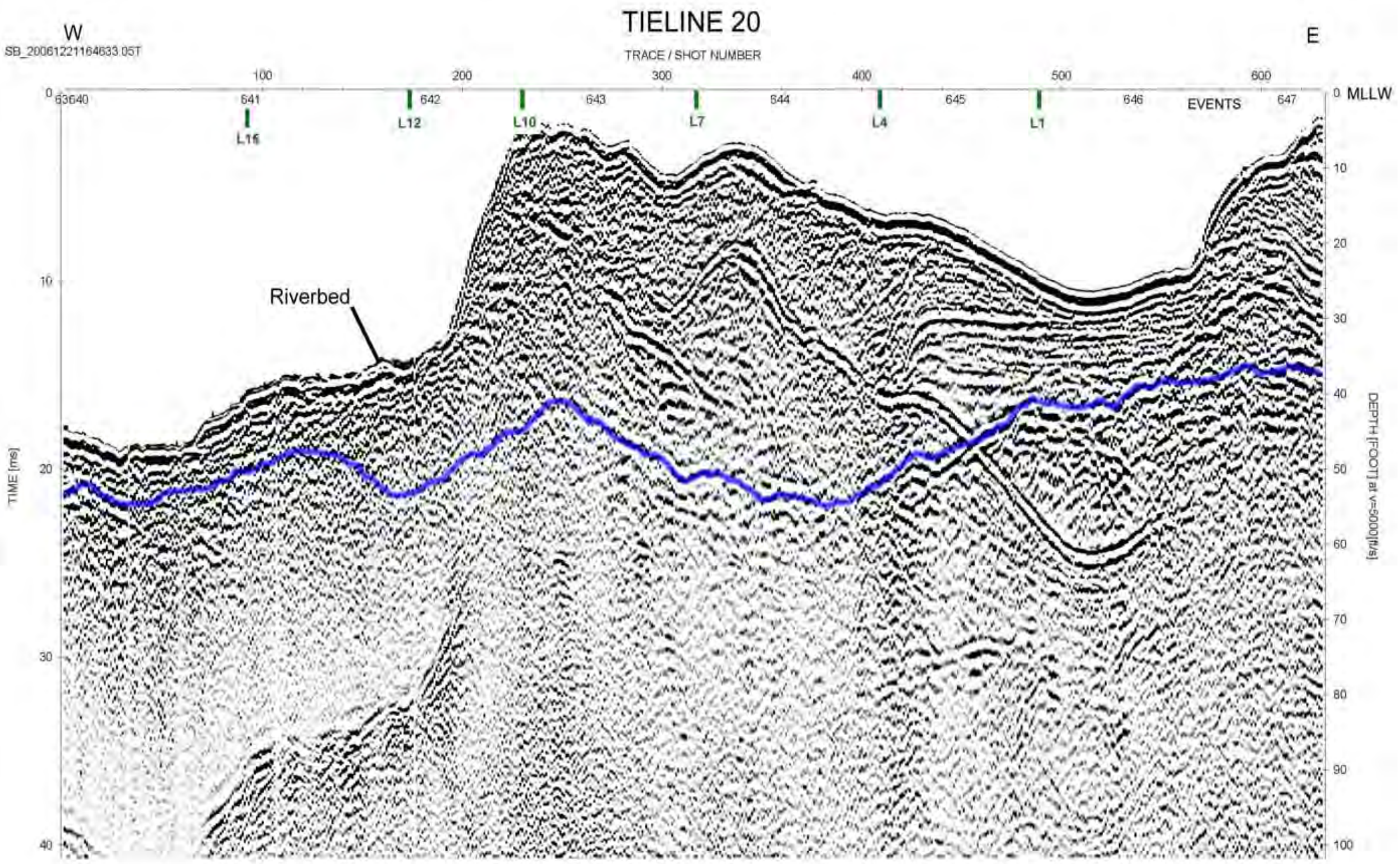
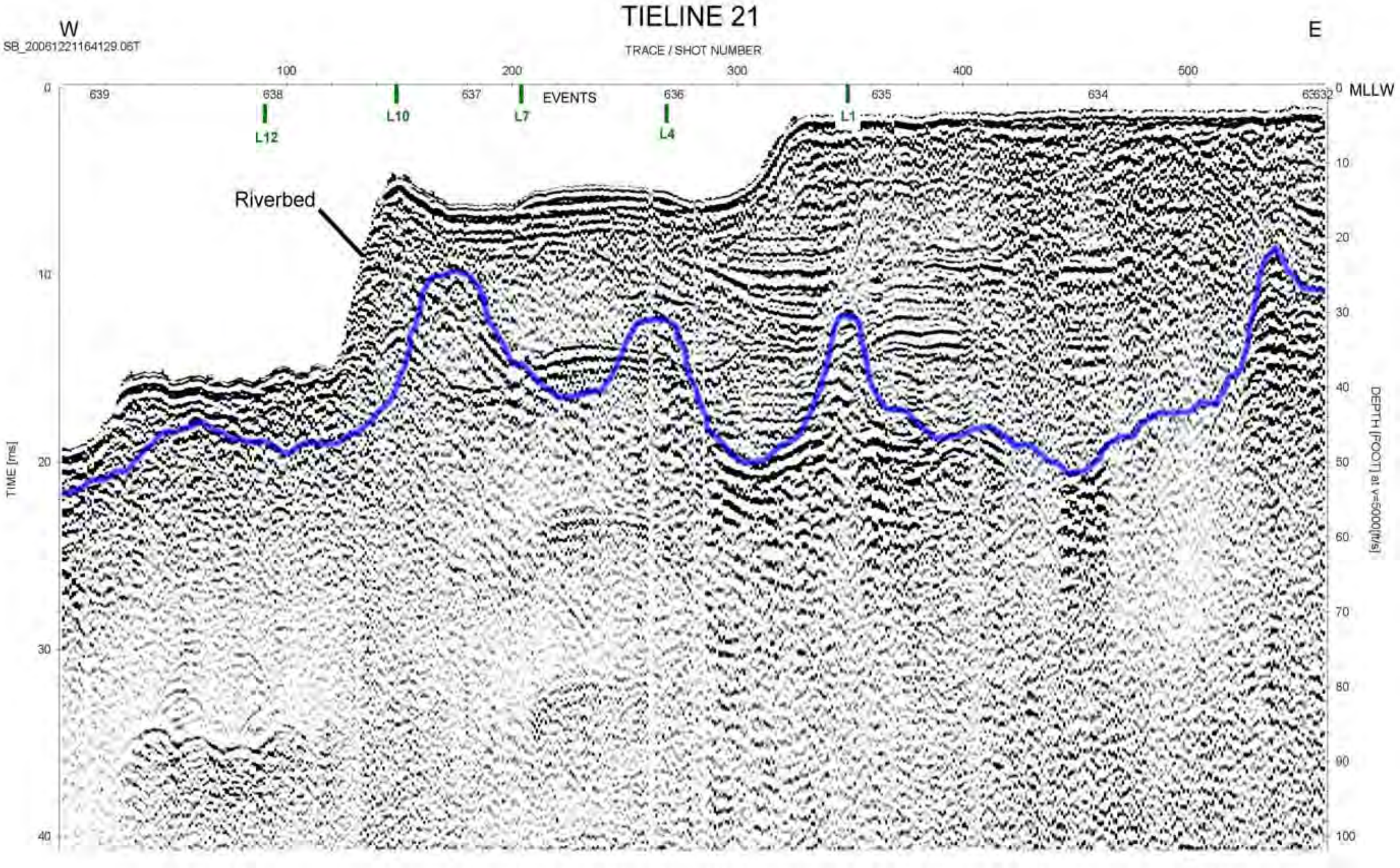
200
300
400
549
548
547
546
545
544
543
542
545
EVENTS
T19
0 MLLW
Riverbed
TIME [ms]
0
10
20
30
40
DEPTH [FOOT] at v=5000[ft/s]
10
20
30
40
50
60
70
80
90
100


TIELINE 19
W
E
SB_20061221165138.07T
TRACE / SHOT NUMBER
100
200
300
400
500
655
654
653
652
651
650
649
EVENTS
L18
L15
L12
L10
L7
L4
Riverbed
TIME [ms]
0
10
20
30
40
0 MLLW
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]


TIELINE 20
W
SB_20061221164633.05T
E
TRACE / SHOT NUMBER
100
200
300
400
500
600
0
63640
641
642
643
644
645
646
EVENTS
647
L16
L12
L10
L7
L4
L1
0 MLLW
Riverbed
TIME [ms]
10
20
30
40
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]


W
SB_20061221164129.06T
TIELINE 21
TRACE / SHOT NUMBER
E
100
200
300
400
500
639
638
637
636
635
634
63632
EVENTS
L12
L10
L7
L4
L1
Riverbed
TIME [ms]
0
10
20
30
40
0 MLLW
10
20
30
40
50
60
70
80
90
100
DEPTH [FOOT] at v=5000[ft/s]

Hole No. B-1

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 103,511.5 E 2,782,522.9

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Manlea "Bub" Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 27.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 27.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 6 ; UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

∇ ft
∇ ft
▼ ft

16. DATE/TIME: STARTED 9/10/07 0945 ; COMPLETED 9/10/07 1200

17. ELEVATION TOP OF HOLE -13.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-13.00 -15.00	0.00 2.00		0.0-2.0 Silty fine, SAND and gravel, wet, brown	J-1	SPT	2-2-17-21		0.7	35%		
-18.00	5.00		2.0-5.0 ROLLERBITTED.								
-20.00	7.00		5.0-7.0 Medium to coarse, SAND and gravel, wet, brown	J-2	SPT	16-11-11-11		0.5	25%		
-23.00	10.00		7.0-10.0 ROLLERBITTED.								
-25.00	12.00		10.0-12.0 Medium to coarse, SAND and gravel, wet, brown, with one larger angular piece of gravel.	J-3	SPT	13-14-13-8		0.3	15%		
-28.00	15.00		12.0-15.0 ROLLERBITTED.								
-30.00	17.00		15.0-17.0 Medium to coarse, SAND and gravel, wet, brown, with one larger piece of gravel.	J-4	SPT	5-7-8-8		0.4	20%		
-33.00	20.00		17.0-20.0 ROLLERBITTED.								

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

∇ DURING DRILLING ∇ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
B-1

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE -13.00 ft	**Hole No. B-1**
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-35.00	22.00		20.0-22.0 Fine, SAND little gravel, wet, brown		J-5	SPT	3-3-7-9		1	50%		
-38.00	25.00		22.0-25.0 ROLLERBITTED.									
-40.00	27.00		25.0-27.0 Fine, SAND some gravel, wet, brown BOTTOM OF HOLE		J-6	SPT	4-5-8-14		0.9	45%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 16.5'
4. Drill rods periodically ran rough for short periods of time during drilling, especially while drilling through sands and gravels.
5. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
6. Boring were advanced using 4" casing and 4" rollerbit.
7. Roundness of gravel was subangular.
8. GPS coordinates were determined through data processing.

Hole No. B-2

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 3 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT 4" roller bit
2. BORING LOCATION (Coordinates or Station) N 104,172.3 E 2,781,786.4	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Manlea "Bub" Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 8; UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 0 15. ELEVATION GROUND WATER ft ▽ ft ▼ ft ▼ ft
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	16. DATE/TIME: STARTED 9/10/07 1322; COMPLETED 9/11/07 0855
7. THICKNESS OF OVERBURDEN 37.00 ft	17. ELEVATION TOP OF HOLE -3.00 ft
8. DEPTH DRILLED INTO ROCK ft	18. TOTAL ROCK CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 37.00 ft	19. SIGNATURE OF INSPECTOR Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-3.00 -5.00	0.00 2.00		0.0-2.0 Medium to coarse, SAND and gravel, wet, brown	J-1	SPT	9-11-5-2		0.5	25%		
-8.00	5.00		2.0-5.0 ROLLERBITTED.								
-10.00	7.00		5.0-7.0 Medium, SAND little gravel, wet, brown	J-2	SPT	6-5-4-5		0.6	30%		
-13.00	10.00		7.0-10.0 ROLLERBITTED.								
-15.00	12.00		10.0-12.0 Fine to medium, SAND little gravel, wet, brown	J-3	SPT	4-4-6-8		1	50%		
-18.00	15.00		12.0-15.0 ROLLERBITTED.								
-20.00	17.00		15.0-17.0 Fine to medium, SAND little gravel, wet, brown, Bottom 0.3 medium to coarse sand and gravel.	J-4	SPT	4-8-12-12		0.8	40%		
-23.00	20.00		17.0-20.0 ROLLERBITTED.								

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-2

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-3.00 ft

Hole No. B-2

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-25.00	22.00		20.0-22.0 Medium to coarse, SAND and gravel, wet, brown		J-5	SPT	9-12-17-17		0.6	30%		
-28.00	25.00		22.0-25.0 ROLLERBITTED.									
-30.00	27.00		25.0-27.0 Medium to coarse, SAND and gravel, wet, brown		J-6	SPT	6-8-11-14		0.7	35%		
-33.00	30.00		27.0-30.0 ROLLERBITTED									
-35.00	32.00		30.0-32.0 Medium to coarse, SAND and gravel, wet, brown		J-7	SPT	11-12-14-18		0.8	40%		
-38.00	35.00		32.0-35.0 ROLLERBITTED									
-40.00	37.00		35.0-37.0 GRAVEL with medium to coarse sand, wet, brown, In tip of SPT the color changed to gray BOTTOM OF HOLE		J-8	SPT	7-31-30-27		0.8	40%		

<u>Notes:</u>

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 9.0'
4. Drill rods running rough between 20.0' - 27.0'.
5. Drill rods periodically ran rough for short periods of time during drilling, especially while drilling through sands and gravels.
6. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
7. Boring were advanced using 4" casing and 4" rollerbit.
8. Roundness of gravel was subangular.

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -3.00 ft		**Hole No. B-2**
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 3 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			9. GPS coordinates were determined through data processing.									

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement	HOLE NO. B-2

Hole No. B-3

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT 4" roller bit
2. BORING LOCATION (Coordinates or Station) N 104,052.6 E 2,782,268.9	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Manlea "Bub" Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 0 15. ELEVATION GROUND WATER ft ▽ ft ▽ ft ▼ ft
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	16. DATE/TIME: STARTED 9/11/07 1000; COMPLETED 9/11/07 1310
	17. ELEVATION TOP OF HOLE -15.00 ft
7. THICKNESS OF OVERBURDEN 27.00 ft	18. TOTAL ROCK CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK ft	19. SIGNATURE OF INSPECTOR Maria Orosz
9. TOTAL DEPTH OF HOLE 27.00 ft	

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-15.00 -17.00	0.00 2.00		0.0-2.0 Fine to medium, SAND contains shells, little gravel, wet, black and brown		J-1	SPT	3-3-3-2		0.4	20%		
-20.00	5.00		2.0-5.0 ROLLERBITTED.									
-20.60	5.60		5.0-5.6 Fine to medium, SAND little gravel, wet, brown		J-2	SPT	31-120/0.1		0.6	100%		
-25.00	10.00		7.0-10.0 ROLLERBITTED.									
-27.00	12.00		10.0-12.0 Sandy fine, SILT with gravel, wet, brown		J-3	SPT	2-5-22-37		1.2	60%		
-30.00	15.00		12.0-15.0 ROLLERBITTED.									
-32.00	17.00		15.0-17.0 Fine, SAND with two interbedded silt layers, wet, brown		J-4	SPT	4-5-5-6		0.7	35%		
-35.00	20.00		17.0-20.0 ROLLERBITTED.									

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-15.00 ft

Hole No. B-3

PROJECT
FS for Navigational Improvement

INSTALLATION
Baltimore District

SHEET 2
OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-37.00	22.00		20.0-22.0 Fine, SAND wet, brown		J-5	SPT	8-2-6-8		0.4	20%		
-40.00	25.00		22.0-25.0 ROLLERBITTED.									
-42.00	27.00		25.0-27.0 Fine to medium, SAND wet, brown BOTTOM OF HOLE		J-6	SPT	8-6-4-6		0.9	45%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 18.5'
4. Casing dropped 0.5' while setting up to sample J-2, potentially due to washed out sand and gravel.
5. Drill rods running rough between 5.6' to 10.0' - sounded like grinding on gravel.
6. Drilling for B-3 was rougher for longer periods of time than B-1 and B-2.
7. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
8. Boring were advanced using 4" casing and 4" rollerbit.
9. Roundness of gravel was subangular.
10. GPS coordinates were determined through data processing.

Hole No. B-4

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,438.4 E 2,781,783.8

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Manlea "Bub" Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 37.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 37.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM
MLLW

11b. HORIZONTAL DATUM
State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 5 : UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▼ ft
▼ ft

16. DATE/TIME: STARTED 9/13/07 1230 : COMPLETED 9/13/07 1230

17. ELEVATION TOP OF HOLE -3.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-3.00 -5.00	0.00 2.00		0.0-2.0 Silty medium to coarse, SAND and gravel, wet, brown, rock stuck in tip of SPT		J-1	SPT	8-12-21-18		0.6	30%		
-8.00	5.00		2.0-5.0 ROLLERBITTED.									
-10.00	7.00		5.0-7.0 Fine to medium, SAND little gravel, wet, brown		J-2	SPT	4-6-9-11		0.9	45%		
-18.00	15.00		7.0-15.0 ROLLERBITTED.									
-20.00	17.00		15.0-17.0 Fine to medium, SAND little gravel, wet, brown, Bottom 0.2 fine sandy silt		J-3	SPT	4-6-10-12		1.3	65%		
			17.0-25.0 ROLLERBITTED.									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

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▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -3.00 ft

Hole No. B-4

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-28.00	25.00										
-30.00	27.00		25.0-27.0 Fine to medium, SAND little gravel, wet, brown	J-4	SPT	7-13-30-42		1.1	55%		
-38.00	35.00		27.0-35.0 ROLLERBITTED.								
-40.00	37.00		35.0-37.0 Fine to medium, SAND wet, brown BOTTOM OF HOLE	J-5	SPT	10-12-38-81		1.4	70%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 8.0'
4. Drill rods running rough between 2.0' to 5.0', 7.0' to 10.0', and 25.0' to 37.0'.
5. The majority of SPT samples did not have sample in shoe, most likely due to wash out.
6. Boring was advanced using 4" casing and 4" rollerbit.
7. Roundness of gravel was subangular.
8. GPS coordinates were not processed and the raw utilized.

Hole No. B-5

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,925.0 E 2,781,460.3

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Dave Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 27.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 27.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 6 ; UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▼ ft
▼ ft

16. DATE/TIME: STARTED 11/27/07 0945 ; COMPLETED 11/27/07 1245

17. ELEVATION TOP OF HOLE -14.50 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-14.50 -16.50	0.00 2.00		0.0-2.0 Sandy fine, SILT wet, brown, Upper 0.3 black fine sand with shells		J-1	SPT	1-1-3-3		1.4	70%		
-19.50	5.00		2.0-5.0 ROLLERBITTED.									
-21.50	7.00		5.0-7.0 Sandy fine, SILT wet, brown		J-2	SPT	3-3-5-5		0.6	30%		
-24.50	10.00		7.0-10.0 ROLLERBITTED.									
-26.30	11.80		10.0-11.8 Silty fine, SAND with gravel, wet, brown, One large piece of gravel approx 0.1'		J-3	SPT	30-50-96-100/0.3		1.2	67%		
-29.50	15.00		11.8-15.0 ROLLERBITTED.									
-31.50	17.00		15.0-17.0 Fine, SAND wet, brown, Bottom 0.2 gravel and coarse sand.		J-4	SPT	20-17-18-21		1.1	55%		
-34.50	20.00		17.0-20.0 ROLLERBITTED.									

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▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement

HOLE NO. B-5

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-14.50 ft

Hole No. B-5

PROJECT
FS for Navigational Improvement

INSTALLATION
Baltimore District

SHEET 2
OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-36.50	22.00		20.0-22.0 Fine, SAND little gravel, wet, brown		J-5	SPT	9-20-21-24		1.2	60%		
-39.50	25.00		22.0-25.0 ROLLERBITTED.									
-41.50	27.00		25.0-27.0 Fine to medium, SAND little gravel, wet, brown BOTTOM OF HOLE		J-6	SPT	12-29-40-48		1.3	65%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 23.5'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. Drill rods running rough between 7.0' to 15.0'.
7. GPS coordinates were not processed and the raw utilized.

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▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

Hole No. B-6

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT 4" roller bit
2. BORING LOCATION (Coordinates or Station) N 104,631.0 E 2,781,500.2	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Dave Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 3; UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 2 15. ELEVATION GROUND WATER ft ▽ ft ▼ ft ▼ ft
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	16. DATE/TIME: STARTED 11/28/07 0800; COMPLETED 11/28/07 1305
	17. ELEVATION TOP OF HOLE -15.00 ft
7. THICKNESS OF OVERBURDEN 12.00 ft	18. TOTAL ROCK CORE RECOVERY FOR BORING 100 %
8. DEPTH DRILLED INTO ROCK 10.00 ft	19. SIGNATURE OF INSPECTOR Maria Orosz
9. TOTAL DEPTH OF HOLE 28.00 ft	

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-15.00 -17.00	0.00 2.00		0.0-2.0 Fine to medium, SAND with gravel, wet, brown		J-1	SPT	7-8-9-10		0.6	30%		
-20.00	5.00		2.0-5.0 ROLLERBITTED.									
-22.00	7.00		5.0-7.0 Silty fine, SAND with gravel, wet, brown		J-2	SPT	18-28-40-43		0.5	25%		
-25.00	10.00		7.0-10.0 ROLLERBITTED.									
-27.00	12.00		10.0-12.0 Silty fine, SAMD with gravel, wet, brown, Upper 0.2 black gravel and coarse sand		J-3	SPT	76-88-63-72		1	50%		
-33.00	18.00		12.0-15.0 ROLLERBITTED. 15.0-18.0 SPT refusal @ 15' (0.0/100). ROLLERBITTED to 18.0'. Wash water from tailings was cloudy gray, and tailings appeared to be crushed rock. Began coring at 18.0.'									
			18.0-23.0 Gneiss gray, slightly weathered, fine, medium hard, Rock contained pitted voids from 18.0 to 19.0'. One apparent fracture at 19.9'. Fracture was slightly stained, rough, narrow, dipping at approx 50 degrees.									

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▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement	HOLE NO. B-6

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -15.00 ft

Hole No. B-6

PROJECT FS for Navigational Improvement

INSTALLATION Baltimore District

SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-38.00	23.00		Mechanical breaks occurred at 18.2', 18.9', 20.1', 20.5' and 22.2'.			CR Run 1			5	100%	0.92	55.2
-43.00	28.00		23.0-28.0 Gneiss gray, slightly weathered, fine, medium hard, One apparent fracture at 23.7'. Fracture was slightly stained, rough, narrow, dipping at approx 60 degrees. Mechanical breaks occurred at 24.6', 25.3', 25.7', and 26.5'. Mechanical break angles ranged from 40 to 70 degrees. BOTTOM OF HOLE			CR Run 2			5	100%	0.94	56.4

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 15.0'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. Run Times (ft/min) for Run #1: 3-4-4-4-4, and Run#2: 4-3-3-3-3.
7. Poor recovery for J-2 due to rock in catcher.
8. Drill rods running rough between 7.0' to 10.0'.
9. GPS coordinates were determined through data processing.

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

Hole No. B-7

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 103,983.5 E 2,781,847.7

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Dave Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 22.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 22.00 ft

10. SIZE AND TYPE OF BIT 4" roller bit

11a. VERTICAL DATUM MLLW

11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 5; UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▼ ft
▼ ft

16. DATE/TIME: STARTED 11/29/07 0830; COMPLETED 11/28/07 1100

17. ELEVATION TOP OF HOLE -19.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-19.00	0.00		0.0-2.0 Fine, SAND little gravel, wet, brown	J-1	SPT	11-4-3-2		1	50%		
-21.00	2.00		2.0-5.0 ROLLERBITTED.								
-24.00	5.00		5.0-7.0 Fine to medium, SAND little gravel, wet, brown	J-2	SPT	5-5-3-5		1.3	65%		
-26.00	7.00		7.0-10.0 ROLLERBITTED.								
-29.00	10.00		10.0-12.0 Fine to coarse, SAND with gravel, wet, brown	J-3	SPT	4-4-4-6		1.2	60%		
-31.00	12.00		12.0-15.0 ROLLERBITTED.								
-34.00	15.00		15.0-17.0 Medium to coarse, SAND with gravel, wet, brown	J-4	SPT	7-8-12-31		0.9	45%		
-36.00	17.00		17.0-20.0 ROLLERBITTED.								
-39.00	20.00										

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▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-19.00 ft

Hole No. B-7

PROJECT
FS for Navigational Improvement

INSTALLATION
Baltimore District

SHEET 2
OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-41.00	22.00		20.0-22.0 Medium to coarse, SAND with gravel, wet, brown BOTTOM OF HOLE		J-5	SPT	13-78-39-26		1.4	70%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 25.0'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. Drill rods running rough between 17.0' to 20.0'.
7. The current was very strong in this location.
8. For samples J-1, J-3, and J-5, the 3" spoon was used to retrieve a greater amount of sample.
9. GPS coordinates were determined through data processing.

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
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∇ DURING DRILLING ⊻ AT COMPLETION ▼ AFTER DRILLING

Hole No. B-8

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT 4" roller bit
2. BORING LOCATION (Coordinates or Station) N 103,732.7 E 2,782,109.8	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Dave Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 5, UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 0 15. ELEVATION GROUND WATER ft ▽ ft ⊽ ft ▼ ft
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	16. DATE/TIME: STARTED 11/29/07 1237, COMPLETED 11/30/07 1000
7. THICKNESS OF OVERBURDEN 22.00 ft	17. ELEVATION TOP OF HOLE -18.00 ft
8. DEPTH DRILLED INTO ROCK ft	18. TOTAL ROCK CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 22.00 ft	19. SIGNATURE OF INSPECTOR Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-18.00 -20.00	0.00 2.00		0.0-2.0 Fine to medium, SAND wet, brown, One large piece of gravel approx 0.3'		J-1	SPT	19-6-2-2		0.7	35%		
-23.00	5.00		2.0-5.0 ROLLERBITTED.									
-25.00	7.00		5.0-7.0 Coarse, SAND AND GRAVEL wet, brown		J-2	SPT	5-5-7-9		1	50%		
-28.00	10.00		7.0-10.0 ROLLERBITTED.									
-30.00	12.00		10.0-12.0 Fine to medium, SAND AND GRAVEL little gravel, wet, brown		J-3	SPT	14-19-23-30		0.9	45%		
-33.00	15.00		12.0-15.0 ROLLERBITTED.									
-35.00	17.00		15.0-17.0 Medium to coarse, SAND AND GRAVEL wet, brown		J-4	SPT	12-30-31-40		2	100%		
-38.00	20.00		17.0-20.0 ROLLERBITTED.									

▽ DURING DRILLING ⊽ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE -18.00 ft	**Hole No. B-8**
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-40.00	22.00		20.0-22.0 Coarse, SAND AND GRAVEL wet, brown BOTTOM OF HOLE		J-5	SPT	13-15-17-14		1	50%		

Notes:

1. Soils are field visually classified in accordance with the Unified Soils Classification System
2. Sampled using a standard 1 3/8" split spoon driven manually by a 140 lb. hammer dropped 30".
3. Water depth at start of drilling from top of water to mudline was 25.0'
4. Boring was advanced using 4" casing and 4" rollerbit.
5. Roundness of gravel was subangular.
6. For samples J-1, J-2, J-4, and J-5, the 3" spoon was used to retrieve a greater amount of sample.
7. GPS coordinates were determined through data processing.

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DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 3 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT
2. BORING LOCATION (Coordinates or Station) N 105,013.1 E 2,781,703.1	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Manlea "Bub" Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 0 ; UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 0 15. ELEVATION GROUND WATER ft ▽ ft ▼ ft ▼ ft
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	16. DATE/TIME: STARTED 9/13/07 0740 ; COMPLETED 9/13/07 0915
7. THICKNESS OF OVERBURDEN 58.90 ft	17. ELEVATION TOP OF HOLE -2.00 ft
8. DEPTH DRILLED INTO ROCK ft	18. TOTAL ROCK CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 58.90 ft	19. SIGNATURE OF INSPECTOR Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-2.00	0.00		0.0-58.9									
			19.0-24.0 Casing blows per foot: 26-24-22-24-21									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE -2.00 ft	**Hole No. P-1**
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			24.0-29.0 Casing blows per foot: 23-21-22-21-21									
			29.0-34.0 Casing blows per foot: 21-21-20-21-22									
			34.0-39.0 Casing blows per foot: 26-25-25-22-20									
			39.0-44.0 Casing blows per foot: 23-27-24-23-22									
			44.0-49.0 Casing blows per foot: 21-21-18-21-27									

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▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)	ELEVATION TOP OF HOLE -2.00 ft	**Hole No. P-1**	
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District		SHEET 3 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
			49.0-54.0 Casing blows per foot: 26-26-29-34-42									
			54.0-58.9 Casing blows per foot: 40-42-48-56-49									
-60.90	58.90		BOTTOM OF HOLE									

Notes:

1. Water depth at start of drilling from top of water to mudline was 2.5'
2. Probe holes were advanced using a 300 lb hammer to pound NW rods into the sediment. An A-rod center plug that was ground into a 60 degree point was used to advance the NW rods.
3. Top of rock was determined by a bouncing refusal.
4. Casing blows were only recorded for P-1.
5. GPS coordinates were determined through data processing.

Hole No. P-2

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 2 SHEETS

1. PROJECT FS for Navigational Improvement, Portsmouth, NH	10. SIZE AND TYPE OF BIT
2. BORING LOCATION (Coordinates or Station) N 103,605.5 E 2,782,165.0	11a. VERTICAL DATUM MLLW 11b. HORIZONTAL DATUM State Plane, NAD 83 Maine West
3. DRILLING AGENCY New Hampshire Boring	12. MANUFACTURER'S DESIGNATION OF DRILL Detrich D-50
4. NAME OF DRILLER Manlea "Bub" Thompson	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 0; UNDISTURBED 0
5. NAME OF INSPECTOR Maria Orosz	14. TOTAL # OF ROCK SAMPLES 0 15. ELEVATION GROUND WATER ft ▽ ft ▽ ft ▼ ft
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.	16. DATE/TIME: STARTED 9/12/07 0130; COMPLETED 9/12/07 1453
7. THICKNESS OF OVERBURDEN 37.00 ft	17. ELEVATION TOP OF HOLE -15.50 ft
8. DEPTH DRILLED INTO ROCK ft	18. TOTAL ROCK CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 37.00 ft	19. SIGNATURE OF INSPECTOR Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-15.50	0.00		0.0-37.0									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▽ AT COMPLETION ▼ AFTER DRILLING

PROJECT
FS for Navigational Improvement

HOLE NO.
P-2

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -15.50 ft	**Hole No. P-2**	
PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 2 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-52.50	37.00		BOTTOM OF HOLE									

Notes:

1. Water depth at start of drilling from top of water to mudline was 15.5'
2. Hard driving rods near bottom of probe hole.
3. At completion of probe hole, the final rod that was pulled was bent.
4. Probe holes were advanced using a 300 lb hammer to pound NW rods into the sediment. An A-rod center plug that was ground into a 60 degree point was used to advance the NW rods.
5. Top of rock was determined by a bouncing refusal.
6. GPS coordinates were not processed and the raw utilized.

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

Hole No. P-3

DRILLING LOG	DIVISION North Atlantic Division	INSTALLATION Baltimore District	SHEET 1 OF 3 SHEETS

1. PROJECT
FS for Navigational Improvement, Portsmouth, NH

2. BORING LOCATION (Coordinates or Station)
N 104,971.2 E 2,781,345.4

3. DRILLING AGENCY
New Hampshire Boring

4. NAME OF DRILLER
Manlea "Bub" Thompson

5. NAME OF INSPECTOR
Maria Orosz

6. DIRECTION OF HOLE
☒ VERTICAL ☐ INCLINED --- DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN 49.00 ft

8. DEPTH DRILLED INTO ROCK ft

9. TOTAL DEPTH OF HOLE 49.00 ft

10. SIZE AND TYPE OF BIT

11a. VERTICAL DATUM
MLLW

11b. HORIZONTAL DATUM
State Plane, NAD 83 Maine West

12. MANUFACTURER'S DESIGNATION OF DRILL
Detrich D-50

13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 0; UNDISTURBED 0

14. TOTAL # OF ROCK SAMPLES 0

15. ELEVATION GROUND WATER ft

▽ ft
▼ ft
▼ ft

16. DATE/TIME: STARTED 9/12/07 0840; COMPLETED 9/12/07 1132

17. ELEVATION TOP OF HOLE -12.00 ft

18. TOTAL ROCK CORE RECOVERY FOR BORING %

19. SIGNATURE OF INSPECTOR
Maria Orosz

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-12.00	0.00		0.0-49.0									

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-12.00 ft

Hole No. P-3

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 2 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD

NAB 1836 LETTER PORTSMOUTH_NAB_ALL_BORINGS.GPJ USACE BALTIMORE.GDT 12/7/07

NAB FORM 1836-A
NOV 06

▽ DURING DRILLING ▼ AT COMPLETION ▼ AFTER DRILLING

PROJECT FS for Navigational Improvement	HOLE NO. P-3

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE
-12.00 ft

Hole No. P-3

PROJECT FS for Navigational Improvement	INSTALLATION Baltimore District	SHEET 3 OF 3 SHEETS

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Description)		SAMPLE	SPT/ AB/ CR	BLOWS / 0.5 ft	PP/ TOR	Length REC.	% REC.	RQD	Length RQD
-61.00	49.00		BOTTOM OF HOLE									

Notes:

1. Water depth at start of drilling from top of water to mudline was 11.5'

2. Probe holes were advanced using a 300 lb hammer to pound NW rods into the sediment. An A-rod center plug that was ground into a 60 degree point was used to advance the NW rods.
3. Top of rock was determined by a bouncing refusal.
4. GPS coordinates were determined through data processing.

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX J
DREDGED MATERIAL SAMPLING AND TESTING

TRIP REPORT
ENVIRONMENTAL RESOURCE SECTION

Location: Piscataqua River Improvement Dredging Project
Portsmouth, New Hampshire

Date: 2 June 2009

Participants:

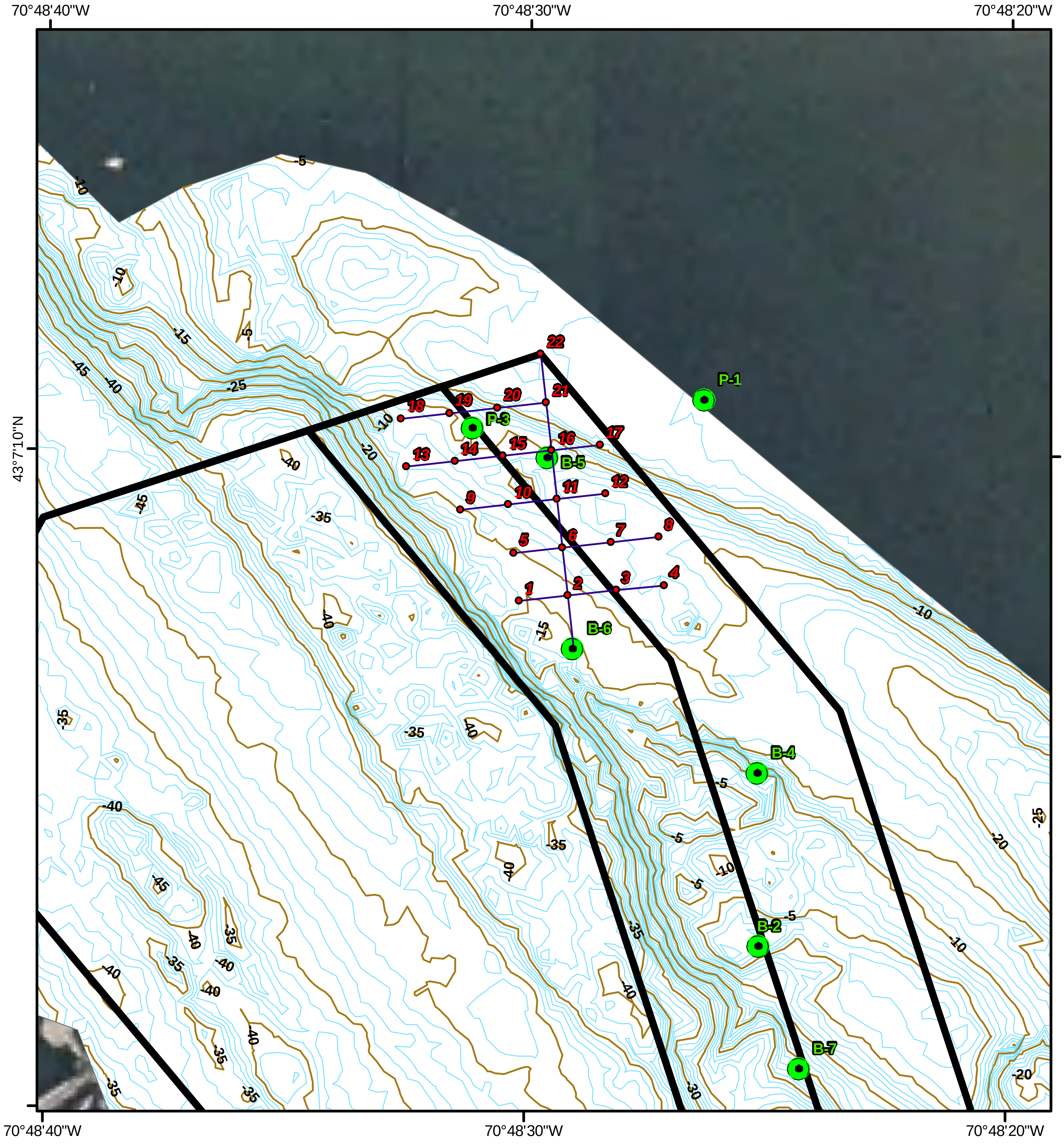
Todd Randall	USACE
Richard Loyd	USACE
Jesse Morril-Winter	USACE

Field Sampling:

The objective of this sampling trip was to acquire sediment grabs from 22 locations (see attached figure) from the proposed project area in the Piscataqua River. Sample locations were chosen by USACE in conjunction with the EPA in order to supplement the data from sediment cores collected in 2007 and to determine the location and presence of areas of predominantly fine grained sediments in the proposed project area. Samples were collected by the USACE personnel indicated above using a 0.04m^2 Van Veen grab on June 2, 2009. Sediments in the sample area consisted of poorly sorted sand, gravel, cobble, and shell with scattered pockets of fine sand and silt (see Table 1). Multiple attempts were required to retrieve a sample at several locations, and 6 locations produced no sample after 5 attempts. This was attributed to a rocky bottom or coarse material preventing the grab from closing.

TABLE 1
SEDIMENT GRAB SAMPLING LOG

Station	Easting NAD 83	Northing NAD83	Depth (ft)	No. Attempts	Sediment Type	Odor	Comments
1	70.8083699	43.11881574	20	5	no sample	-	
2	70.80809097	43.11883993	18.5	5	no sample	-	
3	70.80781203	43.11886412	17.7	3	shell and sand	no	
4	70.80753309	43.11888831	10	5	no sample	-	
5	70.80840293	43.11902008	19	2	coarse to medium sand with cobble, gravel and shell	no	
6	70.80812399	43.11904427	19	4	very fine sand and shell	no	firm bottom, very small sample
7	70.80784505	43.11906846	17.4	3	fine sand and shell	no	
8	70.80756611	43.11909265	18.9	5	no sample	-	
9	70.80871489	43.11920022	20.1	2	coarse sand with coobble, gravel, and shell	no	
10	70.80843595	43.11922442	15.7	2	coarse sand, gravel, and shell	no	
11	70.80815701	43.11924861	16.4	3	medium to fine sand and silt	no	
12	70.80787808	43.1192728	18.5	2	medium to fine sand, silt and shell	no	
13	70.80902686	43.11938037	16.3	2	no sample	-	rocky bottom
14	70.80874792	43.11940456	14.6	2	coarse to medium sand with cobble, gravel and shell	no	
15	70.80846898	43.11942875	16.6	10	sand,shell and gravel	no	
16	70.80819004	43.11945294	17.9	1	fine sand and silt	no	
17	70.8079111	43.11947714	12.5	2	medium to fine sand	no	
18	70.80905988	43.1195847	15	1	fine sand and gravel with some shell	no	
19	70.80878094	43.1196089	7	2	shell, cobble and gravel	no	
20	70.808502	43.11963309	10	5	no sample	-	grab taken with fine sand half way between station 20 and 21
21	70.80822306	43.11965728	6.4	3	fine sand and silt	no	
22	70.80825609	43.11986162	8	1	fine sand and gravel	no	



PISCATAQUA RIVER
IMPROVEMENT DREDGING PROJECT
JUNE 2009 SEDIMENT GRAB SAMPLES

US Army Corps
of Engineers
New England District

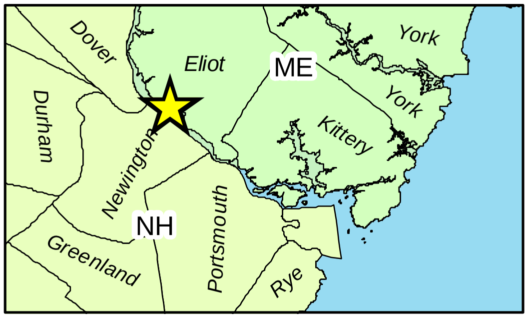
● 2009 Sediment Grab Location

● 2007 Sediment Core Location

75ft Sample Grid

Proposed Project Area

Feet
0 50 100 200 300 400 500
1:2,500



Piscataqua River
Grain Size Analysis of Sediment Grab Samples
(Samples obtained June 2009)

Sample #	% Gravel	% Sand	% Silt & Clay
1	Could not get sample		
2	Could not get sample		
3	78.0	20.7	1.3
4	Could not get sample		
5	45.9	53.3	0.8
6	1.1	67.6	31.3
7	14.4	76.9	8.7
8	Could not get sample		
9	57.0	42.1	0.9
10	41.0	58.1	0.9
11	0.0	92.9	7.1
12	67.0	31.0	2.0
13	Could not get sample		
14	11.8	85.4	2.8
15	82.1	16.9	1.0
16	0.8	90.2	9.0
17	5.7	83.4	10.9
18	36.8	61.5	1.7
19	60.9	33.5	5.6
20	Could not get sample		
21	3.1	78.4	18.5
22	5.5	87.0	7.5

Note: In cases where a sample could not be abtained, the riverbed was either too hard or rocky

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a subsidiary of Geocomp Corporation

1145 Massachusetts Avenue
Boxborough, MA 01719
978 635 0424 Tel
978 635 0266 Fax

Transmittal

TO:
Todd Randall
US Army Corp of Engineers
696 Virginia Road
Concord, MA 01742

DATE: 6/25/2009	GTX NO: 9108
RE: Piscataqua River - June 09	

COPIES	DATE	DESCRIPTION
	6/25/2009	**June 2009 Laboratory Test Report**

REMARKS:

SIGNED: Joe
Joe Tomei, Laboratory Manager

CC:

APPROVED BY: Mark Dobday
Mark Dobday, Laboratory Manager

GeoTesting
express
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Boston
Atlanta
New York
www.geocomp.com/geotesting

June 25, 2009

Todd Randall
US Army Corp of Engineers
696 Virginia Road
Concord, MA 01742

RE: Piscataqua River - June 09 Project (GTX-9108)

Dear Todd Randall:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received 16 samples from you on June 18, 2009. These samples were labeled as follows:

S-3, S-5, S-6, S-7, S-9, S-10, S-11, S-12, S-14, S-15, S-16, S-17, S-18, S-19, S-21, S-22

GTX performed the following test on each of these samples:

Grain Size Analysis (ASTM D 422) - sieve only

A copy of your test request is attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing services. We look forward to working with you again in the future.

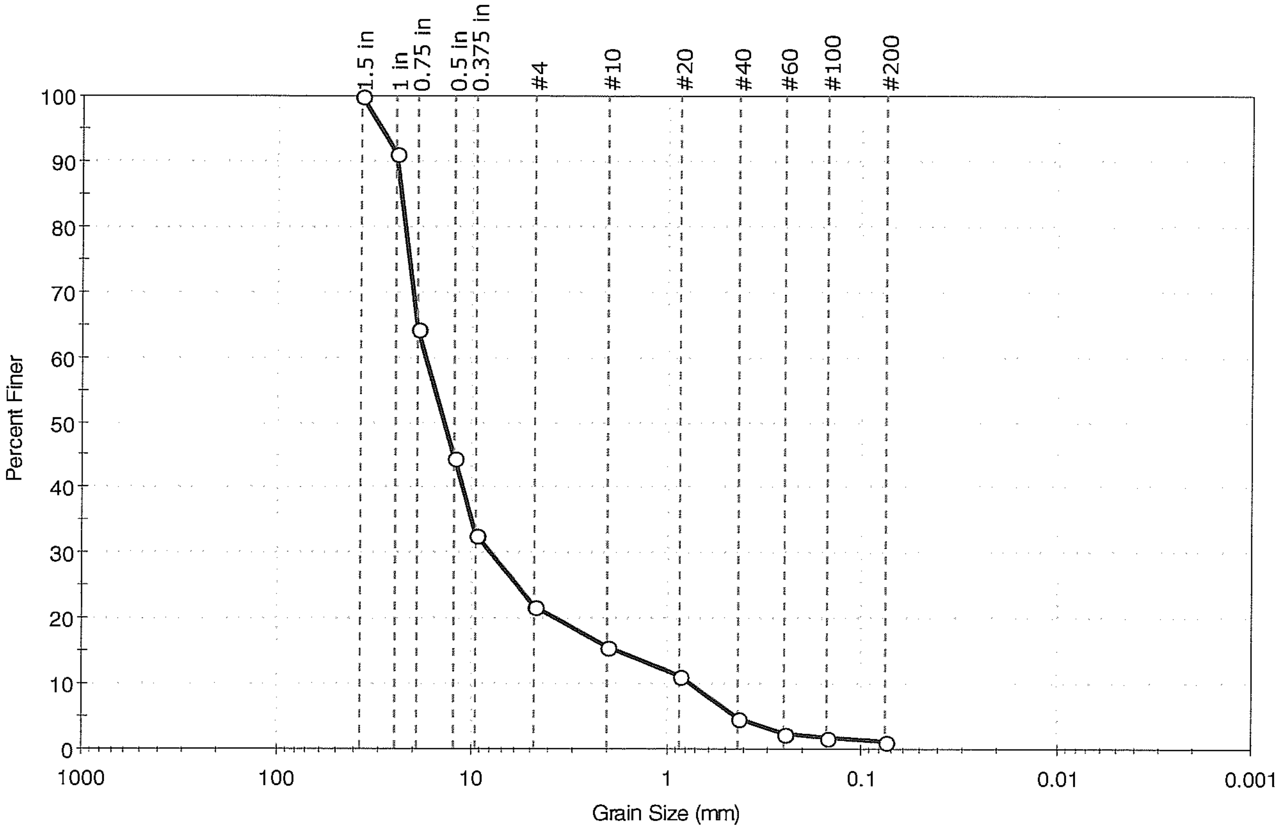
Respectfully yours,

Joe Tomei
Laboratory Manager

Client:	US Army Corp of Engineers				
Project:	Piscataqua River - June 09				
Location:	NH			Project No:	GTX-9108
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	S-3	Test Date:	06/22/09	Checked By:	jdt
Depth :	---	Test Id:	154878		

Test Comment: ---
Sample Description: Moist, dark olive brown gravel with sand
Sample Comment: Shells noted in sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	78.0	20.7	1.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	91		
0.75 in	19.00	64		
0.5 in	12.50	44		
0.375 in	9.50	33		
#4	4.75	22		
#10	2.00	16		
#20	0.85	11		
#40	0.42	5		
#60	0.25	2		
#100	0.15	2		
#200	0.075	1		

Coefficients

D_{85} =23.4621 mm	D_{30} =7.9347 mm
D_{60} =17.3394 mm	D_{15} =1.7444 mm
D_{50} =14.0543 mm	D_{10} =0.7501 mm
C_u =23.116	C_c =4.841

Classification

ASTM	Poorly graded gravel with sand (GP)
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

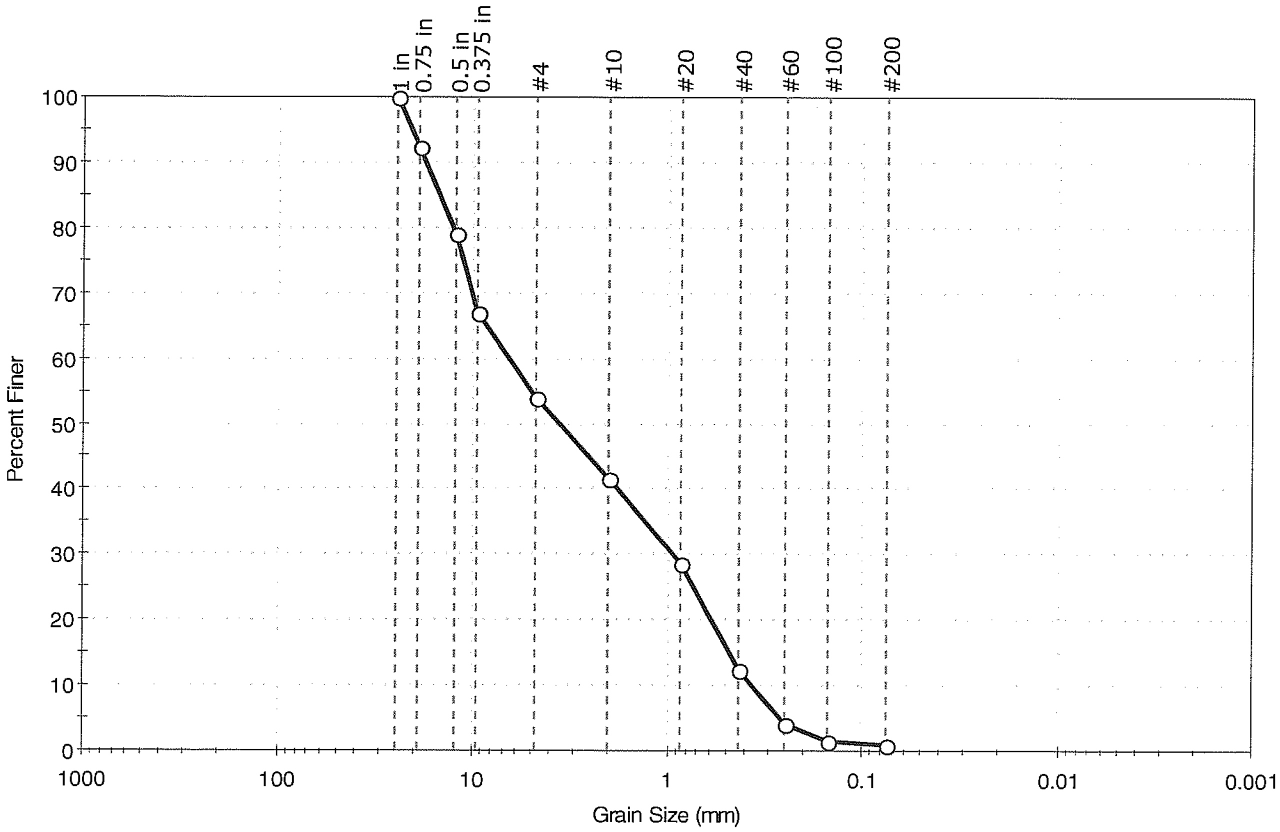
GeoTesting express
a subsidiary of Geocomp Corporation

Client: US Army Corp of Engineers
Project: Piscataqua River - June 09
Location: NH
Project No: GTX-9108

Boring ID: ---
Sample ID:S-5
Depth : ---
Sample Type: bag
Test Date: 06/22/09
Test Id: 154879
Tested By: jbr
Checked By: jdt

Test Comment: ---
Sample Description: Moist, very dark gray sand with gravel
Sample Comment: Shells noted in sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	45.9	53.3	0.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	92		
0.5 in	12.50	79		
0.375 in	9.50	67		
#4	4.75	54		
#10	2.00	42		
#20	0.85	29		
#40	0.42	13		
#60	0.25	4		
#100	0.15	1		
#200	0.075	1		

Coefficients

D_{85} =15.0803 mm	D_{30} =0.9233 mm
D_{60} =6.5205 mm	D_{15} =0.4726 mm
D_{50} =3.5693 mm	D_{10} =0.3618 mm
C_u =18.022	C_c =0.361

Classification

ASTM	Poorly graded sand with gravel (SP)
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting
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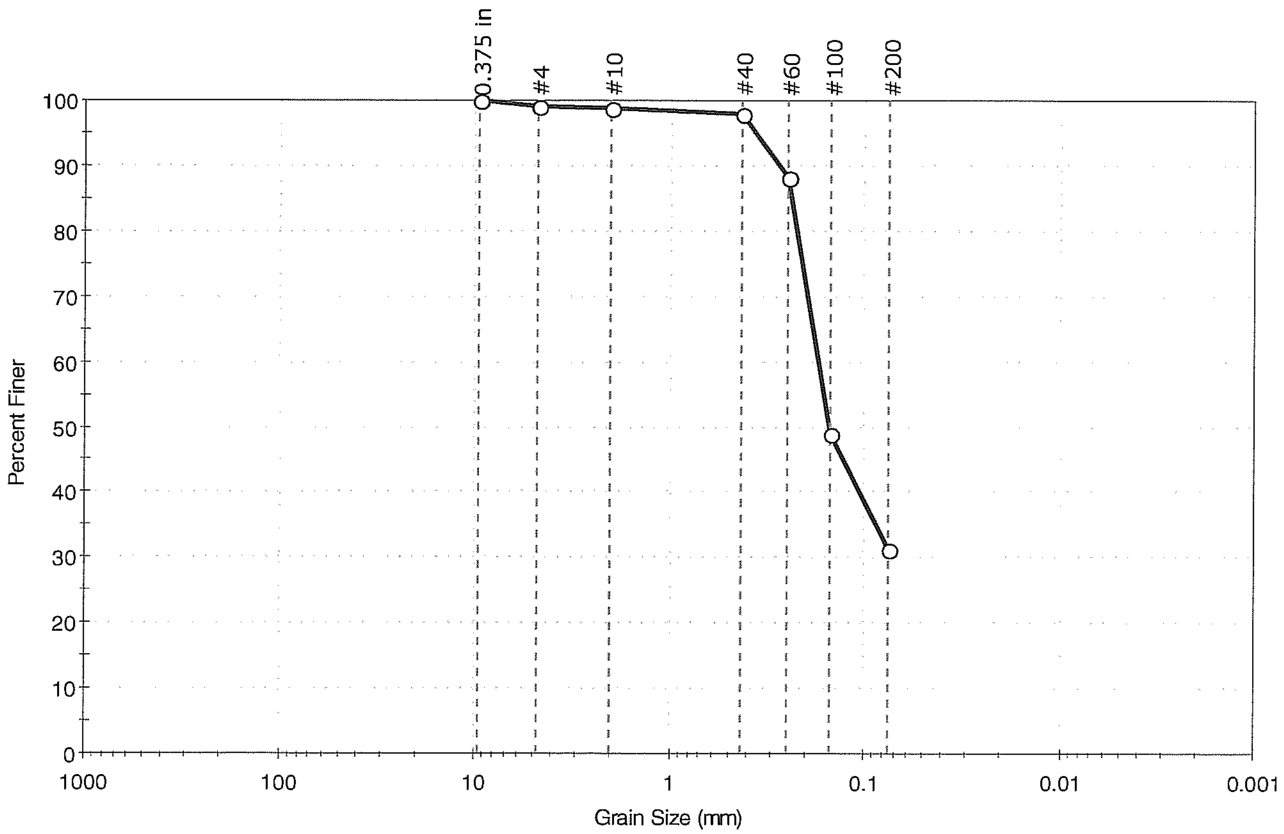
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers		
Project:	Piscataqua River - June 09		
Location:	NH	Project No:	GTX-9108
Boring ID: ---	Sample Type: bag	Tested By:	jbr
Sample ID:S-6	Test Date: 06/22/09	Checked By:	jdt
Depth : ---	Test Id: 154880		

Test Comment: ---
Sample Description: Moist, dark olive brown silty sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	1.1	67.6	31.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	99		
#40	0.42	98		
#60	0.25	88		
#100	0.15	49		
#200	0.075	31		

Coefficients

D_{85} =0.2397 mm	D_{30} =N/A
D_{60} =0.1730 mm	D_{15} =N/A
D_{50} =0.1518 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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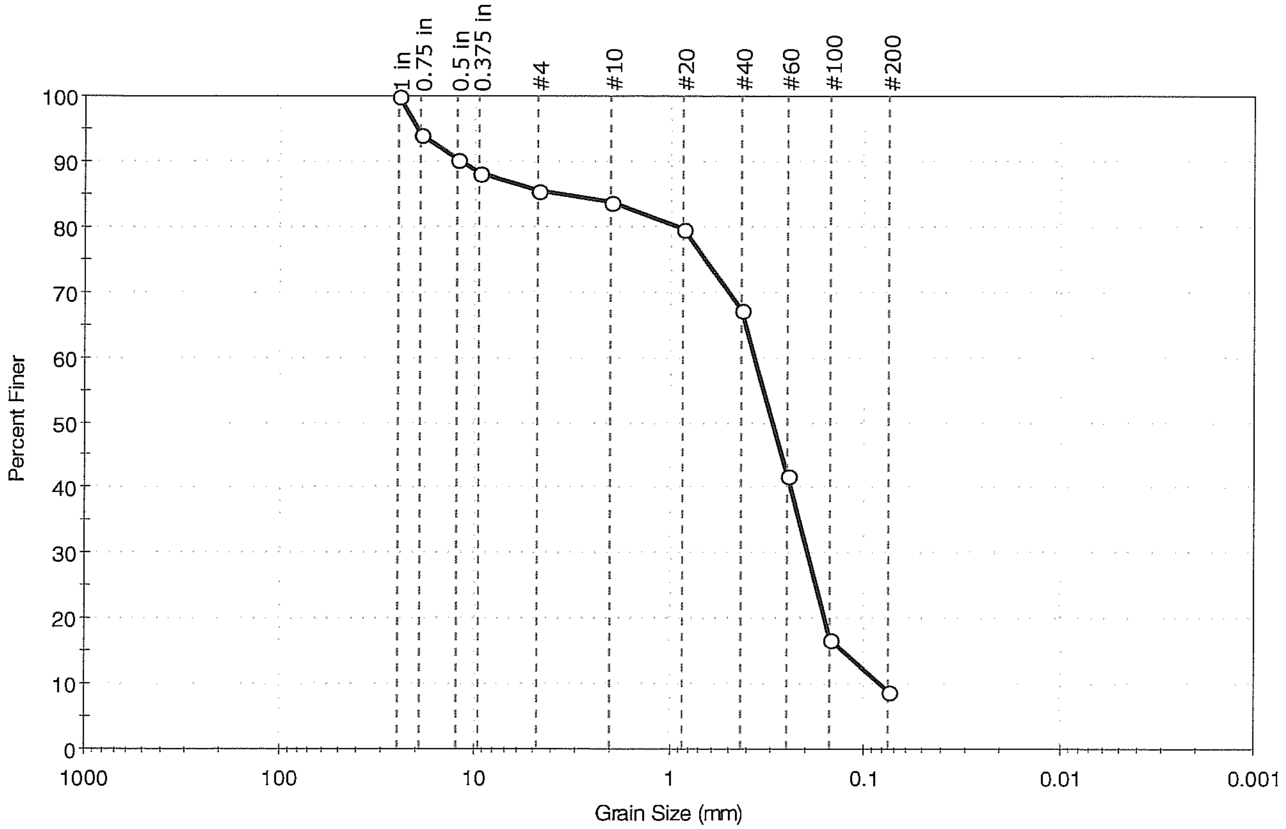
a subsidiary of Geocomp Corporation

Client: US Army Corp of Engineers
Project: Piscataqua River - June 09
Location: NH
Project No: GTX-9108

Boring ID: ---
Sample Type: bag
Tested By: jbr
Sample ID: S-7
Test Date: 06/22/09
Checked By: jdt
Depth : ---
Test Id: 154881

Test Comment: ---
Sample Description: Wet. dark olive brown sand with silt
Sample Comment: Shells noted in sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	14.4	76.9	8.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	94		
0.5 in	12.50	90		
0.375 in	9.50	88		
#4	4.75	86		
#10	2.00	84		
#20	0.85	80		
#40	0.42	67		
#60	0.25	42		
#100	0.15	17		
#200	0.075	9		

Coefficients

D_{85} =3.5440 mm
D_{30} =0.1962 mm
D_{60} =0.3652 mm
D_{15} =0.1292 mm
D_{50} =0.2960 mm
D_{10} =0.0838 mm
C_u =4.358
C_c =1.258

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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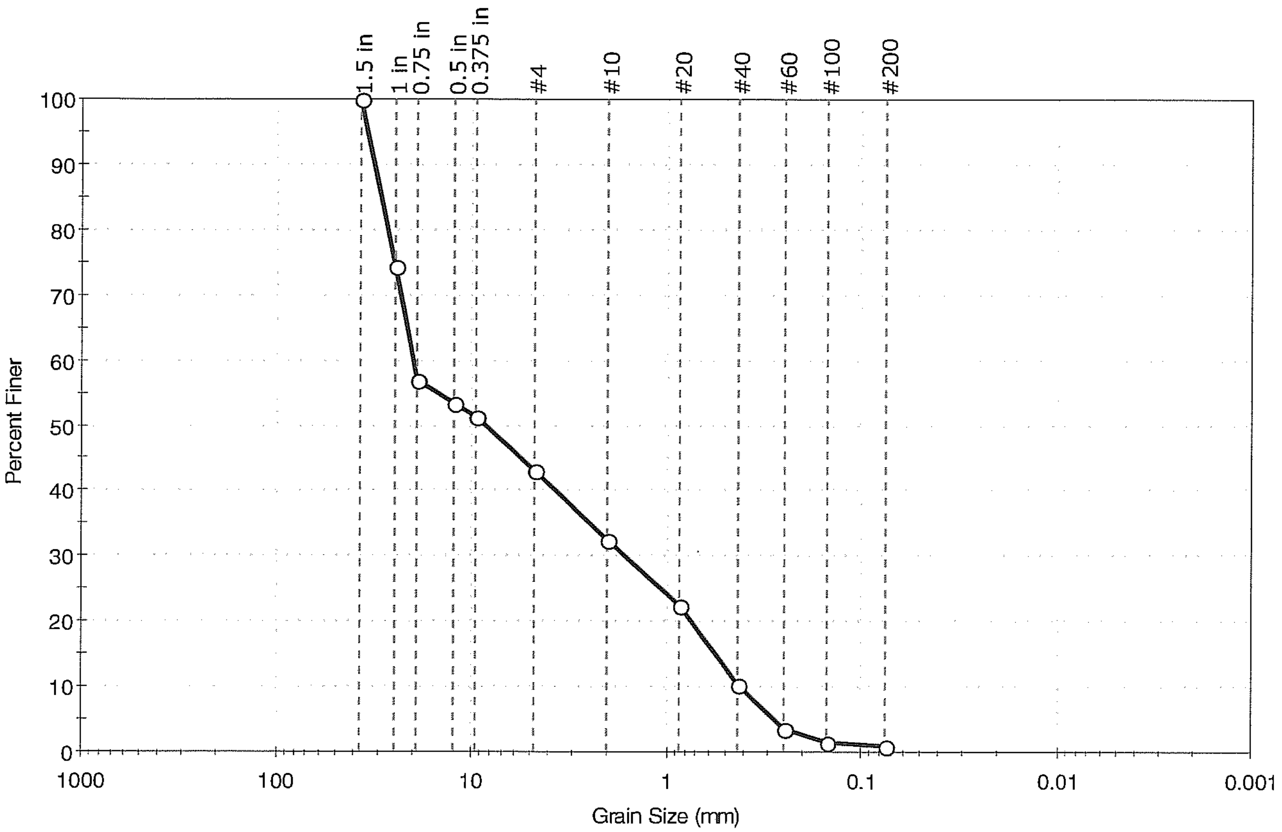
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers		
Project:	Piscataqua River - June 09		
Location:	NH	Project No:	GTX-9108
Boring ID: ---	Sample Type: bag	Tested By:	jbr
Sample ID:S-9	Test Date: 06/22/09	Checked By:	jdt
Depth : ---	Test Id: 154882		

Test Comment: ---
Sample Description: Moist, dark olive brown gravel with sand
Sample Comment: Shells noted in sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	57.0	42.1	0.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	74		
0.75 in	19.00	57		
0.5 in	12.50	53		
0.375 in	9.50	51		
#4	4.75	43		
#10	2.00	32		
#20	0.85	22		
#40	0.42	10		
#60	0.25	3		
#100	0.15	1		
#200	0.075	1		

Coefficients

D_{85} =29.5727 mm	D_{30} =1.6253 mm
D_{60} =19.9570 mm	D_{15} =0.5521 mm
D_{50} =8.5603 mm	D_{10} =0.4106 mm
C_u =48.604	C_c =0.322

Classification

ASTM	Poorly graded gravel with sand (GP)
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

printed 6/25/2009 7:03:42 AM

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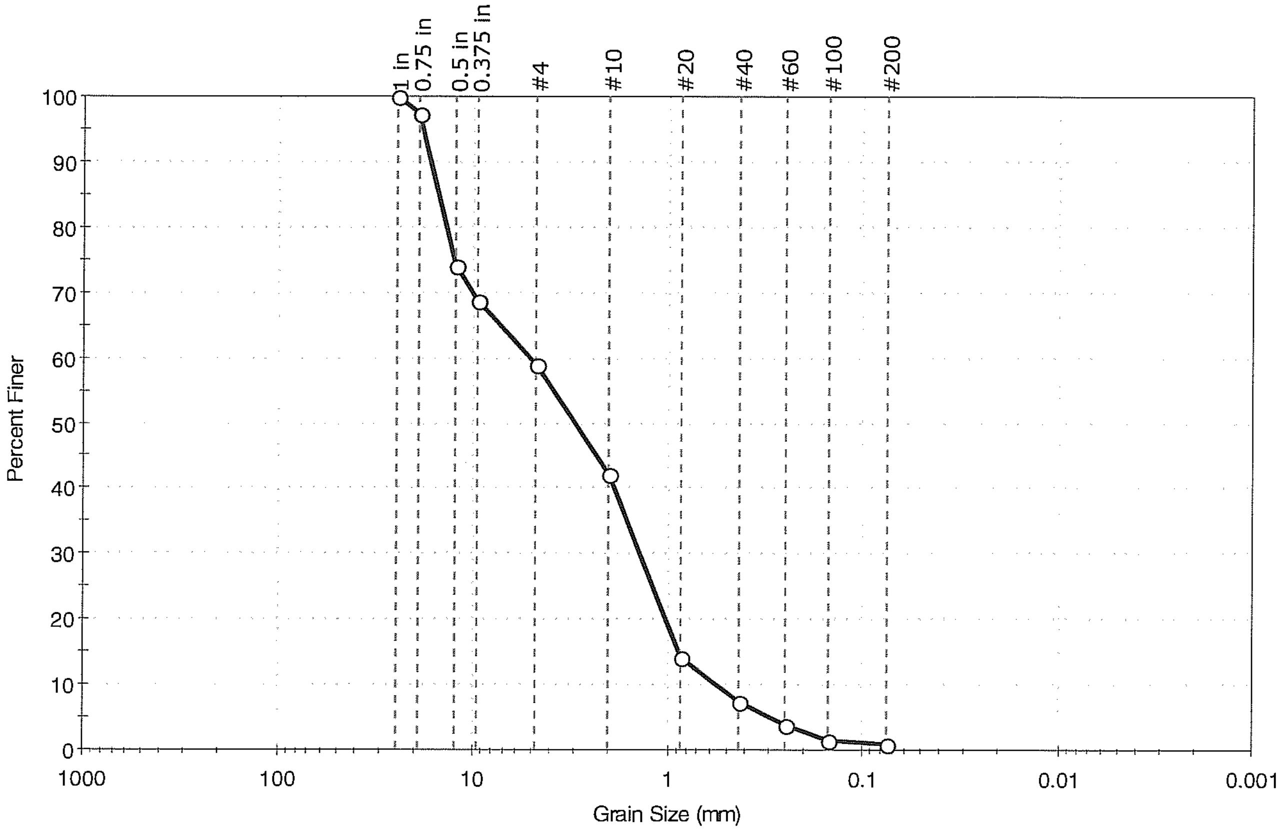
Client:	US Army Corp of Engineers				
Project:	Piscataqua River - June 09				
Location:	NH			Project No:	GTX-9108
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	S-10	Test Date:	06/22/09	Checked By:	jdt
Depth :	---	Test Id:	154883		

Test Comment: ---
Sample Description: Wet, dark olive brown sand with gravel
Sample Comment: Shells noted in sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	41.0	58.1	0.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	97		
0.5 in	12.50	74		
0.375 in	9.50	69		
#4	4.75	59		
#10	2.00	42		
#20	0.85	14		
#40	0.42	7		
#60	0.25	4		
#100	0.15	1		
#200	0.075	1		

Coefficients

D_{85} =15.2154 mm
D_{30} =1.3764 mm
D_{60} =5.0982 mm
D_{15} =0.8725 mm
D_{50} =2.9792 mm
D_{10} =0.5538 mm
C_u =9.206
C_c =0.671

Classification

ASTM Poorly graded sand with gravel (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

GeoTesting
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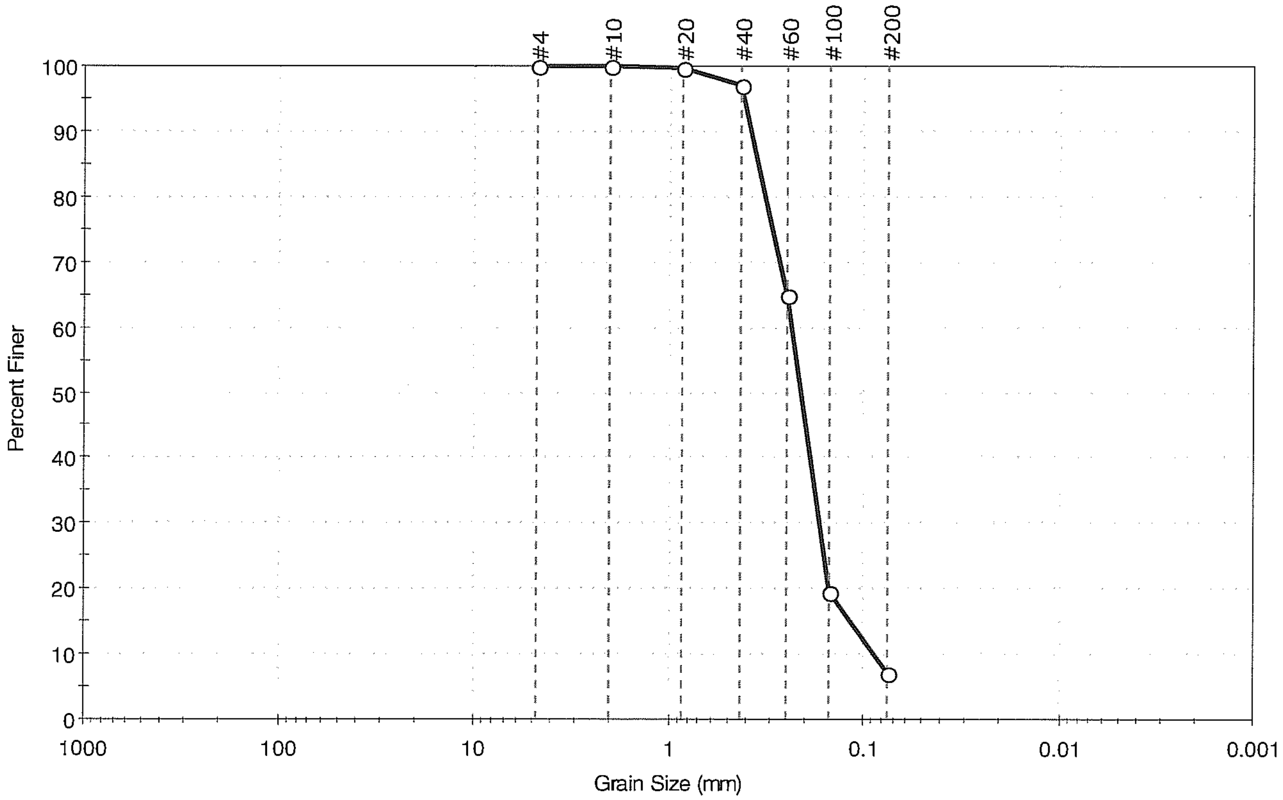
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers		
Project:	Piscataqua River - June 09		
Location:	NH	Project No:	GTX-9108
Boring ID: ---	Sample Type: bag	Tested By:	jbr
Sample ID:S-11	Test Date: 06/22/09	Checked By:	jdt
Depth : ---	Test Id: 154884		

Test Comment: ---
Sample Description: Wet, dark olive brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	---	92.9	7.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	97		
#60	0.25	65		
#100	0.15	20		
#200	0.075	7		

Coefficients

D_{85} =0.3489 mm	D_{30} =0.1687 mm
D_{60} =0.2368 mm	D_{15} =0.1164 mm
D_{50} =0.2115 mm	D_{10} =0.0882 mm
C_u =2.685	C_c =1.363

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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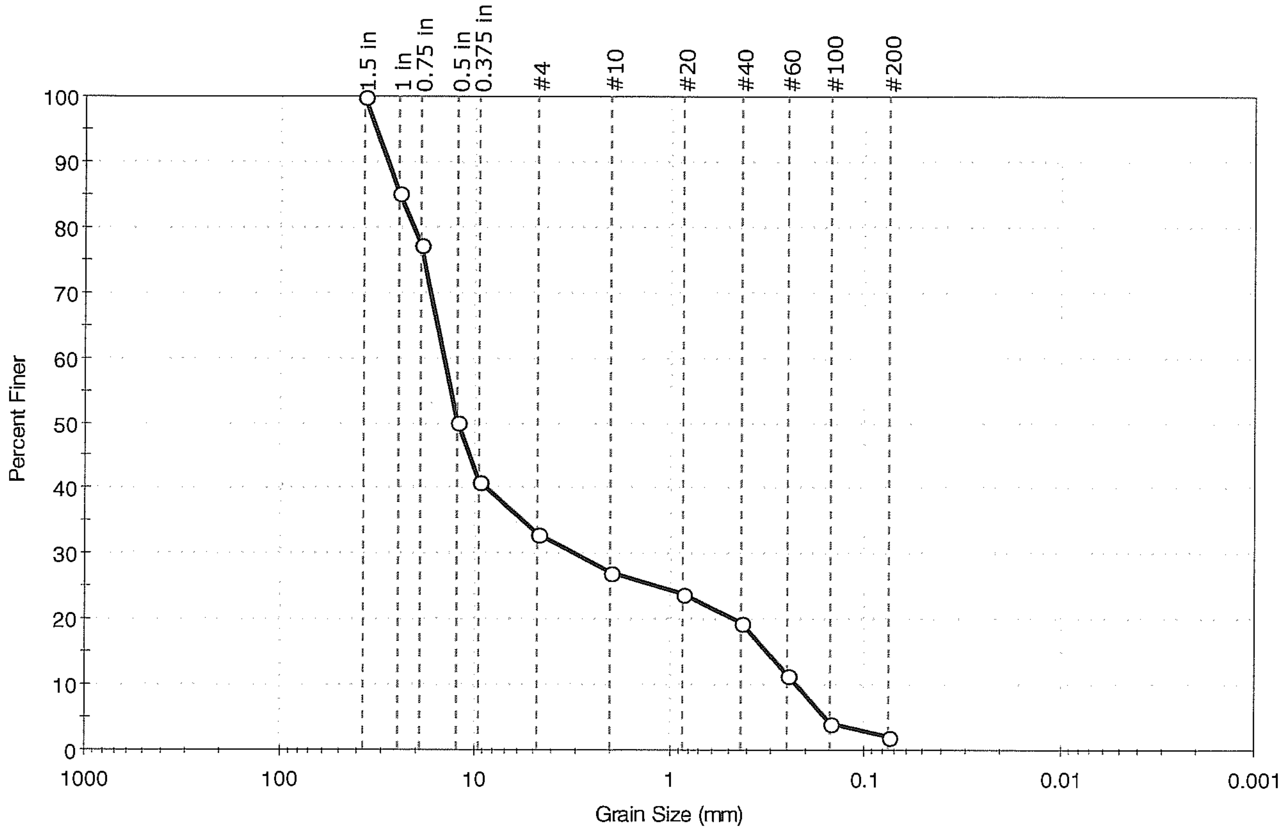
Client:	US Army Corp of Engineers		
Project:	Piscataqua River - June 09		
Location:	NH	Project No:	GTX-9108
Boring ID: ---	Sample Type: bag	Tested By:	jbr
Sample ID:S-12	Test Date: 06/22/09	Checked By:	jdt
Depth : ---	Test Id: 154885		

Test Comment: ---
Sample Description: Wet, very dark gray gravel with sand
Sample Comment: Shells noted in sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	67.0	31.0	2.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	85		
0.75 in	19.00	77		
0.5 in	12.50	50		
0.375 in	9.50	41		
#4	4.75	33		
#10	2.00	27		
#20	0.85	24		
#40	0.42	19		
#60	0.25	11		
#100	0.15	4		
#200	0.075	2		

Coefficients

D_{85} =24.6808 mm	D_{30} =3.0356 mm
D_{60} =14.5506 mm	D_{15} =0.3163 mm
D_{50} =12.4663 mm	D_{10} =0.2261 mm
C_u =64.355	C_c =2.801

Classification

ASTM	Well-graded gravel with sand (GW)
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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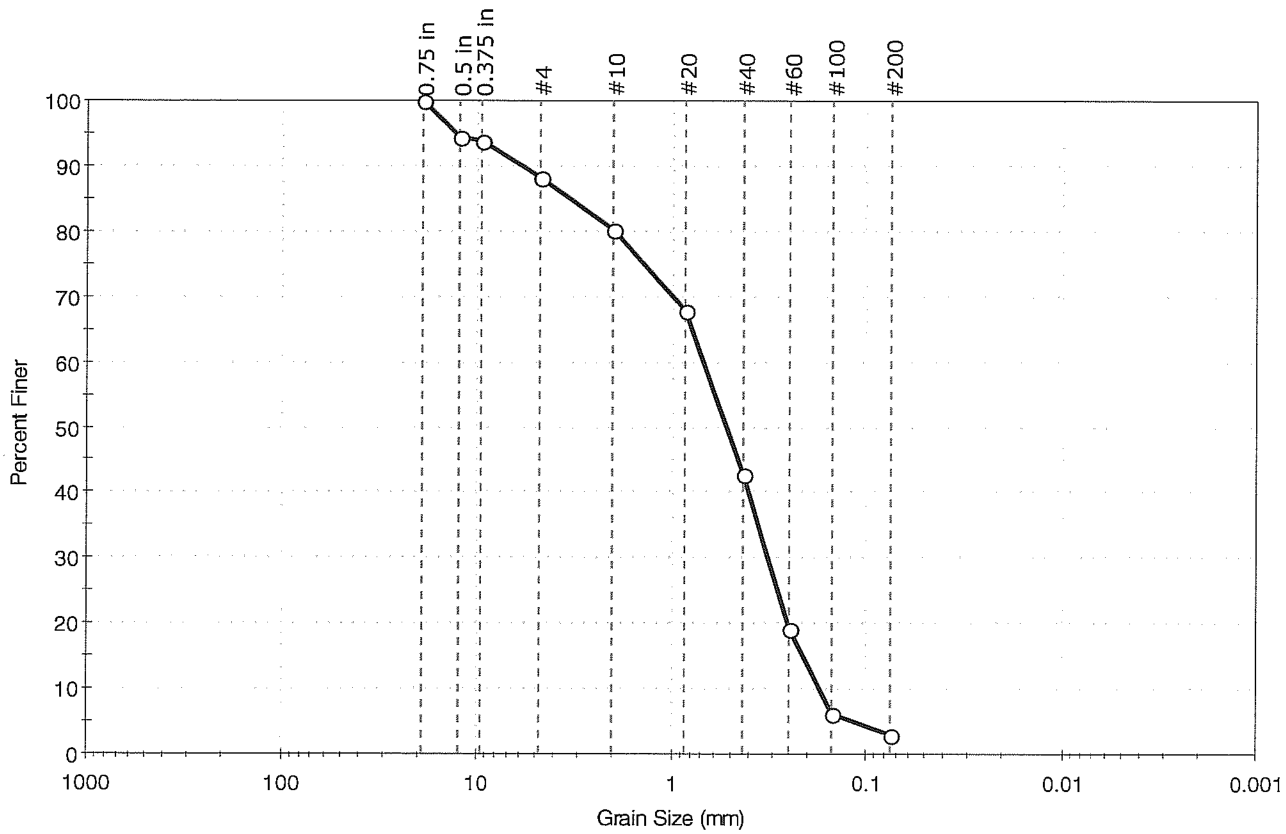
Client:	US Army Corp of Engineers				
Project:	Piscataqua River - June 09				
Location:	NH			Project No:	GTX-9108
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	S-14	Test Date:	06/22/09	Checked By:	jdt
Depth :	---	Test Id:	154886		

Test Comment: ---
Sample Description: Moist, dark olive brown sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	11.8	85.4	2.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	94		
0.375 in	9.50	94		
#4	4.75	88		
#10	2.00	80		
#20	0.85	68		
#40	0.42	43		
#60	0.25	19		
#100	0.15	6		
#200	0.075	3		

Coefficients

D_{85} =3.3648 mm	D_{30} =0.3189 mm
D_{60} =0.6857 mm	D_{15} =0.2123 mm
D_{50} =0.5198 mm	D_{10} =0.1748 mm
C_u =3.923	C_c =0.848

Classification

ASTM	Poorly graded sand (SP)
AASHTO	Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting express
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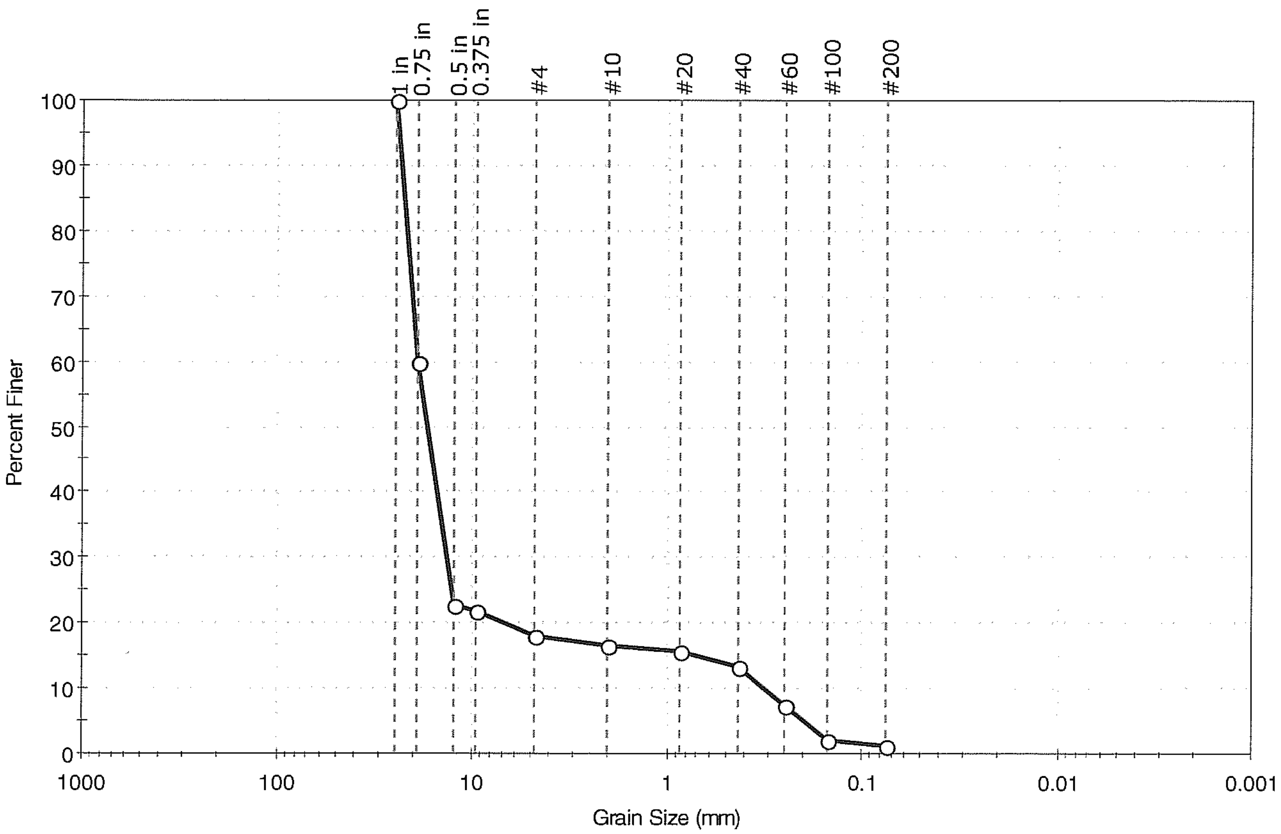
Client:	US Army Corp of Engineers		
Project:	Piscataqua River - June 09		
Location:	NH	Project No:	GTX-9108
Boring ID: ---	Sample Type: bag	Tested By:	jbr
Sample ID:S-15	Test Date: 06/22/09	Checked By:	jdt
Depth : ---	Test Id: 154887		
Test Comment:	---		
Sample Description:	Wet, dark olive brown gravel with sand		
Sample Comment:	Shells noted in sample		

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	82.1	16.9	1.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	60		
0.5 in	12.50	23		
0.375 in	9.50	22		
#4	4.75	18		
#10	2.00	17		
#20	0.85	16		
#40	0.42	13		
#60	0.25	7		
#100	0.15	2		
#200	0.075	1		

Coefficients

D_{85} =22.5610 mm	D_{30} =13.5702 mm
D_{60} =19.0132 mm	D_{15} =0.6966 mm
D_{50} =16.9966 mm	D_{10} =0.3136 mm
C_u =60.629	C_c =30.885

Classification

ASTM	Poorly graded gravel with sand (GP)
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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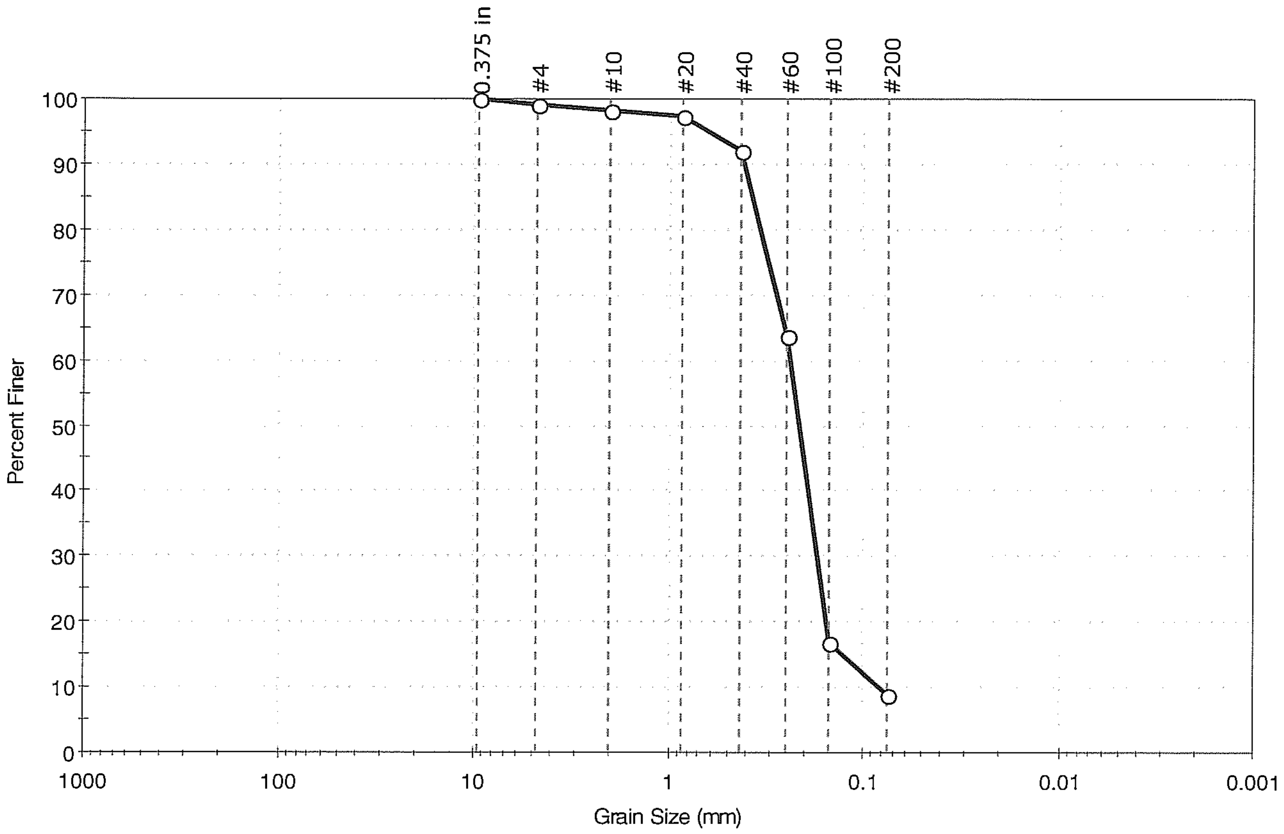
Client:	US Army Corp of Engineers		
Project:	Piscataqua River - June 09		
Location:	NH	Project No:	GTX-9108
Boring ID: ---	Sample Type: bag	Tested By:	jbr
Sample ID: S-16	Test Date: 06/22/09	Checked By:	jdt
Depth : ---	Test Id: 154888		

Test Comment: ---
Sample Description: Wet, dark olive brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.8	90.2	9.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	97		
#40	0.42	92		
#60	0.25	64		
#100	0.15	17		
#200	0.075	9		

Coefficients

D_{85} =0.3729 mm	D_{30} =0.1732 mm
D_{60} =0.2400 mm	D_{15} =0.1284 mm
D_{50} =0.2153 mm	D_{10} =0.0823 mm
C_u =2.916	C_c =1.519

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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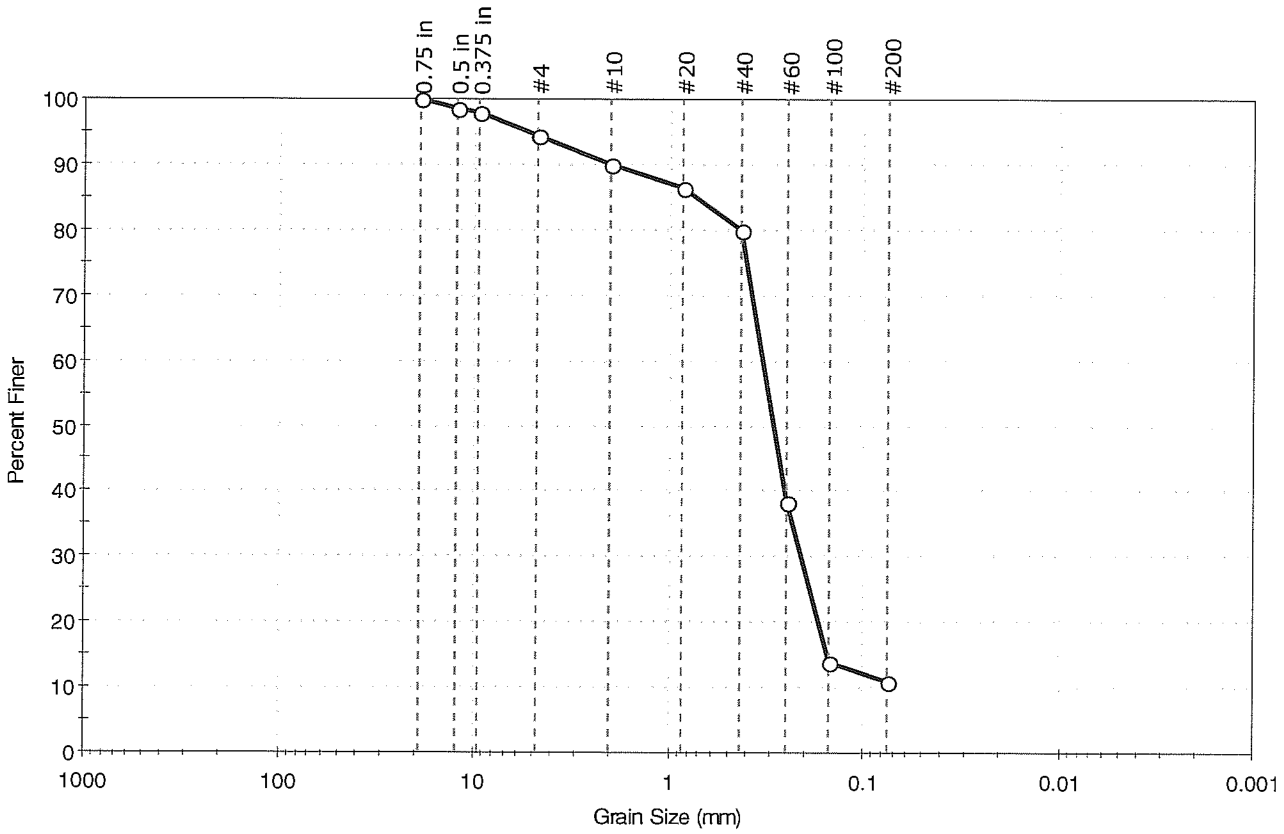
Client:	US Army Corp of Engineers		
Project:	Piscataqua River - June 09		
Location:	NH	Project No:	GTX-9108
Boring ID: ---	Sample Type: bag	Tested By:	jbr
Sample ID:S-17	Test Date: 06/22/09	Checked By:	jdt
Depth : ---	Test Id: 154889		

Test Comment: ---
Sample Description: Moist, dark olive brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	5.7	83.4	10.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	98		
0.375 in	9.50	98		
#4	4.75	94		
#10	2.00	90		
#20	0.85	86		
#40	0.42	80		
#60	0.25	38		
#100	0.15	14		
#200	0.075	11		

Coefficients

D_{85} =0.7262 mm D_{30} =0.2099 mm
D_{60} =0.3296 mm D_{15} =0.1534 mm
D_{50} =0.2900 mm D_{10} =0.0604 mm
C_u =5.457 C_c =2.213

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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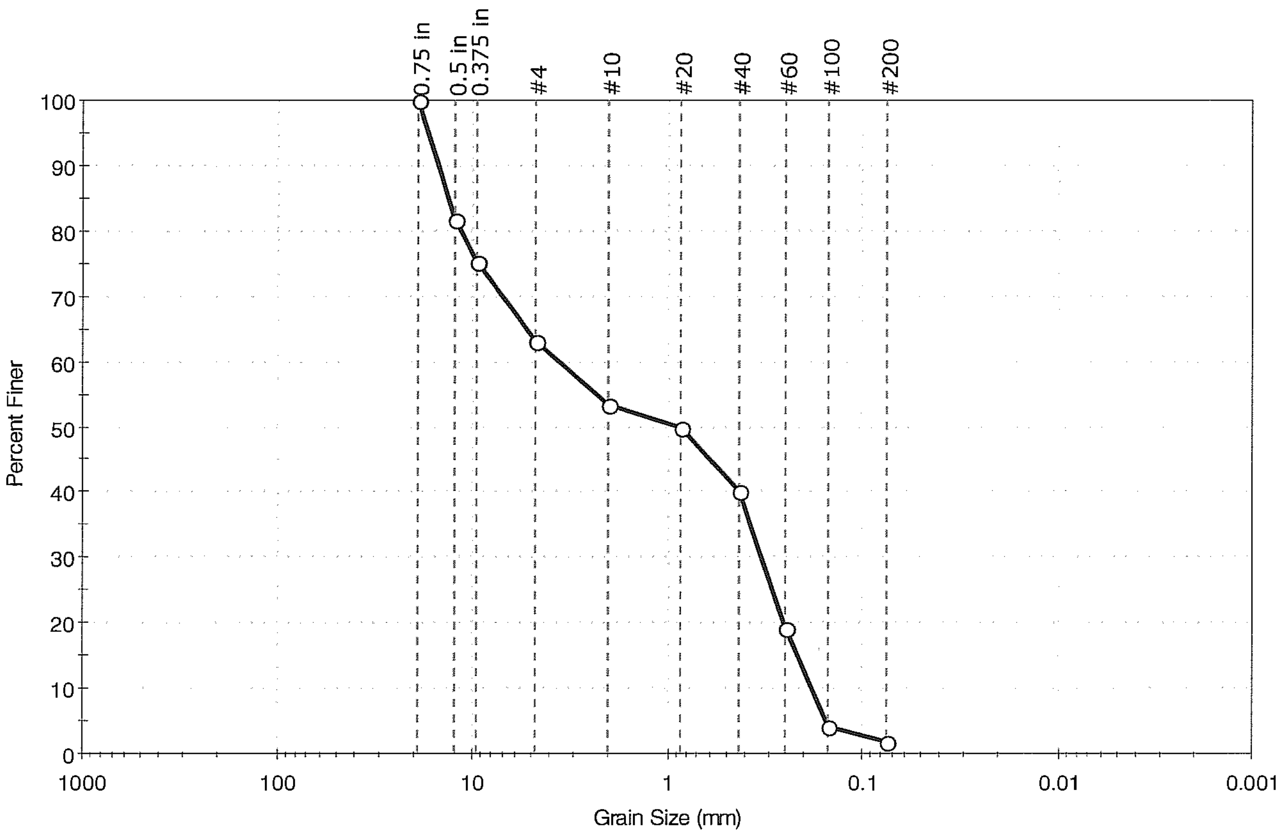
Client:	US Army Corp of Engineers		
Project:	Piscataqua River - June 09		
Location:	NH	Project No:	GTX-9108
Boring ID: ---	Sample Type: bag	Tested By:	jbr
Sample ID:S-18	Test Date: 06/22/09	Checked By:	jdt
Depth : ---	Test Id: 154890		

Test Comment: ---
Sample Description: Moist, dark olive brown sand with gravel
Sample Comment: Shells noted in sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	36.8	61.5	1.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	82		
0.375 in	9.50	75		
#4	4.75	63		
#10	2.00	53		
#20	0.85	50		
#40	0.42	40		
#60	0.25	19		
#100	0.15	4		
#200	0.075	2		

Coefficients

D_{85} =13.4883 mm	D_{30} =0.3298 mm
D_{60} =3.5878 mm	D_{15} =0.2172 mm
D_{50} =0.8618 mm	D_{10} =0.1828 mm
C_u =19.627	C_c =0.166

Classification

ASTM	Poorly graded sand with gravel (SP)
AASHTO	Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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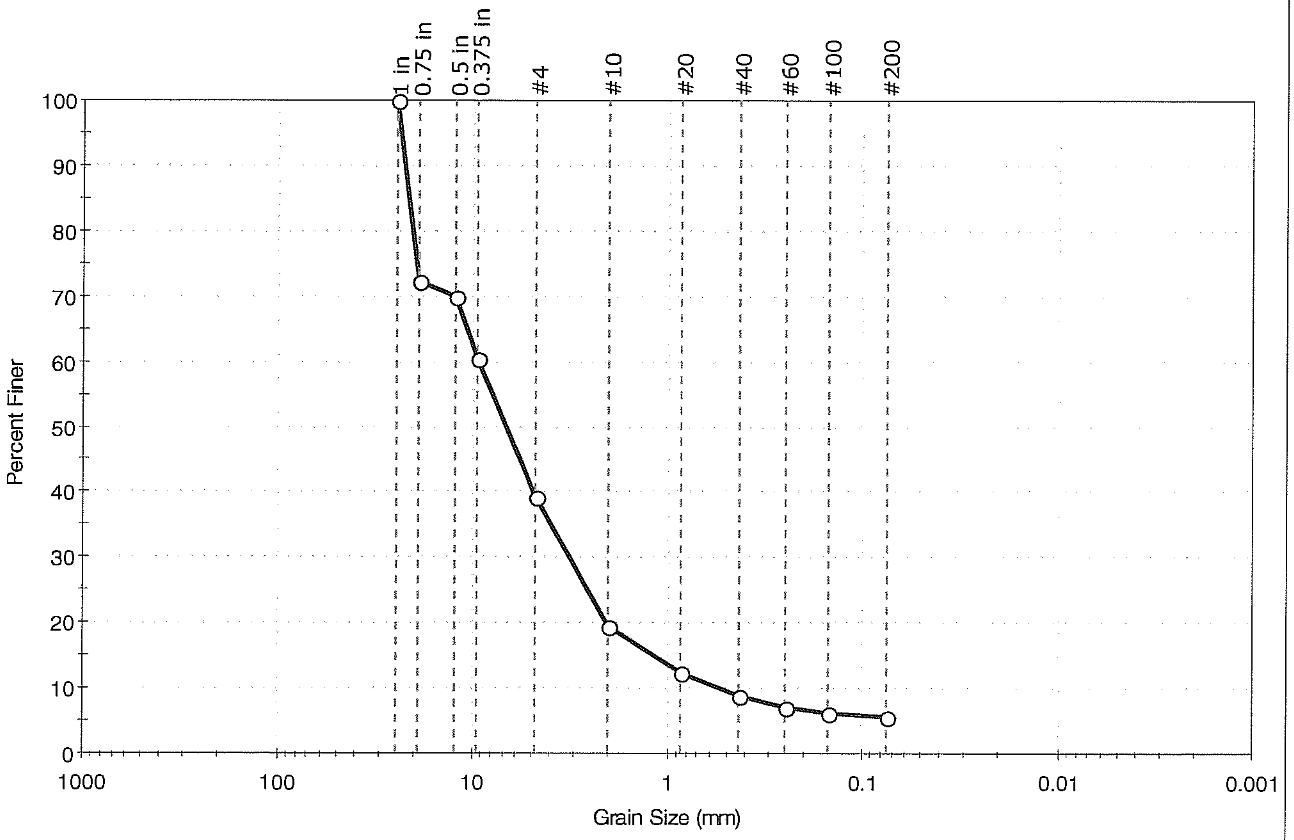
Client:	US Army Corp of Engineers				
Project:	Piscataqua River - June 09				
Location:	NH			Project No:	GTX-9108
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	S-19	Test Date:	06/22/09	Checked By:	jdt
Depth :	---	Test Id:	154891		

Test Comment: ---
Sample Description: Wet, dark olive brown gravel with silt and sand
Sample Comment: Shells noted in sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	60.9	33.5	5.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	72		
0.5 in	12.50	70		
0.375 in	9.50	60		
#4	4.75	39		
#10	2.00	20		
#20	0.85	12		
#40	0.42	9		
#60	0.25	7		
#100	0.15	6		
#200	0.075	6		

Coefficients

D_{85} =21.5542 mm
D_{30} =3.1741 mm
D_{60} =9.3756 mm
D_{15} =1.1652 mm
D_{50} =6.7664 mm
D_{10} =0.5275 mm
C_u =17.774
C_c =2.037

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

GeoTesting express
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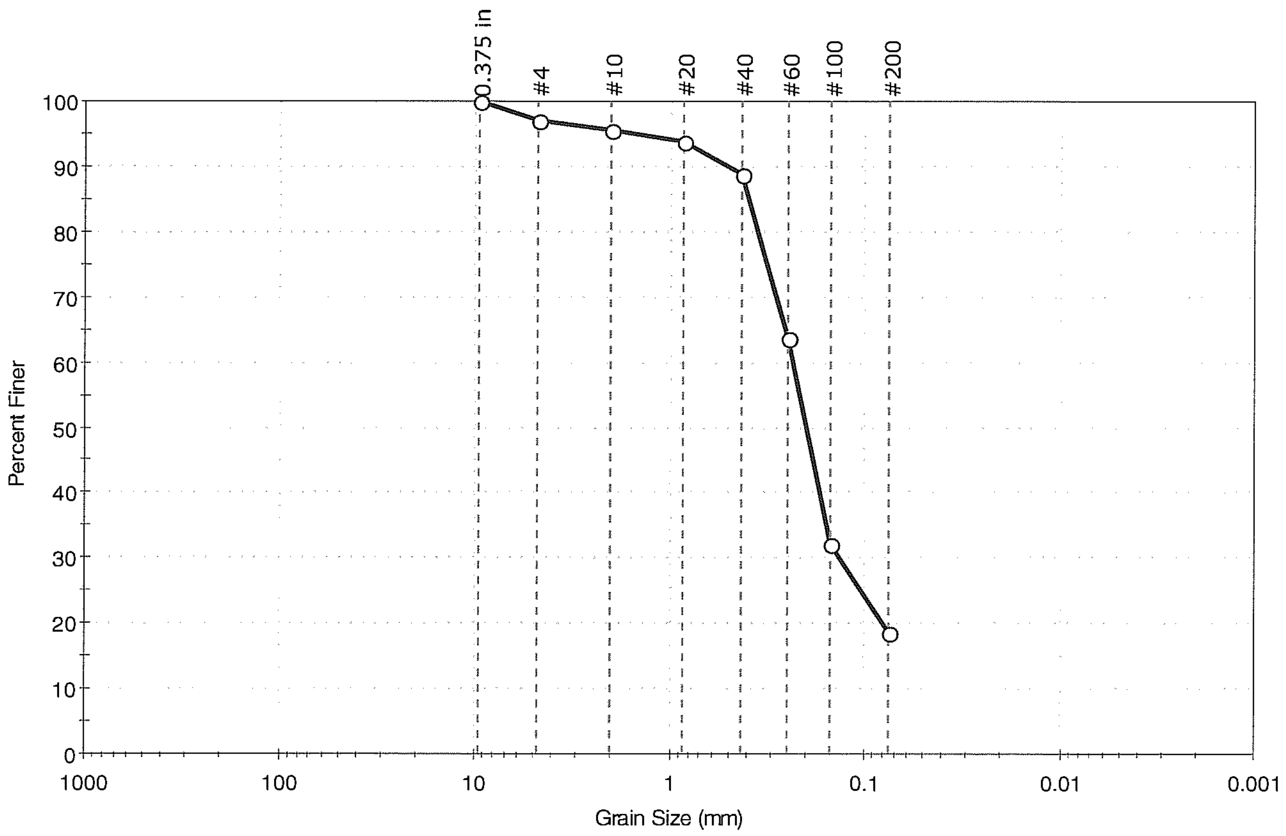
Client:	US Army Corp of Engineers				
Project:	Piscataqua River - June 09				
Location:	NH			Project No:	GTX-9108
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	S-21	Test Date:	06/22/09	Checked By:	jdt
Depth :	---	Test Id:	154893		

Test Comment: ---
Sample Description: Wet, dark olive brown silty sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	3.1	78.4	18.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	97		
#10	2.00	96		
#20	0.85	94		
#40	0.42	89		
#60	0.25	64		
#100	0.15	32		
#200	0.075	19		

Coefficients

D_{85} =0.3914 mm
D_{30} =0.1336 mm
D_{60} =0.2349 mm
D_{15} =N/A
D_{50} =0.1998 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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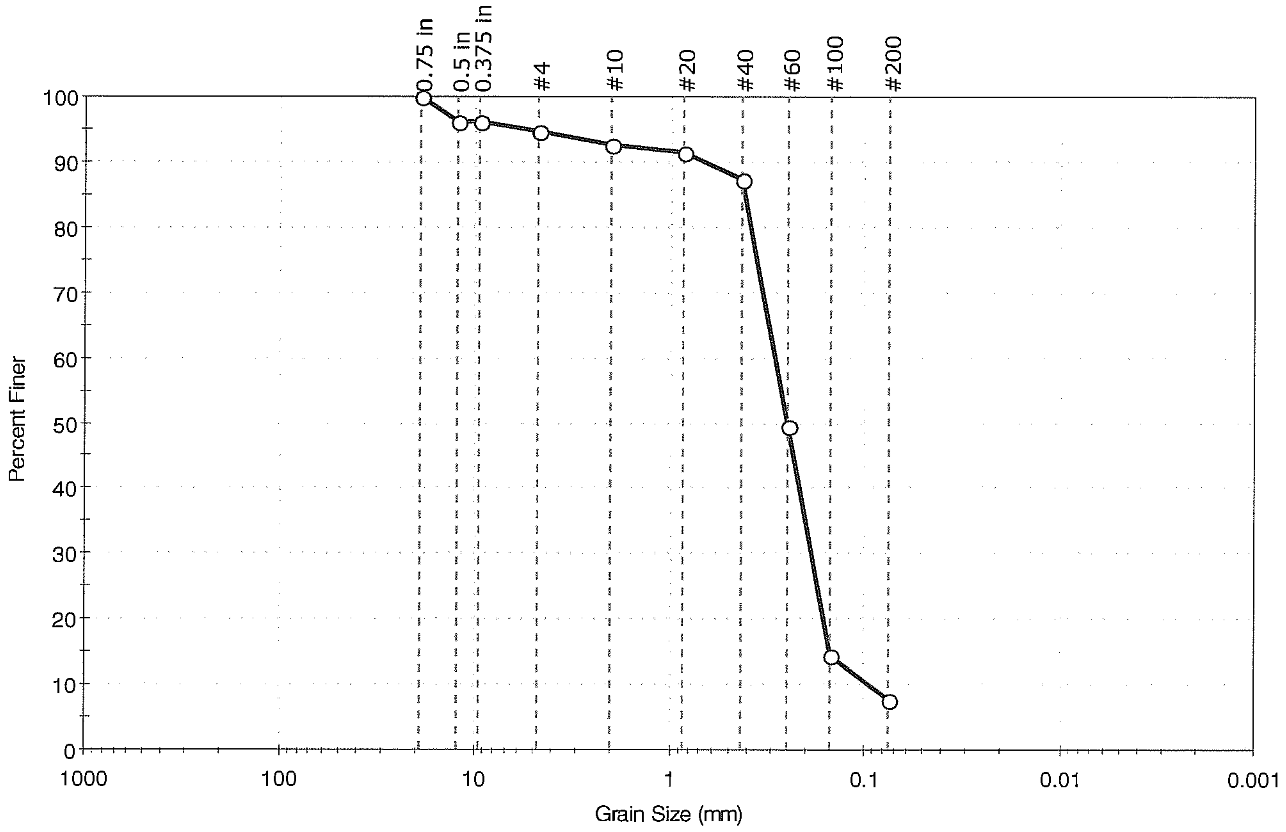
Client:	US Army Corp of Engineers				
Project:	Piscataqua River - June 09				
Location:	NH			Project No:	GTX-9108
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	S-22	Test Date:	06/22/09	Checked By:	jdt
Depth :	---	Test Id:	154892		

Test Comment: ---
Sample Description: Wet, dark olive brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	5.5	87.0	7.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	96		
#4	4.75	95		
#10	2.00	93		
#20	0.85	92		
#40	0.42	87		
#60	0.25	50		
#100	0.15	15		
#200	0.075	8		

Coefficients

D_{85} =0.4115 mm
D_{30} =0.1877 mm
D_{60} =0.2892 mm
D_{15} =0.1509 mm
D_{50} =0.2512 mm
D_{10} =0.0955 mm
C_u =3.028
C_c =1.276

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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U.S. ARMY CORPS OF ENGINEERS
696 Virginia Road
Concord, MA 01742

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME Piscataqua River - June 09					NO. OF CON-TAINERS	Grain Size					REMARKS
SAMPLERS: *(Signature)* Todd Randall												
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION							
3 ~~1~~	6/2			X		1	X					
5				X		1	X					
6				X		1	X					
7				X		1	X					
9				X		1	X					
10				X		1	X					
11				X		1	X					
12				X		1	X					
14				X		1	X					
15				X		1	X					
16				X		1	X					
17				X		1	X					
18				X		1	X					
19	↓			X		1	X					

Relinquished by: *(Signature)*	Date / Time 6/18/09 9:10	Received by: *(Signature)* Robert Dutto	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

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richard.wheidehaldt@usace.army.mil

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U.S. ARMY CORPS OF ENGINEERS

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME Piscataqua River - June 09
SAMPLERS: *(Signature)*	Todd Randall

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	Grain Size						REMARKS
22 ~~20~~	6/2			X		1	X						
21	↓			X		1	X						

Relinquished by: *(Signature)*	Date / Time 6/18/09 9:20	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy 1 to Sample Custodian; Copy 2 to Coordinator Field Files

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GeoTesting
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GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

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Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$
B	pore pressure parameter for $\Delta\sigma_3$
CIU	isotropically consolidated undrained triaxial shear test
CR	compression ratio for one dimensional consolidation
C_c	coefficient of curvature, $(D_{30})^2 / (D_{10} \times D_{60})$
C_u	coefficient of uniformity, D_{60}/D_{10}
C_c	compression index for one dimensional consolidation
C_α	coefficient of secondary compression
c_v	coefficient of consolidation
c	cohesion intercept for total stresses
c'	cohesion intercept for effective stresses
D	diameter of specimen
D_{10}	diameter at which 10% of soil is finer
D_{15}	diameter at which 15% of soil is finer
D_{30}	diameter at which 30% of soil is finer
D_{50}	diameter at which 50% of soil is finer
D_{60}	diameter at which 60% of soil is finer
D_{85}	diameter at which 85% of soil is finer
d_{50}	displacement for 50% consolidation
d_{90}	displacement for 90% consolidation
d_{100}	displacement for 100% consolidation
E	Young's modulus
e	void ratio
e_c	void ratio after consolidation
e_o	initial void ratio
G	shear modulus
G_s	specific gravity of soil particles
H	height of specimen
PI	plasticity index
i	gradient
K_o	lateral stress ratio for one dimensional strain
k	permeability
LI	Liquidity Index
m_v	coefficient of volume change
n	porosity
PI	plasticity index
P_c	preconsolidation pressure
p	$(\sigma_1 + \sigma_3) / 2$, $(\sigma_v + \sigma_h) / 2$
p'	$(\sigma'_1 + \sigma'_3) / 2$, $(\sigma'_v + \sigma'_h) / 2$
p'_c	p' at consolidation
Q	quantity of flow
q	$(\sigma_1 - \sigma_3) / 2$
q_f	q at failure
q_o, q_i	initial q
q_c	q at consolidation
S	degree of saturation
SL	shrinkage limit
s_u	undrained shear strength
T	time factor for consolidation

T	temperature
t	time
U, UC	unconfined compression test
UU, Q	unconsolidated undrained triaxial test
u_a	pore gas pressure
u_e	excess pore water pressure
u, u_w	pore water pressure
V	total volume
V_g	volume of gas
V_s	volume of solids
V_v	volume of voids
V_w	volume of water
V_o	initial volume
v	velocity
W	total weight
W_s	weight of solids
W_w	weight of water
w	water content
w_c	water content at consolidation
w_f	final water content
w_l	liquid limit
w_n	natural water content
w_p	plastic limit
w_s	shrinkage limit
w_o, w_i	initial water content
α	slope of q_f versus p_f
α'	slope of q_f versus p_f'
γ_t	total unit weight
γ_d	dry unit weight
γ_s	unit weight of solids
γ_w	unit weight of water
ε	strain
ε_{vol}	volume strain
ε_h, ε_v	horizontal strain, vertical strain
μ	Poisson's ratio, also viscosity
σ	normal stress
σ'	effective normal stress
σ_c, σ'_c	consolidation stress in isotropic stress system
σ_h, σ'_h	horizontal normal stress
σ_v, σ'_v	vertical normal stress
σ_1	major principal stress
σ_2	intermediate principal stress
σ_3	minor principal stress
τ	shear stress
φ	friction angle based on total stresses
φ'	friction angle based on effective stresses
φ'_r	residual friction angle
φ_{ult}	φ for ultimate strength

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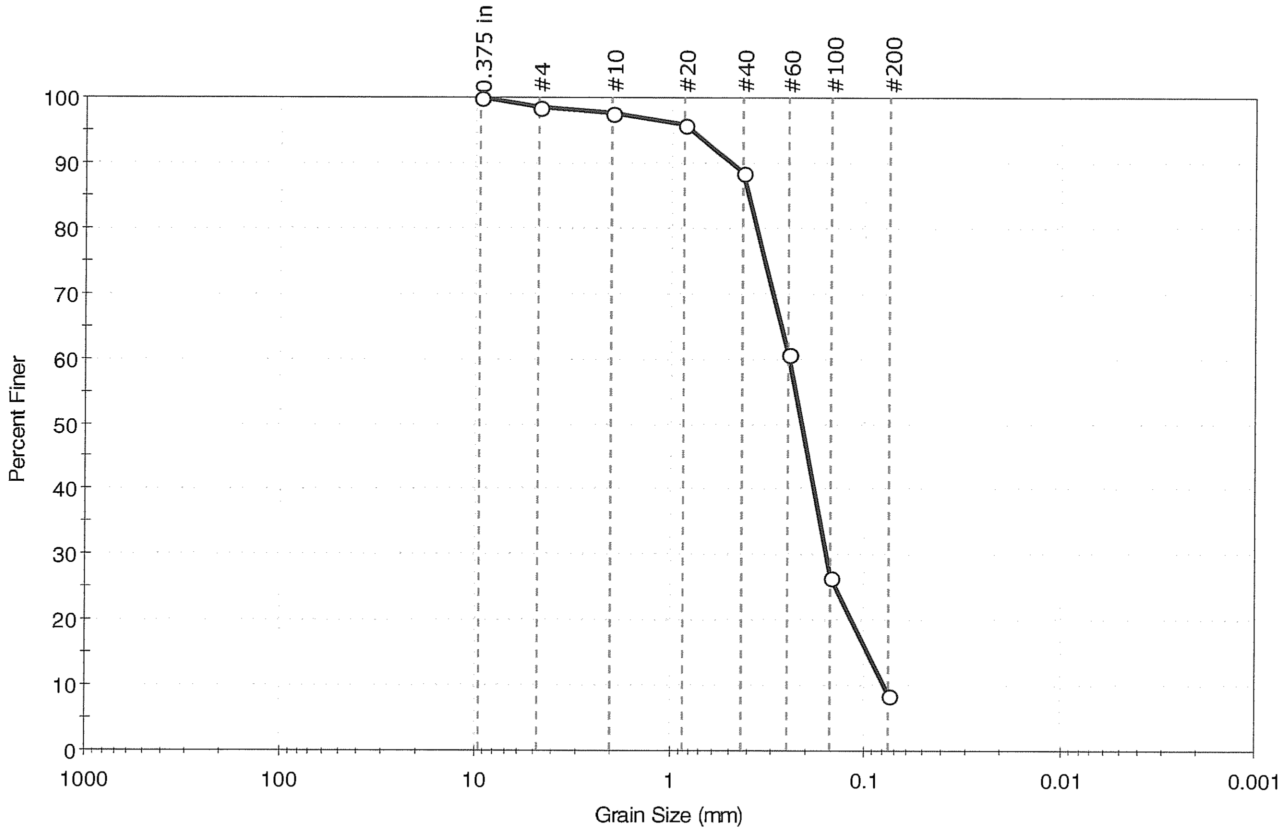
Client: US Army Corp of Engineers
Project: Navigation Improvement
Location: Portsmouth, NH
Project No: GTX-8193
Boring ID: B-1
Sample Type: jar
Tested By: ap
Sample ID: J-5
Test Date: 05/09/08
Checked By: jdt
Depth : 20.0-22.0 ft
Test Id: 130435
Test Comment: ---
Sample Description: Moist, yellowish brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	1.5	89.9	8.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	98		
#20	0.85	96		
#40	0.42	89		
#60	0.25	61		
#100	0.15	27		
#200	0.075	9		

Coefficients

D_{85} =0.3972 mm
D_{30} =0.1578 mm
D_{60} =0.2474 mm
D_{15} =0.0960 mm
D_{50} =0.2130 mm
D_{10} =0.0792 mm
C_u =3.124
C_c =1.271

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting
express
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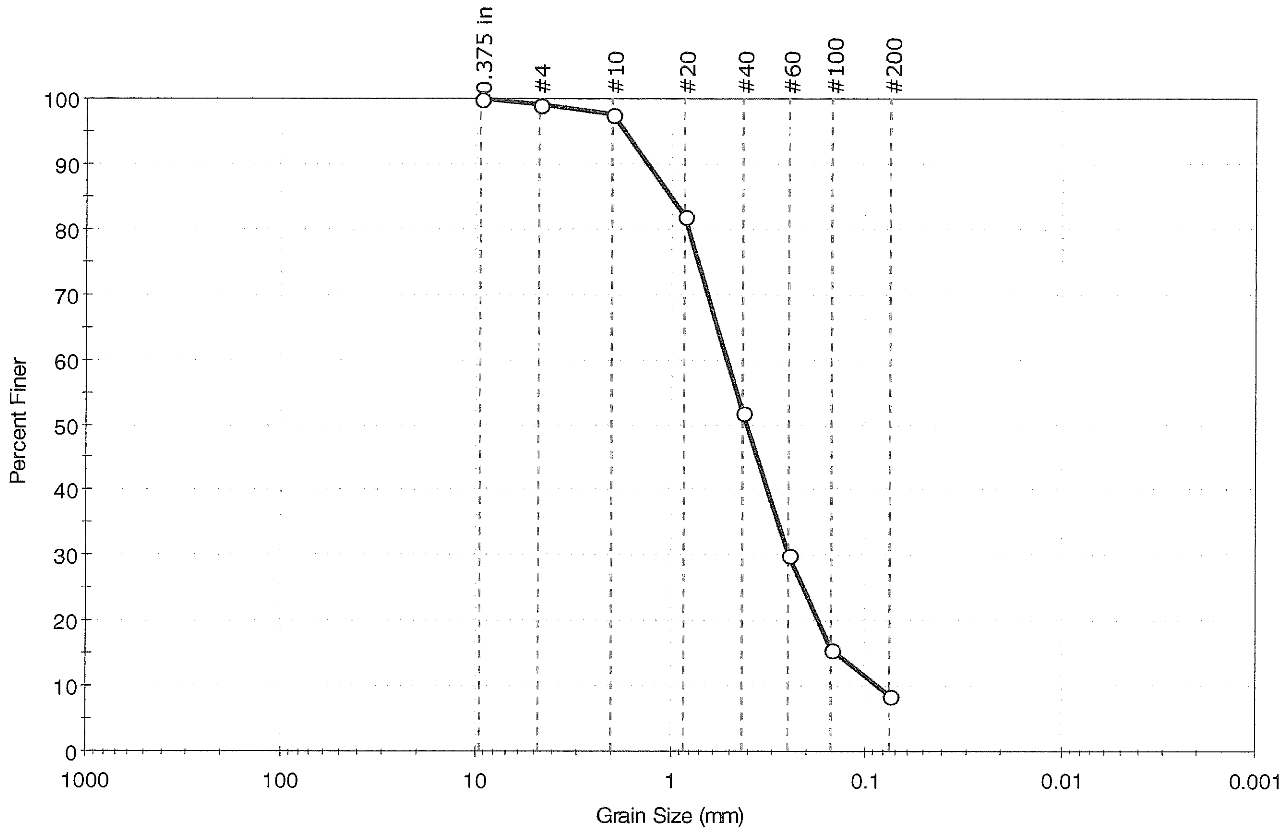
Client: US Army Corp of Engineers
Project: Navigation Improvement
Location: Portsmouth, NH
Project No: GTX-8193
Boring ID: B-2
Sample Type: jar
Tested By: ap
Sample ID:J-3
Test Date: 05/09/08
Checked By: jdt
Depth : 10.0-12.0 ft
Test Id: 130436
Test Comment: ---
Sample Description: Moist, dark yellowish brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	1.0	90.4	8.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	82		
#40	0.42	52		
#60	0.25	30		
#100	0.15	16		
#200	0.075	9		

Coefficients

D_{85} =1.0078 mm
D_{30} =0.2501 mm
D_{60} =0.5115 mm
D_{15} =0.1409 mm
D_{50} =0.4047 mm
D_{10} =0.0860 mm
C_u =5.948
C_c =1.422

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

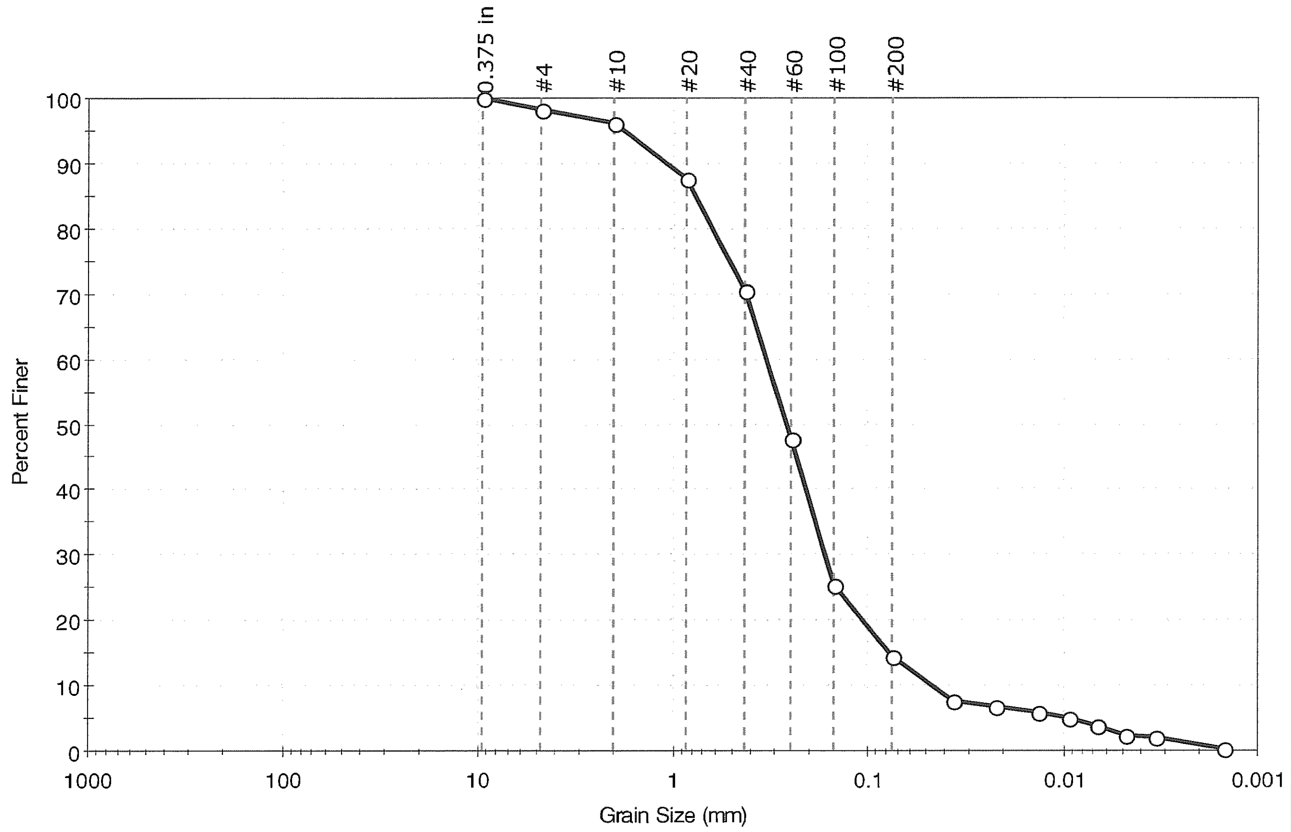
Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID:	B-4	Sample Type:	jar	Tested By:	ap
Sample ID:	J-3	Test Date:	05/09/08	Checked By:	jdt
Depth :	15.0-17.0 ft	Test Id:	130437		
Test Comment:	---				
Sample Description:	Moist, dark yellowish brown silty sand				
Sample Comment:	---				

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	1.7	83.8	14.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	96		
#20	0.85	88		
#40	0.42	71		
#60	0.25	48		
#100	0.15	25		
#200	0.075	15		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0365	8		
---	0.0223	7		
---	0.0134	6		
---	0.0095	5		
---	0.0067	4		
---	0.0048	2		
---	0.0034	2		
---	0.0015	0		

Coefficients

D_{85} =0.7618 mm	D_{30} =0.1664 mm
D_{60} =0.3327 mm	D_{15} =0.0772 mm
D_{50} =0.2637 mm	D_{10} =0.0461 mm
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting
express
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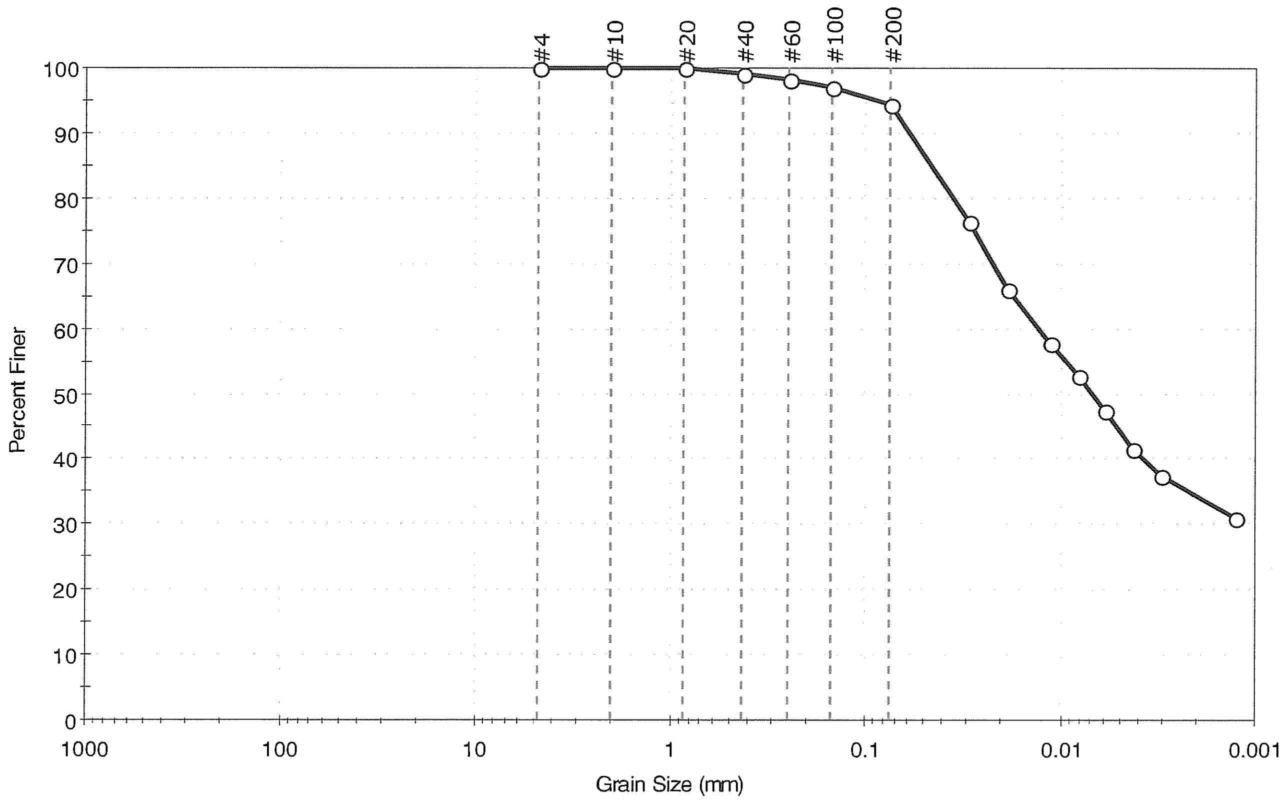
Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID:	B-5	Sample Type:	jar	Tested By:	ap
Sample ID:	J-1	Test Date:	05/12/08	Checked By:	jdt
Depth :	0-2.0 ft	Test Id:	130438		
Test Comment:	---				
Sample Description:	Moist, dark grayish brown clay				
Sample Comment:	---				

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	5.7	94.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	98		
#100	0.15	97		
#200	0.075	94		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0294	77		
---	0.0190	66		
---	0.0115	58		
---	0.0082	53		
---	0.0059	48		
---	0.0043	42		
---	0.0030	37		
---	0.0013	31		

Coefficients

D_{85} =0.0460 mm	D_{30} =N/A
D_{60} =0.0131 mm	D_{15} =N/A
D_{50} =0.0069 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM lean clay (CL)

AASHTO Clayey Soils (A-6 (18))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting express
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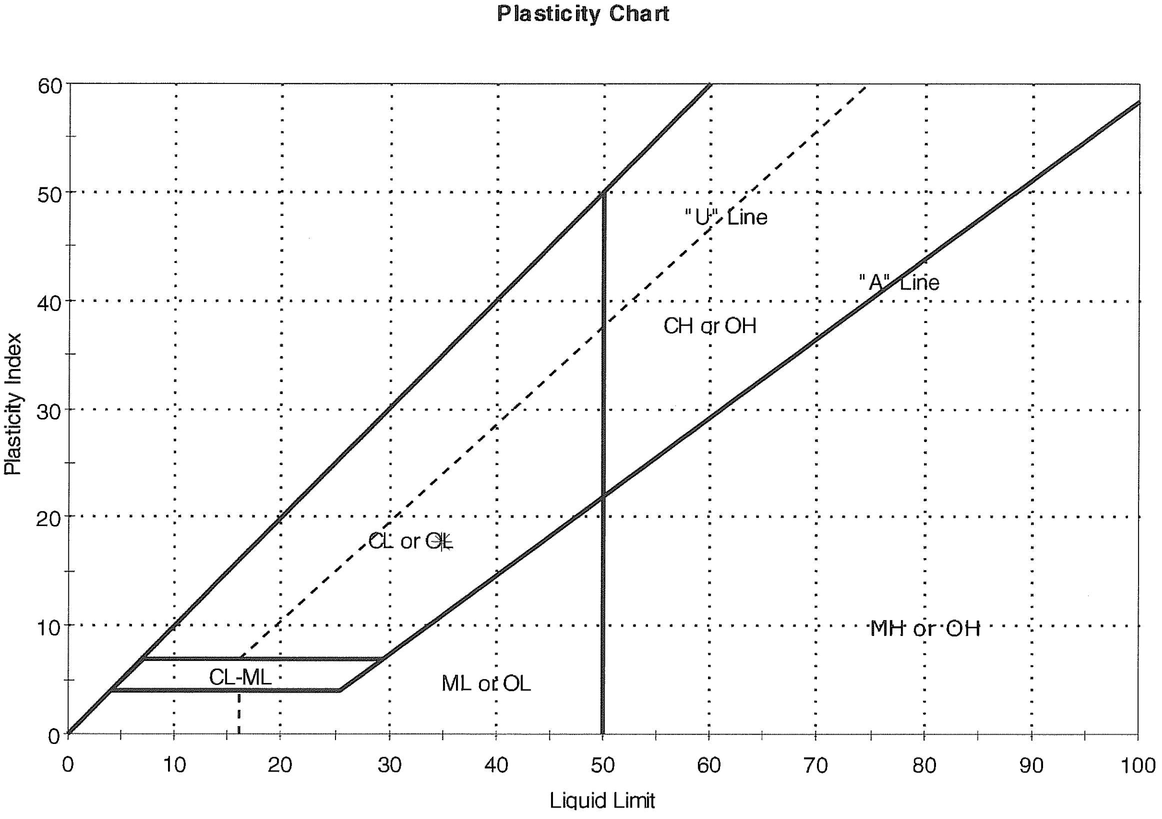
Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID:	B-5	Sample Type:	jar	Tested By:	ap
Sample ID:	J-1	Test Date:	05/09/08	Checked By:	jdt
Depth :	0-2.0 ft	Test Id:	130455		

Test Comment: ---
Sample Description: Moist, dark grayish brown clay
Sample Comment: ---

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
✳	J-1	B-5	0-2.0 ft	31	35	17	18	1	lean clay (CL)

Sample Prepared using the WET method
1% Retained on #40 Sieve
Dry Strength: VERY HIGH
Dilentancy: NONE
Toughness: LOW

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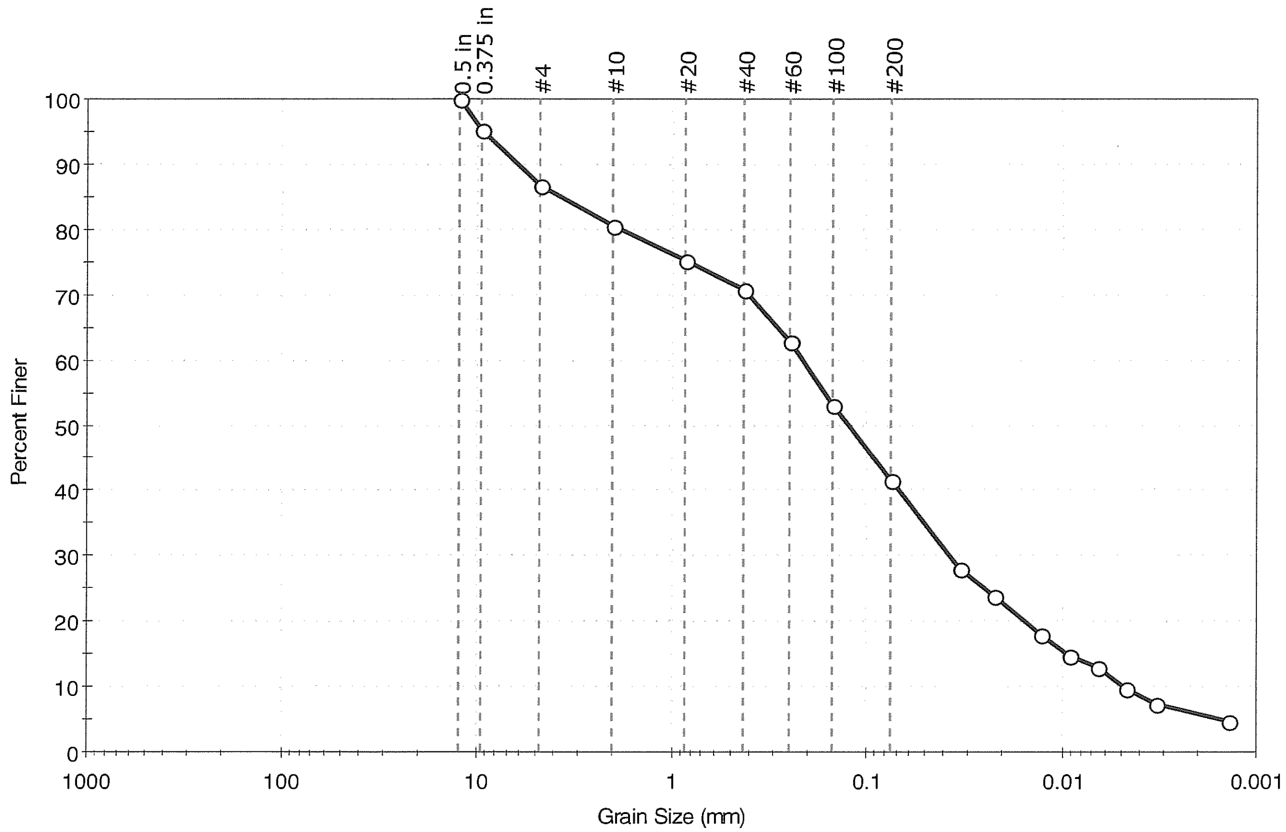
Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID:	B-5	Sample Type:	jar	Tested By:	ap
Sample ID:	J-3	Test Date:	05/12/08	Checked By:	jdt
Depth :	10.0-11.8 ft	Test Id:	130439		

Test Comment: ---
Sample Description: Moist, olive brown silty sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	13.4	45.1	41.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	95		
#4	4.75	87		
#10	2.00	80		
#20	0.85	75		
#40	0.42	71		
#60	0.25	63		
#100	0.15	53		
#200	0.075	41		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0330	28		
---	0.0221	24		
---	0.0129	18		
---	0.0092	15		
---	0.0065	13		
---	0.0047	10		
---	0.0033	7		
---	0.0014	5		
				J-32

Coefficients

D_{85} =3.7939 mm	D_{30} =0.0374 mm
D_{60} =0.2153 mm	D_{15} =0.0096 mm
D_{50} =0.1240 mm	D_{10} =0.0048 mm
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting express
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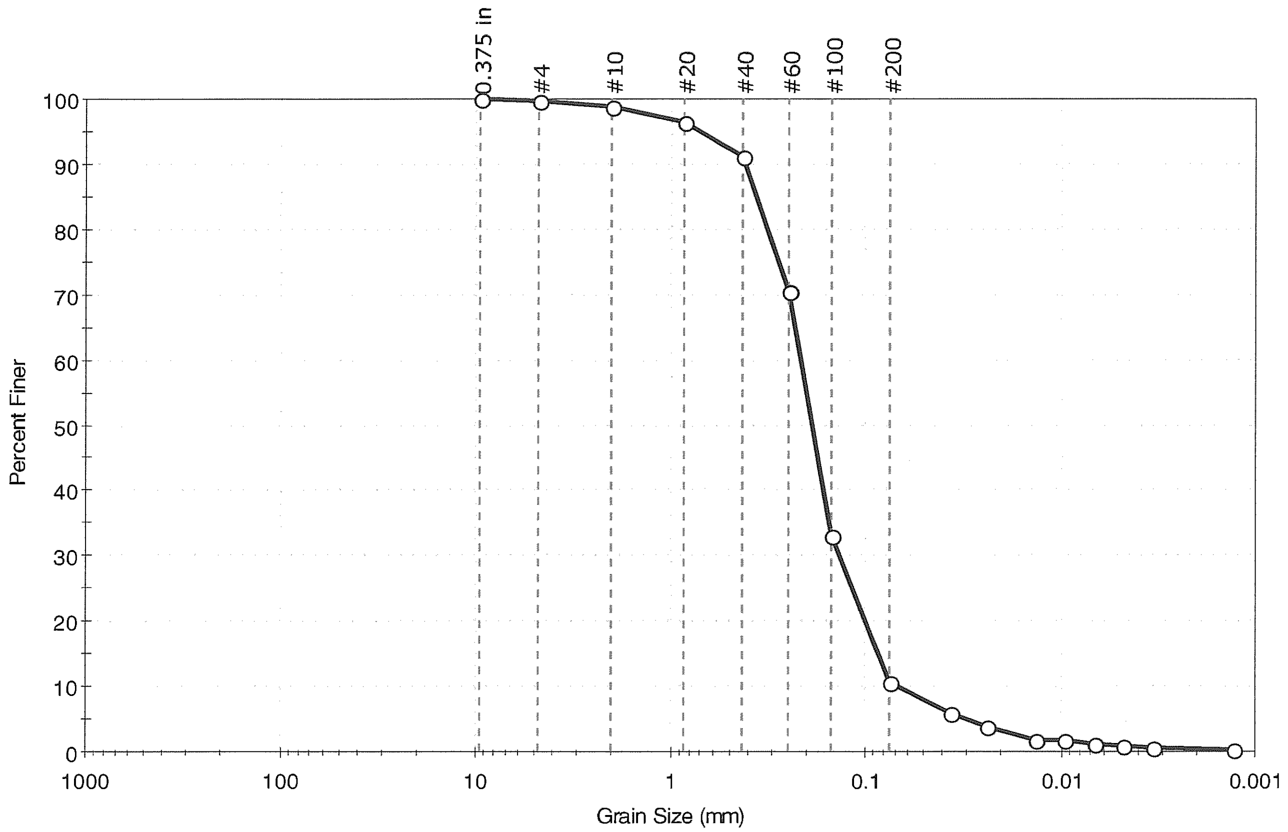
Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID:	B-7	Sample Type:	jar	Tested By:	ap
Sample ID:	J-1	Test Date:	05/09/08	Checked By:	jdt
Depth :	0-2.0 ft	Test Id:	130440		

Test Comment: ---
Sample Description: Moist, light olive brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.3	89.1	10.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	96		
#40	0.42	91		
#60	0.25	71		
#100	0.15	33		
#200	0.075	11		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0367	6		
---	0.0237	4		
---	0.0136	2		
---	0.0097	2		
---	0.0068	1		
---	0.0048	1		
---	0.0034	1		
---	0.0013	0		

Coefficients

D_{85} =0.3633 mm	D_{30} =0.1363 mm
D_{60} =0.2164 mm	D_{15} =0.0858 mm
D_{50} =0.1888 mm	D_{10} =0.0681 mm
C_u =3.178	C_c =1.261

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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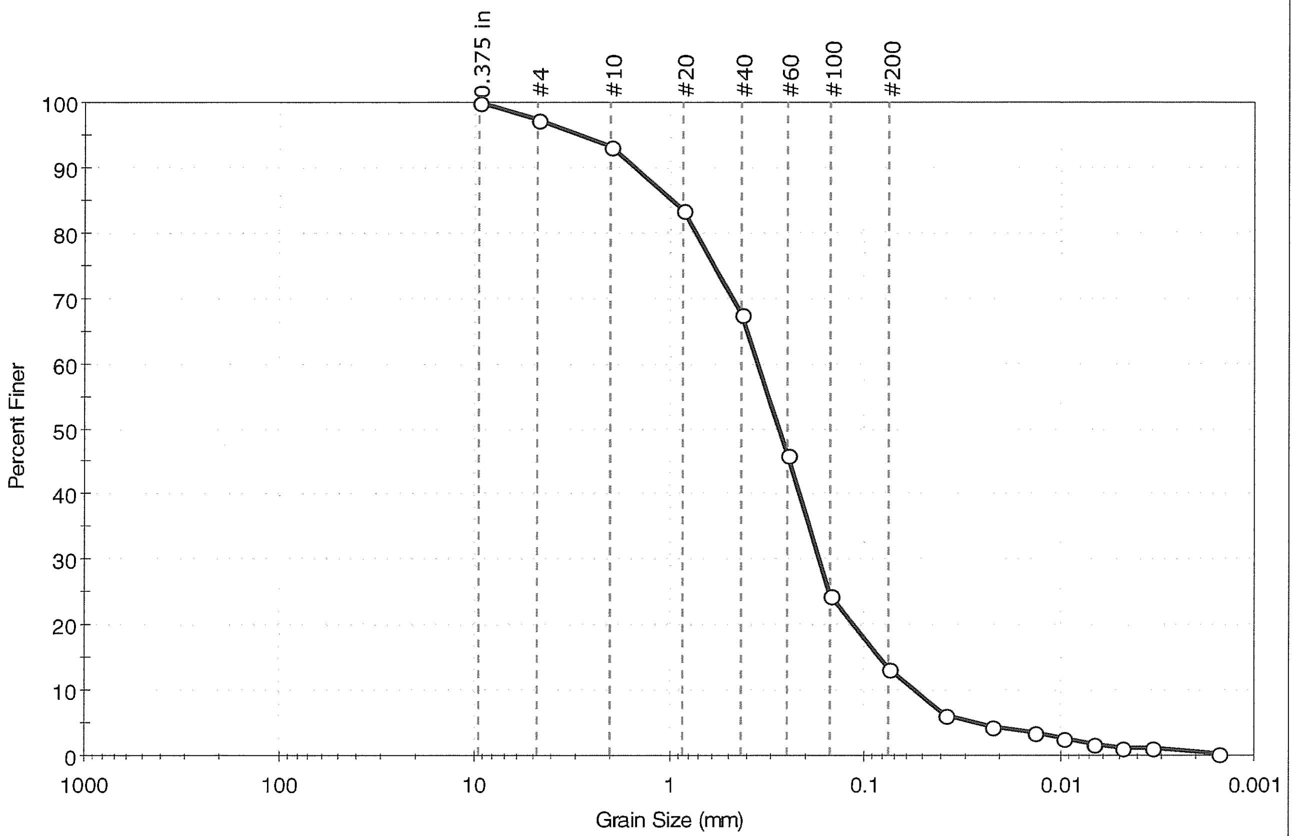
Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID:	B-7	Sample Type:	jar	Tested By:	ap
Sample ID:	J-2	Test Date:	05/09/08	Checked By:	jdt
Depth :	5.0-7.0 ft	Test Id:	130441		

Test Comment: ---
Sample Description: Moist, dark yellowish brown silty sand
Sample Comment: Removed one 2" rock from sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	2.5	84.2	13.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	97		
#10	2.00	93		
#20	0.85	84		
#40	0.42	68		
#60	0.25	46		
#100	0.15	24		
#200	0.075	13		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0382	6		
---	0.0220	4		
---	0.0133	4		
---	0.0096	3		
---	0.0068	2		
---	0.0048	1		
---	0.0034	1		
---	0.0015	0		

Coefficients

D_{85} =0.9690 mm	D_{30} =0.1712 mm
D_{60} =0.3526 mm	D_{15} =0.0833 mm
D_{50} =0.2763 mm	D_{10} =0.0546 mm
C_u =N/A	C_c =N/A

Classification

ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

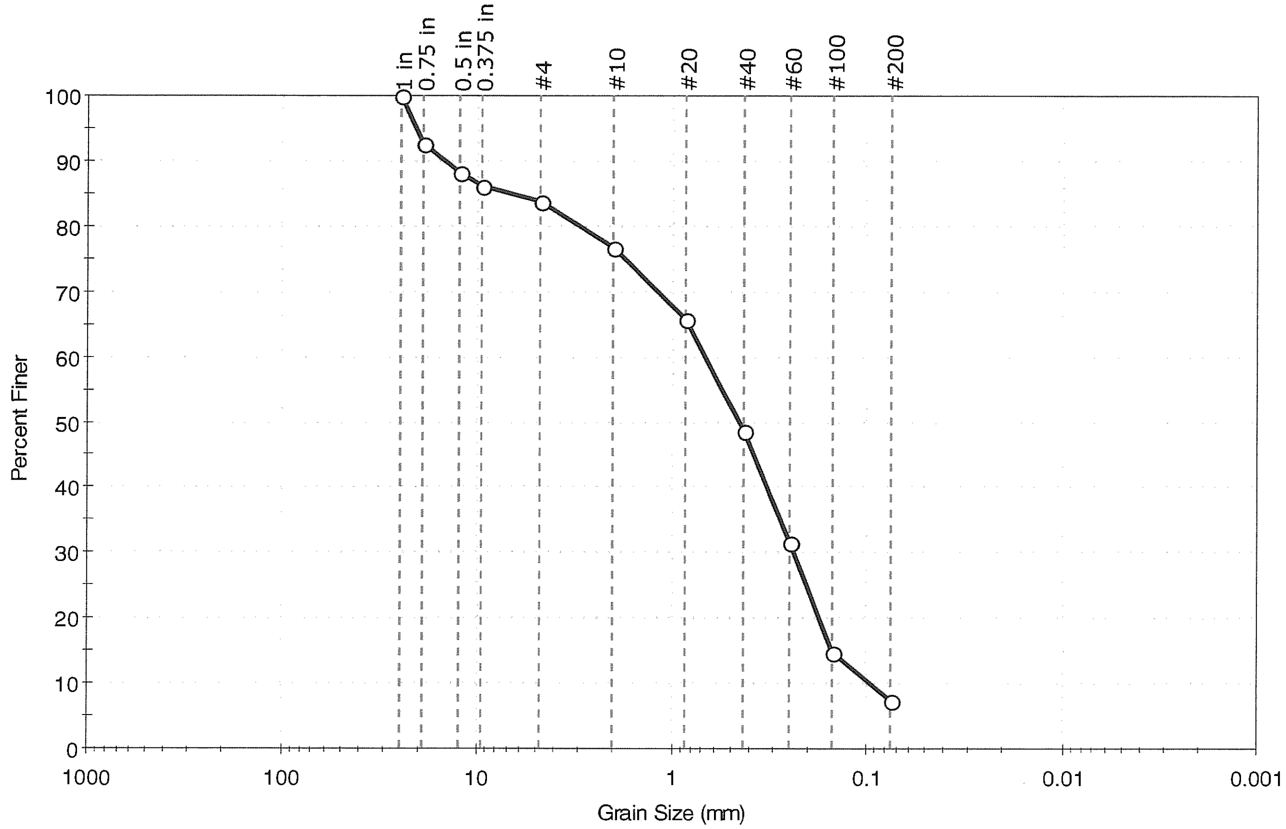
Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID:	B-7	Sample Type:	jar	Tested By:	ap
Sample ID:	J-3	Test Date:	05/08/08	Checked By:	jdt
Depth :	10.0-12.0 ft	Test Id:	130442		

Test Comment: ---
Sample Description: Moist, brown sand with silt and gravel
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	16.2	76.5	7.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	92		
0.5 in	12.50	88		
0.375 in	9.50	86		
#4	4.75	84		
#10	2.00	77		
#20	0.85	66		
#40	0.42	49		
#60	0.25	32		
#100	0.15	15		
#200	0.075	7		

Coefficients

D_{85} =6.7302 mm	D_{30} =0.2386 mm
D_{60} =0.6747 mm	D_{15} =0.1509 mm
D_{50} =0.4490 mm	D_{10} =0.0965 mm
C_u =6.992	C_c =0.874

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting
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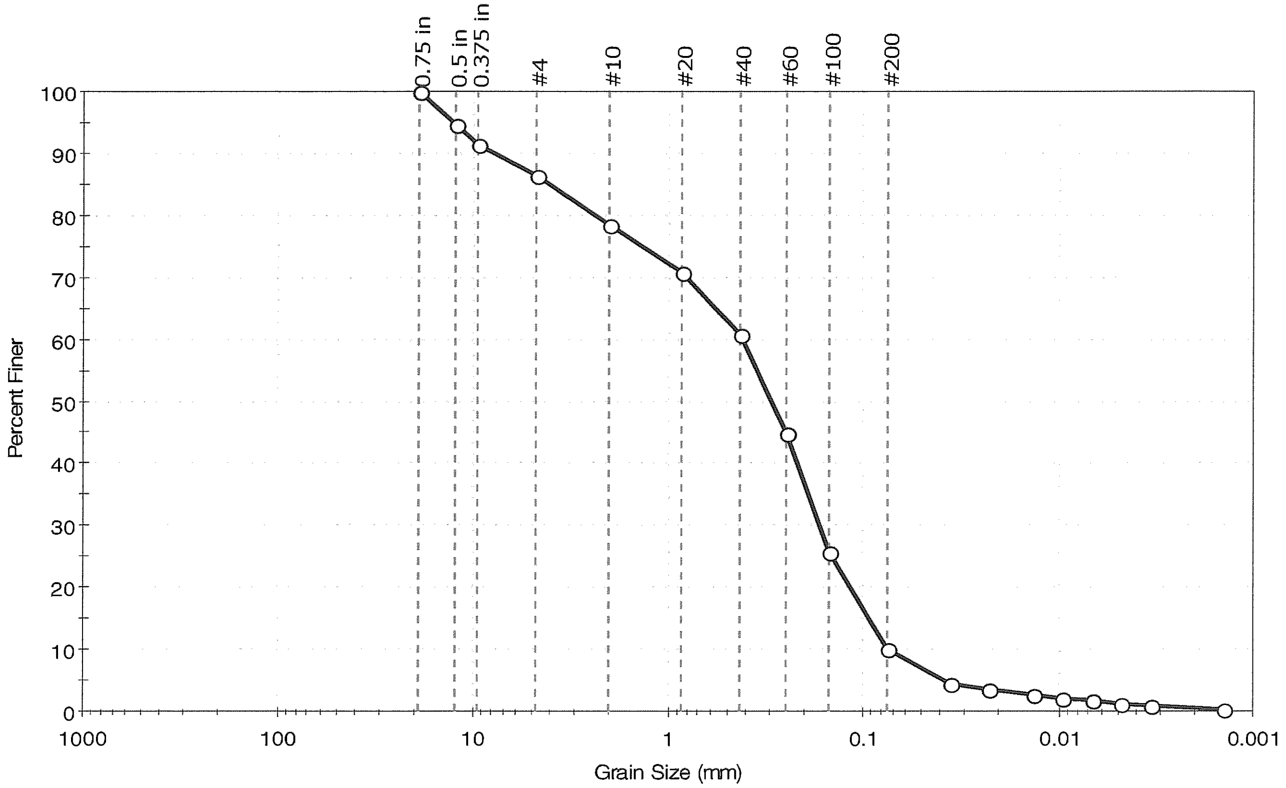
Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID: B-8		Sample Type:	jar	Tested By:	ap
Sample ID:J-1		Test Date:	05/09/08	Checked By:	jdt
Depth : 0-2.0 ft		Test Id:	130443		

Test Comment: ---
Sample Description: Moist, very dark grayish brown sand with silt
Sample Comment: Removed one 2" rock from sample

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	13.5	76.5	10.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	95		
0.375 in	9.50	91		
#4	4.75	86		
#10	2.00	79		
#20	0.85	71		
#40	0.42	61		
#60	0.25	45		
#100	0.15	26		
#200	0.075	10		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0360	5		
---	0.0229	4		
---	0.0136	3		
---	0.0096	2		
---	0.0068	2		
---	0.0048	1		
---	0.0034	1		
---	0.0014	0		

Coefficients

D_{85} =4.0582 mm	D_{30} =0.1688 mm
D_{60} =0.4148 mm	D_{15} =0.0938 mm
D_{50} =0.2970 mm	D_{10} =0.0751 mm
C_u =5.523	C_c =0.915

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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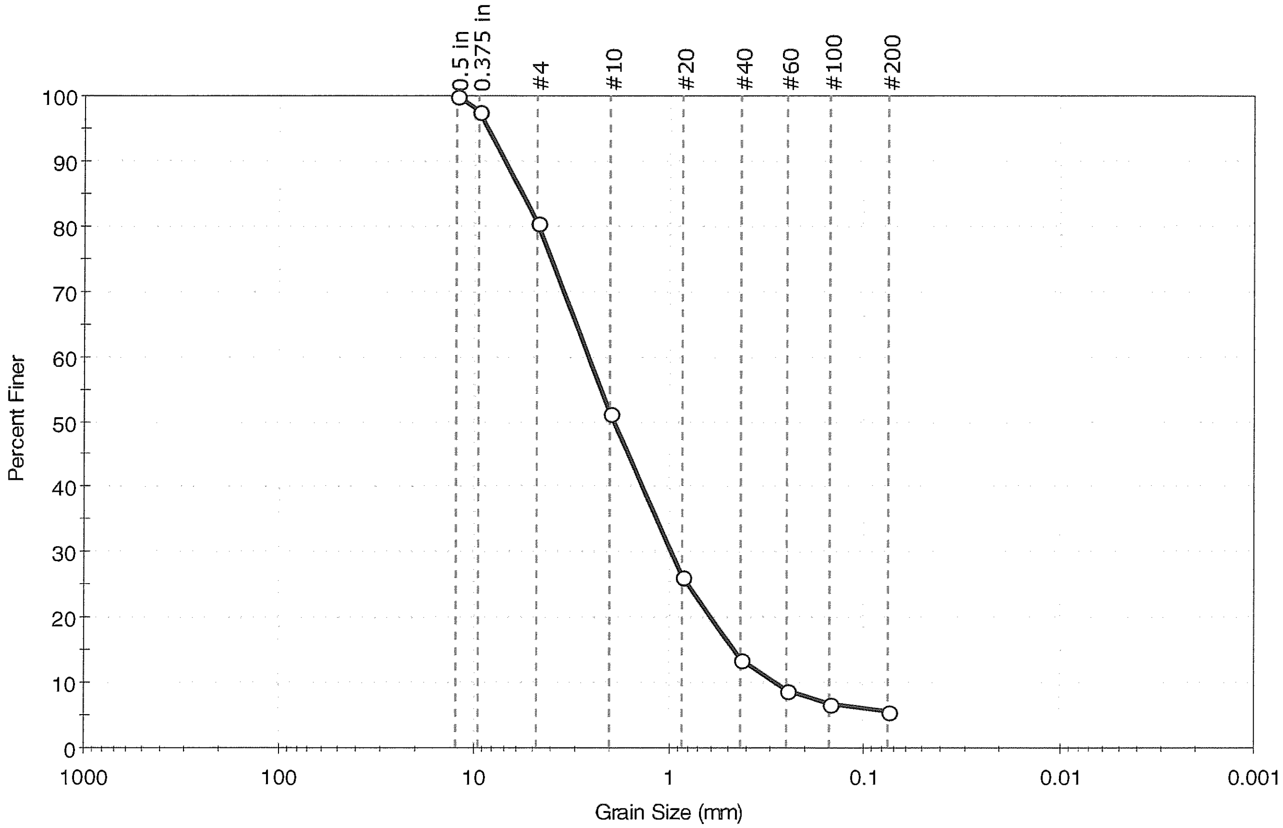
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers				
Project:	Navigation Improvement				
Location:	Portsmouth, NH			Project No:	GTX-8193
Boring ID:	B-8	Sample Type:	jar	Tested By:	ap
Sample ID:	J-2	Test Date:	05/09/08	Checked By:	jdt
Depth :	5.0-7.0 ft	Test Id:	130444		

Test Comment: ---
Sample Description: Moist, brown and gray sand with silt and gravel
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	19.4	74.9	5.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	98		
#4	4.75	81		
#10	2.00	51		
#20	0.85	26		
#40	0.42	14		
#60	0.25	9		
#100	0.15	7		
#200	0.075	6		

Coefficients

D_{85} =5.6893 mm
D_{30} =0.9707 mm
D_{60} =2.5922 mm
D_{15} =0.4589 mm
D_{50} =1.9210 mm
D_{10} =0.2821 mm
C_u =9.189
C_c =1.289

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX K
SUITABILITY DETERMINATION FOR DREDGED MATERIAL DISPOSAL AND BENEFICIAL USE

CENAE–R-PT 27 June 2014

MEMORANDUM THRU:

Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch Ruth M Ladd

Digitally signed by LADD.RUTH.M.1228556242
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI,
ou=USA, cn=LADD.RUTH.M.1228556242
Date: 2014.06.27 11:11:47 -04'00'

FOR: Mark Habel, Project Manager, CENAE-EP-PN

SUBJECT: Third Suitability Determination for the Portsmouth Harbor and Piscataqua River Federal Navigation Improvement Project, Newington, New Hampshire and Eliot, Maine.

1. Summary:

This memorandum addresses compliance with the regulatory evaluation and testing requirements of 40 CFR 227.13 for unconfined open water disposal at an open ocean disposal site. This evaluation confirms that sufficient information was obtained to properly evaluate the suitability of this material for open water disposal under the guidelines and finds the sediments in the vicinity of samples B-2, B-4, B-5, B-6, B-7, and B-8 and also the sediments in the vicinity of samples 1 through 22 suitable for disposal at the Isles of Shoals – North Ocean Placement Site (IOS-N), Wells Beach Nearshore Site, Salisbury Beach Nearshore Site, Newbury Beach Nearshore Site and/or Newburyport Beach Nearshore Site. The rock from Sample B-6 is also suitable for disposal at either the ISO-N site or the Cape Arundel Disposal Site (CADS).

Should disposal at IOS-N be pursued, a Site Selection Document prepared under the requirements of the Ocean Dumping Act would need to be prepared and concurred in by US EPA.

The purpose of this third suitability determination is to clarify the evaluations contained in the prior suitability determinations and encompass all of the potential disposal options that may be followed for this project.

2. Project Description:

The CENAE is proposing to dredge an area of approximately 20.4 acres in the Piscataqua River in Newington, New Hampshire and Eliot, Maine to enlarge the existing 35' MLLW deep turning basin at the upstream end of the Federal Navigation Project (FNP), near the Sprague Energy River Road Terminal. This will produce a volume of approximately 730,000 cu. yds. of sand and gravel till and 25,300 cu. yds. of rock. Rock ledge was encountered at one boring location, B6, at a depth of -33' MLLW, and is expected to be encountered at another location in the widened basin area based on subsurface surveys. Final rock and till volumes will be determined by further explorations during the project's detailed design phase. The sandy glacial till material is proposed to be mechanically dredged and disposed of at the Isles of Shoals – North Ocean

Placement Site (IOS-N), Wells Beach Nearshore Site, Salisbury Beach Nearshore Site, Newbury Beach Nearshore Site and/or Newburyport Beach Nearshore Site. Any combination of the ocean and nearshore placement sites listed above may ultimately be used for the sandy till material. The rock is proposed to be disposed of at either the Cape Arundel Disposal Site (CADS) or the Isles of Shoals North (IOS-N) ocean placement site.

3. **Sampling and Analysis:**
A sampling plan for this project was prepared on 16 August 2007. The plan called for nine cores to be taken from the project area. However, this sampling plan was not implemented because test borings had been taken throughout the project area as a part of the geotechnical survey. Sediment samples were taken from the borings and analyzed for sediment grain size. The results are tabulated on the attached Table 1.

A suitability determination was prepared based on this 2007 data on 21 April 2009. It found the northern section of the proposed project unsuitable for unconfined disposal as proposed based upon the grain size of the single sample in this area. That sample, B-5, is predominately silt/clay, unlike the rest of the samples, and did not meet the exclusion from further testing at 227.13 (b)(1). CENAE opted to extensively sample the northern section and analyze the samples for grain size to delineate the area of fine grained sediment.

We prepared a sampling and analysis plan for the northern part of the project. A grid of 22 locations around the stations B-5 and B-6 from the previous testing effort was developed. Sediment samples were taken from the borings and analyzed for sediment grain size. The results are tabulated on the attached Table 2. Sample 16 was located near core B-5.

I prepared a suitability determination based on this second set of data on 19 August 2009. It found the sediments in the northern section of the proposed project suitable for unconfined disposal as proposed.

4. **Ocean Dumping Act Regulatory Requirements:**
The disposal of sediments below mean low water in the Bigelow Bight is regulated according to both Section 103 of the Ocean Disposal Act and Section 404 of the Clean Water Act.

§227.13 Dredged Materials.

(a) This paragraph defines dredged materials and does not give any criteria for the evaluation of sediments.

(b) This paragraph states that proposed dredged material which meets the criteria in one of the following three paragraphs is environmentally

SUBJECT: Third Suitability Determination for the Portsmouth Harbor and Piscataqua River Federal Navigation Project, Newington, New Hampshire and Eliot, Maine.

NIMESKERN.PHILLIP.W.1228573589

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Date: 2014.06.27 11:17:46 -04'00'

PHILLIP NIMESKERN
Project Manager,
Marine Analysis Section

Melville P. Coté Jr.

Melville P. Coté, Jr., Manager
Ocean and Coastal Protection Unit
EPA Region 1 – New England

[✓ Concur]
Do not concur
Date 6/27/14

JMcCarthy

Digitally signed by MCCARTHY.JENNIFER.LYNN.1180850887
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=MCCARTHY.JENNIFER.LYNN.1180850887
Date: 2014.06.27 14:47:21 -04'00'

Jennifer L. McCarthy
Chief, Regulatory Division
New England District
U.S. Army Corps of Engineers

Concur X
Do not concur
Date

acceptable for ocean disposal without further testing.

(b)(1) Dredged material that is predominately sand, gravel, rock, or any other naturally occurring bottom material with particle size greater than silt and is found in areas of high current or wave energy can be disposed of in a 103 site without further testing. This portion of the Piscataqua River is well known for its fast tidal currents. The NOAA-predicted tidal currents for this portion of the Piscataqua River from 15 July to 11 August 2009 varied from 2.0 knots (103 cm/second) to 4.1 knots (211 cm/second). As the material from the samples is predominately sand and gravel (0% to 31.3% fines), it does meet this exclusion and can be disposed of as proposed. See the attached tables for sediment details.

(b)(2) Dredged material that is proposed for beach nourishment and is predominantly sand gravel or shell with grain sizes similar to the receiving beaches can be disposed of without further testing. See Table 3 for the grain size analyses for samples from the proposed disposal sites. As the material from the sample is predominately sand and is proposed for subtidal beach disposal at Wells Beach Nearshore Site, Salisbury Beach Nearshore Site, Newbury Beach Nearshore Site and/or Newburyport Beach Nearshore Site, it does meet this exclusion if disposed of at any of these sites.

(b)(3) When the dredged material is substantially the same as that at the disposal site and the dredged material is taken from a site far removed from known sources of pollution, it can be disposed of without further testing. This project's material does not meet this exclusion.

(c) This paragraph states that if the dredged material does not meet the criteria of paragraph b above, it must undergo further testing of the liquid, suspended particulate and solid phases before it can be considered acceptable for ocean disposal. This section does not apply to this portion of this project, as the material meets the criteria in paragraphs (b)(1) and (b)(2) above.

(d) This subsection discusses the choice of the liquid phase analytes and does not give any criteria for the evaluation of sediments.

5. Copies of the above mentioned data and of the draft suitability determination were sent to the State DEPs, US EPA, and US F&WS for their review. The EPA responded to say that they concur with the determination. The two F&WS offices have stated in the past that they will not be responding to draft SAPs or SDs.

6. If you have any questions, please contact me at (978) 318-8660.

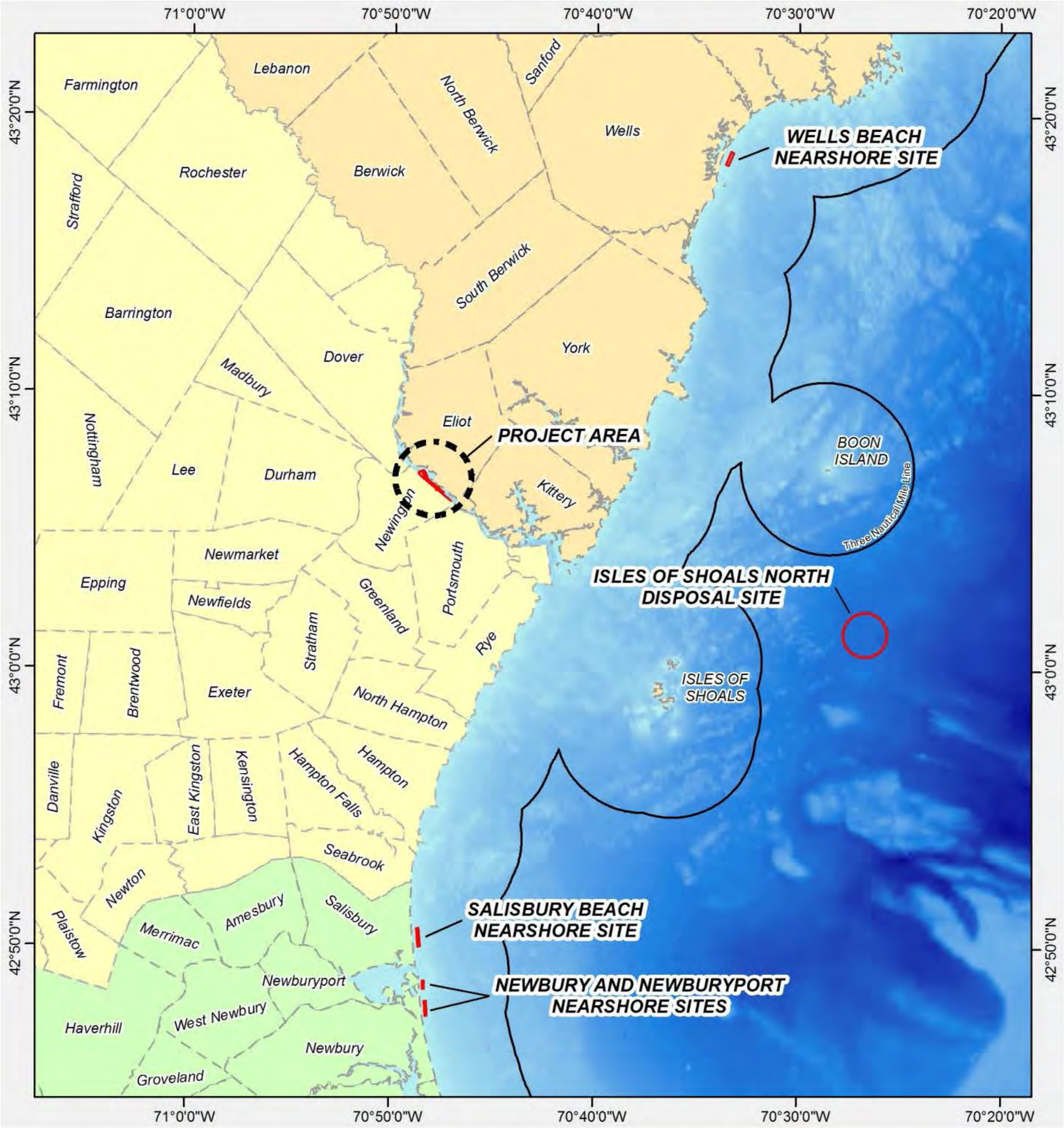
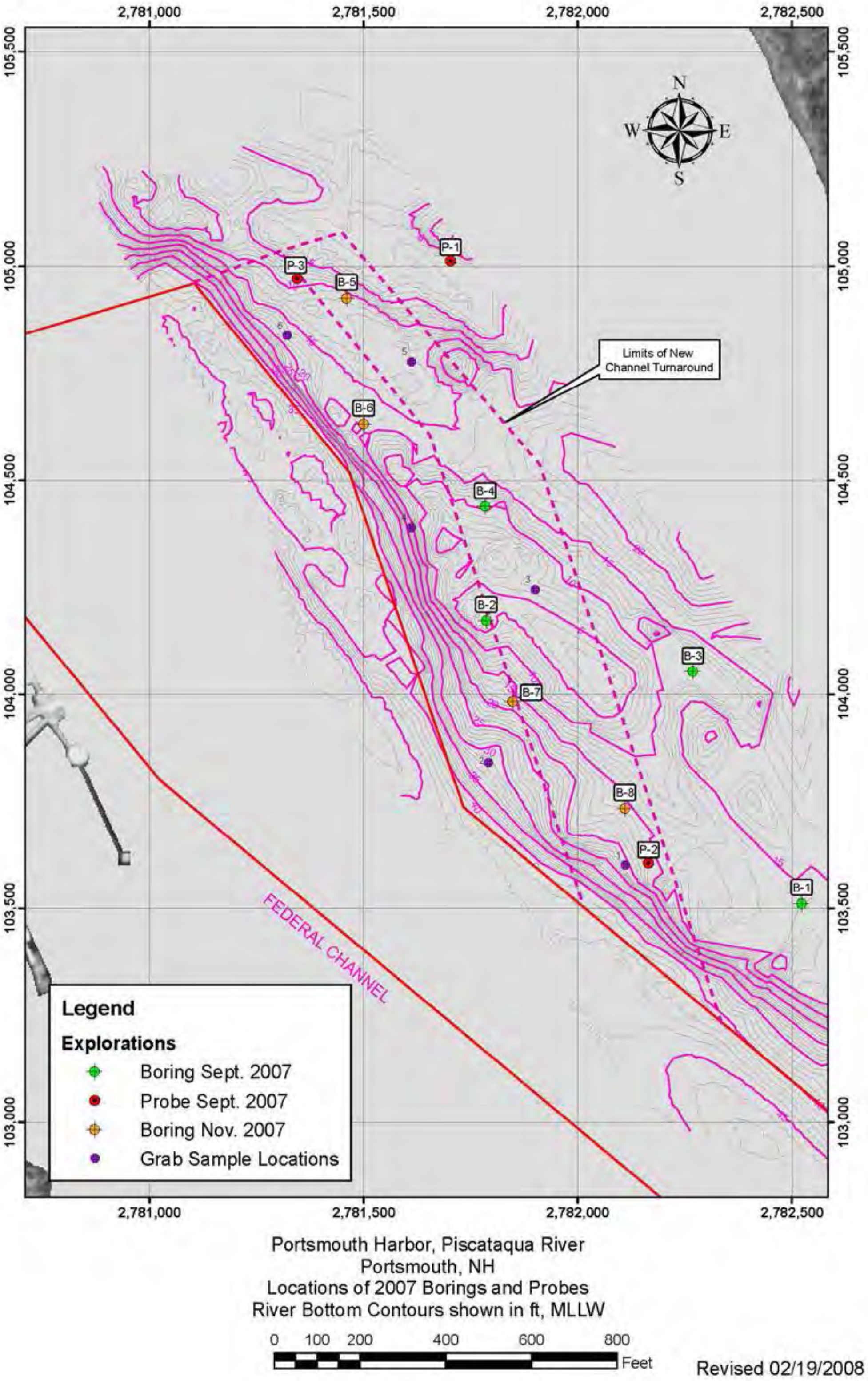


Figure 7. Nearshore Placement Sites and Location of IOS-N

Table 1 - 2007 Grain Size Results

Boring location/ Depth below riverbed	Elevation below MLLW in feet	% gravel	% sand	% silt & clay
B-2 (10-12')	13.0 – 15.0	1.0	90.4	8.6
B-4 (15-17')	18.0 – 20.0	1.7	83.8	14.5
B-5 (0-2')	14.5 – 16.5	0.0	5.7	94.3
B-5 (10-11.8')	24.5 – 26.3	13.4	45.1	41.5
B-7 (0-2')	19.0 – 21.0	0.03	89.1	10.6
B-7 (5-7')	24.0 – 26.0	2.5	84.2	13.3
B-7 (10-12')	29.0 – 31.0	16.2	76.5	7.3
B-8 (0-2')	18.0 – 20.0	13.5	76.5	10.0
B-8 (5-7')	23.0 – 25.0	19.4	74.9	5.7

Note: Not enough material was recovered from boring B6 to perform grain size analysis.



Portsmouth Harbor, Piscataqua River
Portsmouth, NH
Locations of 2007 Borings and Probes
River Bottom Contours shown in ft, MLLW

Revised 02/19/2008

Table 2 – 2009 Grain Size results

2009 Grab Location	Water Depth	% Gravel	% Sand	% Silt & Clay
1	20	No sample		
2	18.5	No sample		
3	17.7	78.0	20.7	1.3
4	10	No sample		
5	19	45.9	53.3	0.8
6	19	1.1	67.6	31.3
7	17.4	14.4	76.9	8.7
8	18.9	No sample		
9	20.1	57.0	42.1	0.9
10	15.7	41.0	58.1	0.9
11	16.4	-	92.9	7.1
12	18.5	67.0	31.0	2.0
13	16.3	No sample		
14	14.6	11.8	85.4	2.8
15	16.6	82.1	16.9	1.0
16	17.9	0.8	90.2	9.0
17	12.5	5.7	83.4	10.9
18	15	36.8	61.5	1.7
19	7	60.9	33.5	5.6
20	10	No sample		
21	6.4	3.1	78.4	18.5
22	8	5.5	87.0	7.5

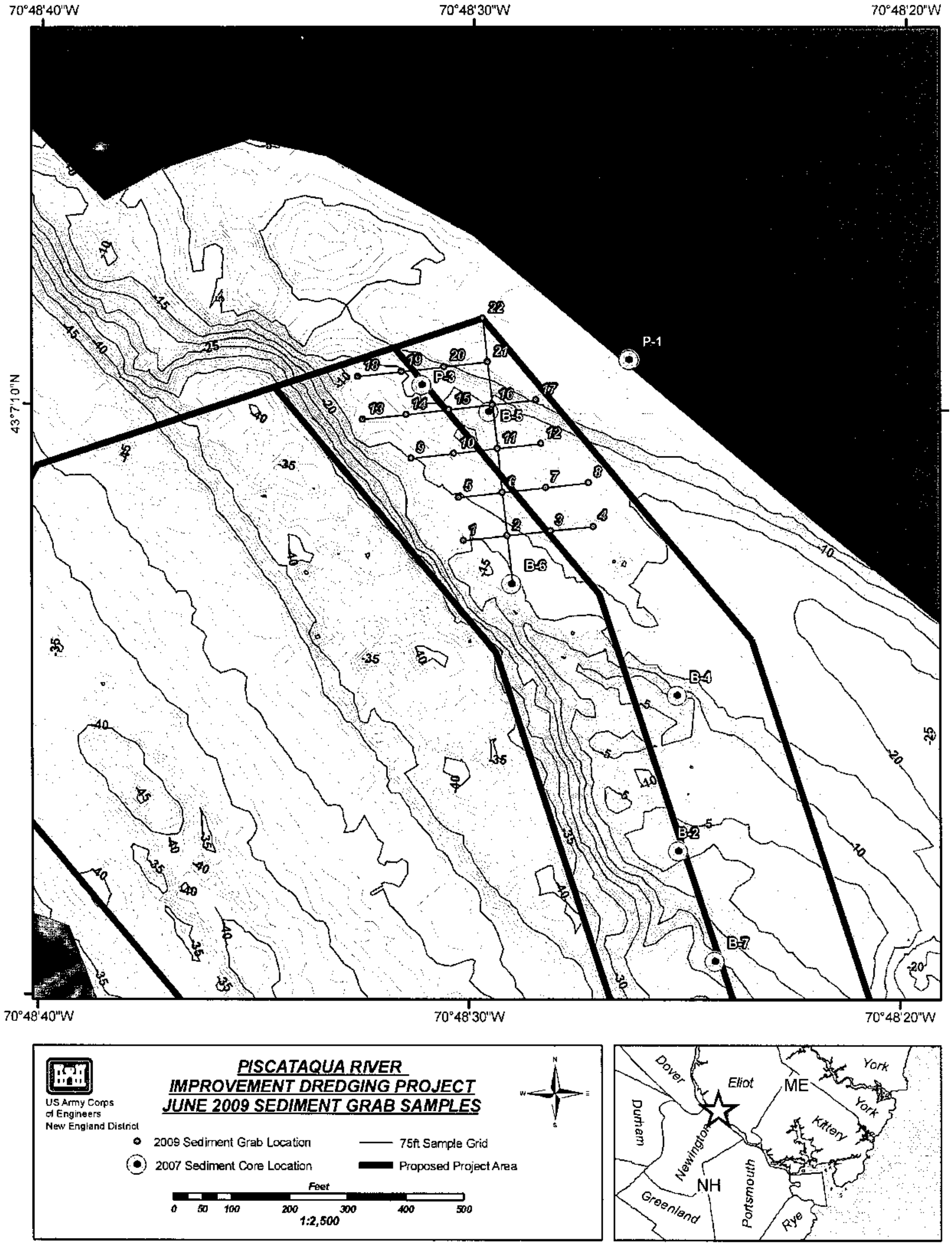
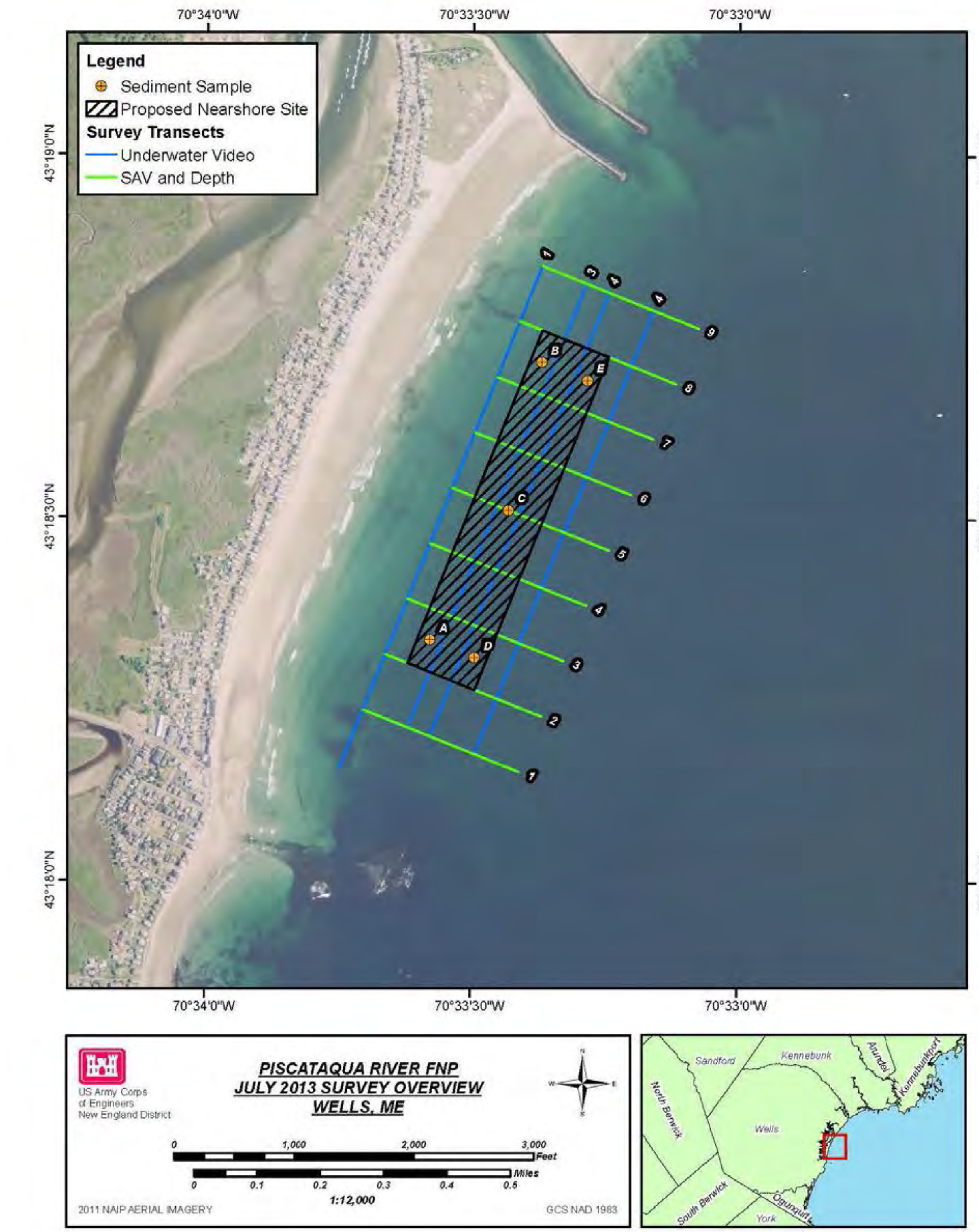

70°48'40"W
70°48'30"W
70°48'20"W
43°7'10"N
P-1
P-3
B-5
B-6
B-4
B-2
B-7
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
PISCATAQUA RIVER
IMPROVEMENT DREDGING PROJECT
JUNE 2009 SEDIMENT GRAB SAMPLES
US Army Corps of Engineers
New England District
2009 Sediment Grab Location
2007 Sediment Core Location
75ft Sample Grid
Proposed Project Area
Feet
0 50 100 200 300 400 500
1:2,500
N
S
E
W
Dover
Eliot
ME
York
Durham
Newington
Kittery
NH
Portsmouth
Greenland
Rye

Table 3 - Grain size Results for Nearshore Placement Sites

Station	% Fine Gravel	% Sand	% Fines
Wells-A	0.0	100	0.0
Wells-B	0.2	99.8	0.0
Wells-C	0.1	99.9	0.0
Wells-D	0.0	100	0.0
Wells-E	0.5	99.5	0.0
Salisbury-A	0.0	100	0.0
Salisbury-B	0.0	100	0.0
Salisbury-C	0.0	99.9	0.0
Salisbury-D	0.0	100	0.0
Salisbury-E	0.0	99.9	0.0
Newburyport-A	1.6	98.4	0.0
Newburyport-B	0.0	100	0.0
Newburyport-C	0.2	99.8	0.0
Newburyport-D	5.1	95.0	0.0
Newburyport-E	0.8	99.2	0.0
Newbury-A	0.0	100	0.0
Newbury-B	0.3	99.8	0.0
Newbury-C	0.0	100	0.0
Newbury-D	0.1	100	0.0
Newbury-E	0.0	99.9	0.0


70°34'0"W
70°33'30"W
70°33'0"W
43°19'0"N
43°18'30"N
43°18'0"N
Legend
Sediment Sample
Proposed Nearshore Site
Survey Transects
Underwater Video
SAV and Depth
A
B
C
D
E
1
2
3
4
5
6
7
8
9
US Army Corps of Engineers New England District
PISCATAQUA RIVER FNP
JULY 2013 SURVEY OVERVIEW
WELLS, ME
0
1,000
2,000
3,000
Feet
0
0.1
0.2
0.3
0.4
0.5
Miles
1:12,000
2011 NAIP AERIAL IMAGERY
GCS NAD 1983
N
E
S
W
Sandford
Kennebunk
Arundel
Kennebunkport
North Berwick
Wells
South Berwick
York
Ogunquit


70°49'0"W
70°48'0"W
42°51'0"N
42°50'0"N
Legend
Sediment Sample
Proposed Nearshore Site
Survey Transects
Underwater Video
SAV and Depth
1
2
3
11
10
9
8
7
6
5
4
3
2
1
A
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C
D
E
US Army Corps of Engineers New England District
PISCATAQUA RIVER FNP
JULY 2013 SURVEY OVERVIEW
SALISBURY, MA
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W
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1,000
2,000
3,000
Feet
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0.1
0.2
0.3
0.4
0.5
Miles
1:12,000
2012 NAIP Aerial Imagery
WGS NAD 1983
South Hampton
Seabrook
Newton
Salisbury
Amesbury
Merrimac
Newburyport
Haverhill
West Newbury
Newbury
Groveland
Georgetown
Rowley
Ipswich


70°49'0"W
70°48'0"W
42°49'0"N
Legend
⊕ Sediment Sample
▨ Proposed Nearshore Site
Survey Transects
Underwater Video
SAV and Depth
1
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US Army Corps of Engineers New England District
PISCATAQUA RIVER FNP
JULY 2013 SURVEY OVERVIEW
NEWBURYPORT, MA
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Feet
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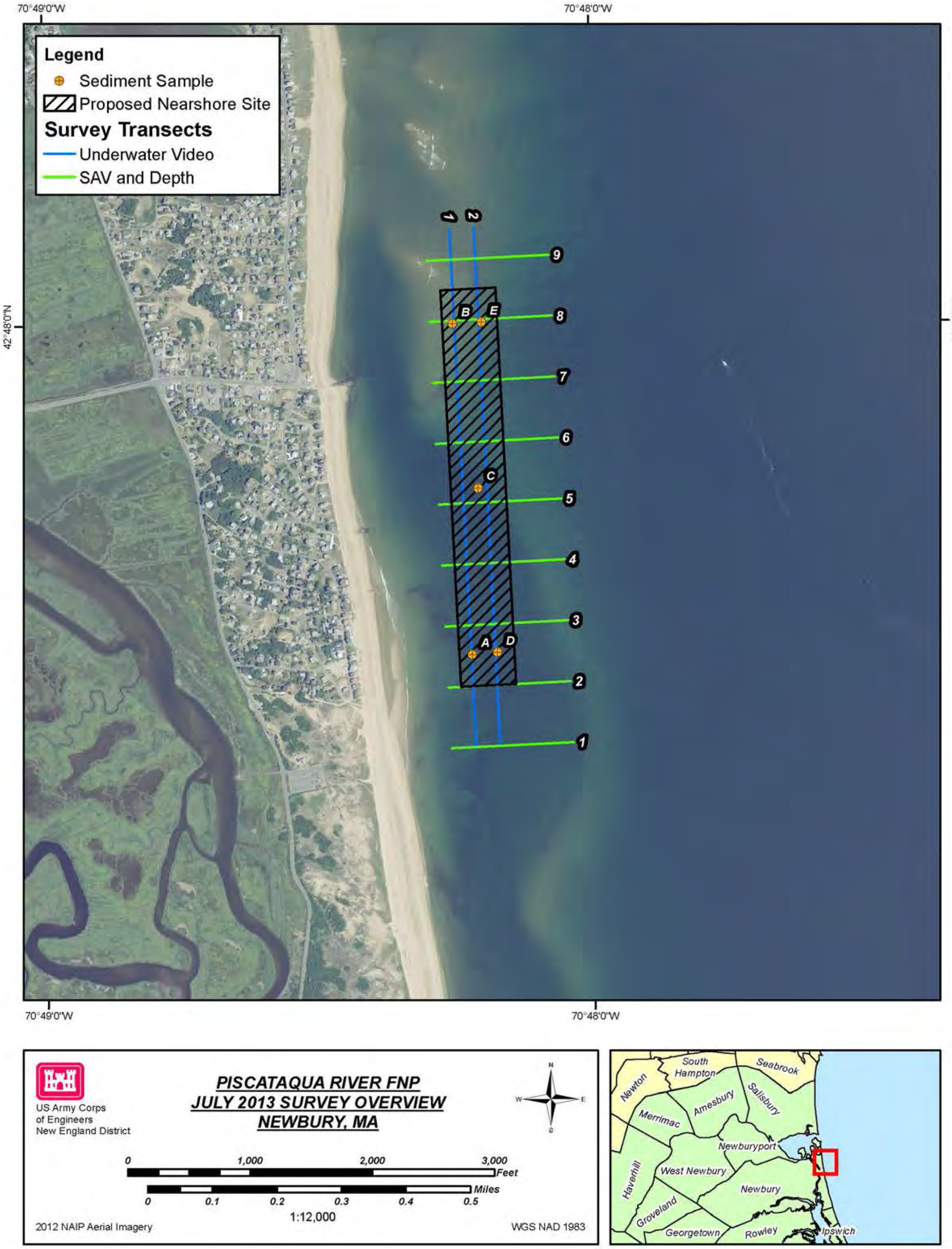
0.5
Miles
1:12,000
2012 NAIP Aerial Imagery
WGS NAD 1983
South Hampton
Seabrook
Newton
Amesbury
Salisbury
Merrimac
Newburyport
Haverhill
West Newbury
Newbury
Groveland
Georgetown
Rowley
Ipswich


70°49'0"W
70°48'0"W
42°48'0"N
Legend
Sediment Sample
Proposed Nearshore Site
Survey Transects
Underwater Video
SAV and Depth
1
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4
5
6
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8
9
A
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D
E
US Army Corps of Engineers New England District
PISCATAQUA RIVER FNP
JULY 2013 SURVEY OVERVIEW
NEWBURY, MA
N
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1,000
2,000
3,000
Feet
0
0.1
0.2
0.3
0.4
0.5
Miles
1:12,000
2012 NAIP Aerial Imagery
WGS NAD 1983
South Hampton
Seabrook
Newton
Salisbury
Amesbury
Merrimac
Newburyport
Haverhill
West Newbury
Newbury
Groveland
Georgetown
Rowley
Ipswich

CENAE–R-PT 19 August 2009

MEMORANDUM THRU:

Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch

FOR: Richard Heidebrecht, Project Manager, CENAE-EP-PP

SUBJECT: Second Suitability Determination for the Piscataqua River Federal Navigation Improvement Project (General Investigations), Newington, New Hampshire and Eliot, Maine.

1. **Project Description:**

The CENAE is proposing to dredge an area of **between 7 and 16 acres** in the **Piscataqua River** to enlarge the existing 35' deep MLLW turning basin at the upstream end of the Federal Navigation Project (FNP), near the Sprague Energy River Road Terminal. This will produce a volume in the range of approximately **270,000 to 630,000 cu. yds**. of material, depending on the navigation improvement alternative selected. Rock ledge was encountered at one boring location, B6, at a depth of -33' deep MLLW. Based on boring and seismic data, a small amount of rock (<10,000 cy) will need to be excavated and disposed of. This material is proposed to be mechanically dredged and disposed of at the Cape Arundel Disposal Site (**CADS**), the Wallis Sands Beach Disposal Site (**WSBDS**) or the Isles of Shoals Disposal Site (**ISDS**).

2. **Summary:**

This memorandum addresses compliance with the regulatory evaluation and testing requirements of 40 CFR 227.13 for unconfined open water disposal at an open ocean disposal site. This evaluation confirms that sufficient information was obtained to properly evaluate the suitability of this material for open water disposal under the guidelines and finds the sediments in the vicinity of samples 1 through 22 suitable for disposal at CADS, WSBDS or ISDS. When these conclusions are combined with the conclusions of the first Suitability Determination, dated 21 April 2009, I find that all material proposed for dredging described above is suitable for open ocean disposal.

You should note that the CADS will be closed on 10 January 2010 and will not be available for disposal of dredged material after that date. In addition, disposal at ISDS may require a Site Selection Process, which may be time consuming. The EPA favors beneficial reuse disposal at WSBDS.

3. **Sampling and Analysis:**

A sampling plan for this project was prepared on 16 August 2007. The plan called for nine cores to be taken from the project area. However, this sampling plan was not implemented because test borings were made throughout the project area as a part of the geotechnical survey. Sediment samples were taken from the borings and analyzed for sediment grain size.

A suitability determination was prepared based on this data on 21 April 2009. It found the northern section of the proposed project unsuitable for unconfined disposal as proposed based upon the grain size of the single sample in this area. That sample, B-5, is predominately silt/clay, unlike the rest of the samples, and did not meet the exclusion from further testing at 227.13 (b)(1). You opted to extensively sample the northern section and analyze the samples for grain size to delineate the area of fine grained sediment.

You, Cathy Rogers, Ben Loyd and I prepared a sampling and analysis plan for the northern part of the project. I later discussed this plan with Olga Guza, U.S. EPA, who had no objections. A grid of 22 locations around the stations B-5 and B-6 from the previous testing effort was developed.

A crew from CENAE did the sampling using a Van Veen grab. They were unable to obtain any samples from 6 of the 22 locations, despite taking 5 attempts per location. These stations appeared to the sampling crew to be rocky sediment or rock outcrops. The remaining samples were analyzed for grain size by GeoTesting Express. The results are tabulated on the attached table. Sample 16 was located close to core B-5.

4. **Ocean Dumping Act Regulatory Requirements:**
The disposal of sediments below mean low water in the Bigelow Bight is regulated according to both Section 103 of the Ocean Disposal Act and Section 404 of the Clean Water Act.

§227.13 Dredged Materials.

(a) This paragraph defines dredged materials and does not give any criteria for the evaluation of sediments.

(b) This paragraph states that proposed dredged material which meets the criteria in one of the following three paragraphs is environmentally acceptable for ocean disposal without further testing.

(b)(1) Dredged material that is predominately sand, gravel, rock, or any other naturally occurring bottom material with particle size greater than silt and is found in areas of high current or wave energy can be disposed of in a 103 site without further testing. This portion of the Piscataqua River is well known for its fast tidal currents. The NOAA-predicted tidal currents for this portion of the Piscataqua River from 15 July to 11 August 2009 varied from 2.0

knots (103 cm/second) to 4.1 knots (211 cm/second). As the material from the samples is predominately sand and gravel (0% to 31.3% fines), it does meet this exclusion and can be disposed of as proposed. See the attached table for sediment details.

(b)(2) Dredged material that is proposed for beach nourishment and is predominantly sand, gravel, or shell with grain sizes similar to the receiving beaches can be disposed of without further testing. As the material from the sample is predominately sand and is proposed for subtidal beach disposal at Wallis Sands Beach, it does meet this exclusion if disposed of at WSBDS.

(b)(3) When the dredged material is substantially the same as that at the disposal site and the dredged material is taken from a site far removed from known sources of pollution, it can be disposed of without further testing. This project's material does not meet this exclusion.

(c) This paragraph states that if the dredged material does not meet the criteria of paragraph b above, it must undergo further testing of the liquid, suspended particulate and solid phases before it can be considered acceptable for ocean disposal. This section does not apply to this portion of this project, as the material meets the criteria in paragraph b (1) above.

(d) This subsection discusses the choice of the liquid phase analytes and does not give any criteria for the evaluation of sediments.

5. Copies of the above mentioned data and of the draft suitability determination were sent to the Maine and New Hampshire DEPs, US EPA, and US F&WS for their review. The US F&WS responded to say that they had no comment on the determination. The EPA discussed the SD with me and gave their concurrence with the recommendation that this SD include current velocities.

6. If you have any questions, please contact me at (978) 318-8660.

Phillip Nimeskern

PHILLIP NIMESKERN
Project Manager,
Marine Analysis Section

Grab Location	Water Depth	% Gravel	% Sand	% Silt & Clay
1	20	No sample		
2	18.5	No sample		
3	17.7	78.0	20.7	1.3
4	10	No sample		
5	19	45.9	53.3	0.8
6	19	1.1	67.6	31.3
7	17.4	14.4	76.9	8.7
8	18.9	No sample		
9	20.1	57.0	42.1	0.9
10	15.7	41.0	58.1	0.9
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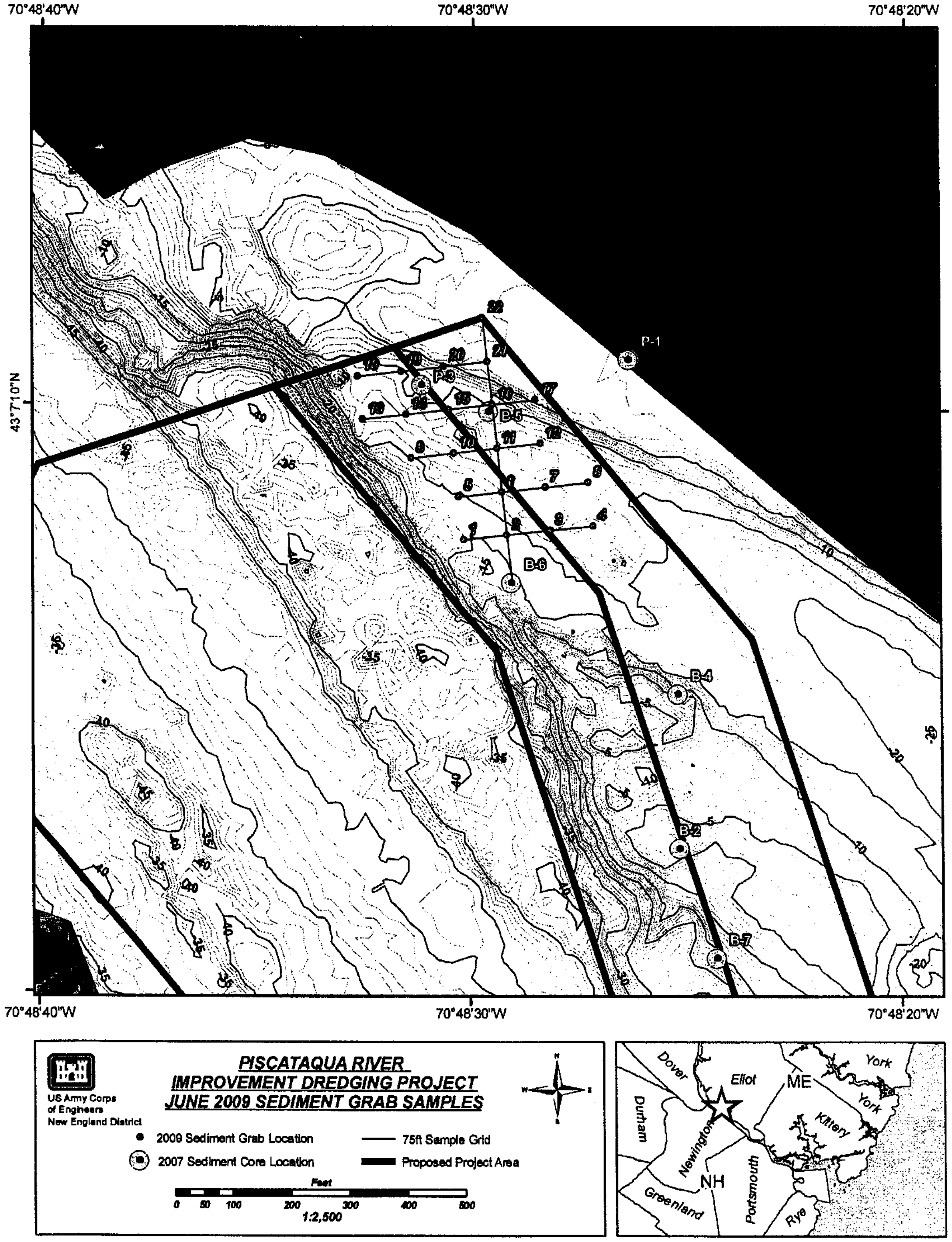
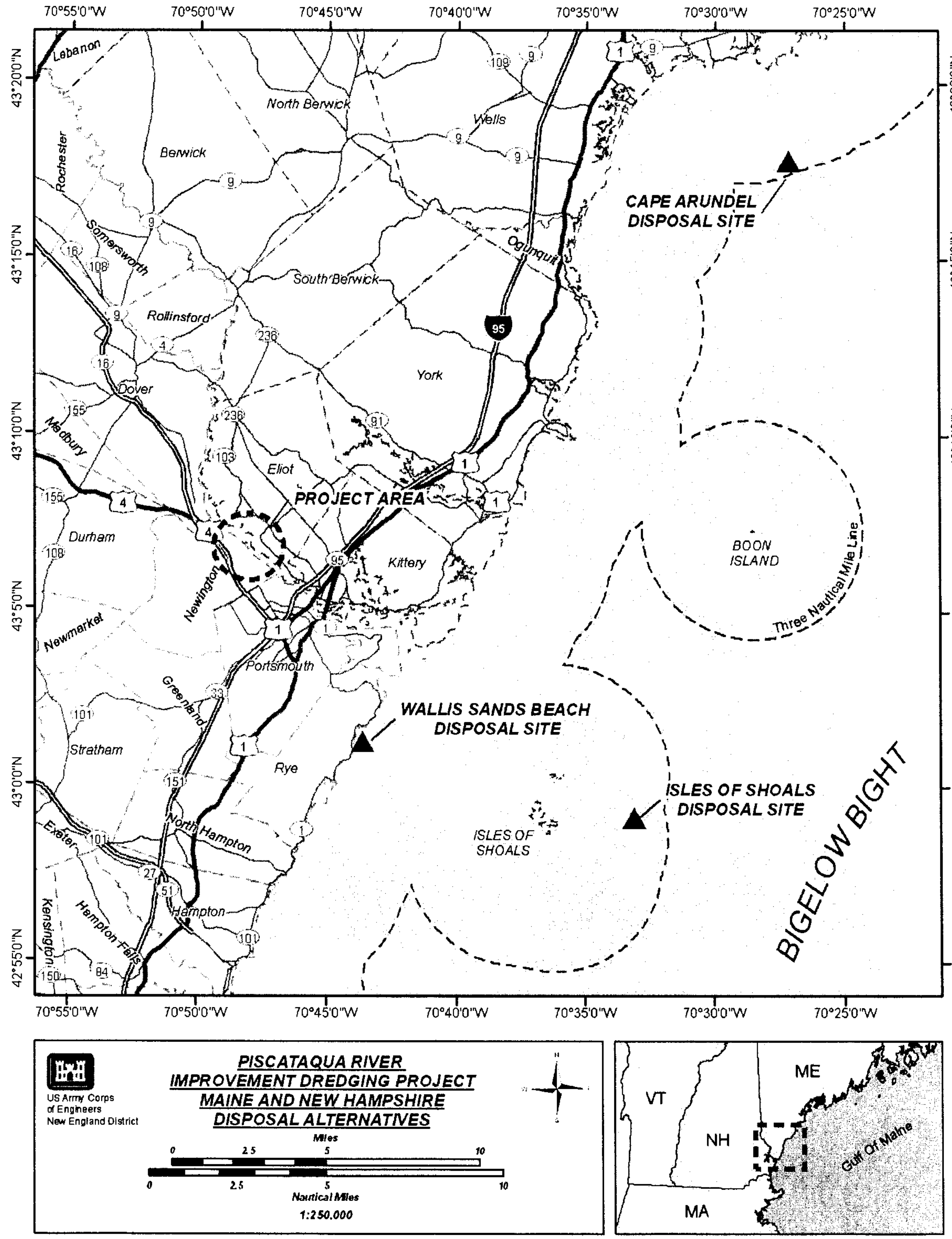
12	18.5	67.0	31.0	2.0
13	16.3	No sample		
14	14.6	11.8	85.4	2.8
15	16.6	82.1	16.9	1.0
16	17.9	0.8	90.2	9.0
17	12.5	5.7	83.4	10.9
18	15	36.8	61.5	1.7
19	7	60.9	33.5	5.6
20	10	No sample		
21	6.4	3.1	78.4	18.5
22	8	5.5	87.0	7.5

SUBJECT: Second Suitability Determination for Piscataqua River Federal Navigation Project, Newington, New Hampshire and Eliot, Maine.




70°55'0"W
70°50'0"W
70°45'0"W
70°40'0"W
70°35'0"W
70°30'0"W
70°25'0"W
43°20'0"N
43°15'0"N
43°10'0"N
43°5'0"N
43°0'0"N
42°55'0"N
Lebanon
North Berwick
Wells
Berwick
Rochester
Somersworth
South Berwick
Ogunquit
Rollinsford
York
Dover
Madbury
Eliot
PROJECT AREA
Kittery
Durham
Newington
Newmarket
Portsmouth
Greenland
Stratham
Rye
North Hampton
Exeter
Hampton
Hampton Falls
Kensington
CAPE ARUNDEL DISPOSAL SITE
BOON ISLAND
Three Nautical Mile Line
WALLIS SANDS BEACH DISPOSAL SITE
ISLES OF SHOALS DISPOSAL SITE
ISLES OF SHOALS
BIGELOW BIGHT
95
1
4
9
16
33
51
81
84
101
103
108
150
151
155
236
27
US Army Corps of Engineers New England District
PISCATAQUA RIVER IMPROVEMENT DREDGING PROJECT MAINE AND NEW HAMPSHIRE DISPOSAL ALTERNATIVES
Miles
0
2.5
5
10
Nautical Miles
1:250,000
VT
NH
ME
MA
Gulf Of Maine

CENAE–R-PT 21 April 2009

MEMORANDUM THRU:

Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch

FOR: Richard Heidebrecht, Project Manager, CENAE-EP-PP

SUBJECT: Suitability Determination for the Piscataqua River Federal Navigation Improvement Project (General Investigations), Newington, New Hampshire and Eliot, Maine.

1. **Project Description:**

The CENAE is proposing to dredge an area of **between 7 and 16 acres** in the **Piscataqua River** to enlarge the existing 35' deep MLLW turning basin at the upstream end of the Federal Navigation Project (FNP), near the Sprague Energy River Road Terminal. This will produce a volume in the range of approximately **270,000 to 630,000 cu. yds**. of material, depending on the navigation improvement alternative selected. Rock ledge was encountered at one boring location, B6, at a depth of -33' deep MLLW. Based on boring and seismic data, a small amount of rock (<10,000 cy) would need to be excavated and disposed of. This material is proposed to be mechanically dredged and disposed of at the Cape Arundel Disposal Site (**CADS**), the Wallis Sands Beach Disposal Site (**WSBDS**) or the Isles of Shoals Disposal Site (**ISDS**).

A sampling plan for this project was prepared on 16 August 2007. The plan called for nine cores to be taken from the project area. However, this sampling plan was not implemented because test borings were made throughout the project area as a part of the geotechnical survey. Sediment samples were taken from the borings and analyzed for sediment grain size. This suitability determination is based on this data.

2. **Summary:**

This memorandum addresses compliance with the regulatory evaluation and testing requirements of 40 CFR 227.13 for unconfined open water disposal at an open ocean disposal site. This evaluation confirms that sufficient information was obtained to properly evaluate the suitability of this material for open water disposal under the guidelines and finds the sandy sediments in the vicinity of cores B-1, B-2, B-3, B-4, B-6, B-7, and B-8 suitable for disposal at CADS, WSBDS or ISDS. The sediment in the vicinity of core B-5 is predominantly silt/clay and I cannot find it suitable for open ocean disposal at CADS, WSBDS or ISDS at this tier.

You should note that the CADS will be closed on 10 January 2010 and will not be available for disposal of dredged material after that date. In addition, disposal at ISDS may require a Site Selection Process, which may be time consuming. The EPA favors beneficial reuse disposal at WSBDS.

3. **Ocean Dumping Act Regulatory Requirements:**
The disposal of sediments below mean low water in the Bigelow Bight is regulated according to both Section 103 of the Ocean Disposal Act and Section 404 of the Clean Water Act.

§227.13 Dredged Materials.

(a) This paragraph defines dredged materials and does not give any criteria for the evaluation of sediments.

(b) This paragraph states that proposed dredged material which meets the criteria in one of the following three paragraphs is environmentally acceptable for ocean disposal without further testing.

(b)(1) Dredged material that is predominately sand, gravel, rock, or any other naturally occurring bottom material with particle size greater than silt and is found in areas of high current or wave energy can be disposed of in a 103 site without further testing. This portion of the Piscataqua River is well known for its fast tidal currents. As the material from Cores B-1, B-2, B-3, B-4, B-6, B-7, and B-8 is predominately sand and gravel (5.7% to 14.5% fines), it does meet this exclusion and can be disposed of as proposed. See the attached table for details.

Test borings were taken in September and November 2007. These borings parallel those of the 2007 SAP. Samples from these borings were analyzed for sediment grain size in May 2008. There were not enough sample recovered from all layers in all cores or for all cores (i.e. B3 and B6), for grain size analysis. However, the boring logs show that the cores B-1, B-2, B-3, B-4, B-6, B-7, and B-8 have surficial and underlying layers of sand and gravel. The grain size analyses support these observations. The sole exception is core B-5, which is predominately silt/clay to a depth of 10 feet below the sediment surface.

(b)(2) Dredged material that is proposed for beach nourishment and is predominantly sand gravel or shell with grain sizes similar to the receiving beaches can be disposed of without further testing. As the material from cores B-1, B-2, B-3, B-4, B-6, B-7, and B-8 is predominately sand and is proposed for subtidal beach disposal at Wallis Sands Beach, it does meet this exclusion if disposed of at WSBDS.

(b)(3) When the dredged material is substantially the same as that at the disposal site and the dredged material is taken from a site far removed from known sources of pollution, it can be disposed of without further testing. This project's material does not meet this exclusion.

(c) This paragraph states that if the dredged material does not meet the criteria of paragraph b above, it must undergo further testing of the liquid, suspended particulate and solid phases before it can be considered acceptable for ocean disposal. This section applies in part to this project, as the material from core B-5 doesn't meet any of the criteria in paragraph b above. Further analysis or alternate disposal should be considered for the material in the vicinity of core B-5. This section does not apply to the rest of this project, as the material meets the criteria in paragraph b (1) above.

(d) This subsection discusses the choice of the liquid phase analytes and does not give any criteria for the evaluation of sediments.

4. Copies of the above mentioned data and of the draft suitability determination were sent to the Maine and New Hampshire DEP, US EPA, and US F&WS for their review. The EPA responded to say that they concur with the determination but thought the CADS and ISDS should be removed from the SD and the WSBDS should be a favored disposal site. No response was received from the F&WS within the 10-day response period so their concurrence may be assumed.

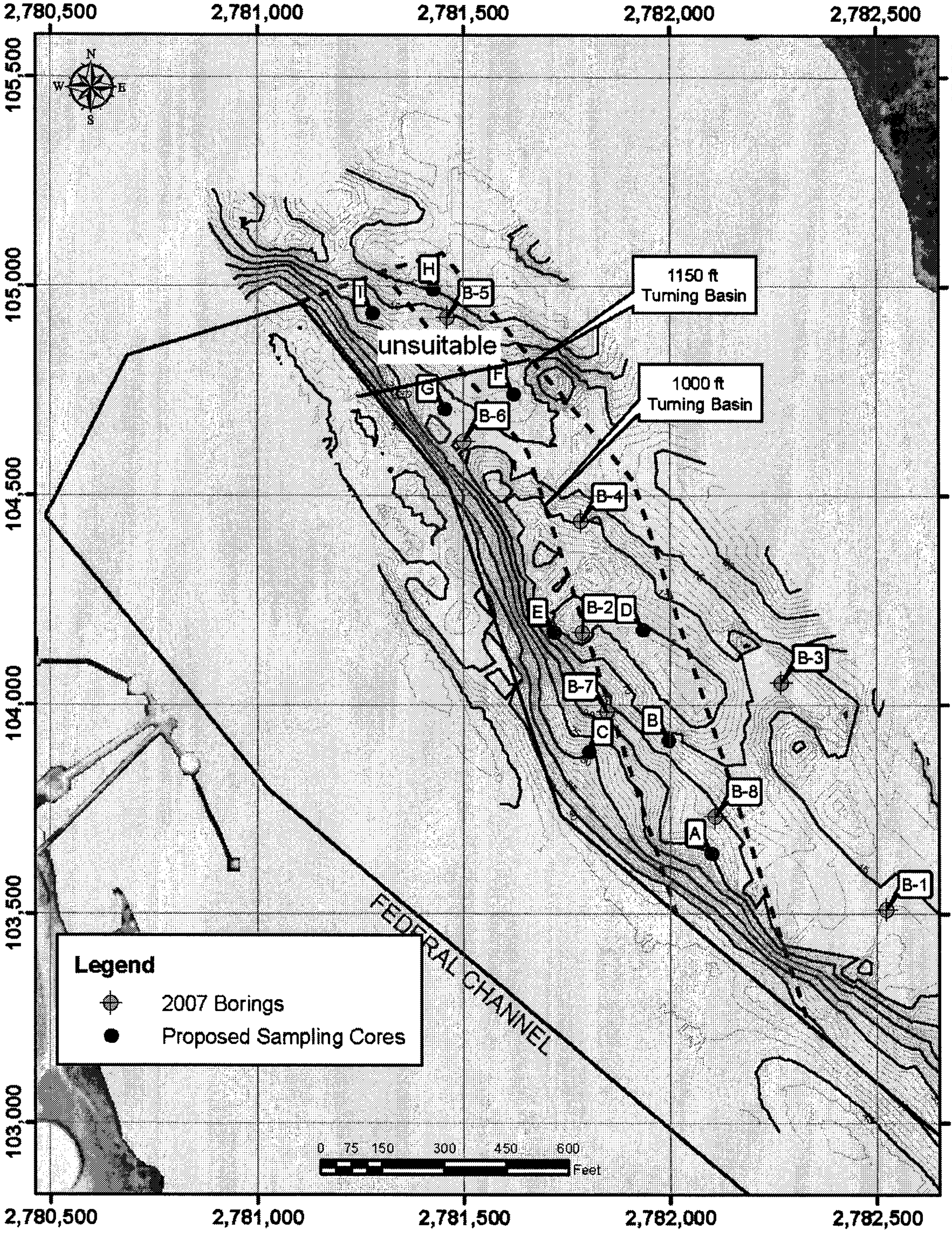
5. If you have any questions, please contact me at (978) 318-8660.

Phillip Nimeskern

PHILLIP NIMESKERN
Project Manager,
Marine Analysis Section

Boring location/ Depth below riverbed	Elevation below MLLW in feet	% gravel	% sand	% silt & clay
B-1 (20-22')	33.0 – 35.0	1.5	89.9	8.6
B-2 (10-12')	13.0 – 15.0	1.0	90.4	8.6
B-4 (15-17')	18.0 – 20.0	1.7	83.8	14.5
B-5 (0-2')	14.5 – 16.5	0.0	5.7	94.3
B-5 (10-11.8')	24.5 – 26.3	13.4	45.1	41.5
B-7 (0-2')	19.0 – 21.0	0.03	89.1	10.6
B-7 (5-7')	24.0 – 26.0	2.5	84.2	13.3
B-7 (10-12')	29.0 – 31.0	16.2	76.5	7.3
B-8 (0-2')	18.0 – 20.0	13.5	76.5	10.0
B-8 (5-7')	23.0 – 25.0	19.4	74.9	5.7

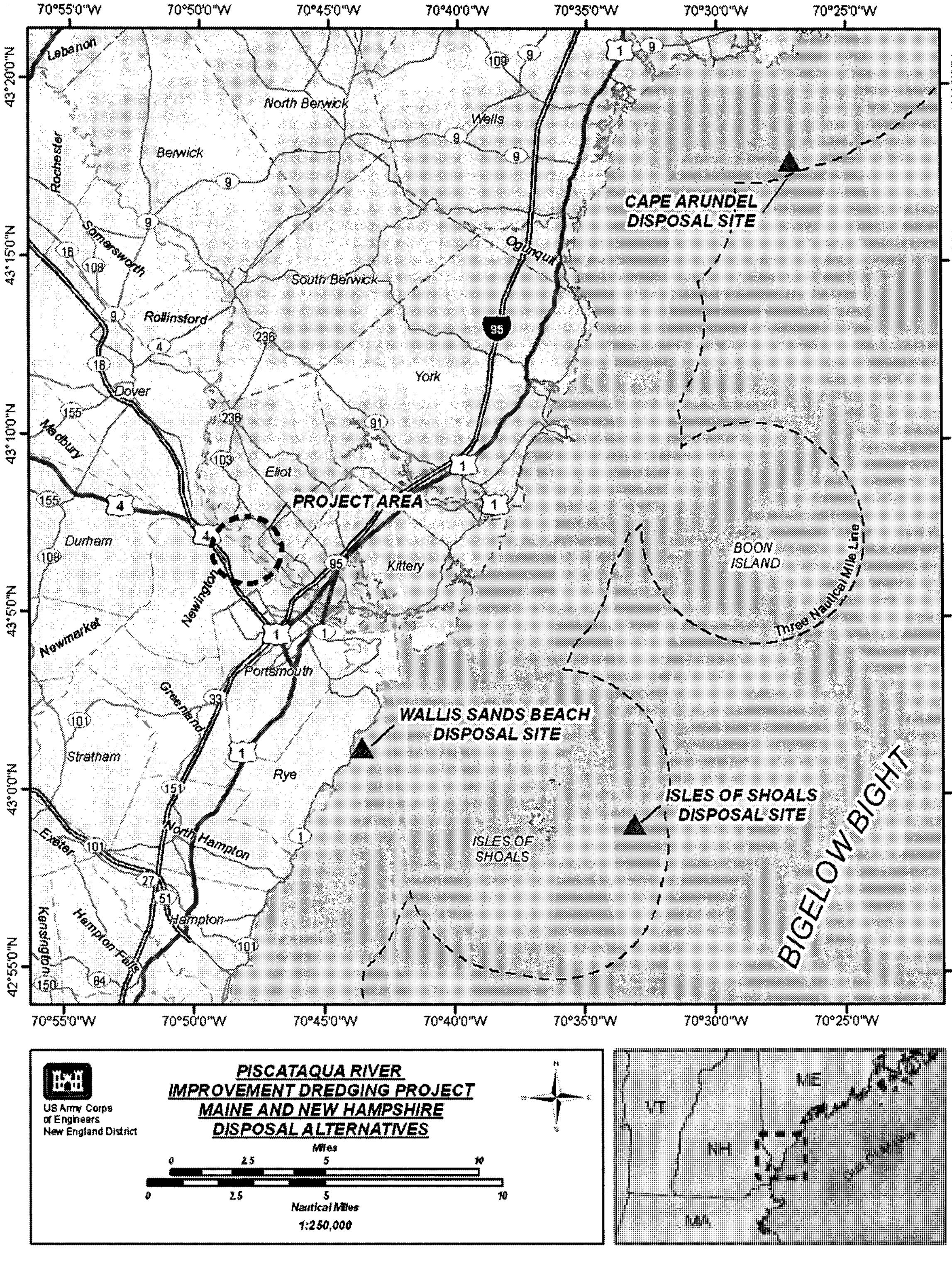
Note: Not enough material was recovered from borings B3 and B6 to perform grain size analysis.



Portsmouth Harbor, Piscataqua River
Portsmouth, NH
Locations of 2007 Borings
River Bottom Contours shown in ft, MLLW

Revised 03/24/2009
piscataqua_2400.mxd

SUBJECT: Suitability Determination for Piscataqua River Federal Navigation Project, Newington, New Hampshire.



From: Rogers, Catherine J NAE
To: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: FW: FW: Piscataqua River FNP
Date: Monday, March 30, 2009 9:26:27 AM

Another one.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Wende_Mahaney@fws.gov [mailto:Wende_Mahaney@fws.gov]
Sent: Monday, March 30, 2009 8:19 AM
To: Rogers, Catherine J NAE
Cc: Maria_Tur@fws.gov
Subject: Re: FW: Piscataqua River FNP

Catherine: The Maine Field Office has no comments on the draft suitability determination in terms of resource impacts in Maine waters.

Thanks, Wende

>>
Wende S. Mahaney, Fish and Wildlife Biologist U.S. Fish and Wildlife Service
1168 Main Street
Old Town, ME 04468
Phone: (207) 827-5938, Ext. 20
Fax: (207) 827-6099
Cellular: (207) 944-2991
Inactive hide details for Maria Tur/R5/FWS/DOIMaria Tur/R5/FWS/DOI

Maria Tur/R5/FWS/DOI

03/27/2009 03:47 PM

To

"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

cc

Wende Mahaney/R5/FWS/DOI@FWS

Subject

Re: FW: Piscataqua River FNPWende Mahaney

<Notes:///85256998006511FB/38D46BF5E8F08834852564B500129B2C/D2607ED18C7C64E487257586006C726E>

Hi Catherine,

I think you have the wrong email for Wende. I'll forward this to her. Thank you.

Maria E. Tur
U.S. Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301
Phone (603) 223-2541 x12
FAX (603) 223-0104

http://www.fws.gov/northeast/newenglandfieldoffice/
Inactive hide details for "Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

03/27/2009 03:44 PM

To

<Maria_Tur@fws.gov>

cc

"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

Subject

FW: Piscataqua River FNP

Hi Maria,

O.K., I guess Wende is no longer at FWS?? I hope you are the right recipient of this message. If not please forward to the right person. Please see message below.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560 catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Rogers, Catherine J NAE
Sent: Friday, March 27, 2009 1:59 PM
To: 'Wende_Mahaney@mail.fwa.gov'; 'Guza-Pabst.Olga@epamail.epa.gov'; 'cwilliams@des.state.nh.us'; 'Robert.Green@maine.gov'
Cc: Rogers, Catherine J NAE; Heidebrecht, Richard W NAE; Nimeskern, Phillip W NAE

Subject: FW: Piscataqua River FNP

All,

Please find attached the draft suitability determination for the Piscataqua River Federal Navigation Improvement Project. Questions can be addressed to Phill, the PM-Dick Heidebrecht, or myself.

Please provide any comments by COB April 10th.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560 catherine.j.rogers@usace.army.mil [attachment "Piscataqua FNP INTERAGENCY COORD2.doc" deleted by Wende Mahaney/R5/FWS/DOI] [attachment "Piscataqua FNP SD meeting the 103 exclusions 2.doc" deleted by Wende Mahaney/R5/FWS/DOI]

From: Rogers, Catherine J NAE
To: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: FW: FW: Portsmouth, draft 2nd SD coordination
Date: Tuesday, August 18, 2009 11:26:10 AM

FYI.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Wende_Mahaney@fws.gov [mailto:Wende_Mahaney@fws.gov]
Sent: Wednesday, August 12, 2009 1:50 PM
To: Rogers, Catherine J NAE
Cc: Maria_Tur@fws.gov
Subject: Re: FW: Portsmouth, draft 2nd SD coordination

Catherine: The Maine Field Office has no comments on this suitability determination due to other workload priorities at this time. Not sure if you are also coordinating with our New England Field Office, since part of this project is in New Hampshire.

Thanks, Wende

>>
Wende S. Mahaney, Fish and Wildlife Biologist U.S. Fish and Wildlife Service
1168 Main Street
Old Town, ME 04468
Phone: (207) 827-5938, Ext. 20
Fax: (207) 827-6099
Cellular: (207) 944-2991
Inactive hide details for "Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>

08/05/2009 02:15 PM

To

<wende_mahaney@fws.gov>

cc

Subject

FW: Portsmouth, draft 2nd SD coordination

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560 catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Rogers, Catherine J NAE
Sent: Wednesday, August 05, 2009 12:31 PM
To: 'Olga Guza (guza-pabst.olga@epa.gov)'; 'wende_mahaney@mail.fws.gov'; 'cwilliams@des.state.nh.us'; 'robert.green@maine.gov'
Cc: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE; Rogers, Catherine J NAE
Subject: FW: Portsmouth, draft 2nd SD coordination

All,

Please find attached the draft Suitability Determination for the Piscataqua River Navigation Improvement Project. Please provide comments/concurrence within the next 10 days. Please contact Phil at x660 or Dick at x513.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560 catherine.j.rogers@usace.army.mil [attachment "Portsmouth - Draft 2nd SD Coordination Memo.pdf" deleted by Wende Mahaney/R5/FWS/DOI] [attachment "Piscataqua FNP 2nd SD (2).doc" deleted by Wende Mahaney/R5/FWS/DOI]

From:	Habel, Mark L NAE
To:	Habel, Mark L NAE
Subject:	FW: Response to Piscataqua River Navigation Improvement Project Draft Suitability Determination (UNCLASSIFIED)
Date:	Friday, October 25, 2013 7:58:19 AM

Classification: UNCLASSIFIED
Caveats: NONE

From: Williams, Chris [mailto:Christian.Williams@des.nh.gov]
Sent: Thursday, April 09, 2009 2:00 PM
To: Heidebrecht, Richard W NAE
Cc: Rogers, Catherine J NAE; guza-pabst.olga@epa.gov; t.shattuck@peasedev.org; douglas.grout@wildlife.nh.gov; todd.burrowes@maine.gov; Diers, Ted
Subject: Response to Piscataqua River Navigation Improvement Project Draft Suitability Determination

Hello Dick,

The New Hampshire Coastal Program (NHCP) has received the U.S. Army Corps of Engineers' (ACOE's) Memorandum ("Memorandum") regarding the draft Suitability Determination for the Piscataqua River Federal Navigation Improvement Project (FNIP) in Newington, New Hampshire and Eliot, Maine. The Memorandum describes the approximate volume and nature of the material that will be dredged to enlarge the existing uppermost turning basin in the Piscataqua River. It also lists three potential sites for the disposal of the majority of the dredged material: 1) Cape Arundel Disposal Site (CADS); 2) Isles of Shoals Disposal Site (ISDS); and 3) Wallis Sands Beach Disposal Site.

The NHCP has concerns with proposed use of CADS for the placement of the material for the Piscataqua River FNIP. As you know, use of CADS is scheduled to end in January 2010, even though construction of the Piscataqua River FNIP is not likely to begin until 2012, at the earliest. Furthermore, even if CADS were to remain open after January 2010, the estimated minimum volume of material produced by the project, 270,000 yd^3, exceeds the ACOE's estimated remaining capacity at CADS of 200,000 yd^3. For these reasons, the NHCP finds that CADS does not appear to be a practicable alternative for disposal of the material from the project. Moreover, neither does the ISDS. It is the understanding of the NHCP that the ISDS, which has not been used since 1971, is closed. Evidence to support this can be found in the 1994 report prepared for the ACOE entitled A Dredged Material Management Study for Coastal Maine and New Hampshire, which states "Currently, disposal of dredged materials is not allowed at the Isles of Shoals." Further evidence can be found in the 1999 document entitled Dredging in New Hampshire, prepared by the NHCP, which states that the Isles of Shoals Disposal Site is "…no longer active…" This is likely the reason why the ISDS is not listed in ACOE's Ocean Disposal Database nor identified as part of the ACOE's Disposal Area Monitoring System program.

Based on the information above, the NHCP recommends that the ACOE address the feasibility of utilizing alternative disposal locations to CADS and the ISDS. Grain size information provided in the Memorandum indicates that the majority of the material found at the project site is sand. While subtidal disposal off the beach at Wallis Sands State Park may be a practicable alternative for this material, are there other beaches in the region that could benefit from the addition of sand from the project? There are a number of beaches here in New Hampshire, as well as in York, Ogunquit and Wells, Maine, located closer to the project site than CADS, for which beach nourishment may be a practicable alternative. Similarly, it appears that practicable alternatives may exist to hauling the estimated amount of rock (< 10,000 yd^3) produced by the project to CADS or the ISDS. One such alternative involves the beneficial use of the rock to create an artificial reef to add structure to existing sandy/silty areas outside the federal navigation channel of the Piscataqua River or offshore. The NHCP has discussed this alternative with the New Hampshire Fish & Game Department (NHF&G) and recommends further consultation with NHF&G regarding this issue. With regard to the predominantly silt and clay material found in the vicinity of core B-5, the NHCP recommends reviewing potential upland disposal options. For example, there may be a need for this type of material from one or more of the municipalities (in New Hampshire and/or Maine) located along the Piscataqua River. The NHCP recognizes that the practicability of a particular upland disposal location will likely depend, in part, on the amount of material available. Once the ACOE determines the estimated amount of silt and clay material to be produced by the project, the NHCP would be glad to assist with efforts to identify potential users of this material.

Finally, as you are probably aware, the NHCP and the Pease Development Authority Division of Ports and Harbors have developed a Regional Dredged Material Management Plan (DMMP) aimed at addressing the future dredged material disposal needs of New Hampshire and southern Maine. The DMMP is comprised of an Ocean Disposal Site Designation Study and a Comprehensive Upland Dredge Material Disposal Study. The DMMP is a priority for the state of New Hampshire, and we have requested a Congressional appropriation for it in the ACOE's FY 2010 budget. Should monies be made available for the DMMP in FY2010, the ACOE could begin the scoping process for the environmental impact statement needed to formally designate CADS and consider alternative offshore disposal sites. This exercise, along with efforts to initiate the feasibility phase of the New Hampshire Comprehensive Upland Dredge Material Disposal Study, would help inform the decision-making process for identifying practicable disposal sites for the dredge material from the Piscataqua River FNIP.

The NHCP appreciates the opportunity to comment on the above-referenced memorandum. Please feel free to contact me should you have any questions.

Chris

Christian Williams

Federal Consistency Coordinator

NH Coastal Program

Pease Field Office

50 International Drive, Suite 200

Portsmouth, NH 03801

Phone: (603) 559-0025

Fax: (603) 559-1510

Classification: UNCLASSIFIED
Caveats: NONE

From: Rogers, Catherine J NAE
To: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: FW: Piscataqua River FNP
Date: Monday, March 30, 2009 9:24:18 AM

Good to go for Maine.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Green, Robert [mailto:Robert.Green@maine.gov]
Sent: Monday, March 30, 2009 8:59 AM
To: Rogers, Catherine J NAE
Subject: RE: Piscataqua River FNP

Good morning,

The DEP has no comment on the draft suitability determination.

Bob.

Robert L. Green, Jr., Project Manager
Division of Land Resource Regulation
Bureau of Land and Water Quality
tel: 207-822-6350
fax: 207-822-6303

-----Original Message-----
From: Rogers, Catherine J NAE [mailto:Catherine.J.Rogers@usace.army.mil]

Sent: Friday, March 27, 2009 1:59 PM
To: Wende_Mahaney@mail.fwa.gov; Guza-Pabst.Olga@epamail.epa.gov; cwilliams@des.state.nh.us; Green, Robert
Cc: Rogers, Catherine J NAE; Heidebrecht, Richard W NAE; Nimeskern, Phillip W NAE
Subject: FW: Piscataqua River FNP

All,

Please find attached the draft suitability determination for the Piscataqua River Federal Navigation Improvement Project. Questions can be addressed to Phill, the PM-Dick Heidebrecht, or myself.

Please provide any comments by COB April 10th.

Thanks,
Catherine J. Rogers
Environmental Resources Section

From: Guza-Pabst.Olga@epamail.epa.gov
To: Rogers, Catherine J NAE
Cc: Rogers, Catherine J NAE; Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: RE: Piscataqua River FNP
Date: Tuesday, April 21, 2009 11:41:20 AM

You stated it correctly.

Olga Guza
Environmental Scientist
USEPA Region 1
Boston, MA
Telephone - 617-918-1542
Fax 617-918-0542

```
             "Rogers,
             Catherine J NAE"
             <Catherine.J.Rog                                  To
             ers@usace.army.m          "Nimeskern, Phillip W NAE"
             il>                       <Phillip.W.Nimeskern@usace.army.m
                                       il>
             04/21/2009 11:39                                  cc
             AM                        "Heidebrecht, Richard W NAE"
                                       <Richard.W.Heidebrecht@usace.army
                                       .mil>, Olga
                                       Guza-Pabst/R1/USEPA/US@EPA,
                                       "Rogers, Catherine J NAE"
                                       <Catherine.J.Rogers@usace.army.mi
                                       l>
                                                              Subject
                                       RE: Piscataqua River FNP
```

Phil,

I just spoke with Olga and she has the following comments on above
subject
(Olga correct me if I misstate anything):

1) CADS is closing January 2010, so it is not a viable option and should
not
be included in the memo. I suggest putting that statement in the SD as
a
reference why it is not discussed.
2) Any disposal at the Isle of Shoals Site will require a Site Selection
Process, which can be quite lengthy.
3) Placement of the sandy material on Wallis Sands Beach as beneficial
reuse

is favored.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Rogers, Catherine J NAE
Sent: Friday, April 17, 2009 4:37 PM
To: 'Guza-Pabst.Olga@epamail.epa.gov'
Cc: Nimeskern, Phillip W NAE; Heidebrecht, Richard W NAE
Subject: FW: Piscataqua River FNP
Importance: High

Hi Olga,

Just wanted to make sure you didn't have any comments before Phil
finalizes
his suitability determination.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Rogers, Catherine J NAE
Sent: Friday, March 27, 2009 1:59 PM
To: 'Wende_Mahaney@mail.fwa.gov'; 'Guza-Pabst.Olga@epamail.epa.gov';
'cwilliams@des.state.nh.us'; 'Robert.Green@maine.gov'
Cc: Rogers, Catherine J NAE; Heidebrecht, Richard W NAE; Nimeskern,
Phillip W
NAE
Subject: FW: Piscataqua River FNP

All,

Please find attached the draft suitability determination for the
Piscataqua
River Federal Navigation Improvement Project. Questions can be
addressed to
Phill, the PM-Dick Heidebrecht, or myself.

Please provide any comments by COB April 10th.

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers

From: Guza-Pabst.Olga@epamail.epa.gov
To: Heidebrecht, Richard W NAE
Cc: Rogers, Catherine J NAE; cwilliams@des.state.nh.us; Geno Marconi; Nimeskern, Phillip W NAE; robert.green@maine.gov
Subject: Re: Portsmouth Harbor 2nd Suitability Determination (SD)
Date: Thursday, August 27, 2009 10:57:47 AM

I concur with the 2nd SD as written.

Olga Guza
Environmental Scientist
USEPA Region 1
Boston, MA
Telephone - 617-918-1542
Fax 617-918-0542

"Heidebrecht, Richard W NAE" <Richard.W.Heidebrecht@usace.army.mil>
08/26/2009 05:27 PM

To
<robert.green@maine.gov>, Olga Guza-Pabst/R1/USEPA/US@EPA, "Geno Marconi" <g.marconi@peasedev.org>, <cwilliams@des.state.nh.us>

cc
"Rogers, Catherine J NAE" <Catherine.J.Rogers@usace.army.mil>, "Nimeskern, Phillip W NAE" <Phillip.W.Nimeskern@usace.army.mil>

Subject
Portsmouth Harbor 2nd Suitability Determination (SD)

All,

Attached is the final SD for your information.

Thanks,
Dick H.

Richard W. Heidebrecht, P.E.
Project Manager
New England District
Corps of Engineers
696 Virginia Road
Concord, MA 01742

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

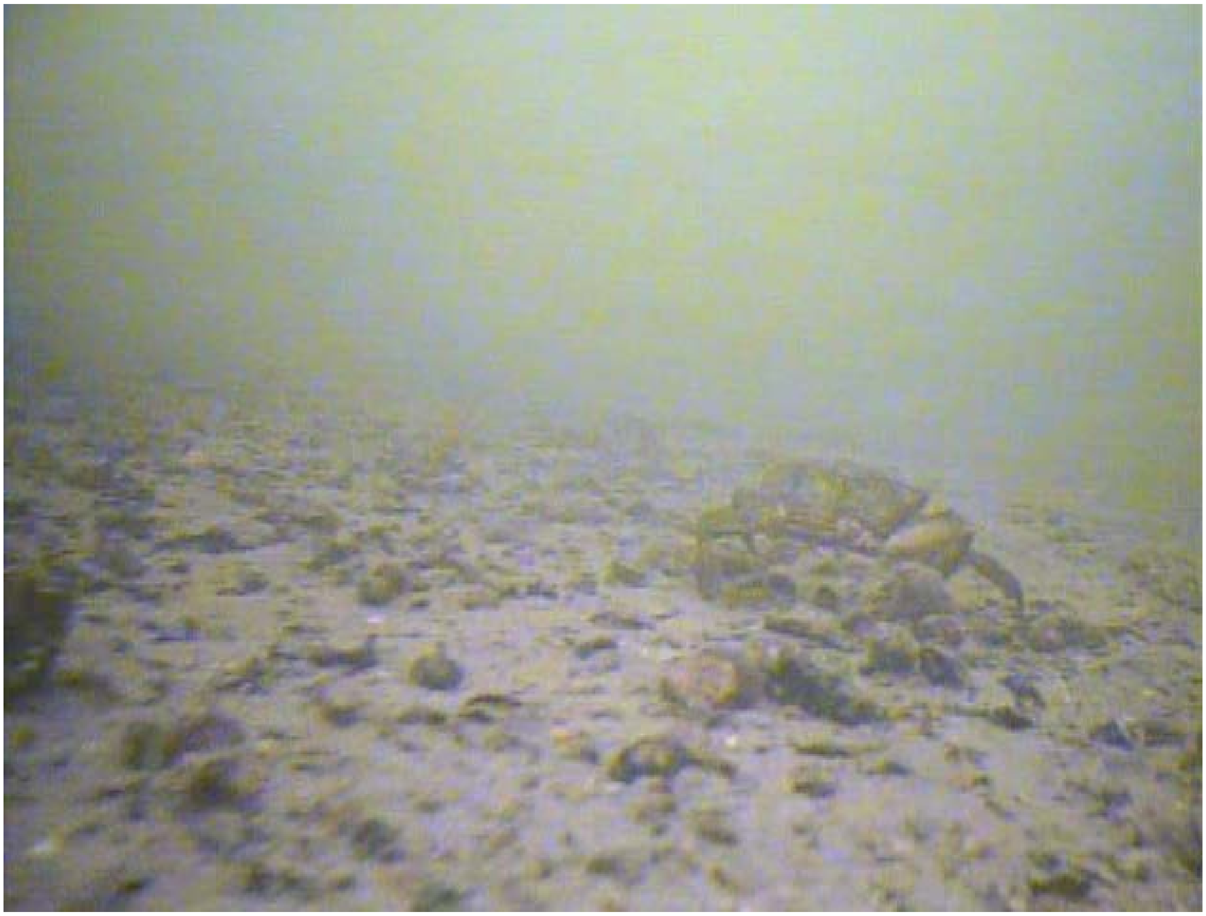
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX L

EELGRASS VIDEO SURVEY
AND BENTHIC COMMUNITY DATA
FOR THE
PORTSMOUTH TURNING BASIN DREDGING SITE

This appendix presents the results of two investigations of the Portsmouth Harbor upper turning basin expansion. The first is a video survey to determine the presence or absence of eelgrass in the dredge area. The second is an analysis of the benthic community from sediment samples taken from the dredge area.

TRIP REPORT
Piscataqua River Turning Basin
Underwater Video Survey
and Sediment Sampling
Long Sands Beach Nearshore Placement Site
Maine and New Hampshire



US ARMY CORPS
OF ENGINEERS
New England District

November 2009

1.0 INTRODUCTION

The objective of this trip was to perform a video survey to confirm the presence or absence of eelgrass in the vicinity of the proposed project area in the Piscataqua River and to collect sediment grabs from the proposed nearshore disposal site at Long Sands Beach in York, ME. The sediment grab samples were collected to evaluate site suitability and potential impacts to the benthic community.

2.0 MATERIALS AND METHODS

The video survey and sediment sampling efforts were conducted on November 5, 2009. Work was carried out on board the 24 foot Corps of Engineers Environmental Survey Launch (CEESL). In attendance were U.S. Army Corps of Engineers (USACE) marine ecologists, Todd Randall, and Ben Loyd, and Department of the Army intern Jesse Morrill-Winter. Positioning was achieved using a Garmin GPSMAP 492 WAAS enabled chart plotter and Garmin external antenna.

General areas for the video survey (i.e., proposed dredging areas and historic eelgrass areas) were plotted on the Garmin chart plotter prior to the start of field activities. Individual points for the video survey were chosen in the field (Figure 1) based on comments from Dr. Fred Short of the University of New Hampshire indicating that historic eelgrass beds had been reestablished in the area to the north of the proposed project area. Each point was recorded on the Garmin chart plotter along with the vessel track for the duration of the video feed at each station. Video footage was collected using a Sea Viewer Sea-Drop 950 Underwater Video Camera and recorded to an onboard DVR system outfitted with an LCD monitor for real time viewing. The camera was deployed off the bow of the vessel. Depth and directional adjustments were made manually by USACE personnel positioned on the bow.

Sediment grab locations at the proposed Long Sands Nearshore Disposal Site (see Figure 2) were selected by USACE team members prior to sampling activities with the intent to represent surficial sediments adequately throughout the disposal site. These locations were stored on the Garmin chart plotter which was used for navigation in the field. Sediment samples were collected by USACE personnel using a $0.04 m^2$ Van Veen grab which was retrieved with a commercial grade pot hauler mounted on the CEESL.

The first grab from each station was transferred to a sample container and set aside for grain size analysis. The contents of the second grab were washed through a # 35 (0.5 mm) sieve, and the material retained was transferred to a sample container where it was treated with the biological stain rose bengal and preserved in a 10% formalin solution for benthic community analysis.

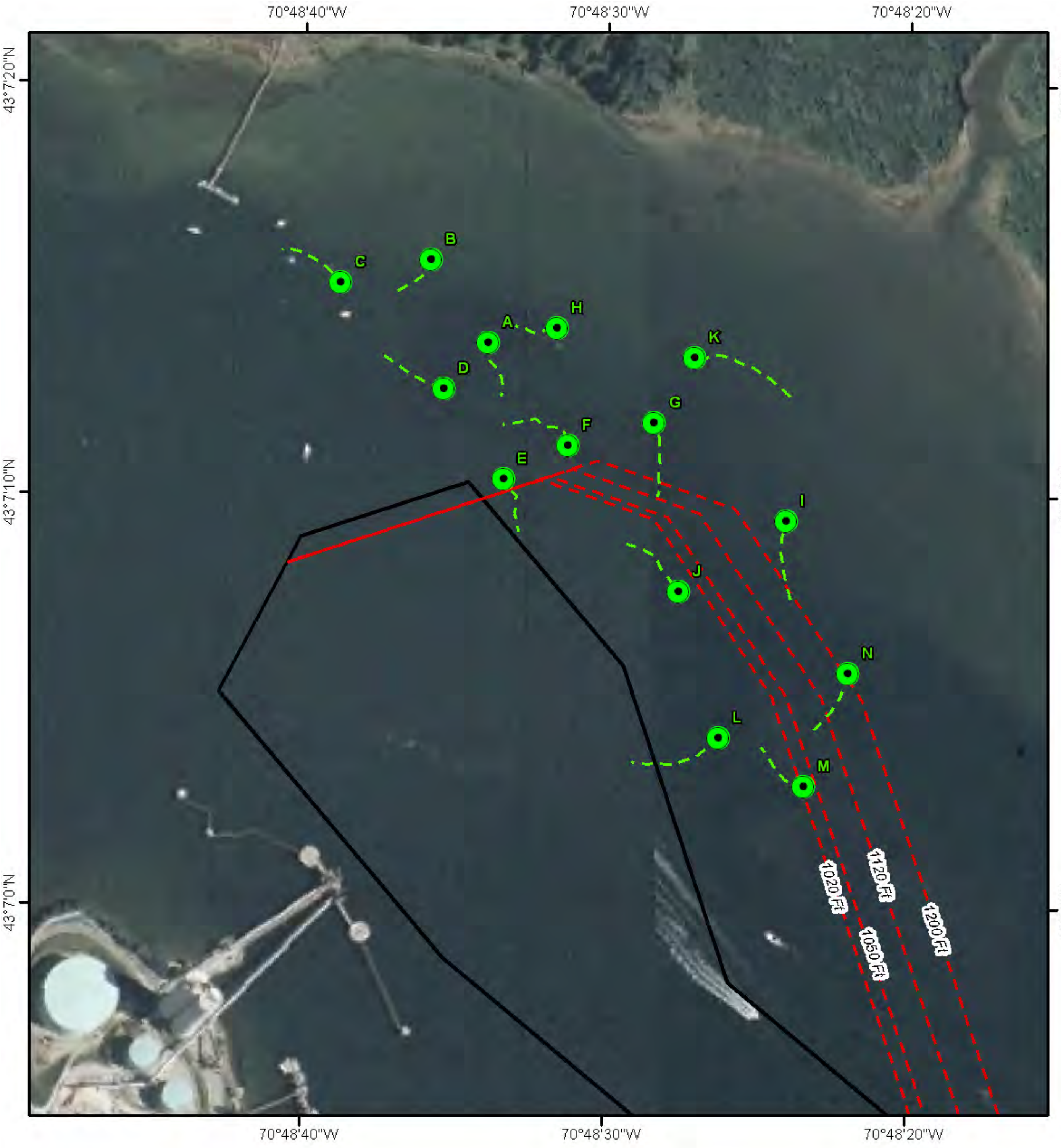
3.0 RESULTS

A video survey was successfully carried out by the above USACE personnel in the vicinity of the proposed project area in the Piscataqua River which were reported to have eelgrass beds. Depths in the area surveyed ranged from 5 to 24 feet at the time of survey (intertidal to 19 feet adjusted to MLLW). No eelgrass was observed in the survey area. Bottom type consisted of sand with cobble gravel and shell, and several areas with dense kelp beds. A record of the video survey log is presented in Table 1. Screen captures from each of the video survey stations can be found in Appendix A.

Sediment grabs were collected by USACE personnel at each of the 5 sample locations at the Long Sands Beach Nearshore Disposal Site. Sediments in the sample area uniformly consisted of well graded, medium to fine grained brownish-gray sand (see Table 1). Samples from stations LS1, LS2, LS4, and LS5 all contained polychaete worm tubes. The sample from station LS1 also included a green crab (*Carcinus maenas*) and a sand dollar (*Echinarachnius parma*). Two attempts were required to retrieve sufficient sample volume at each of the five locations. Grain size samples were transported to Geotesting Express in Boxborough, MA. Samples for benthic community analysis were sent to the Bigelow Lab for Ocean Sciences in West Boothbay Harbor, ME.

TABLE 1. Video Survey Log

Station	Easting NAD 83	Northing NAD83	Depth (ft)	Water Temp (°F)	Comments
A	-70.8094	43.12047	9.5	53.6	Sandy bottom with some gravel and shell. Hermit crabs noted.
B	-70.8099	43.12103	5.1	52.3	Sandy bottom with some gravel and shell.
C	-70.8108	43.12087	11.2	51.6	Sandy bottom with gravel cobble and shell. Patches of green algae.
D	-70.8098	43.12016	6.2	52.2	Sand, gravel, and some shell. Kelp bed with red algae.
E	-70.8093	43.11955	17.9	52.2	Sandy bottom with cobble, gravel, and some shell. Several small boulders. Patches of green algae.
F	-70.8087	43.11978	7.9	52.3	Sandy bottom with cobble, gravel, and some shell. Green crab noted.
G	-70.8079	43.11994	8.2	52.2	Sand bottom with scattered gravel and shell. Hermit crabs noted.
H	-70.8088	43.12057	7.6	52.1	Sandy bottom with gravel and shell.
I	-70.8067	43.11928	6.9	52.3	Sandy bottom. Dropped to 19 feet at end and still all sand.
J	-70.8076	43.1188	18.3	52.4	Sand and shell with gravel.
K	-70.8075	43.12038	6.0	52.7	Sand with scattered gravel and shell. Spider crab noted.
L	-70.8073	43.11781	13.5	52.4	Thick kelp bed on edge of channel.
M	-70.8065	43.11749	10.4	52.0	Gravel and shell bottom adjacent to kelp bed.
N	-70.8061	43.11825	24.4	52.5	Sandy bottom with cobble, gravel, and some shell.



US Army Corps
of Engineers
New England District

PISCATAQUA RIVER
IMPROVEMENT DREDGING PROJECT
NOVEMBER 2009 SAV SURVEY

Survey Track	Proposed Alternatives
Survey Point	Existing Project Area

Feet

0 100 200 400 600 800 1,000

2003 AERIALS FROM MEGIS WEBSITE

1:4,000

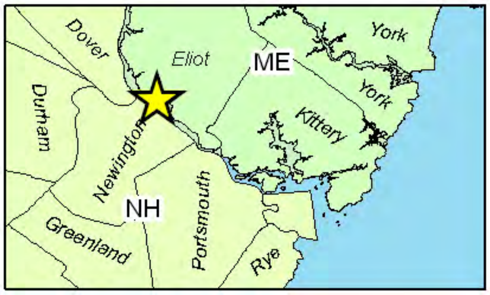
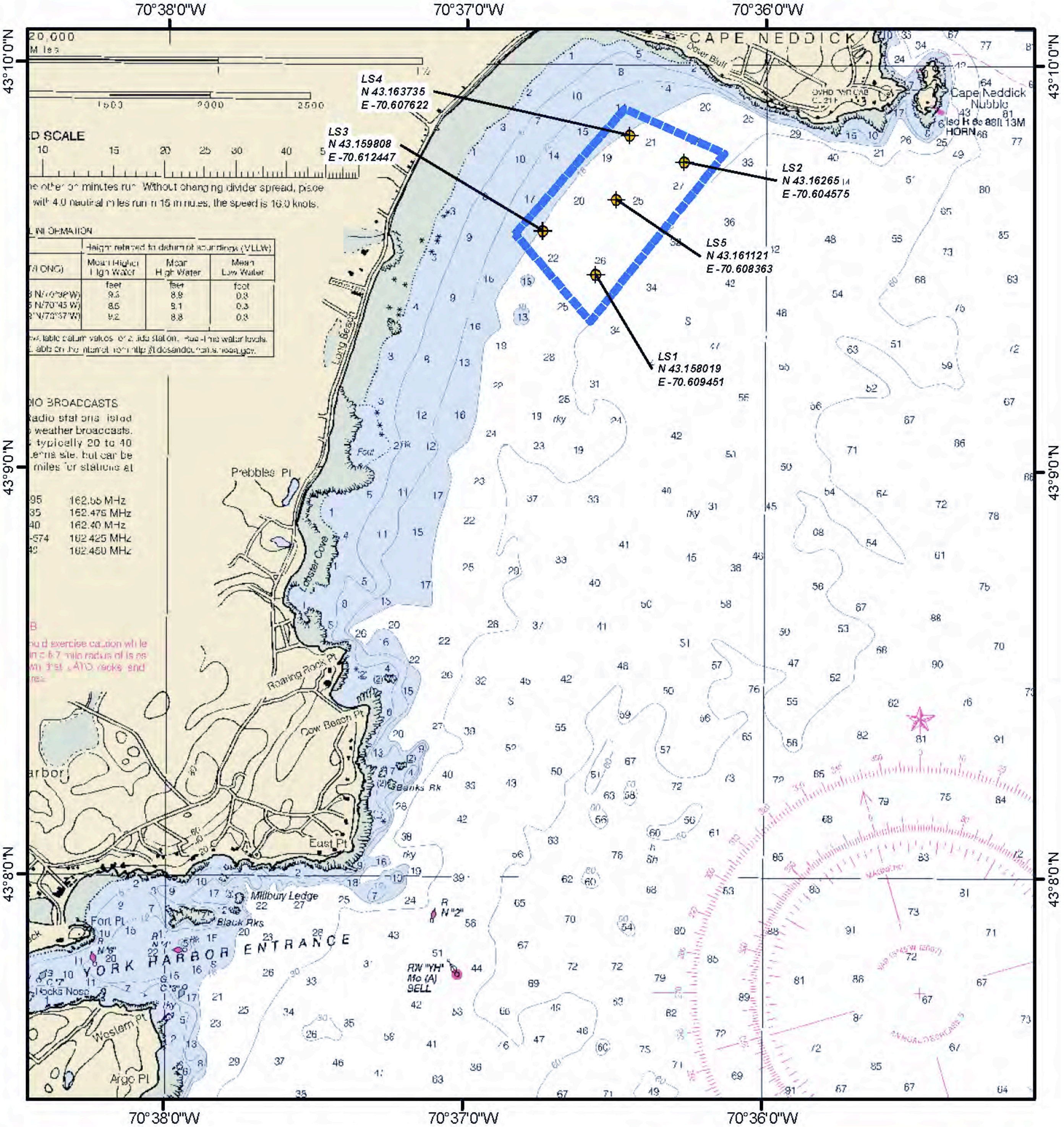


Figure 1



LONG SANDS BEACH
NEARSHORE DISPOSAL SITE
NOVEMBER 2009 BENTHIC STATIONS

US Army Corps
of Engineers
New England District

Proposed Disposal Site — Sample Station

Feet
0 500 1,000 2,000 3,000 4,000 5,000
1:24,000

NOAA CHART 13283

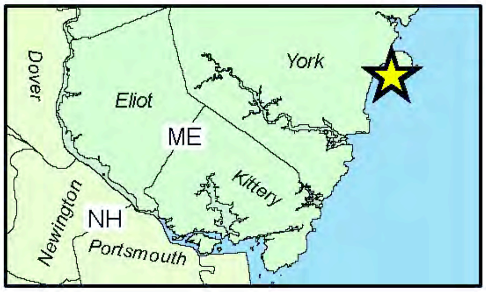


Figure 2

Data from samples taken offshore of Long Sands Beach, York, Maine, as part of investigations for potential nearshore berm placement sites for dredged sand from the Piscataqua River are presented in Appendix O.

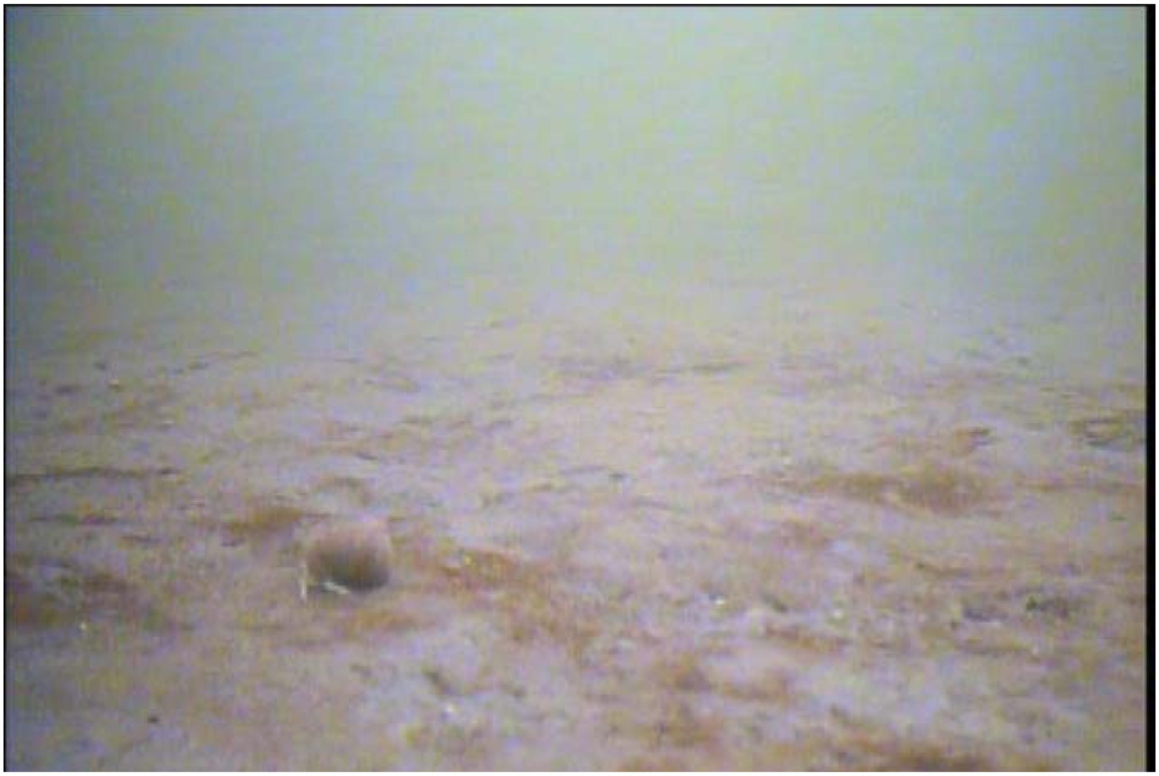
APPENDIX A

VIDEO SURVEY SCREEN CAPTURES

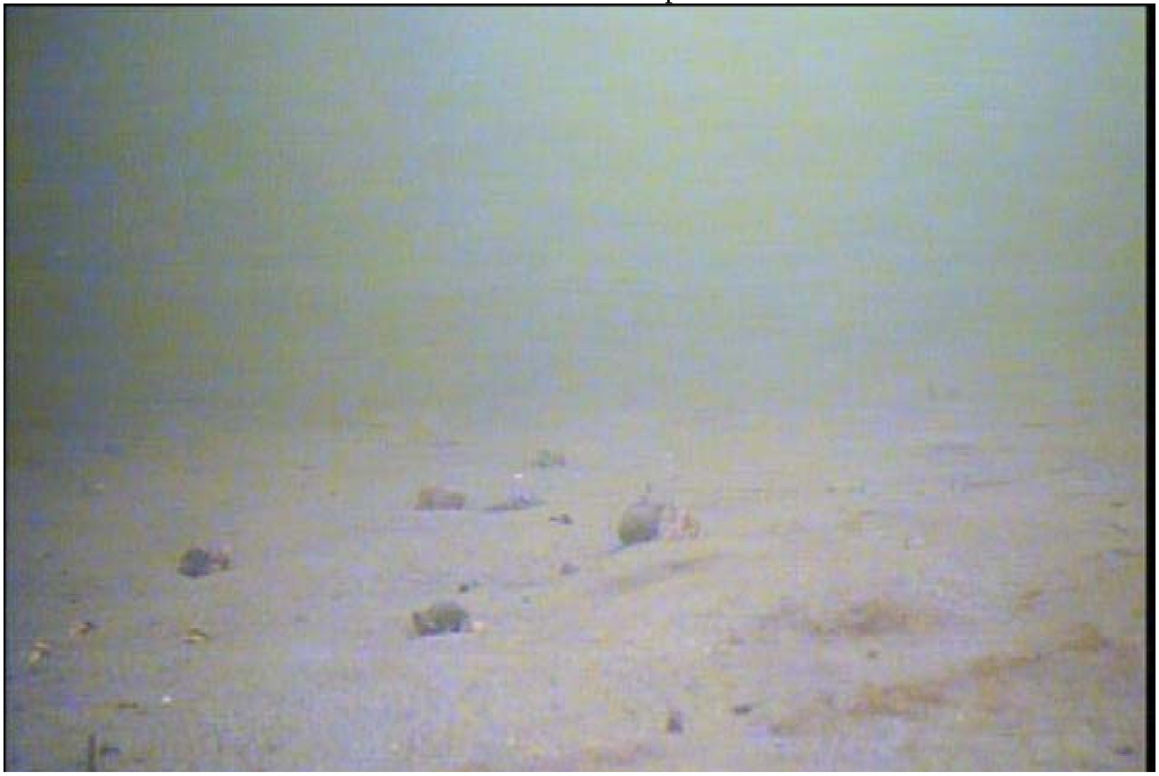
PORTSMOUTH HARBOR AND PISCTAQUA RIVER

UPPER TURNING BASIN EXPANSION

Appendix A: Video Survey Screen Captures



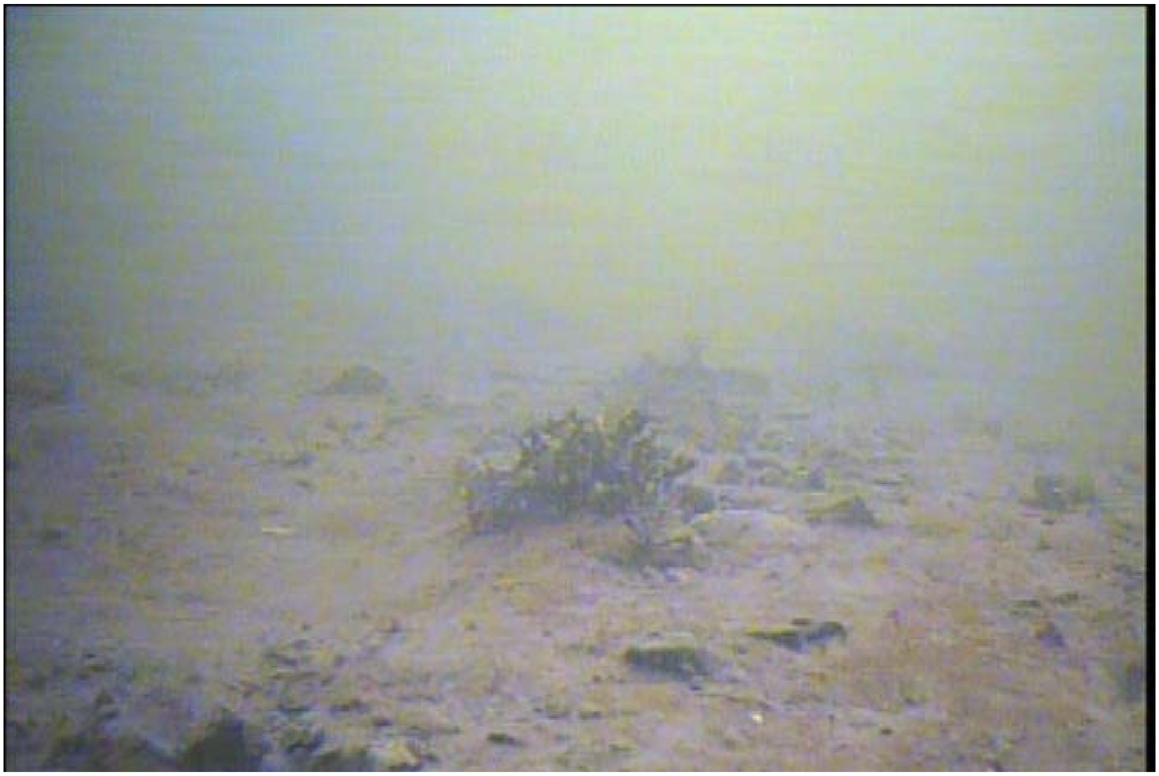
Station A Screen Capture 1



Station A Screen Capture 2

Station B Screen Capture 1

Station B Screen Capture 2

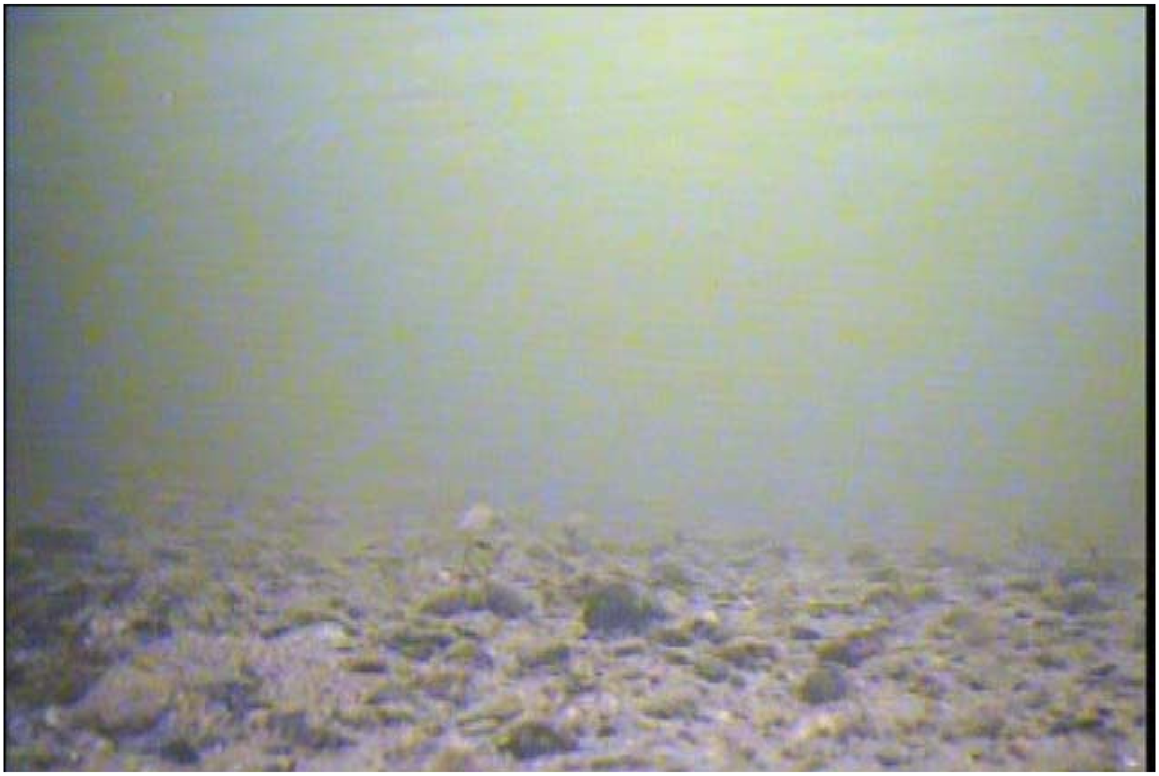


Station C Screen Capture 1

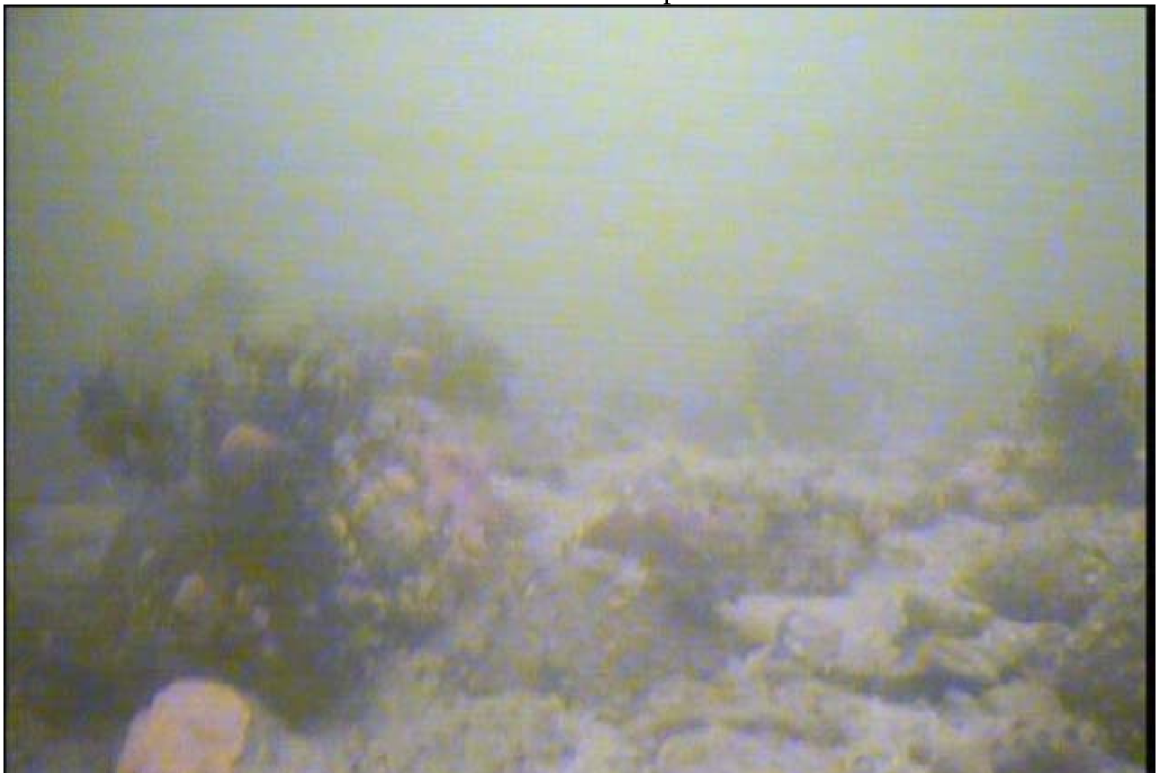
Station C Screen Capture 2

Station D Screen Capture 1

Station D Screen Capture 2



Station E Screen Capture 1



Station E Screen Capture 2

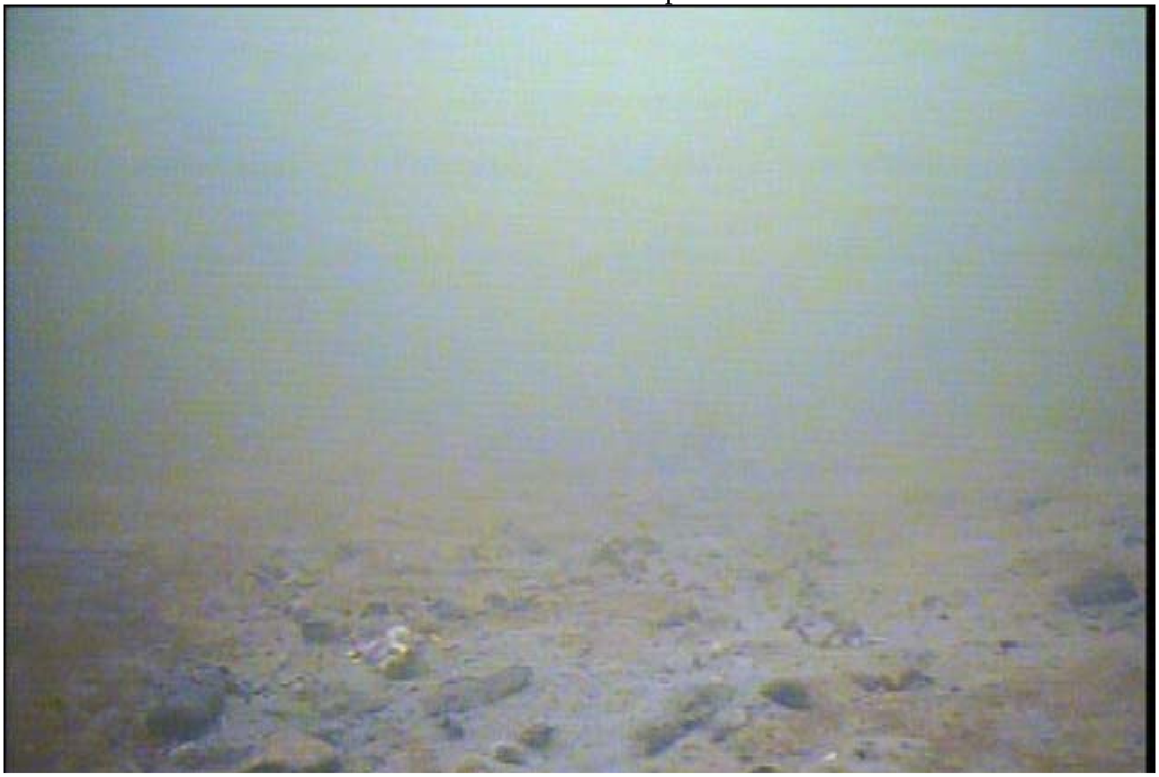
Station F Screen Capture 1

Station F Screen Capture 2

Station G Screen Capture 1

Station G Screen Capture 2

Station H Screen Capture 1



Station H Screen Capture 2

Appendix A: Video Survey Screen Captures

Station I Screen Capture 1

Station I Screen Capture 2

Station J Screen Capture 1

Station J Screen Capture 2

Station K Screen Capture 1

Station K Screen Capture 2

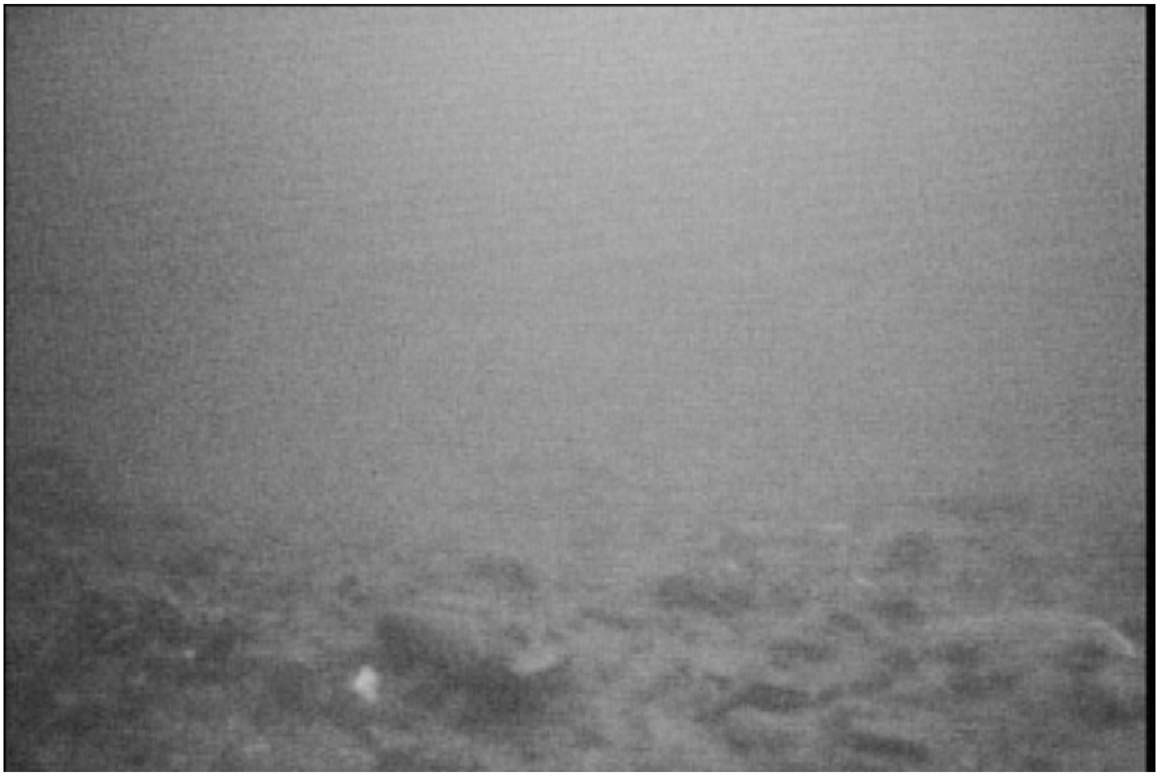
Station L Screen Capture 1

Station L Screen Capture 2

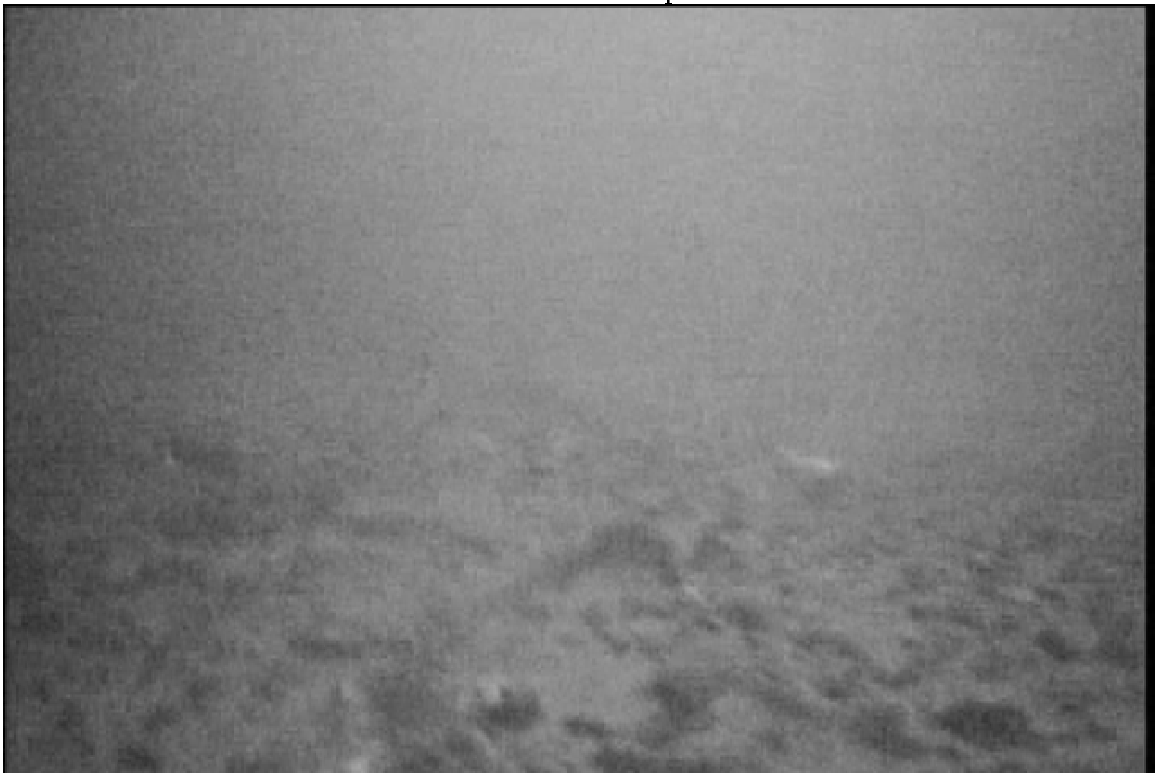
Appendix A: Video Survey Screen Captures

Station M Screen Capture 1

Station M Screen Capture 2

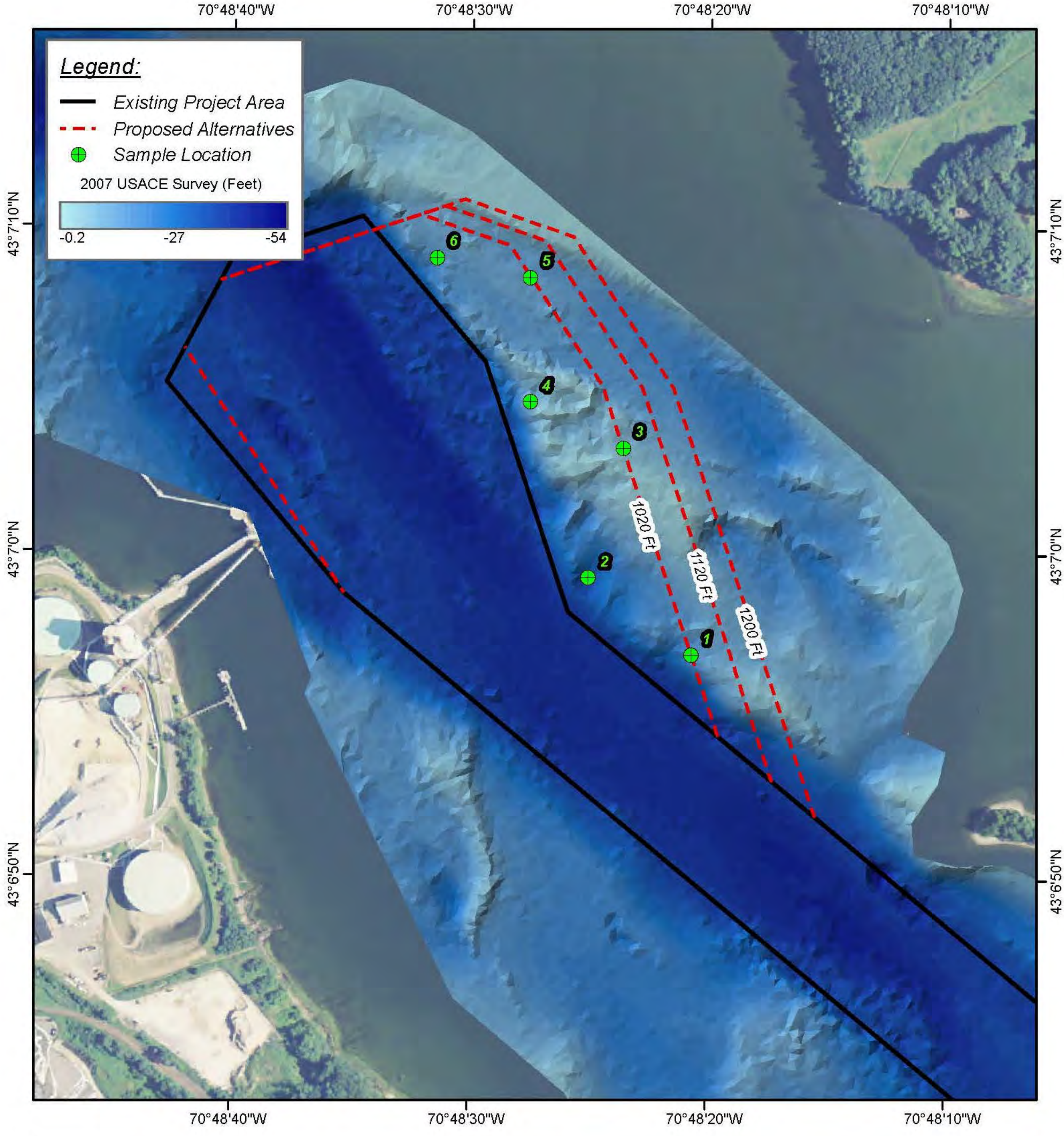


Station N Screen Capture 1



Station N Screen Capture 2

BENTHIC COMMUNITY DATA
PORTSMOUTH HARBOR AND PISCTAQUA RIVER
UPPER TURNING BASIN EXPANSION



US Army Corps
of Engineers
New England District

PISCATAQUA RIVER IMPROVEMENT DREDGING PROJECT 2007 BENTHIC SAMPLE LOCATIONS

0 100 200 300 Meters

0 250 500 750 1,000 Feet

1:5,000

NOS NE ATLANTIC DEM

GCS NAD 1983

TABLE B-1. Benthos collected in the Piscataqua River Turning Basin (Stations 1- 6) on September 11, 2007. Density values are per 0.04m^2.

SPECIES	STA. 1	STA. 2	STA. 3	STA. 4	STA. 5	STA. 6
ANNELIDA						
POLYCHAETA						
Leitoscoloplos fragilis		7	8			28
Phyllodoce mucosa	5	8	4	7	6	9
Lepidonotus squamatus		1	8	10	1	13
Nereis aren aceodonta		1	8		1	6
Pygospio eleganss		5	3		14	
Exogone hebes		8	1			
Polycirrus eximius	1	8	4		12	16
Eulalia viridis				1		3
Clymenella torquata						2
Harmothoe imbricata				1		3
Podarke obscura				1	2	
Autolytus prolifera				1	1	4
Paradoneis lyra					7	
Exogone dispar					4	
Spio sp.					1	
Streptosyllis arenae					1	
Pontogeneia inemius						3
Ninoe nigripes						1
Acmira catherinae					11	
OLIGOCHAETA						
Unidentified species A	29	51	19	21	55	51
MOLLUSCA						
BIVALVIA						
Gemma gemma			10		1	
Macoma baltica						2
Lyonsia hyalina			1		5	41
Mya arenaria		6				8
Mytilus edulis	24	15	9	63	4	6
Cerastoderma sp.				1		
GASTROPODA						
Crepidula sp.			1			
Littorina sp.		4	2		1	1
Acanthodoris pilosa	1		1	10	1	

SPECIES	STA. 1	STA. 2	STA. 3	STA. 4	STA. 5	STA. 6
POLYPLACOPHORA						
Chaetopleura sp.						1
ARTHROPODA						
CRUSTACEA						
AMPHIPODA						
Corophium acutum	75	37	104	326	70	95
Ampelisca abdita					4	
Microdeutopus gryllotalpa	34	52	277	284	86	305
Caprella sp.	6	13	39	56	18	14
Calliopus laevis				3		
Gammarus annulatus				2	1	
Gammarus mucronatus				3		
Ericthonius filiformis				1		
Phoxocephalus hollboli					3	
Unciola sp.						1
Orchomenella pinguis						1
ISOPODA						
Jaera marina	7	3	27	3	11	
Chiridotea tuftsi					5	
Tanaidacea						
Leptochelia savigni					2	
DECAPODA						
Cancer sp.			1			
MYSIDACEA						
Heteromysis formosa			1	3	14	
ECHINODERMATA						
Arbacia punctulata		2		1		
TOTALS						
# of species	9	16	20	20	28	23
# of individuals	181	221	528	798	342	614

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX M

BENTHIC COMMUNITY ANALYSIS
AND
SEDIMENT SEIVE ANALYSIS
OF THE
ISLES OF SHOALS NORTH
ALTERNATIVE OCEAN PLACEMENT SITE

This appendix presents data collected from the alternative ocean placement site Isles of Shoals North and consists of two parts:

1) Identification and Enumeration of Muddy Bottom Benthic Macrofauna from the Isles of Shoals Area, by Peter Larsen, Ph.D., Coastal Sciences, Boothbay, Maine

2) Sediment sieve analysis results from the Isles of Shoals North Alternative Ocean Placement Site

IDENTIFICATION AND ENUMERATION OF MUDDY BOTTOM BENTHIC MACROFAUNA FROM THE ISLES OF SHOALS-NORTH AREA, NORTHEAST GULF OF MAINE

Contract No. W912WJ-11-M-0020

SUBMITTED BY:

PETER FOSTER LARSEN, Ph.D.

COASTAL SCIENCES

91 KNICKERBOCKER ROAD

BOOTHBAY, MAINE 04537

This report represents analytical results of benthic samples received by Coastal Sciences on November 10, 2010 from the US Army Corps of Engineers.

Peter F. Larsen, Ph.D.
Coastal Sciences

TABLE OF CONTENTS

INTRODUCTION

The Gulf of Maine is one of the world's most productive fishing grounds and best-studied continental seas. Since the last glaciation, the Gulf has undergone a rapid and dynamic geological and oceanographic evolution that has produced the rich and intricate ecological system that we witness today (Bousfield and Thomas 1975, Shaw, *et al.*, 2002). Interest the benthic macrofauna of the Gulf began early and several investigations qualitatively documented the high invertebrate species richness of the region (Mighels, 1843; Stimpson, 1853; Verrill, 1872, 1874; and Webster and Benedict, 1887; Kinsley, 1901; others). In more recent times, the rich macrobenthos of the offshore Gulf has been documented quantitatively by Rowe, *et al.*, (1975), Theroux and Wigley (1998) and others. Likewise, the coastal embayments and estuarine bottoms of New England have also been sampled widely (Larsen, 1979; Larsen and Gilfillan, 2004); Hale, 2010; and many others). All these studies confirm the rich and complex zoogeography described by Bousfield and Thomas (1975).

In spite of the high level of investigative activity, there remain other areas and systems in the Gulf of Maine that are not adequately described. One of these is the muddy bottoms of the coastal region (Lewis Incze, Gulf of Maine Area Program, Census of Marine Life, personal communication). Such areas generally fall between the deeper waters sampled from large oceanographic vessels and nearshore environments sampled from smaller workboats. Nevertheless, increased knowledge of these mid-depth soft sediment patches is required by environmental managers as the proposed uses for the coastal margin are accelerating. In particular, several demonstration projects for the development of offshore wind power are now being planned. These projects could potentially disturb these stable depositional areas by the impact of cable footings to secure the floating turbine platforms and the passage of transmission lines to the coast. In this communication we describe the benthic community inhabiting a muddy bottom in 100m water off the coast of southern Maine.

METHODS

Sampling occurred at nine stations on November 1, 2010 within a 780m radius circle approximately 14 km east northeast of the Isles of Shoals in the northwestern Gulf of Maine (Fig. 1). This is the proposed Isles of Shoals-North disposal area. The sampling site is in an area known as the Bigelow Bight and lies between the shallow Jeffreys Ledge and the Maine coast. At each station, samples for fauna and sediment analyses were retrieved using a 0.04 m^2 modified Van Veen grab. The faunal samples were sieved on a 0.5 mm screen and fixed in 10% formalin solution with the vital stain Rose Bengal.

The nine faunal samples were transferred from the U.S. Army Corps of Engineers to Coastal Sciences on November 10, 2010. In the laboratory, the formalin was removed from the samples by gentle washing on a 0.5 mm sieve and the samples were preserved in 70% ethanol. The benthic macrofauna in each sample was separated from the limited inorganic debris and sorted to major taxonomic categories. This process was accomplished by trained personnel using binocular dissecting microscopes. A subsample of the residue of each sample was reexamined to insure complete removal of the fauna. No problems were detected. Each taxonomic group was examined by an experienced marine taxonomist who identified each individual to the lowest practical taxonomic level, usually the species level, and enumerated the number of individuals in each taxon. Synonymies were made current using the World Register of Marine Species (www.marinespecies.org/).

Zoogeographic affinities and feeding types were determined using standard references such as Pettibone (1963), Gosner (1971), Bousfield (1973), Fauchald and Jumars (1979) and Watling (1979) as well as several websites including using the World Register of Marine Species (www.marinespecies.org/).

The numerical data were analyzed using the statistical package PRIMER v6 (Clarke and Gorley, 2006). Univariate community structure analyses performed include density (N), species richness (S), Shannon diversity (H^1, base *e*) and Pielou's Evenness (J^1). The faunal relationships were also investigated using numerical classification and ordination. Species data were square root transformed to moderate the influence of abundant species. A hierarchical agglomerative classification scheme was employed using the Bray-Curtis similarity index. The group-average linking method was used to produce a dendrogram of sample relatedness and a 2-dimensional ordination of stations was accomplished using the non-metric multidimensional scaling (MDS) technique found in PRIMER. Multivariate analyses were limited to species that occurred at two or more stations.

Species accumulation curves were utilized to assess the adequacy of the sampling and to estimate the unknown biodiversity of the northwestern Gulf of Maine community. The Chao 2 formula was chosen. This is a presence-absence measure that relies on the number of species that occur in one sample and the number that occur in two samples to calculate an estimate of the maximum number of species expected (Colwell and Coddington, 1994).

RESULTS

Abiotic Factors

Descriptive details of station location, depth and sediment type are presented in Table 1. The stations were in close proximity to one another; the maximum distance between any two stations being about 1.5 km. Depth was rather uniform as all stations occurred at depths between 95 and 100 m. The sediments can be characterized as fine. Seven of the nine stations exhibited silt/clay content in excess of 96%. Two stations, B and H, were somewhat coarser with silt/clay contents of 79.8 and 92.7%, respectively. The non-silt/clay fractions of all the samples consisted of sand. Moist, brown silty clay is the visual description of all of the samples. The Folk classification of these sediments is silt (Folk, 1968).

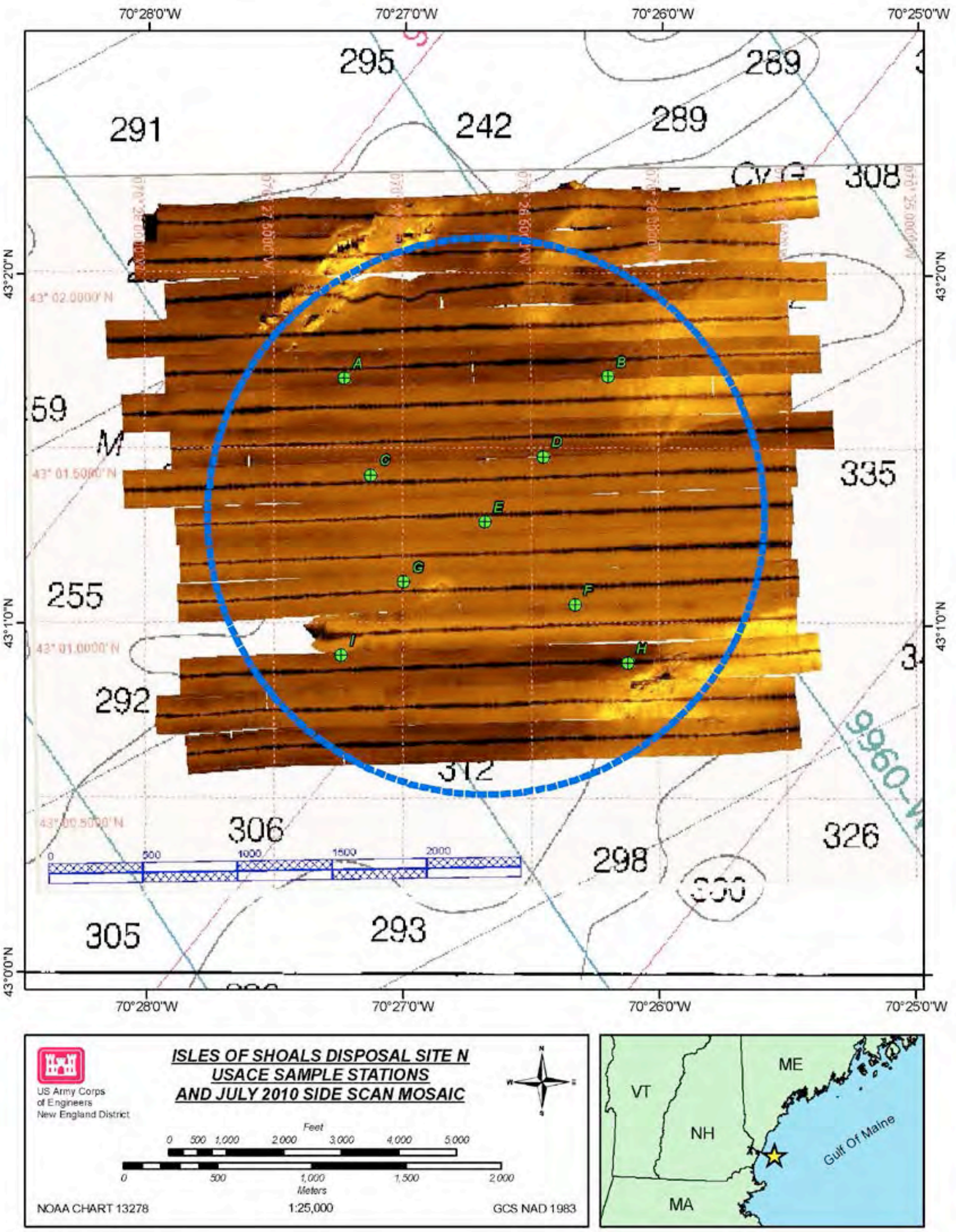


Figure 1. Isles of Shoals-North Station Locations with Side Scan Sonar Mosaic Superimposed. Depths are in Feet.

Faunal Composition, Abundance and Dominance

A total of 40 taxa from four phyla were identified from the nine samples (Table 2). Thirty-two taxa were identified to the species level. No colonial species were encountered. The number of taxa at the stations ranged from seven to 19 with a mean of 10.7 (Table 3). The fauna was dominated by polychaetes that accounted for 25 of the 40 taxa or 62.5% of the fauna. Percentage representation of other taxa was 17.5% Arthropoda, 15% Mollusca and 5% Rhynchocoela.

TABLE 1. Location and Environmental Characteristics of the Nine Benthic Stations from the Northwestern Gulf of Maine.

Station	Latitude	Longitude	Depth (m)	% Sand	% Silt & Clay
A	43.028412	-70.45389	97.2	2.1	97.9
B	43.028527	-70.43678	95.7	20.2	79.8
C	43.023773	-70.45215	96.0	2.4	97.6
D	43.024674	-70.44097	96.9	3.4	96.6
E	43.021569	-70.44474	96.3	3.7	96.3
F	43.017613	-70.43885	97.8	2.4	97.6
G	43.018689	-70.45004	96.6	3.9	96.1
H	43.014840	-70.43541	100.0	7.3	92.7
I	73.015181	-70.45402	95.4	2.1	97.9

Density at the stations ranged from 400 to 1,950 individuals/m^2 with a mean density of 1,055/m^2 (Table 3). The numerical dominance of polychaetes was very pronounced. Polychaetes represented 93.2% of all individuals. Percentage of total individuals of Mollusca, Arthropoda and Rhynchocoela were 2.6, 2.1 and 2.1 percent, respectively.

Numerical dominance of the most abundant species ranged from moderate to high (Table 3). The percentage of the fauna represented by the dominant species ranged from 14 to 51%. At eight of the nine stations the dominant species was the deposit feeding polychaete *Paraonis gracilis* that accounted for over 40% of the individuals at four of the nine stations. The only other species obtaining dominant status was another deposit feeder, the polychaete *Cossura longocirrata*.

Most of the Shannon informational diversity values (base log *e*) were constrained within a rather narrow range with the low species richness (Table 3). Station C was something of an outlier. Mean diversity was 1.811 and the range was 1.184 -2.367. Evenness also did not vary widely. Evenness values ranged from 0.6362 to 0.9182 with a mean of 0.8035.

Zoogeographic Affinities and Feeding Guilds

It was possible to assign zoogeographic affinities to 32 of the 40 identified taxa (Table 4).

Fifteen of the taxa, 47%, could be classified as Boreal in their distribution. Another 34% of the taxa were considered to have a Boreal-Virginian geographic range. Taxa characterized as being Arctic or Virginian in their zoogeographic affinities each represented nine per cent of the identified species.

TABLE 2. List of Taxa Collected During the Isles of Shoals-North Benthic Survey

Phylum	Species	Phylum	Species
Rhynchocoela		**Arthropoda**	
	Micrura sp. (Ehrenberg, 1971)		*Cyclaspis varians* Calman, 1912
	Nemertean		*Eudorella pusilla* Sars, 1871
Mollusca			*Harpinia propinqua* Sars, 1891
	Astarte undata (Gould, 1841)		*Leptocheirus plumulosus* Shoemaker, 1932
	Bivavle juv.		*Leptostylis longimana* (Sars, 1865)
	Parvicardium pinnulatum (Conrad, 1831)		*Paracaprella tenuis* Mayer, 1903
	Chaetoderma nitidulum (Loven, 1844)		*Photis* sp. Kroyer, 1842
	Thyasira gouldi (Philippi, 1845)		
	Thyasira sp. (Lamarck, 1818)		
Annelida			
	Aglaophamus neotenus (Noyes, 1980)		
	*Ampharete arctica (*Malmgrem, 1866)		
	Aricidea suecica (Eliason, 1920)		
	Ceratocephale loveni (Malmgren, 1867)		
	Chaetozone setosa (Malmgren, 1867)		
	Cossura longocirrata (Webster & Benedict, 1887)		
	Harmothoe extenuata (Grube, 1840)		
	Lepidonotus squamatus (Linnaeus, 1758)		
	Lumbrineris latreilli Audouin & Milne Edwards, 1834		
	Scoletoma tenuis Verrill, 1873		
	Maldane sarsi Malmgren, 1865		
	Mediomastus ambiseta (Hartman, 1947)		
	Nephtys incisa Malmgren, 1865		
	Ninoe nigripes Verrill, 1973		
	Owenia fusiformis Delle Chiaje, 1844		

	Paramphinome pulchella Sars, 1869		
	Paraonis gracilis (Tauber, 1879)		
	Praxillella gracilis (M. Sars, 1861)		
	Praxillella praetermissa (Malmgren, 1865)		
	Prionospio sp Malmgren, 1867.		
	Sabaco elongatus (Verrill, 1873)		
	Scalibregma inflatum Rathke, 1843		
	Syllid juvenile		
	Tharyx acutus Webster & Benedict, 1887		
	Unknown		

TABLE 3. Community Parameters and Numerical Dominance

Station	**Species Richness**	**Density (m^2)**	**Evenness (J^1)**	**Diversity (H^1)**	**Numerical Dominance**
A	11	775	0.8561	2.053	*Paraonis gracilis* 26%
B	7	400	0.9182	1.787	*Paraonis gracilis* 14%
C	6	825	0.6609	1.184	*Paraonis gracilis* 61%
D	14	825	0.875	2.309	*Cossura longocirrata* 31%
E	10	1,425	0.7059	1.625	*Paraonis gracilis* 37%
F	10	950	0.7556	1.740	*Paraonis gracilis* 42%
G	8	475	0.8195	1.704	*Paraonis gracilis* 42%
H	19	1,875	0.8039	2.367	*Paraonis gracilis* 26%
I	11	1,950	0.6362	1.526	*Paraonis gracilis* 60%

On the basis of abundance, the distribution among the zoogeographic provinces was much more skewed. A full 71% of the individuals encountered could be defined as Boreal in character. The remaining individuals were divided rather evenly between Arctic, Boreal-Virginian and Virginian affinities.

The taxa encountered were assigned to one of four feeding guilds for the purposes of analysis. Surface deposit feeders, subsurface deposit feeders and omnivores were grouped together as deposit feeders in this analysis. Deposit feeders were the most prevalent of the feeding guilds. Twenty-three of the 40 species, 59%, were classified as deposit feeders.

Carnivores accounted for 23% of the taxa while only 18% were considered suspension feeders. A different pattern emerged when the analysis was done on the basis of individuals. Here 88% of the community consisted of deposit feeders, nine per cent were carnivores and suspension feeders represented only three per cent of the fauna.

Multivariate Analyses

The dendrogram based on group-average sorting classification using the Bray-Curtis similarity measure on square-root transformed data did not present a clear-cut spatial pattern (Fig. 2). Only four stations were linked in pair-groupings. Stations C and F and stations H and I formed the two pair-groupings at a very high level of similarity. Station E was then linked to the C/F grouping and the five stations were joined at nearly 60% similarity. The remaining stations then were chain-linked to the five-station cluster, i.e. individual stations were sequentially added to the dendrogram singly. They were no higher level dichotomies indicating basic dissimilarities in the station array. The SIMPROF routine of PRIMER was run to test the null hypothesis that the set of samples do not differ from each other in the dendrogram structure. Groupings that do not reject the null hypothesis are connected with red lines in the test output. As indicated in Fig. 2, all samples are connected by red lines and, hence, it can be concluded that all of the samples came from the same community.

The biological relationships among the nine samples were further investigated using a two dimensional non-metric multi-dimensional scaling (MDS) ordination also with the Bray-Curtis similarity measure calculated on square root transformed abundance data. Similar to the cluster analysis, the MDS did not reveal any segregation of groups of stations (Fig. 3). Stations C, E, F, H and I were grouped towards the center while Stations A, B, D and G were spaced around the periphery. The stress level of 0.07 indicates that the MDS is “a good ordination with no real prospect of misleading interpretation; 3- or higher dimensional solutions will not add any additional information” (Clarke and Warwick, 2001).

TABLE 4. Zoogeographic Affinities and Feeding Guilds of Taxa Collected in a Mud Habitat, Northwestern Gulf of Maine.

Phylum and Species		**Zoogeographic Affinity**	**Feeding Guild**
Phylum Rhynchocoela			
	Micrura sp. Ehrenberg, 1971	BV	Carnivorous
	Nemertean		Carnivorous
Phylum Mollusca			
	Astarte undata Gould, 1841	B	Suspension
	Bivavle juv.		Suspension
	Parvicardium pinnulatum (Conrad, 1831)	BV	Suspension
	Chaetoderma nitidulum (Loven, 1844)	B	Omnivorous
	Thyasira gouldi (Philippi, 1845)	B+	Suspension
	Thyasira sp. Lamarck, 1818		Suspension
Phylum Annelida			
	Aglaophamus neotenus Noyes, 1980	B	Deposit
	Ampharete arctica Malmgrem, 1866	A+	Deposit
	Aricidea suecica (Eliason, 1920)	A+	Deposit
	Ceratocephale loveni Malmgren, 1867	B	Deposit
	Chaetozone setosa Malmgren, 1867	B	Surface deposit
	Cossura longocirrata Webster & Benedict, 1887	B	Surface deposit
	Harmothoe extenuata (Grube, 1840	B	Carnivorous
	Lepidonotus squamatus (Linnaeus, 1758)	B	Carnivorous
	Lumbrineris latreilli Audouin & Milne Edwards, 1834	BV	Carnivorous
	Scoletoma tenuis Verrill, 1873	BV	Carnivorous
	Maldane sarsi Malmgren, 1865	B	Subsurface deposit
	Mediomastus ambiseta (Hartman, 1947)		Deposit
	Nephtys incisa Malmgren, 1865	B	Deposit
	Ninoe nigripes Verrill, 1973	BV	Carnivorous
	Owenia fusiformis Delle Chiaje, 1844	BV	Surface deposit
	Paramphinome pulchella Sars, 1869	BV	Carnivorous
	Paraonis gracilis (Tauber, 1879)	B	Deposit
	Praxillella gracilis (M. Sars, 1861)		Subsurface deposit
	Praxillella praetermissa (Malmgren, 1865)	B	Subsurface deposit
	Prionospio sp Malmgren, 1867.		Surface deposit
	Sabaco elongatus (Verrill, 1873)	V	Subsurface deposit
	Scalibregma inflatum Rathke, 1843	BV	Subsurface deposit
	Syllid juvenile		Carnivorous
	Tharyx acutus Webster & Benedict, 1887	B+	Surface deposit
	Unknown		

Phylum Arthropoda			
	Cyclaspis varians Calman, 1912	V	Deposit
	Eudorella pusilla Sars, 1871	BV	Deposit
	Harpinia propinqua Sars, 1891	B	Surface deposit
	Leptocheirus plumulosus Shoemaker, 1932	V	Suspension
	Leptostylis longimana (Sars, 1865)	A+	Deposit
	Paracaprella tenuis Mayer, 1903	BV	Suspension/carnivorous
	Photis sp. Kroyer, 1842	BV	Deposit

Species Accumulation Analysis

The observed species accumulation curve (Sobs) and the calculated Chao 2 values are plotted in Figure 4. Tabulated values are presented in Table 5. The values are the product of 999 permutations at each step as the sample size is increased by adding samples randomly. The figure and table indicate that, while the Sobs curve continued to incline smoothly, the Chao 2 curve reached an asymptote when approximately six samples were accumulated. The Chao 2 estimator predicted that the number of species in this community is expected to be about 75 with a standard deviation of 20 under conditions of infinite sampling. The survey recovered slightly more than 50% of the theoretical total species number.

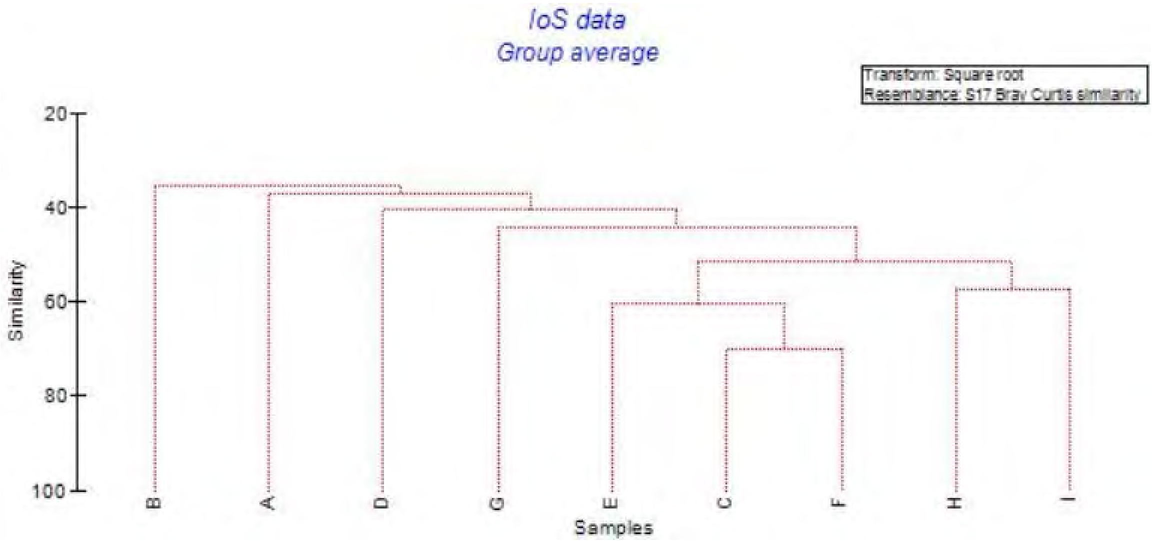


Figure 2. Dendrogram Based on a Group-Average Sorting Classification using the Bray-Curtis Similarity Measure on Square Root Transformed Data.

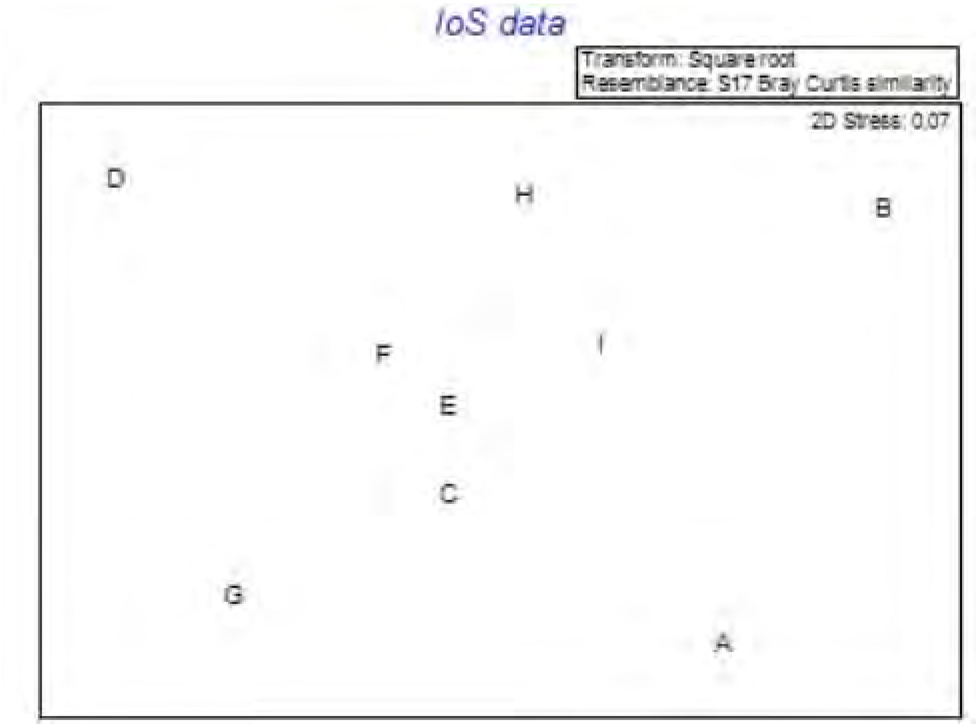


Figure 3. MDS Ordination of the Nine Samples Based on Square Root Transformed Species Abundances and Bray-Curtis Similarities (stress = 0.07).

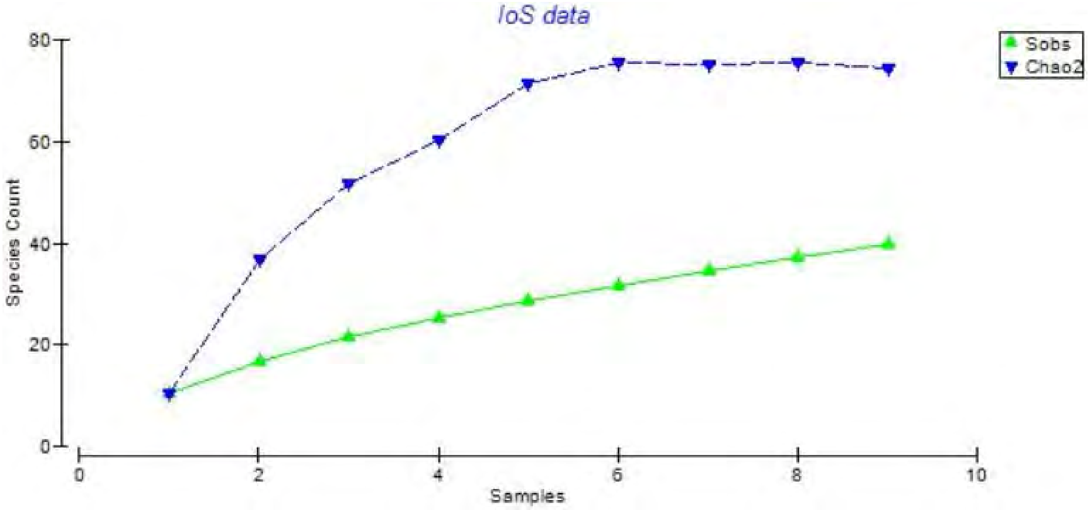


Figure 4. Plot of Observed Species Accumulation Curve (Sobs) and the Curve Predicted by the Chao 2 Extrapolator.

TABLE 5. Number of Observed Species (Sobs) and True Total Number of Species Predicted to be Found (Chao 2) with Infinite Sampling Following the Same Sampling Protocol

Station	Sobs	Sobs(SD)	Chao2	Chao2(SD)
1	10.62	3.66	10.62	12.69
2	16.65	3.91	36.05	15.56
3	21.42	3.91	50.39	24.20
4	25.43	3.54	60.79	28.43
5	28.89	3.28	70.93	33.98
6	32.07	2.85	76.53	33.15
7	34.85	2.31	75.54	27.57
8	37.54	1.56	76.50	24.95
9	40.00	0.00	74.57	20.56

DISCUSSION

The salient result of this benthic survey in the northwest Gulf of Maine is the uniformity of the environment both physically and biologically. The stations occur over a very narrow depth range and the sediments have a very high silt/clay content that can be described as silt (Table 1). In the limited area covered by the survey, there is no reason to suspect that temperatures and currents are not equally uniform.

The macroinvertebrate fauna at the site is limited. The benthic community consists of only 40 species representing just four phyla (Table 2). The assemblage is noteworthy for its lack of oligochaetes, nearly ubiquitous elsewhere, and the absence of echinoderms and colonial species. Polychaetes are the characteristic taxa overwhelmingly dominating the community in terms of numbers of species and individuals. Density is relatively low while the univariate statistics, species richness, diversity and evenness, are also at low to modest levels. One species, the polychaete *Paraonis gracilis*, is the numerical dominant at eight of the nine stations.

The zoogeographic affinities of the species that could be characterized range from Arctic to Virginian (Table 4). The largest group has a Boreal affinity followed by the Boreal-Virginian group accounting for about a third of the taxa. Fewer than one in ten of the taxa are considered to be either Arctic or Virginian. Numerically, however, individuals of the Boreal species make up nearly three-quarters of the community.

The functional group in this fine-grained habitat is overwhelmingly deposit feeders as would be expected. Species in this generalized feeding guild partition the environment by practicing several variations of obtaining nutrition from the sediments. Some, such as the four maldanid polychaete species, feed relatively deeply within the subsurface sediments. Other subsurface feeders, *Scalibregma inflatum*, feed higher in the sediment column while several other species, *Cossura longocirrata* and *Tharyx acutus*, feed on the very sediment surface.

Hence, a large number of deposit-feeders can be supported.

The biological homogeneity is confirmed by multivariate analyses of the community data. Cluster analysis does not dissect the stations into any discernible pattern. SIMPROF indicates that there are no statistically significant differences among the branches of the dendrogram (Figure 2). MDS analysis, likewise, shows no separation of samples that would indicate any coherent underlying biological divisions (Figure 3). It can be concluded that the samples were drawn from the same faunal community.

The species accumulation analyses are revealing. While the observed species curve climbs smoothly, the Chao 2 curve reaches an asymptote rather quickly (Figure 4, Table 5). This suggests that the true species complement would be reached with a finite amount of additional sampling. The Chao 2 estimate of the true species number is less than twice the number of species actually observed (Table 5) indicating that further sampling would add rare species to the species list while not affecting the numerical dominance observed (Appendix).

In summary, the study area is physically homogeneous and inhabited by a limited benthic invertebrate community. Richness, at the species and higher taxonomic levels, and density are low relative to both more inshore and more offshore habitats. Deposit-feeding polychaetes dominate the fauna qualitatively and quantitatively. The community can be considered Boreal in its zoogeographic affinity. Further sampling would undoubtedly add to the species total but would probably not modify the characterization of the community significantly. This communication helps to fill an identified gap in our knowledge of the Gulf of Maine ecosystem.

ACKNOWLEDGEMENTS

We are grateful to Hannah Proctor of Normandeau Associates for the confirmation of several polychaete identifications.

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APPENDIX

COMMUNITY STRUCTURE TABLES

TABLE 1A. Isles of Shoals-North Benthic Sample A

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Paraonis gracilis	8	8	25.8	25.8	Annelida
Lepidonotus squamatus	6	14	19.4	45.2	Annelida
Ampharete arctica	6	20	19.4	64.5	Annelida
Nemertean	3	23	9.7	74.2	Rhynchocoela
Cossura longocirrata	2	25	6.5	80.6	Annelida
Scoletoma tenuis	1	26	3.2	83.9	Annelida
Ceratocephale loveni	1	27	3.2	87.1	Annelida
Tharyx acutus	1	28	3.2	90.3	Annelida
Unknown	1	29	3.2	93.5	Annelida
Harpinia propinqua	1	30	3.2	96.8	Arthropoda
Eudorella pusilla	1	31	3.2	100.0	Arthropoda
Number of Species:	11				
Density (m^{-2}):	775				
Diversity (H'):	2.053				

TABLE 2A. Isles of Shoals-North Benthic Sample B

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Paraonis gracilis	4	4	13.8	13.8	Annelida
Ampharete arctica	4	8	13.8	27.6	Annelida
Ninoe nigripes	3	11	10.3	37.9	Annelida
Cossura longocirrata	2	13	6.9	44.8	Annelida
Sabaco elongatus	2	15	6.9	51.7	Annelida
Mediomastus ambiseta	1	16	3.4	55.2	Annelida
Maldane sarsi	1	17	3.4	58.6	Annelida
Aglaophamus neotenus	1	18	3.4	62.1	Annelida
Paraonis gracilis	4	22	13.8	75.9	Annelida
Ampharete arctica	4	26	13.8	89.7	Annelida
Ninoe nigripes	3	29	10.3	100.0	Annelida
Number of Species:	11				
Density (m^{-2}):	725				
Diversity (H'):	1.787				

TABLE 3A. Isles of Shoals-North Benthic Sample C

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Paraonis gracilis	20	20	60.6	60.6	Annelida
Cossura longocirrata	7	27	21.2	81.8	Annelida
Ampharete arctica	2	29	6.1	87.9	Annelida
Owenia fusiformis	2	31	6.1	93.9	Annelida
Ceratocephale loveni	1	32	3.0	97.0	Annelida
Paracaprella tenuis	1	33	3.0	100.0	Annelida
Number of Species:	6				
Density (m^{-2}):	825				
Diversity (H'):	1.184				

TABLE 4A. Isles of Shoals-North Benthic Sample D

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Cossura longocirrata	9	9	31.0	31.0	Annelida
Sabaco elongatus	4	13	44.8	44.8	Annelida
Mediomastus ambiseta	4	17	58.6	58.6	Annelida
Prionospio sp.	2	19	65.5	65.5	Annelida
Ceratocephale loveni	2	21	72.4	72.4	Annelida
Paramphinome pulchella	1	22	75.9	75.9	Annelida
Syllid juvenile	1	23	79.3	79.3	Annelida
Paraonis gracilis	1	24	82.8	82.8	Annelida
Owenia fusiformis	1	25	86.2	86.2	Annelida
Nephtys incisa	1	26	89.7	89.7	Annelida
Chaetozone setosa	1	27	93.1	93.1	Annelida
Leptocheirus plumulosus	1	28	96.6	96.6	Arthropoda
Astarte undata	1	29	100.0	100.0	Mollusca
Number of Species:	13				
Density (m^{-2}):	725				
Diversity (H'):	2.309				

TABLE 5A. Isles of Shoals-North Benthic Sample E

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Paraonis gracilis	22	22	38.6	38.6	Annelida
Cossura longocirrata	19	41	33.3	71.9	Annelida
Ampharete arctica	4	45	7.0	78.9	Annelida
Prionospio sp.	4	49	7.0	86.0	Annelida
Ceratocephale loveni	2	51	3.5	89.5	Annelida
Sabaco elongatus	2	53	3.5	93.0	Annelida
Ninoe nigripes	1	54	1.8	94.7	Annelida
Praxillella gracilis	1	55	1.8	96.5	Annelida
Thyasira sp.	1	56	1.8	98.2	Mollusca
Bivavle juv.	1	57	1.8	100.0	Mollusca
Number of Species:	10				
Density (m^{-2}):	1425				
Diversity (H'):	1.625				

TABLE 6A. Isles of Shoals-North Benthic Sample F

Species	**Total**	**Cum. Tot.**	**%**	**Cum. %**	**Higher Taxon**
Paraonis gracilis	16	16	42.1	42.1	Annelida
Cossura longocirrata	9	25	23.7	65.8	Annelida
Ampharete arctica	3	28	7.9	73.7	Annelida
Mediomastus ambiseta	3	31	7.9	81.6	Annelida
Ceratocephale loveni	2	33	5.3	86.8	Annelida
Praxillella gracilis	1	34	2.6	89.5	Annelida
Owenia fusiformis	1	35	2.6	92.1	Annelida
Micrura sp.	1	36	2.6	94.7	Rhynchocoela
Paracaprella tenuis	1	37	2.6	97.4	Arthropoda
Astarte undata	1	38	2.6	100.0	Mollusca
Number of Species:	10				
Density (m^{-2}):	950				
Diversity (H'):	1.740				

TABLE 7A. Isles of Shoals-North Benthic Sample G

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Paraonis gracilis	8	8	42.1	42.1	Annelida
Cossura longocirrata	4	12	21.1	63.2	Annelida
Owenia fusiformis	2	14	10.5	73.7	Annelida
Sabaco elongatus	1	15	5.3	78.9	Annelida
Aricidea suecica	1	16	5.3	84.2	Annelida
Prionospio sp.	1	17	5.3	89.5	Annelida
Chaetoderma nitidulum	1	18	5.3	94.7	Mollusca
Micrura sp.	1	19	5.3	100.0	Rhynchocoela
Number of Species:	8				
Density (m^{-2}):	475				
Diversity (H'):	1.704				

TABLE 8A. Isles of Shoals-North Benthic Sample H

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Paraonis gracilis	20	20	26.3	26.3	Annelida
Sabaco elongatus	15	35	19.7	46.1	Annelida
Ampharete arctica	7	42	9.2	55.3	Annelida
Praxillella gracilis	5	47	6.6	61.8	Annelida
Cossura longocirrata	4	51	5.3	67.1	Annelida
Prionospio sp.	4	55	5.3	72.4	Annelida
Scoletoma tenuis	3	58	3.9	76.3	Annelida
Mediomastus ambiseta	3	61	3.9	80.3	Annelida
Owenia fusiformis	2	63	2.6	82.9	Annelida
Ninoe nigripes	2	65	2.6	85.5	Annelida
Scalibregma inflatum	1	66	1.3	86.8	Annelida
Paramphinome pulchella	2	68	2.6	89.5	Annelida
Ceratocephale loveni	1	69	1.3	90.8	Annelida
Tharyx acutus	1	70	1.3	92.1	Annelida
Harmothoe extenuata	1	71	1.3	93.4	Annelida
Astarte undata	1	72	1.3	94.7	Mollusca
Thyasira gouldi	1	73	1.3	96.1	Mollusca
Parvicardium pinnulatum	1	74	1.3	97.4	Mollusca
Cyclaspis varians	1	75	1.3	98.7	Arthropoda
Leptostylis longimana	1	76	1.3	100.0	Arthropoda
Number of Species:	20				
Density (m^{-2}):	1900				
Diversity (H'):	2.367				

TABLE 9A. Isles of Shoals-North Benthic Sample I

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Paraonis gracilis	47	47	59.5	59.5	Annelida
Sabaco elongatus	7	54	8.9	68.4	Annelida
Cossura longocirrata	5	59	6.3	74.7	Annelida
Ampharete arctica	4	63	5.1	79.7	Annelida
Ninoe nigripes	3	66	3.8	83.5	Annelida
Mediomastus ambiseta	3	69	3.8	87.3	Annelida
Nemertean	3	72	3.8	91.1	Rhynchocoela
Praxillella praetermissa	2	74	2.5	93.7	Annelida
Owenia fusiformis	2	76	2.5	96.2	Annelida
Lumbrineris latreilli	1	77	1.3	97.5	Annelida
Lepidonotus squamatus	1	78	1.3	98.7	Annelida
Photis sp.	1	79	1.3	100.0	Arthropoda
Number of Species:	12				
Density (m^{-2}):	1975				
Diversity (H'):	1.526				

SEDIMENT SEIVE ANALYSIS RESULTS

ISLES OF SHOALS NORTH

ALTERANTIVE OCEAN PLACEMENT SITE

GeoTesting
EXPRESS

1145 Massachusetts Avenue
Boxborough, MA 01719
978 635 0424 Tel
978 635 0266 Fax

Transmittal

TO:
Richard Heidebrecht
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

DATE: 12/21/2010	GTX NO: 10463
RE: Isles of Shoals Site N	

COPIES	DATE	DESCRIPTION
	12/21/2010	**December 2010 Laboratory Test Report**

REMARKS:

CC:

SIGNED:
Joe Tomei, Laboratory Manager

APPROVED BY:
Nancy Hubbard, Project Manager

GeoTesting
EXPRESS

Boston
Atlanta
New York
www.geocomp.com/geotesting

December 21, 2010

Richard Heidebrecht
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: Isles of Shoals Site N, (GTX-10463)

Dear Richard:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received nine samples from you on 12/15/2010. These samples were labeled as follows:

Boring Number	Sample Number	Depth
Site N	A	319 ft
Site N	B	314 ft
Site N	C	315 ft
Site N	D	318 ft
Site N	E	316 ft
Site N	F	321 ft
Site N	G	317 ft
Site N	H	328 ft
Site N	I	313 ft

GTX performed the following test on each of these samples:

ASTM D 422 – Grain Size Analysis with Hydrometer

A copy of your test request is attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing services. We look forward to working with you again in the future.

Respectfully yours,

Joe Tomei
Laboratory Manager

GeoTesting
EXPRESS

1145 Massachusetts Avenue
Boxborough, MA 01719
978 635 0424 Tel
978 635 0266 Fax

Geotechnical Test Report **12/21/2010**

GTX-10463
Isles of Shoals Site N Project

Client Project No.: Call #13

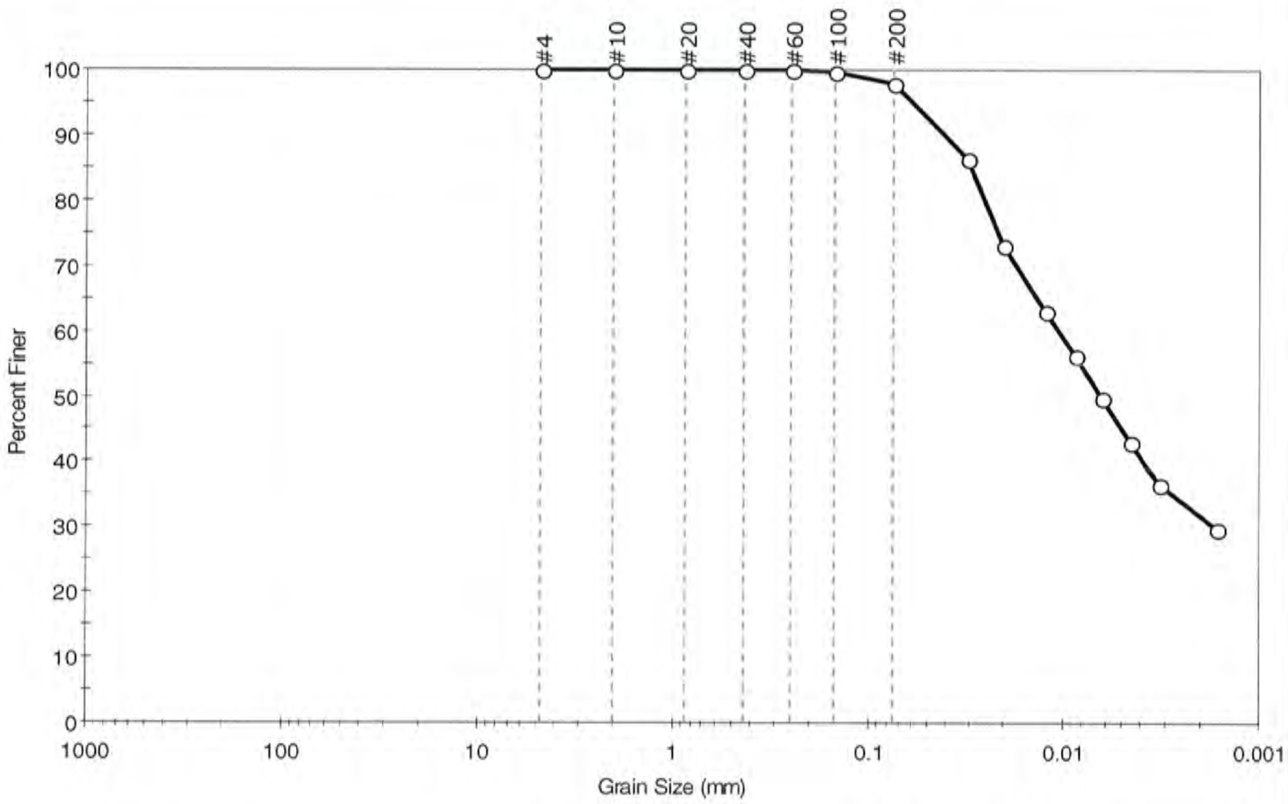
Prepared for:

U.S. Army Corps of Engineers

GeoTesting
EXPRESS

Client: U.S. Army Corps of Engineers
Project: Isles of Shoals Site N
Location: --- Project No: GTX-10463
Boring ID: Site N Sample Type: bag Tested By: jbr
Sample ID:A Test Date: 12/17/10 Checked By: jdt
Depth : 319 ft Test Id: 201085
Test Comment: ---
Sample Description: Moist, brown silty clay
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	2.1	97.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	98		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0308	86		
---	0.0202	73		
---	0.0122	63		
---	0.0086	56		
---	0.0062	50		
---	0.0045	43		
---	0.0032	37		
---	0.0016	30		

Coefficients

D_{85} =0.0295 mm D_{30} =0.0017 mm
D_{60} =0.0103 mm D_{15} =N/A
D_{50} =0.0063 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

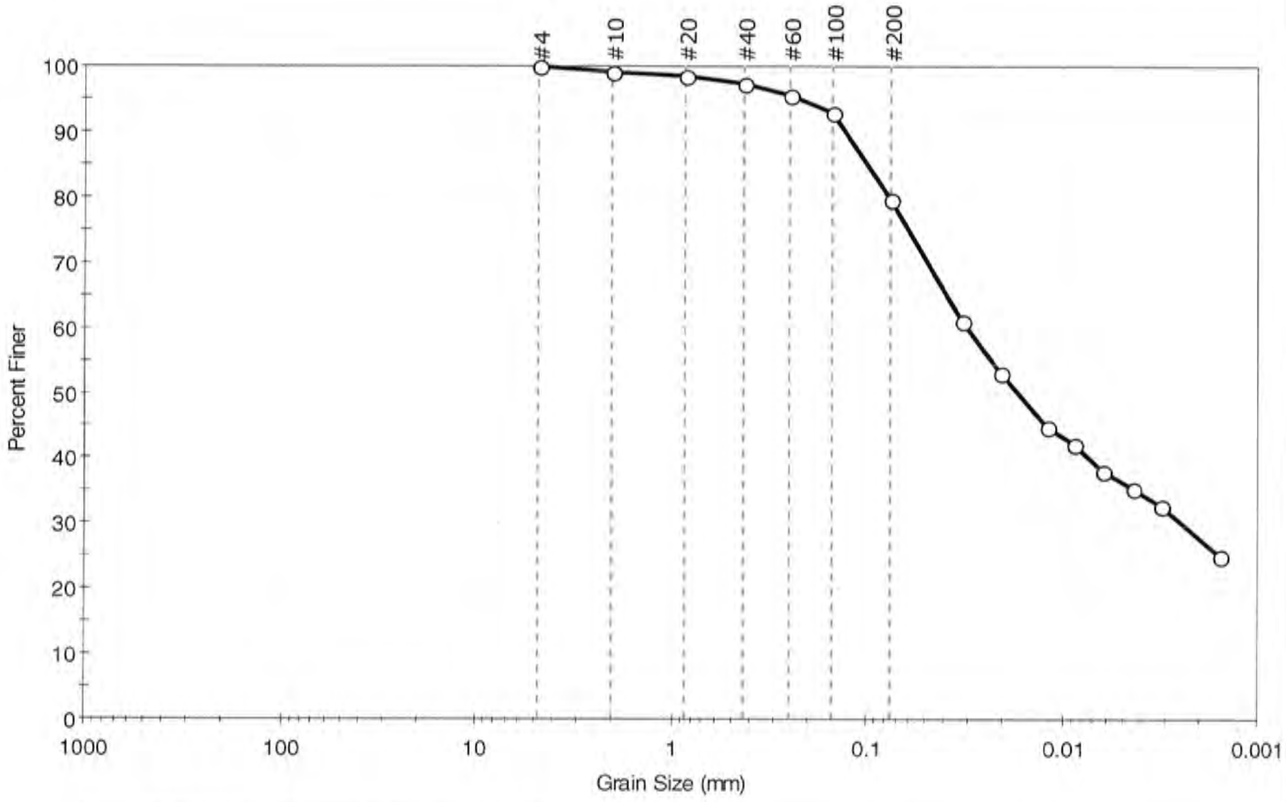
Sand/Gravel Hardness : ---

printed 12/21/2010 11:07:41 AM

GeoTesting EXPRESS

Client: U.S. Army Corps of Engineers
Project: Isles of Shoals Site N
Location: --- Project No: GTX-10463
Boring ID: Site N Sample Type: bag Tested By: jbr
Sample ID:B Test Date: 12/17/10 Checked By: jdt
Depth : 314 ft Test Id: 201086
Test Comment: ---
Sample Description: Moist, brown silt with sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	20.2	79.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	99		
#40	0.42	97		
#60	0.25	96		
#100	0.15	93		
#200	0.075	80		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0328	61		
---	0.0209	53		
---	0.0121	45		
---	0.0087	42		
---	0.0062	38		
---	0.0044	35		
---	0.0032	33		
---	0.0016	25		

Coefficients

D_{85} =0.0988 mm	D_{30} =0.0025 mm
D_{60} =0.0307 mm	D_{15} =N/A
D_{50} =0.0170 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

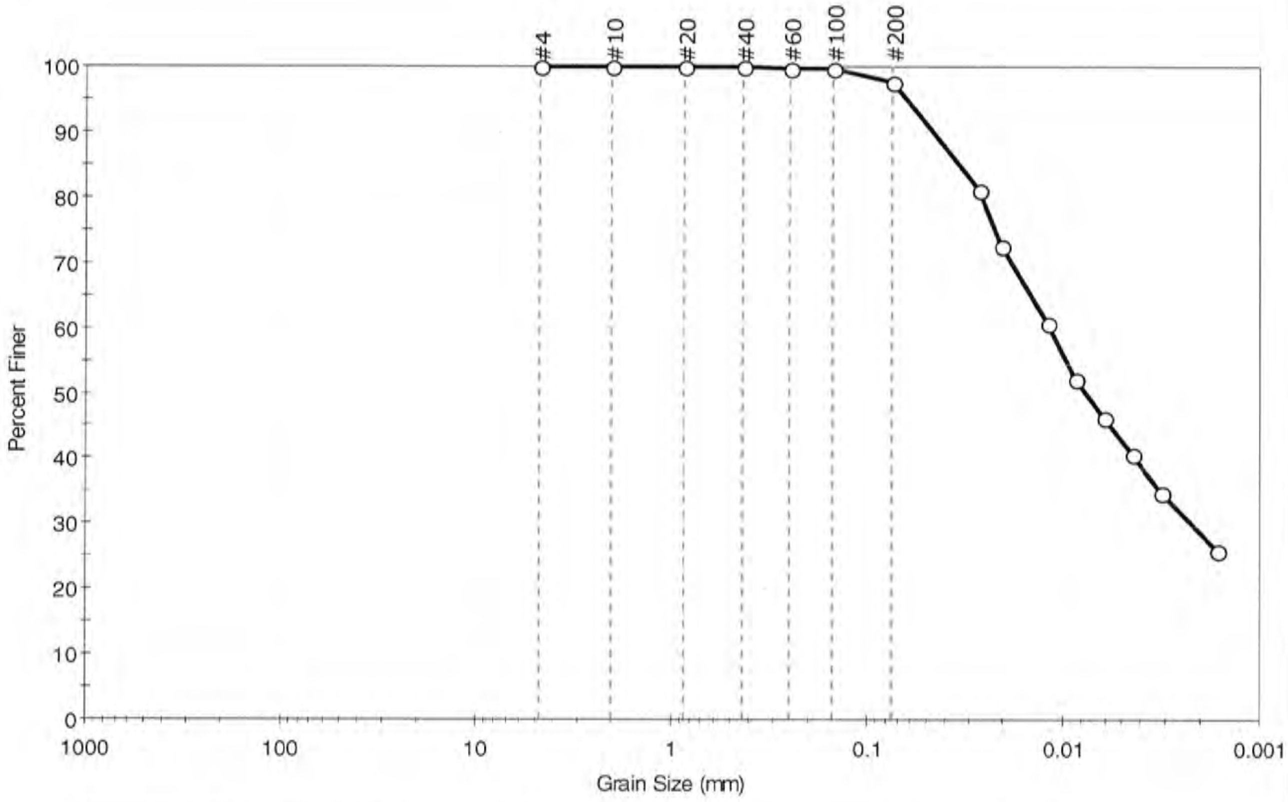
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting EXPRESS

Client: U.S. Army Corps of Engineers			
Project: Isles of Shoals Site N			
Location: ---		Project No:	GTX-10463
Boring ID: Site N	Sample Type: bag	Tested By:	jbr
Sample ID:C	Test Date: 12/17/10	Checked By:	jdt
Depth : 315 ft	Test Id: 201087		
Test Comment: ---			
Sample Description: Moist, brown silty clay			
Sample Comment: ---			

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	2.4	97.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	98		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0269	81		
---	0.0205	72		
---	0.0120	61		
---	0.0086	52		
---	0.0062	46		
---	0.0044	41		
---	0.0032	35		
---	0.0016	26		

Coefficients

D_{85} =0.0341 mm	D_{30} =0.0022 mm
D_{60} =0.0116 mm	D_{15} =N/A
D_{50} =0.0076 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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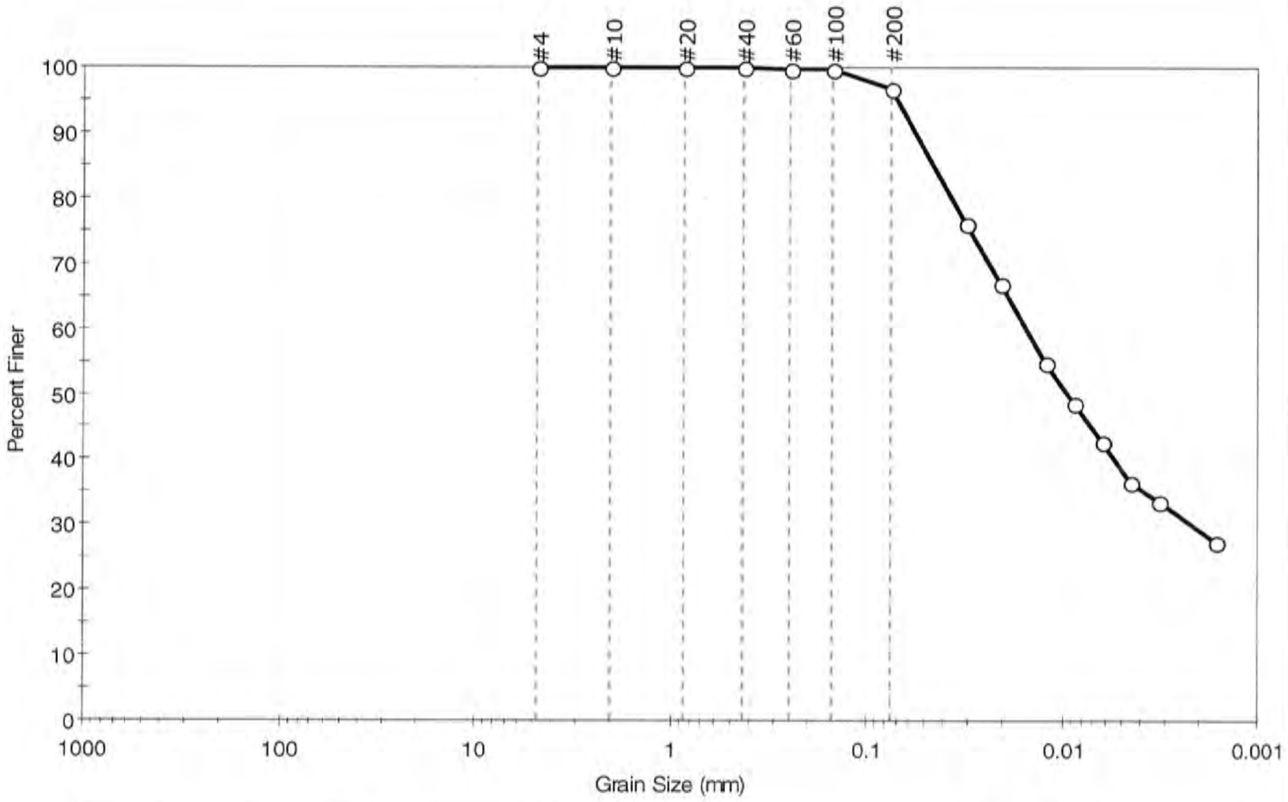
GeoTesting
EXPRESS

Client: U.S. Army Corps of Engineers
Project: Isles of Shoals Site N
Location: --- Project No: GTX-10463
Boring ID: Site N Sample Type: bag Tested By: jbr
Sample ID:D Test Date: 12/17/10 Checked By: jdt
Depth : 318 ft Test Id: 201088
Test Comment: ---
Sample Description: Moist, brown silty clay
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	3.4	96.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	97		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0314	76		
---	0.0207	67		
---	0.0121	55		
---	0.0088	49		
---	0.0062	43		
---	0.0045	37		
---	0.0032	34		
---	0.0016	27		

Coefficients

D_{85} =0.0456 mm	D_{30} =0.0022 mm
D_{60} =0.0152 mm	D_{15} =N/A
D_{50} =0.0093 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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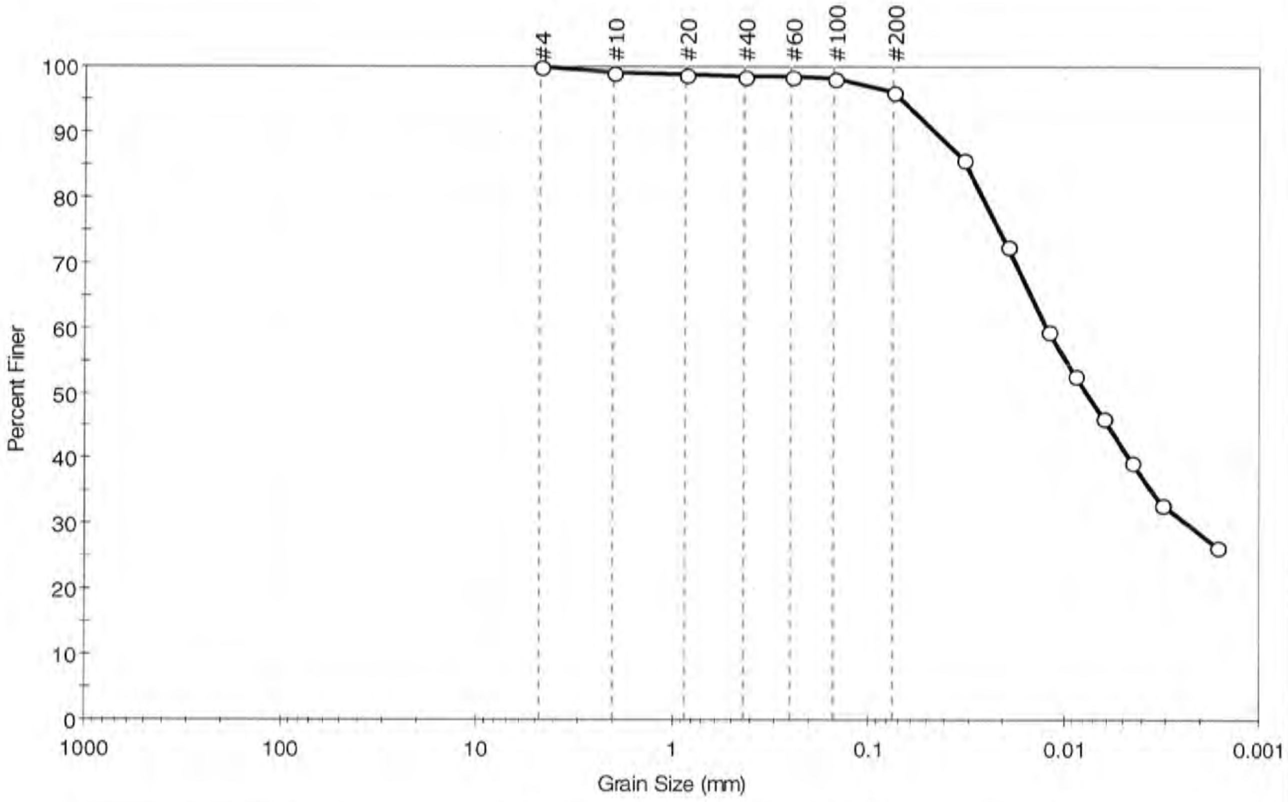
GeoTesting
EXPRESS

Client: U.S. Army Corps of Engineers			
Project: Isles of Shoals Site N			
Location: ---		Project No:	GTX-10463
Boring ID: Site N	Sample Type: bag	Tested By:	jbr
Sample ID:E	Test Date: 12/17/10	Checked By:	jdt
Depth : 316 ft	Test Id: 201089		

Test Comment: ---
Sample Description: Moist, brown silty clay
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	3.7	96.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	99		
#40	0.42	99		
#60	0.25	99		
#100	0.15	98		
#200	0.075	96		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0328	86		
---	0.0191	73		
---	0.0120	59		
---	0.0087	53		
---	0.0062	46		
---	0.0045	40		
---	0.0032	33		
---	0.0017	26		

Coefficients

D_{85} =0.0316 mm	D_{30} =0.0024 mm
D_{60} =0.0122 mm	D_{15} =N/A
D_{50} =0.0075 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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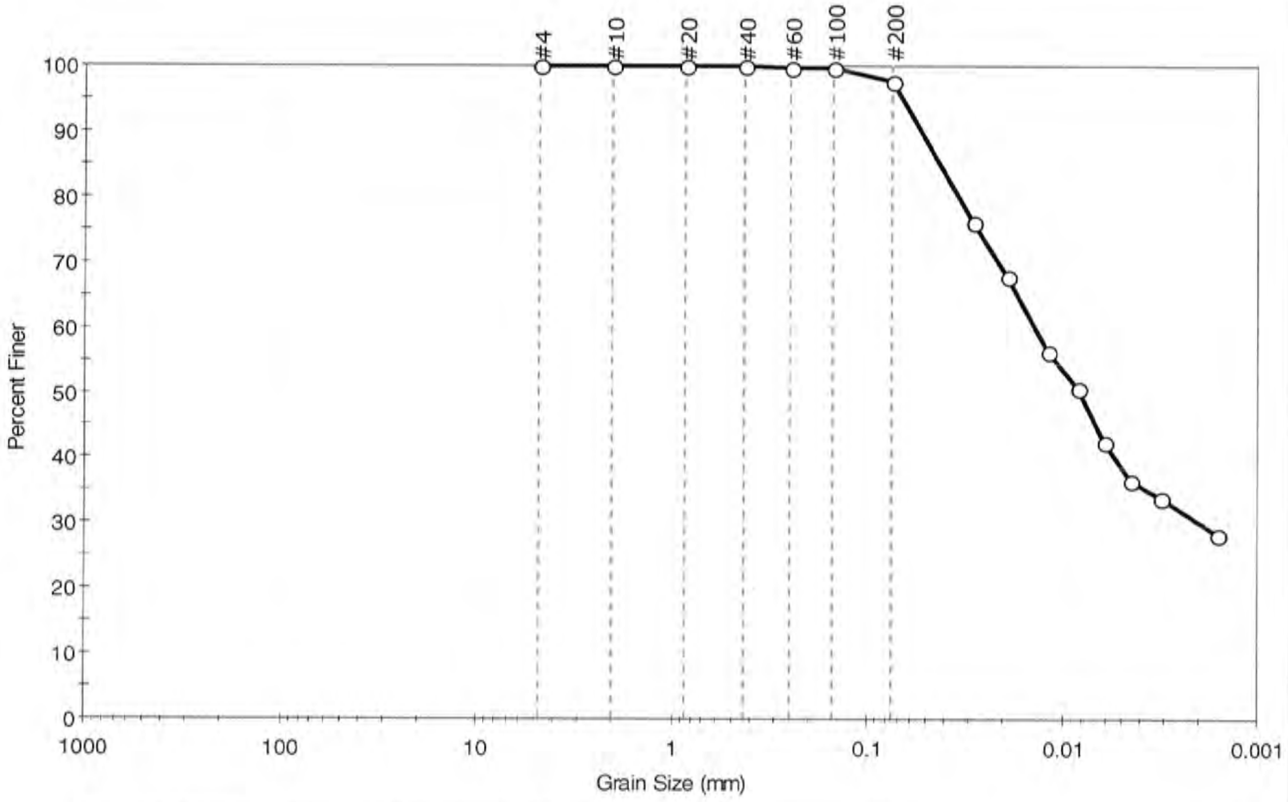
GeoTesting
EXPRESS

Client:	U.S. Army Corps of Engineers				
Project:	Isles of Shoals Site N				
Location:	---			Project No:	GTX-10463
Boring ID: Site N		Sample Type:	bag	Tested By:	jbr
Sample ID:F		Test Date:	12/17/10	Checked By:	jdt
Depth :	321 ft	Test Id:	201090		

Test Comment: ---
Sample Description: Moist, brown silty clay
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	2.4	97.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	98		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0286	76		
---	0.0191	68		
---	0.0119	56		
---	0.0084	51		
---	0.0062	42		
---	0.0045	37		
---	0.0032	34		
---	0.0016	28		

Coefficients

D_{85} = 0.0425 mm
D_{30} = 0.0020 mm
D_{60} = 0.0138 mm
D_{15} = N/A
D_{50} = 0.0082 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

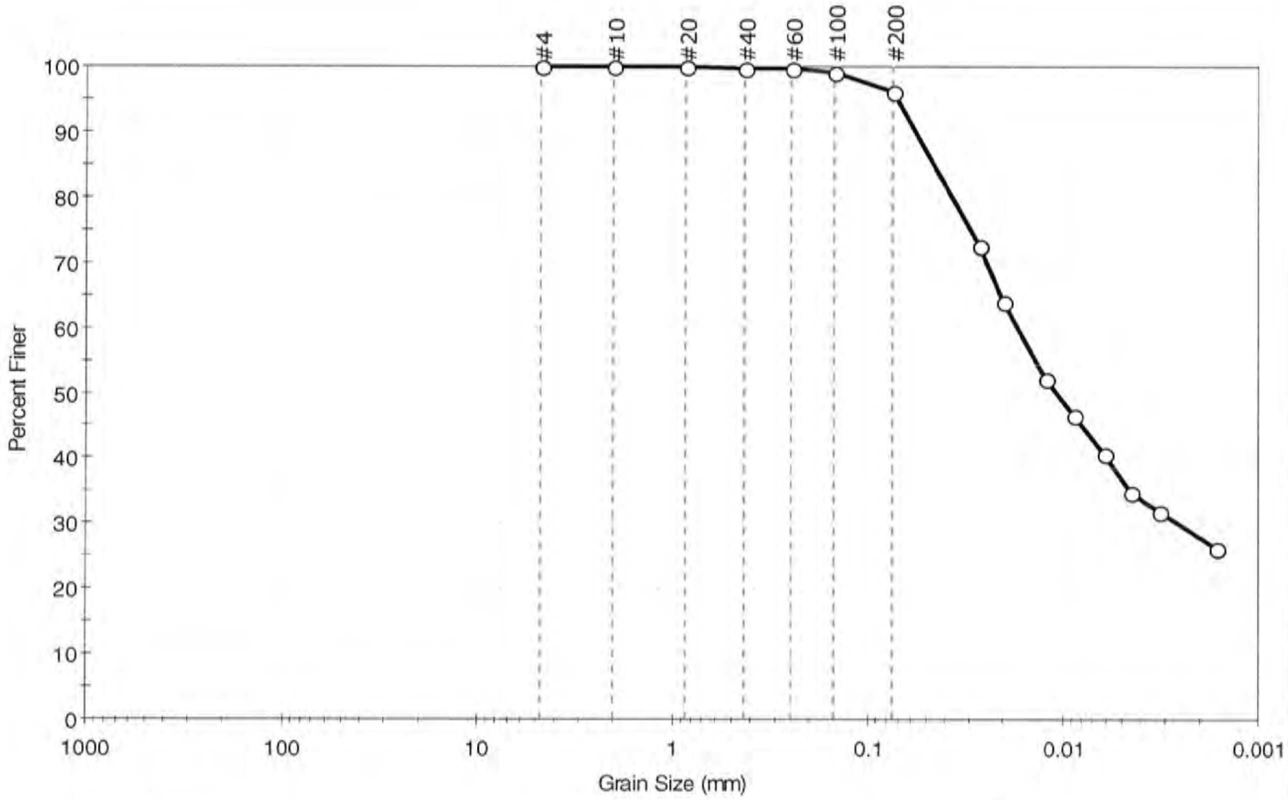
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting
EXPRESS

Client:	U.S. Army Corps of Engineers		
Project:	Isles of Shoals Site N		
Location:	---	Project No:	GTX-10463
Boring ID: Site N	Sample Type: bag	Tested By:	jbr
Sample ID:G	Test Date: 12/17/10	Checked By:	jdt
Depth : 317 ft	Test Id: 201091		
Test Comment:	---		
Sample Description:	Moist, brown silty clay		
Sample Comment:	---		

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	3.9	96.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	99		
#200	0.075	96		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0268	73		
---	0.0203	64		
---	0.0122	52		
---	0.0088	46		
---	0.0062	41		
---	0.0045	35		
---	0.0032	32		
---	0.0016	26		

Coefficients

D_{85} =0.0461 mm
D_{30} =0.0026 mm
D_{60} =0.0171 mm
D_{15} =N/A
D_{50} =0.0107 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

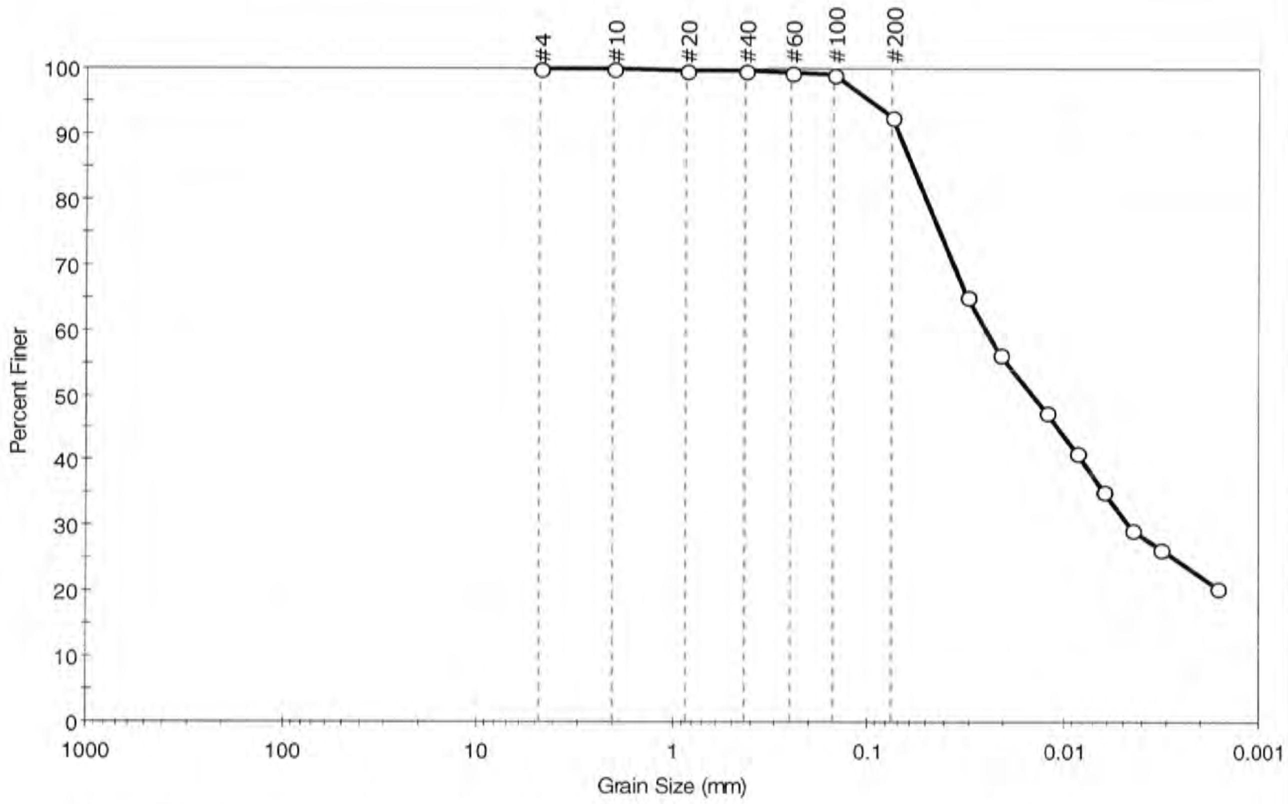
Sand/Gravel Hardness : ---

GeoTesting
EXPRESS

Client:	U.S. Army Corps of Engineers		
Project:	Isles of Shoals Site N		
Location:	---	Project No:	GTX-10463
Boring ID: Site N	Sample Type: bag	Tested By:	jbr
Sample ID:H	Test Date: 12/17/10	Checked By:	jdt
Depth : 328 ft	Test Id: 201092		

Test Comment: ---
Sample Description: Moist, brown silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	7.3	92.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	99		
#100	0.15	99		
#200	0.075	93		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0311	65		
---	0.0213	56		
---	0.0124	47		
---	0.0085	41		
---	0.0063	36		
---	0.0045	30		
---	0.0032	27		
---	0.0017	21		

Coefficients

D_{85} =0.0586 mm	D_{30} =0.0046 mm
D_{60} =0.0250 mm	D_{15} =N/A
D_{50} =0.0146 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

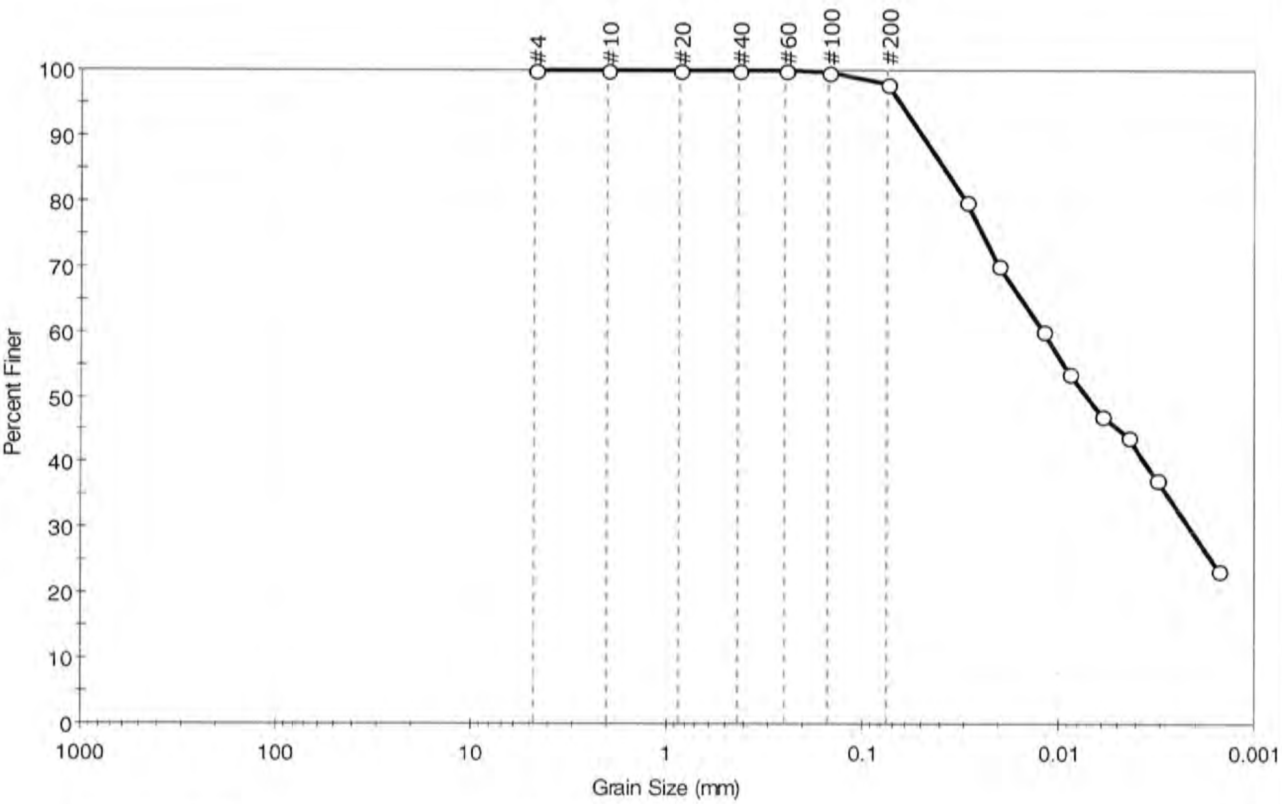
Sand/Gravel Hardness : ---

GeoTesting
EXPRESS

Client:	U.S. Army Corps of Engineers				
Project:	Isles of Shoals Site N				
Location:	---			Project No:	GTX-10463
Boring ID:	Site N	Sample Type:	bag	Tested By:	jbr
Sample ID:	I	Test Date:	12/17/10	Checked By:	jdt
Depth :	313 ft	Test Id:	201093		

Test Comment: ---
Sample Description: Moist, brown silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	2.1	97.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	98		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0293	80		
---	0.0204	70		
---	0.0121	60		
---	0.0087	54		
---	0.0060	47		
---	0.0044	44		
---	0.0031	37		
---	0.0015	24		

Coefficients

D_{85} =0.0383 mm
D_{30} =0.0021 mm
D_{60} =0.0119 mm
D_{15} =N/A
D_{50} =0.0070 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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U.S. ARMY CORPS OF ENGINEERS

Richard Heidebrecht 978-318-8513 **CHAIN OF CUSTODY RECORD**

PROJ. NO.	PROJECT NAME Isles of Shoals Site N					NO. OF CON-TAINERS	Wet Sieve Atterberg					REMARKS
SAMPLERS: (Signature) Todd Randall												
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION							
A	11/1			/	Site N	1	/					319' Depth
B	11/1			/		1	/					314' Depth
C	11/1	940		/		1	/					315' Depth
D	11/1			/		1	/					318' Depth
E	11/1	1200		/		1	/					316' Depth
F	11/1	1040		/		1	/					321' Depth
G	11/1	1015		/		1	/					317' Depth
H	11/1	1115		/		1	/					328' Depth
I	11/1	1140		/	↓	1	/					313' Depth

Relinquished by: (Signature)	Date / Time 12/15/10 9:50	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks Call #13	

Distribution: Original Accompanies Shipment; Copy 1 to Sample Custodian; Copy 2 to Coordinator Field Files

10321

GeoTesting
EXPRESS

WARRANTY and LIABILITY

GeoTesting Express (GTX) warrants that all tests it performs are run in general accordance with the specified test procedures and accepted industry practice. GTX will correct or repeat any test that does not comply with this warranty. GTX has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

GTX's liability will be limited to correcting or repeating a test which fails our warranty. GTX's liability for damages to the Purchaser of testing services for any cause whatsoever shall be limited to the amount GTX received for the testing services. GTX will not be liable for any damages, or for any lost benefits or other consequential damages resulting from the use of these test results, even if GTX has been advised of the possibility of such damages. GTX will not be responsible for any liability of the Purchaser to any third party.

Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$
B	pore pressure parameter for $\Delta\sigma_3$
CIU	isotropically consolidated undrained triaxial shear test
CR	compression ratio for one dimensional consolidation
C_c	coefficient of curvature, $(D_{30})^2 / (D_{10} \times D_{60})$
C_u	coefficient of uniformity, D_{60}/D_{10}
C_c	compression index for one dimensional consolidation
C_α	coefficient of secondary compression
c_v	coefficient of consolidation
c	cohesion intercept for total stresses
c'	cohesion intercept for effective stresses
D	diameter of specimen
D_{10}	diameter at which 10% of soil is finer
D_{15}	diameter at which 15% of soil is finer
D_{30}	diameter at which 30% of soil is finer
D_{50}	diameter at which 50% of soil is finer
D_{60}	diameter at which 60% of soil is finer
D_{85}	diameter at which 85% of soil is finer
d_{50}	displacement for 50% consolidation
d_{90}	displacement for 90% consolidation
d_{100}	displacement for 100% consolidation
E	Young's modulus
e	void ratio
e_c	void ratio after consolidation
e_0	initial void ratio
G	shear modulus
G_s	specific gravity of soil particles
H	height of specimen
PI	plasticity index
i	gradient
K_0	lateral stress ratio for one dimensional strain
k	permeability
LI	Liquidity Index
m_v	coefficient of volume change
n	porosity
PI	plasticity index
P_c	preconsolidation pressure
p	$(\sigma_1 + \sigma_3) / 2$, $(\sigma_v + \sigma_h) / 2$
p'	$(\sigma'_1 + \sigma'_3) / 2$, $(\sigma'_v + \sigma'_h) / 2$
p'_c	p' at consolidation
Q	quantity of flow
q	$(\sigma_1 . \sigma_3) / 2$
q_f	q at failure
q_0, q_i	initial q
q_c	q at consolidation
S	degree of saturation
SL	shrinkage limit
s_u	undrained shear strength
T	time factor for consolidation

T	temperature
t	time
U, UC	unconfined compression test
UU, Q	unconsolidated undrained triaxial test
u_a	pore gas pressure
u_e	excess pore water pressure
u, u_w	pore water pressure
V	total volume
V_g	volume of gas
V_s	volume of solids
V_v	volume of voids
V_w	volume of water
V_o	initial volume
v	velocity
W	total weight
W_s	weight of solids
W_w	weight of water
w	water content
w_c	water content at consolidation
w_f	final water content
w_l	liquid limit
w_n	natural water content
w_p	plastic limit
w_s	shrinkage limit
w_o, w_i	initial water content
α	slope of q_f versus p_f
α'	slope of q_f versus p_f'
γ_t	total unit weight
γ_d	dry unit weight
γ_s	unit weight of solids
γ_w	unit weight of water
ε	strain
ε_{vol}	volume strain
ε_h, ε_v	horizontal strain, vertical strain
μ	Poisson's ratio, also viscosity
σ	normal stress
σ'	effective normal stress
σ_c, σ'_c	consolidation stress in isotropic stress system
σ_h, σ'_h	horizontal normal stress
σ_v, σ'_v	vertical normal stress
σ_1	major principal stress
σ_2	intermediate principal stress
σ_3	minor principal stress
τ	shear stress
φ	friction angle based on total stresses
φ'	friction angle based on effective stresses
φ'_r	residual friction angle
φ_{ult}	φ for ultimate strength

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX N

NEARSHORE PLACEMENT SITE INVESTIGATIONS
WELLS BEACH AND
MERRIMACK RIVER AREA BEACHES

Field Survey in Support of
Nearshore Placement Site Characterization Final

Portsmouth Harbor and Piscataqua River Navigation Improvement Project Nearshore Placement Site Characterization

US Army Corps
of Engineers ®
New England District

August 2013

FIELD SURVEY

IN SUPPORT OF

PORTSMOUTH HARBOR AND PISCATAQUA RIVER

NAVIGATION IMPROVEMENT PROJECT

NEARSHORE PLACEMENT SITE CHARACTERIZATION

WELLS, MAINE
NEWBURY AND NEWBURYPORT, MASSACHUSETTS

August, 2013

Prepared by:

Engineering/Planning Division
Environmental Resources Section
U.S. Army Corps of Engineers
New England District
Concord, Massachusetts

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TABLES

FIGURES

APPENDICES

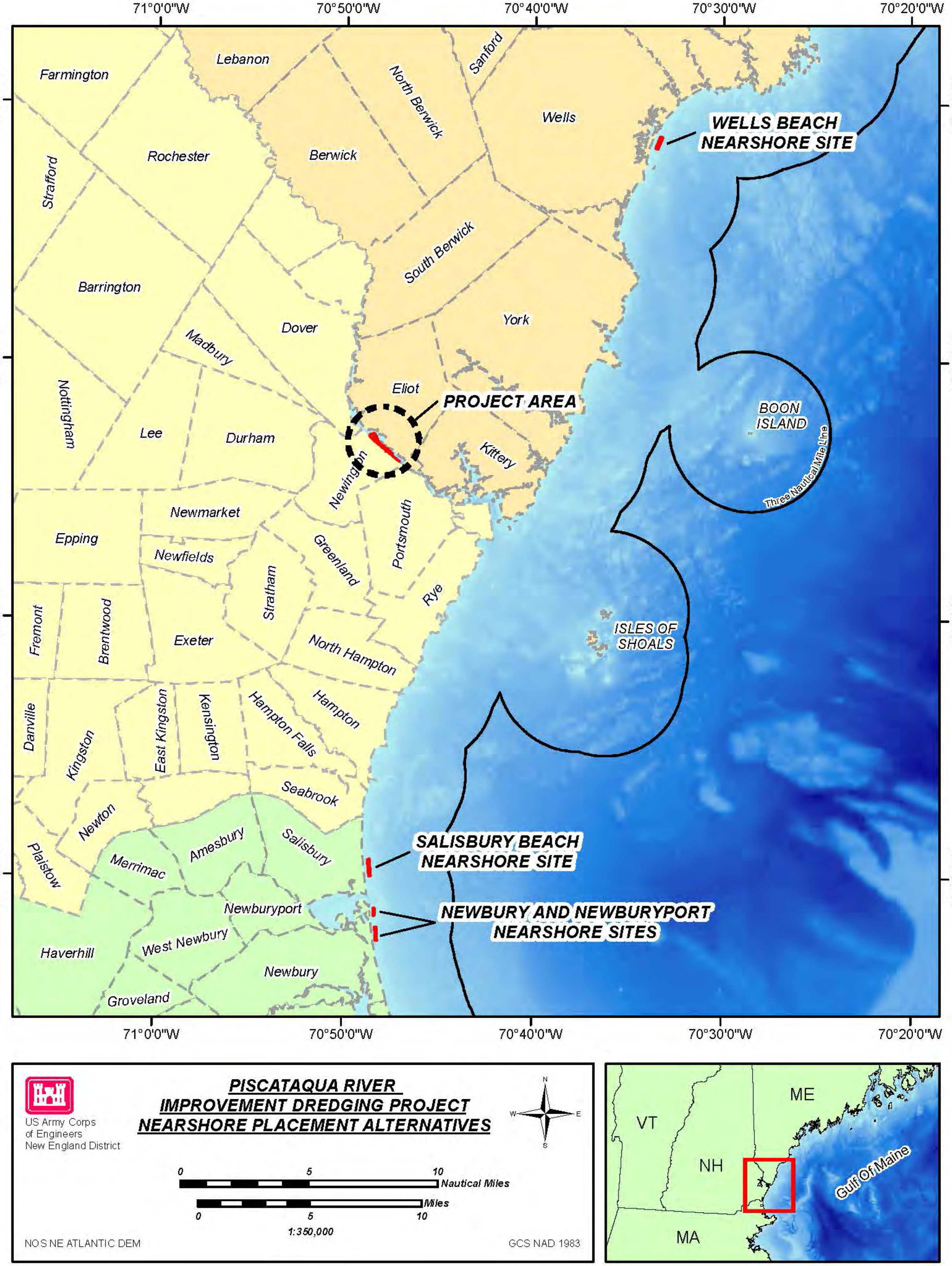
1.0 INTRODUCTION

The existing federal navigation project (FNP) in the Piscataqua River consists of a 400 foot wide, 35 foot deep (MLLW) channel extending 8.8 miles upstream from the entrance in Portsmouth Harbor; a 850 foot wide, 35 foot deep (MLLW) turning basin located just upstream of Boiling Rock; and a 950 foot wide, 35 foot deep (MLLW) turning basing at the upstream end of the federal channel. The current width of the uppermost turning basin poses safety concerns for liquid petroleum gas (LPG) cryo-tankers and other large bulk cargo vessels which rely on this area to access terminals in the upstream portions of the river.

The New England District (NAE) of the Army Corps of Engineers (USACE) is currently proposing to widen the upper turning basin to a width of 1,200 feet at the current 35-foot depth. This would involve mechanically dredging approximately 720,000 cubic yards of sand and gravel in addition to the blasting and removal of 16,000 cubic yards of bedrock. NAE coordinated with communities along the Maine, Massachusetts, and New Hampshire coastlines regarding beneficial use opportunities for the proposed dredged material and four towns have expressed an interest in placing the sandy material in nearshore areas for the purpose of beach nourishment. It is anticipated that 360,000 of the 720,000 cubic yards of dredged material will be placed off of Wells Beach in Wells, Maine, and the remaining 360,000 will be divided between beaches in Newbury, Newburyport, and Salisbury, Massachusetts. An overview of the proposed nearshore placement sites in relation to the project area is presented as Figure 1.

The objectives of the field effort described in this report were to collect data to characterize the proposed nearshore placement sites and to help identify any resources of concern that might be impacted by the proposed activity. In order to accomplish these objectives surficial sediment samples were collected at each site and analyzed for grain size and benthic infaunal community assemblage. In addition, towed video and hydroacoustic survey transects were completed at each site in order to document water depth, presence of submerged aquatic vegetation (SAV) (defined in this report as any rooted vascular plant or attached macroalgae), and general bottom conditions. This report describes the field methods employed, site conditions encountered, and the results of analysis.

FIGURE 1



PISCATAQUA RIVER IMPROVEMENT DREDGING PROJECT NEARSHORE PLACEMENT ALTERNATIVES

2.0 MATERIALS AND METHODS

Video and acoustic surveys as well as sediment sampling efforts took place at the proposed Wells Beach nearshore placement site on July 30, 2013. Sediment sampling at the Newbury, Newburyport, and Salisbury sites took place on July 31. Video and acoustic surveys at these sites were scheduled to be carried out on August 1, but were postponed until August 15 due to rough sea state. Work was carried out onboard the R/V NOMAD, a 25 foot SBI defender. Positioning was achieved using a WAAS enabled Lowrance HDS-10 sonar/chart plotter with external LGC-4000 GPS receiver antenna, and verified with a Trimble GeoXM Differential Global Positioning System (DGPS) with an accuracy of 3 meters or less.

Video and hydroacoustic survey transects were pre-planned in ArcGIS 10 and transferred to the Lowrance chartplotter for navigation in the field. Video transects were laid out parallel to the shoreline for ease of towing the camera sled and to obtain the best picture quality by minimizing changes in bottom depth. Hydroacoustic transects were laid out perpendicular to the shoreline to better document changes in depth and the inshore/offshore edges of SAV beds. SAV species of concern were not identified in the vicinity of any of the proposed placement sites by state resource agencies, so a wider transect spacing of 500 feet was selected to provide a generalized overview of SAV coverage to supplement the video survey data. The planned survey transects for each site are presented are presented as Figures 2-5.

Video footage was collected using a Sea Viewer® Sea-Drop 950 Underwater Video Camera and recorded to a portable DVR system connected to a Sea-Trak™ GPS video overlay to provide date, time, position, speed, and heading data from the vessel's navigation system. The Camera was mounted in a custom made benthic sled which maintained the camera height and angle in relation to the bottom. The sled was towed along the seafloor approximately 50 feet off the stern of the vessel at a speed between 2 and 3 knots. Transects were run in opposite directions to minimize non-recording time. All video footage was viewed in real time on a dash mounted LCD monitor.

Hydroacoustic data was collected using a Lowrance LSS-1 Structure Scan System with an in-line 200/800 kHz transducer array. The transducer array was mounted to the stern of the boat along the centerline. Sonar data was viewed in real time and recorded to a memory card using the Lowrance HDS-10. The boat operator navigated all transects at a speed of approximately 5 knots while recording data. Transects were run in opposite directions to minimize non-recording time.

Sediment grabs for grain size and benthic community analysis were collected from five pre-planned locations at each site (Figures 2-5) using a 0.04m^2 Van Veen grab which was deployed and retrieved with a davit mounted on the starboard side of the vessel. Sediment collected for grain size analysis was transferred to sample containers and stored at ambient temperature. Sediment collected for benthic community analysis was washed through a 0.5 mm sieve, treated with the biological stain rose bengal, and preserved in 10% buffered formalin. All samples were delivered to the NAE environmental laboratory in Concord, MA at the conclusion of field activities. Sediment collection data is summarized in Table 1.

Table 1: Summary of Sediment Collection Data

Station ID	Lat (NAD 83)	Long (NAD 83)	Date	Time (EDT)	Measured Water Depth (FT)
Wells-A	43.305541	-70.559624	7/30/2013	16:30	-21
Wells-B	43.311916	-70.556157	7/30/2013	17:11	-23
Wells-C	43.308522	-70.557182	7/30/2013	16:44	-24
Wells-D	43.305135	-70.558227	7/30/2013	16:13	-23
Wells-E	43.311501	-70.554730	7/30/2013	17:37	-26
Salisbury-A	42.834346	-70.809975	7/31/2013	11:31	-13
Salisbury-B	42.843930	-70.810784	7/31/2013	11:54	-16
Salisbury-C	42.839165	-70.809785	7/31/2013	11:39	-18
Salisbury-D	42.834406	-70.808646	7/31/2013	11:22	-18
Salisbury-E	42.843990	-70.809476	7/31/2013	11:47	-22
Newburyport-A	42.808835	-70.805989	7/31/2013	12:37	-13
Newburyport -B	42.812375	-70.805966	7/31/2013	12:14	-14
Newburyport -C	42.810657	-70.805499	7/31/2013	12:20	-15
Newburyport -D	42.808842	-70.805155	7/31/2013	12:34	-14
Newburyport -E	42.812370	-70.805149	7/31/2013	12:08	-16
Newbury-A	42.792570	-70.803665	7/31/2013	13:14	-12
Newbury -B	42.800016	-70.804189	7/31/2013	12:50	-7
Newbury -C	42.796320	-70.803457	7/31/2013	12:57	-14
Newbury -D	42.792615	-70.802901	7/31/2013	13:09	-17
Newbury -E	42.800044	-70.803313	7/31/2013	12:46	-10

FIGURE 2


70°34'0"W
70°33'30"W
70°33'0"W
43°19'0"N
43°18'30"N
43°18'0"N
Legend
Sediment Sample
Proposed Nearshore Site
Survey Transects
Underwater Video
SAV and Depth
1
3
4
4
9
8
7
6
5
4
3
2
1
A
B
C
D
E
US Army Corps
of Engineers
New England District
PISCATAQUA RIVER FNP
JULY 2013 SURVEY OVERVIEW
WELLS, ME
N
E
S
W
0
1,000
2,000
3,000
Feet
0
0.1
0.2
0.3
0.4
0.5
Miles
1:12,000
2011 NAIP AERIAL IMAGERY
GCS NAD 1983
Sandford
Kennebunk
Arundel
Kennebunkport
North Berwick
Wells
South Berwick
Ogunquit
York

FIGURE 3


70°49'0"W
70°48'0"W
42°51'0"N
42°50'0"N
Legend
Sediment Sample
Proposed Nearshore Site
Survey Transects
Underwater Video
SAV and Depth
1
2
3
11
10
9
8
7
6
5
4
3
2
1
A
B
C
D
E
US Army Corps
of Engineers
New England District
PISCATAQUA RIVER FNP
JULY 2013 SURVEY OVERVIEW
SALISBURY, MA
N
W
E
S
0
1,000
2,000
3,000
Feet
Miles
0
0.1
0.2
0.3
0.4
0.5
1:12,000
2012 NAIP Aerial Imagery
WGS NAD 1983
South Hampton
Seabrook
Newton
Salisbury
Amesbury
Merrimac
Newburyport
West Newbury
Haverhill
Newbury
Groveland
Georgetown
Rowley
Ipswich

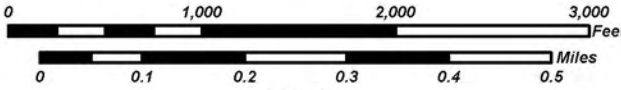
FIGURE 4

PISCATAQUA RIVER FNP
JULY 2013 SURVEY OVERVIEW
NEWBURYPORT, MA

FIGURE 5

US Army Corps
of Engineers
New England District

PISCATAQUA RIVER FNP
JULY 2013 SURVEY OVERVIEW
NEWBURY, MA



1:12,000

2012 NAIP Aerial Imagery

WGS NAD 1983

3.0 DATA PROCESSING

Video files were reviewed using CyberLink PowerDirector video editing software. Representative screen captures were created at user selected intervals along each transect to show general bottom conditions. An image library containing all screen captures organized by time and transect along with a descriptive caption is presented as appendix A of this report.

The Navico .sl2 files containing the hydroacoustic survey transect data were processed using the SAVEWS Jr. (Submersed Aquatic Vegetation Early Warning System) software package developed by the US Army Engineer Research and Development Center (ERDC). This software uses an algorithm augmented by user defined parameters to track the bottom depth and the presence of SAV while providing an estimate of canopy height and vegetation percent coverage. Outputs include an ASCII file with output variables and position referenced data and a graphic consisting of the classified output (bottom depth and canopy top) superimposed on the colorized echogram along with aligned data plots of canopy height and percent coverage for each transect. The SAVEWS Jr. post-processing program FINALIZE was then used to combine transect data files, make depth corrections, and coordinate projection transformations. Tide correction data for FINALIZE was obtained from the nearby Wells and Merrimack River tide stations. The SAVEWS Jr. configuration file and the graphic output for each transect are presented in Appendix A.

The ASCII files containing the processed and compiled SAVEWS Jr. output for each survey area were imported into ArcGIS as point shapefiles and interpolated to raster files representing the SAV percent cover data along each transect. This data was compared with video transect footage to validate the SAVEWS Jr. output and delineate areas of SAV coverage. In addition, the tide corrected depth data contained in each point shapefile was interpolated as a raster file and used to generate depth contours for the extent of each survey area.

Grain size analysis was completed by the NAE environmental laboratory. Samples were prepared according to the guidance in ASTM D421-85 (Re-approved 2002), Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants, and analyzed according to ASTM D422-63 (Re-approved 2002), Standard Test Method for Particle-Size Analysis of Soils using sieve nos. 4, 10, 40, 100, 200. There were no deviations from the established laboratory testing protocols.

Benthic community analysis was also completed by the NAE environmental laboratory. All samples were re-washed through a 0.5 mm sieve, sorted into major taxonomic groups, and identified to lowest identifiable taxon by qualified marine benthic taxonomists. Samples were stored in 70% ethyl alcohol while awaiting sorting and for archiving after identification.

4.0 RESULTS AND DISCUSSION

4.1 Wells, ME Nearshore Area

Depths within the Wells, ME survey area ranged from -9 to -24 feet MLLW (Figure 6). Depths in the proposed nearshore placement site were between -12 and -21 feet MLLW. Water conditions and sea state during at the time of survey resulted in decreased visibility in shallower portions of the video survey, but sufficient footage was obtained to characterize the bottom conditions along all video survey transects. In general the bottom was very uniform, consisting of small scale sand waves with scattered macroalgae wrack. Multiple lobsters were observed along transects 2, 3, and 4 with increasing frequency in the offshore portion of the survey area.

Because sonar data was recorded during both the hydroacoustic and video survey transects, the coverage of hydroacoustic data collected from the Wells survey area was sufficient to create an interpolated grid representing SAVEWS vegetation percent cover for the entire survey area (Figure 7). Processed SAVEWS percent cover data correlated well with the video survey and aerial imagery of the area. Vegetation detected by SAVEWS was found to be either clumps of drift algae or *Codium fragile*. Eelgrass (*Zostera marina*) was not observed within any portion of the survey area.

Grain size analysis of sediments from the five stations within the proposed nearshore placement site indicates that the entire site is composed of poorly sorted fine sand. The results of grain size analysis are summarized in Table 2. Grain size curves and laboratory data sheets can be found in the analytical report presented as Appendix B.

The benthic community within the nearshore site off Wells was dominated by burrowing amphipods (*Haustorius canadensis*). A wide range of polychaete species were also present. Juvenile razor clams (*Ensis directus*) and juvenile surf clams (*Spisula solidissima*) were abundant throughout the site. The individuals found at this site represent a sandy nearshore assemblage typical of New England intertidal and shallow subtidal environments (Croker, et al. 1974, Larsen and Doggett, 1990). A complete species list and abundance data are presented in Table 3.

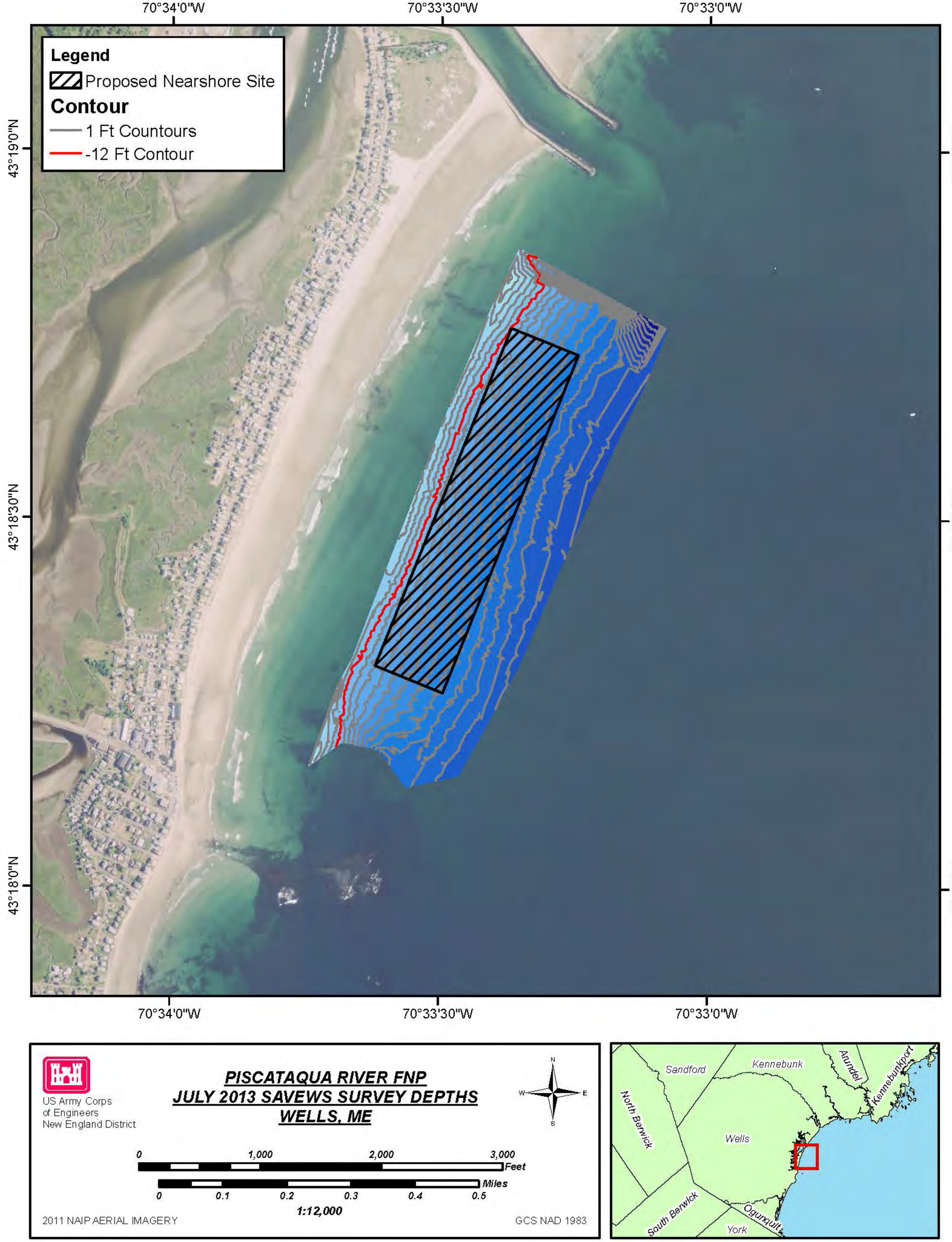
Table 2: Wells, ME Grain Size Results

Sample ID	%Cobble	%Gravel		%Sand			%Fines
		Coarse	Fine	Coarse	Medium	Fine	
Wells-A	0.0	0.0	0.0	0.1	1.0	98.9	0.0
Wells-B	0.0	0.0	0.2	0.4	1.4	98.1	0.0
Wells-C	0.0	0.0	0.1	0.0	0.6	99.3	0.0
Wells-D	0.0	0.0	0.0	0.1	1.2	98.7	0.0
Wells-E	0.0	0.0	0.5	0.2	0.5	98.8	0.0

Table 3: Wells, ME Benthic Community Data (Numbers of individuals per 0.04 m^2)

Species	Wells-A	Wells- B	Wells- C	Wells- D	Wells- E
ANNELIDA					
POLYCHAETA					
Capitella capitata	-	-	1	-	7
Drilonereis spp.	-	-	-	-	1
Exogone dispar	-	-	-	-	1
Nephtys picta	3	-	-	-	1
Sthenelais sp.	-	-	-	1	-
Paraonis fulgens	1	-	2	1	4
Sabaco elongatus	-	-	-	-	2
Spio setosa	-	-	-	-	1
Streblospio benedicti	30	1	12	11	18
ANNELIDA					
CLITELLATA					
Unidentifed Oligochaete	1	-	-	-	-
NEMATODA					
Unidentified Nematoda	3	-	-	-	-
MOLLUSCA					
BIVALVIA					
Ensis directus	24	4	5	9	17
Spisula solidissima	201	1	8	19	9
ARTHROPODA					
MALACOSTRACA					
Chiridotea spp.	3	1	6	5	11
Eudorella spp.	-	1	4	1	2
Gammaridae spp.	-	-	2	-	1
Haustorius canadensis	242	79	569	379	590
Idunella spp.	-	-	-	-	1
ECHINODERMATA					
ECHINOIDEA					
Echinarachnius parma	-	-	1	-	1
TOTALS					
# of Species	**9**	**6**	**10**	**8**	**16**
# of Individuals	**508**	**87**	**610**	**426**	**667**

FIGURE 6



PISCATAQUA RIVER FNP
JULY 2013 SAVEWS SURVEY DEPTHS
WELLS, ME

1:12,000

2011 NAIP AERIAL IMAGERY

GCS NAD 1983

FIGURE 7

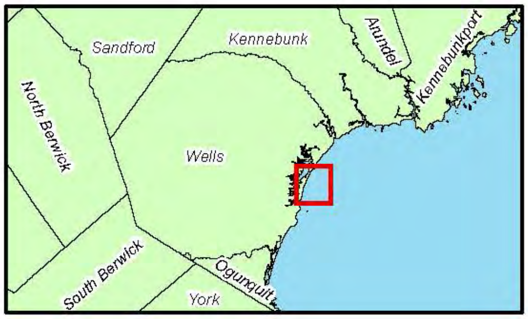
US Army Corps
of Engineers
New England District

PISCATAQUA RIVER FNP
JULY 2013 SAVEWS PERCENT COVER
WELLS, ME

1:12,000

2011 NAIP AERIAL IMAGERY

GCS NAD 1983



4.2 Salisbury, MA Nearshore Area

Depths within the Salisbury, MA survey area ranged from -9 to -27 feet MLLW (Figure 8). Depths in the proposed nearshore placement site were between -10 and -22 feet MLLW. Three video transects were successfully completed within the survey area, but a high concentration of lobster traps in the northern portion of the site resulted in the early termination of the outermost transect. Sufficient footage was obtained to characterize the bottom along all video survey transects. Bottom conditions were uniform, consisting of small scale sand waves with a high concentration of drift algae in the northern and outermost portions of the survey area. Several lobsters were observed along the central portion of transect 2.

The spacing of hydroacoustic survey transects was too wide to create a grid representing vegetation percent cover for the entire Salisbury survey area, but the processed SAVEWS data combined with the video survey data and interpretation of aerial photography enabled an adequate characterization of the site.

Grain size analysis of sediments from the five stations within the proposed nearshore placement site indicates that the entire site is composed of poorly sorted medium to fine sand. The results of grain size analysis are summarized in Table 4. Grain size curves and laboratory data sheets can be found in the analytical report presented as Appendix B.

The benthic community within the nearshore site off Salisbury was dominated by burrowing amphipods (*Haustorius canadensis*). A wide range of polychaete species (typically syllids and spionids) were also present. Razor clams (*Ensis directus*) were present in low numbers, while juvenile surf clams (*Spisula solidissima*) were abundant. The individuals found at this site represent a sandy nearshore assemblage typical of New England intertidal and shallow subtidal environments (Croker, et al. 1974, Larsen and Doggett, 1990). A complete species list and abundance data are presented in Table 5.

Table 4: Salisbury, MA Grain Size Results

Sample ID	%Cobble	%Gravel		%Sand			%Fines
		Coarse	Fine	Coarse	Medium	Fine	
Salisbury-A	0.0	0.0	0.0	0.1	73.2	26.7	0.0
Salisbury-B	0.0	0.0	0.0	0.0	2.7	97.3	0.0
Salisbury-C	0.0	0.0	0.0	0.0	74.9	25.0	0.0
Salisbury-D	0.0	0.0	0.0	0.1	83.1	16.8	0.0
Salisbury-E	0.0	0.0	0.0	0.0	1.4	98.5	0.0

Table 5: Salisbury, MA Benthic Community Data
(Numbers of individuals per 0.04 m^2)

Species	Salisbury A	Salisbury B	Salisbury C	Salisbury D	Salisbury E
ANNELIDA					
POLYCHAETA					
Arabella iricolor	-	-	4	2	-
Brania spp.	-	-	16	7	-
Capitella capitata	-	-	2	1	-
Nephtys caeca	-	6	-	-	-
Nephtys picta	-	4	6	2	5
Sabaco elongatus	-	-	-	-	2
Schistomeringos rudolphii	-	4	-	-	-
Scolelepis squamata	1	3	-	1	-
Streblospio benedicti	-	7	-	-	24
NEMATODA					
Unidentifed Nematoda	-	2	-	-	-
MOLLUSCA					
BIVALVIA					
Ensis directus	-	-	-	-	9
Spisula solidissima	1	17	7	9	188
GASTROPODA					
Ilyanassa trivittata	-	1	1	-	3
ARTHROPODA					
MALACOSTRACA					
Chiridotea spp.	-	4	-	-	15
Cyathura polita	-	-	1	-	-
Oxyurostylis spp.	-	-	-	-	4
Gammaridae spp.	-	2	-	-	2
Haustorius canadensis	15	235	314	102	557
Leptocheirus pinguis	-	-	-	-	4
ECHINODERMATA					
ECHINOIDEA					
Echinarachnius parma	-	-	1	-	1
Strongylocentrotus droebachiensis	-	-	1	-	-
TOTALS					
# of Species	**3**	**11**	**10**	**7**	**12**
# of Individuals	**17**	**285**	**353**	**124**	**814**

FIGURE 8

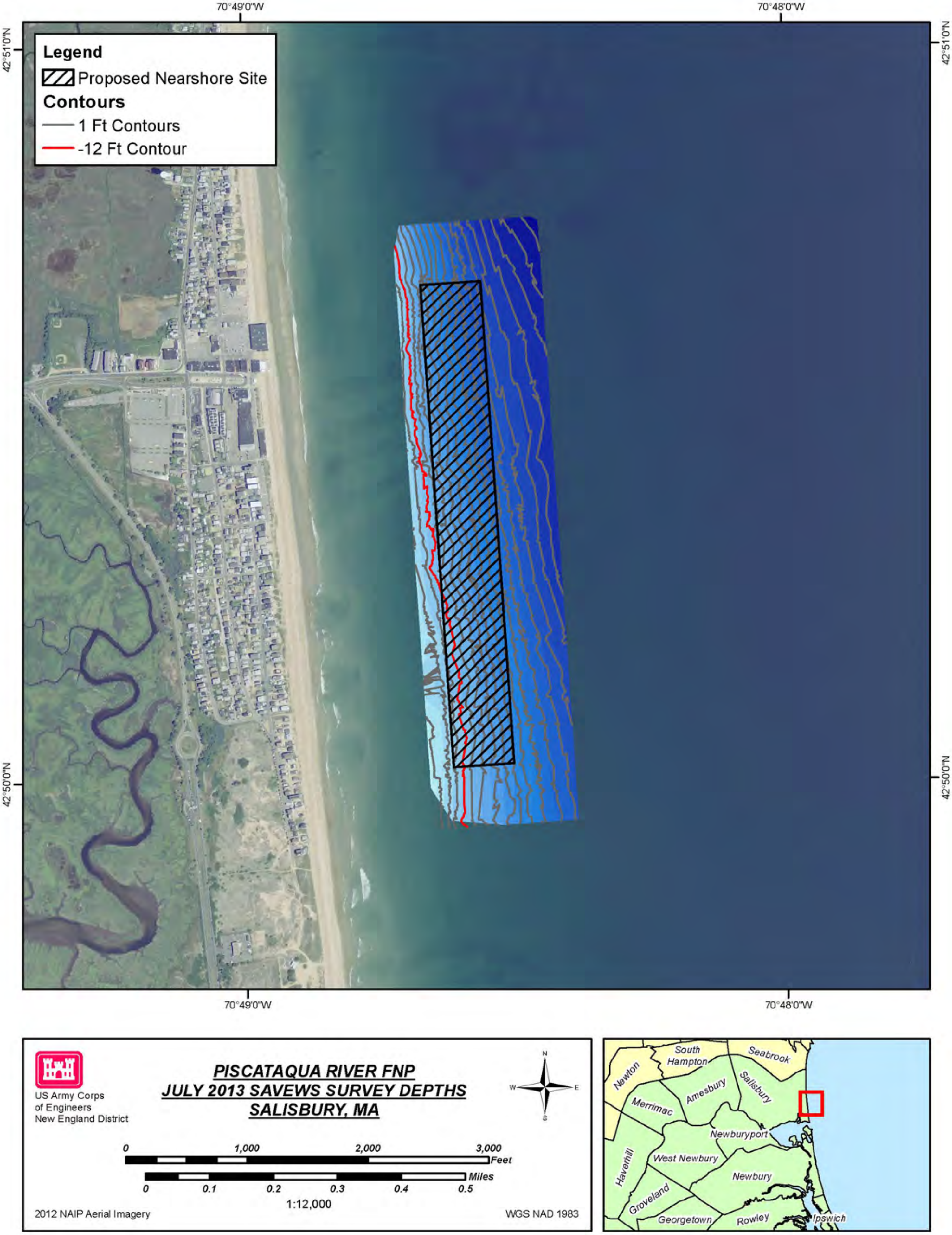

70°49'0"W
70°48'0"W
42°51'0"N
42°50'0"N
Legend
▨ Proposed Nearshore Site
Contours
1 Ft Contours
-12 Ft Contour
US Army Corps
of Engineers
New England District
PISCATAQUA RIVER FNP
JULY 2013 SAVEWS SURVEY DEPTHS
SALISBURY, MA
N
W
E
S
0
1,000
2,000
3,000
Feet
0
0.1
0.2
0.3
0.4
0.5
Miles
1:12,000
2012 NAIP Aerial Imagery
WGS NAD 1983
South Hampton
Seabrook
Newton
Salisbury
Amesbury
Merrimac
Newburyport
West Newbury
Haverhill
Newbury
Groveland
Georgetown
Rowley
Ipswich

FIGURE 9

US Army Corps
of Engineers
New England District

PISCATAQUA RIVER FNP
JULY 2013 SAVEWS PERCENT COVER
SALISBURY, MA

0 1,000 2,000 3,000 Feet

0 0.1 0.2 0.3 0.4 0.5 Miles

1:12,000

2012 NAIP Aerial Imagery

WGS NAD 1983

4.3 Newburyport, MA Nearshore Area

Depths within the Newburyport, MA survey area ranged from -3 to -18 feet MLLW (Figure 10). The proposed nearshore placement site is situated over a longshore trough with depths between -10 and -27 feet MLLW. Three video transects were successfully completed within the survey area. The camera was towed in the water column independently of the camera sled because the sled repeatedly rolled over when crossing larger sand waves. Sufficient footage was obtained to characterize the bottom along all video survey transects. Bottom conditions were uniform, consisting of small to medium sand waves with scattered surf clam shell.

The spacing of hydroacoustic survey transects was too wide to create a grid representing vegetation percent cover for the entire Newburyport survey area, but the processed SAVEWS data combined with the video survey data and interpretation of aerial photography enabled an adequate characterization of the site. Processed SAVEWS percent cover data along each transect (Figure 11) correlated well with the video survey and aerial imagery of the area. Vegetation detected by SAVEWS was found to be clumps of drift algae in contact with the bottom. Eelgrass was not observed within any portion of the survey area.

Grain size analysis of sediments from the five stations within the proposed nearshore placement site indicates that the entire site is composed of poorly sorted medium to fine sand. The results of grain size analysis are summarized in Table 6. Grain size curves and laboratory data sheets can be found in the analytical report presented as Appendix B.

The benthic community within the nearshore site off Newburyport was dominated by syllid polychaetes (*Brania* sp. and *Exogone dispar*) and various species of burrowing amphipods (e.g. *Haustorius canadensis*). Razor clams (*Ensis directus*) and surf clams (*Spisula solidissima*) were also present in low numbers. All clams were juvenile. The individuals found at this site represent a sandy nearshore assemblage typical of New England intertidal and shallow subtidal environments (Croker, et al. 1974, Larsen and Doggett, 1990). A complete species list and abundance data are presented in Table 7.

Table 6: Newburyport, MA Grain Size Results

Sample ID	%Cobble	%Gravel		%Sand			%Fines
		Coarse	Fine	Coarse	Medium	Fine	
Newburyport-A	0.0	0.0	1.6	8.6	85.4	4.4	0.0
Newburyport -B	0.0	0.0	0.0	0.9	98.1	1.0	0.0
Newburyport -C	0.0	0.0	0.2	3.2	85.9	10.7	0.0
Newburyport -D	0.0	0.0	5.1	4.3	36.2	54.5	0.0
Newburyport -E	0.0	0.0	0.8	2.2	74.1	22.9	0.0

Table 7: Newburyport, MA Benthic Community Data (Numbers of individuals per 0.04 m^2)

Species	Newburyport A	Newburyport B	Newburyport C	Newburyport D	Newburyport E
ANNELIDA					
POLYCHAETA					
Brania spp.	450	38	-	14	464
Capitella capitata	70	-	-	130	38
Exogone dispar	-	-	-	388	-
Nephtys picta	-	-	-	2	-
Polydora spp.	-	-	-	-	8
Sabaco elongatus	-	-	-	1	-
Scolelepis squamata	3	6	-	-	5
Streblospio benedicti	-	1	-	10	-
CLITELLATA					
Unidentified Tubificidae	-	-	-	-	12
NEMATODA					
Unidentified Nematoda	60	3	-	13	27
MOLLUSCA					
BIVALVIA					
Ensis directus	-	1	-	-	1
Mytilus edulis	-	-	-	-	1
Spisula solidissima	-	3	1	1	1
GASTROPODA					
Euspira triseriata	-	1	-	-	-
ARTHROPODA					
MALACOSTRACA					
Politolana sp.	-	-	-	1	-
Cancer borealis	-	-	-	1	-
Chiridotea spp.	1	4	-	7	14
Limnoria lignorum	-	-	-	-	1
Unidentified Lysianassidae	-	226	-	-	-
Haustorius canadensis	1	10	-	-	3
TOTALS					
# of Species	**6**	**10**	**1**	**11**	**12**
# of Individuals	**585**	**293**	**1**	**568**	**575**

FIGURE 10

US Army Corps
of Engineers
New England District

PISCATAQUA RIVER FNP
JULY 2013 SAVEWS SURVEY DEPTHS
NEWBURYPORT, MA

0 1,000 2,000 3,000 Feet

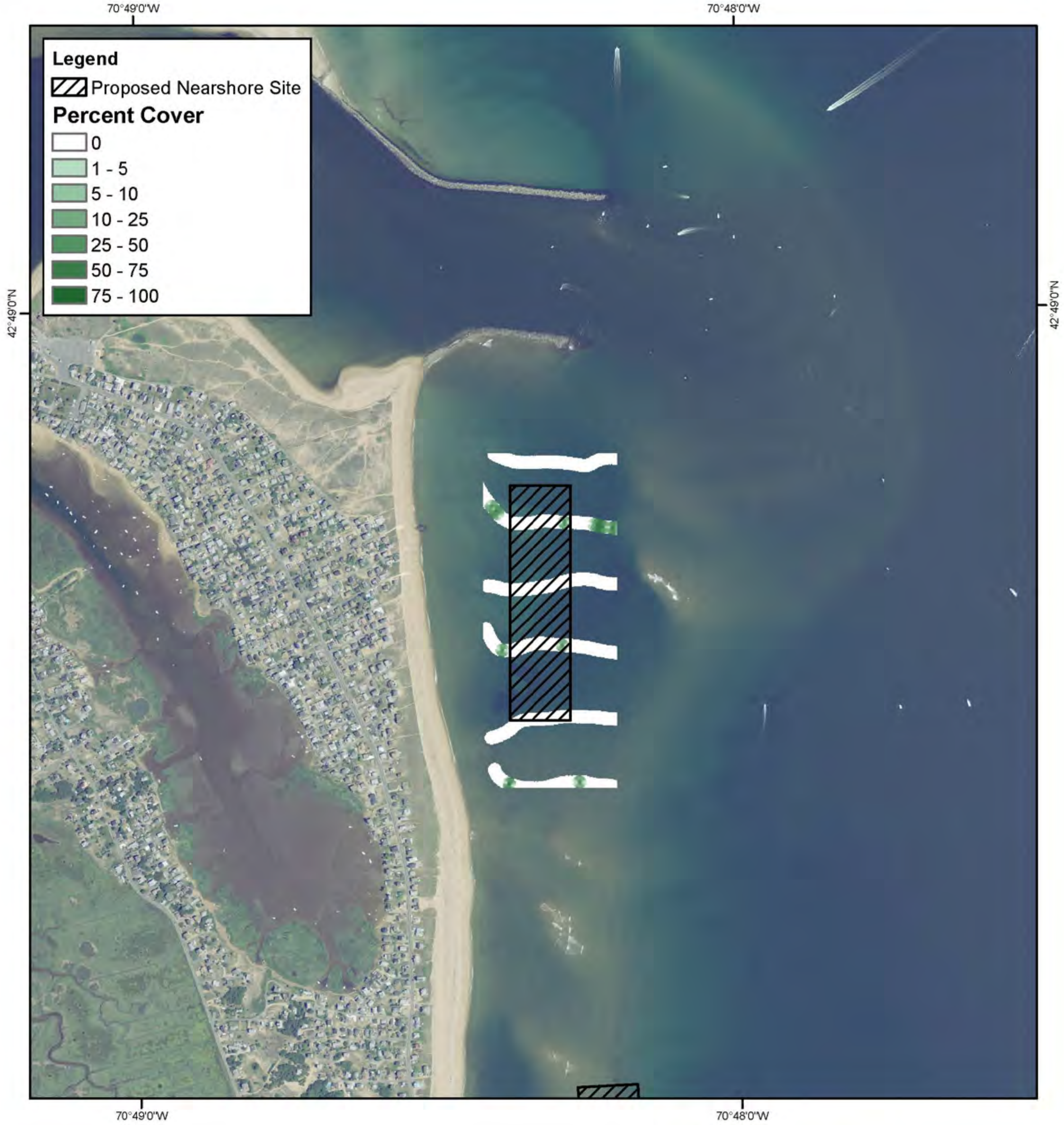
0 0.1 0.2 0.3 0.4 0.5 Miles

1:12,000

2012 NAIP Aerial Imagery

WGS NAD 1983

FIGURE 11



US Army Corps
of Engineers
New England District

PISCATAQUA RIVER FNP
JULY 2013 SAVEWS PERCENT COVER
NEWBURYPORT, MA

1:12,000

2012 NAIP Aerial Imagery

WGS NAD 1983

4.4 Newbury, MA Nearshore Area

Depths within the Newbury, MA survey area ranged from -5 to -26 feet MLLW (Figure 12). The proposed nearshore placement site is situated over a longshore trough with depths between -5 and -20 feet MLLW. Two video transects were successfully completed within the survey area. The camera was towed in the water column independently of the camera sled because the sled repeatedly rolled over when crossing larger sand waves. Visibility in the shallower portions of the survey area was decreased due to wave action and turbidity in the water column. Sufficient footage was obtained to characterize the bottom along all video survey transects. The majority of the site consisted of small to medium sand waves with scattered surf clam shell and macroalgae wrack. A small area in the south east portion of the proposed placement site was covered with dense macroalgae wrack. Several lobsters were observed in this area.

The spacing of hydroacoustic survey transects was too wide to create a grid representing vegetation percent cover for the entire Newbury survey area, but the processed SAVEWS data combined with the video survey data and interpretation of aerial photography enabled an adequate characterization of the site. Processed SAVEWS percent cover data along each transect (Figure 13) correlated well with the video survey and aerial imagery of the area. Vegetation detected by SAVEWS was found to be clumps of macroalgae wrack in contact with the bottom. Eelgrass was not observed within any portion of the survey area.

Grain size analysis of sediments from the six stations within the proposed nearshore placement site indicates that the entire site is composed of poorly sorted medium to fine sand. The results of grain size analysis are summarized in Table 8. Grain size curves and laboratory data sheets can be found in the analytical report presented as Appendix B.

The benthic community within the nearshore site off Newbury was dominated by a mix of syllid polychaetes (*Brania* sp. and *Exogone dispar*), capitellid polychaetes (*Capitella* sp.) and oligochaetes. Surf clams (*Spisula solidissima*) were present within the site in low numbers. All surf clams were juvenile. The community found at this site represents a sandy nearshore assemblage typical of New England intertidal and shallow subtidal environments (Croker, et al. 1974, Larsen and Doggett, 1990). A complete species list and abundance data are presented in Table 9.

Table 8: Newbury, MA Grain Size Results

Sample ID	%Cobble	%Gravel		%Sand			%Fines
		Coarse	Fine	Coarse	Medium	Fine	
Newbury-A	0.0	0.0	0.0	0.1	49.1	50.8	0.0
Newbury -B	0.0	0.0	0.3	0.7	87.2	11.9	0.0
Newbury -C	0.0	0.0	0.0	0.0	66.0	34.0	0.0
Newbury -D	0.0	0.0	0.1	0.2	57.2	42.6	0.0
Newbury -E	0.0	0.0	0.0	0.2	96.5	3.2	0.0

Table 9: Newbury, MA Benthic Community Data (Numbers of individuals per 0.04 m^2)

Species	Newbury A	Newbury B	Newbury C	Newbury D	Newbury E
ANNELIDA					
POLYCHAETA					
Brania spp.	-	63	170	112	8
Capitella sp.	1	96	186	25	3
Drilonereis spp.	-	-	-	-	1
Exogone dispar	123	-	-	-	22
Polydora spp.	-	-	-	-	1
Sabaco elongatus	7	-	-	-	8
Scolelepis squamata	-	-	5	-	-
CLITELLATA					
Unidentified Tubificidae	6	33	-	42	-
NEMATODA					
Unidentifed Nematoda	-	58	29	10	30
MOLLUSCA					
BIVALVIA					
Spisula solidissima	-	5	-	-	3
ARTHROPODA					
MALACOSTRACA					
Chiridotea spp.	-	11	1	1	2
Unidentified Gammaridae	4	-	-	2	-
Haustorius canadensis	-	3	-	-	-
Politolana sp.	-	-	1	-	-
TOTALS					
# of Species	**5**	**7**	**6**	**6**	**9**
# of Individuals	**141**	**269**	**392**	**192**	**78**

FIGURE 12

US Army Corps
of Engineers
New England District

PISCATAQUA RIVER FNP
JULY 2013 SAVEWS SURVEY DEPTHS
NEWBURY, MA

1:12,000

2012 NAIP Aerial Imagery

WGS NAD 1983

FIGURE 13

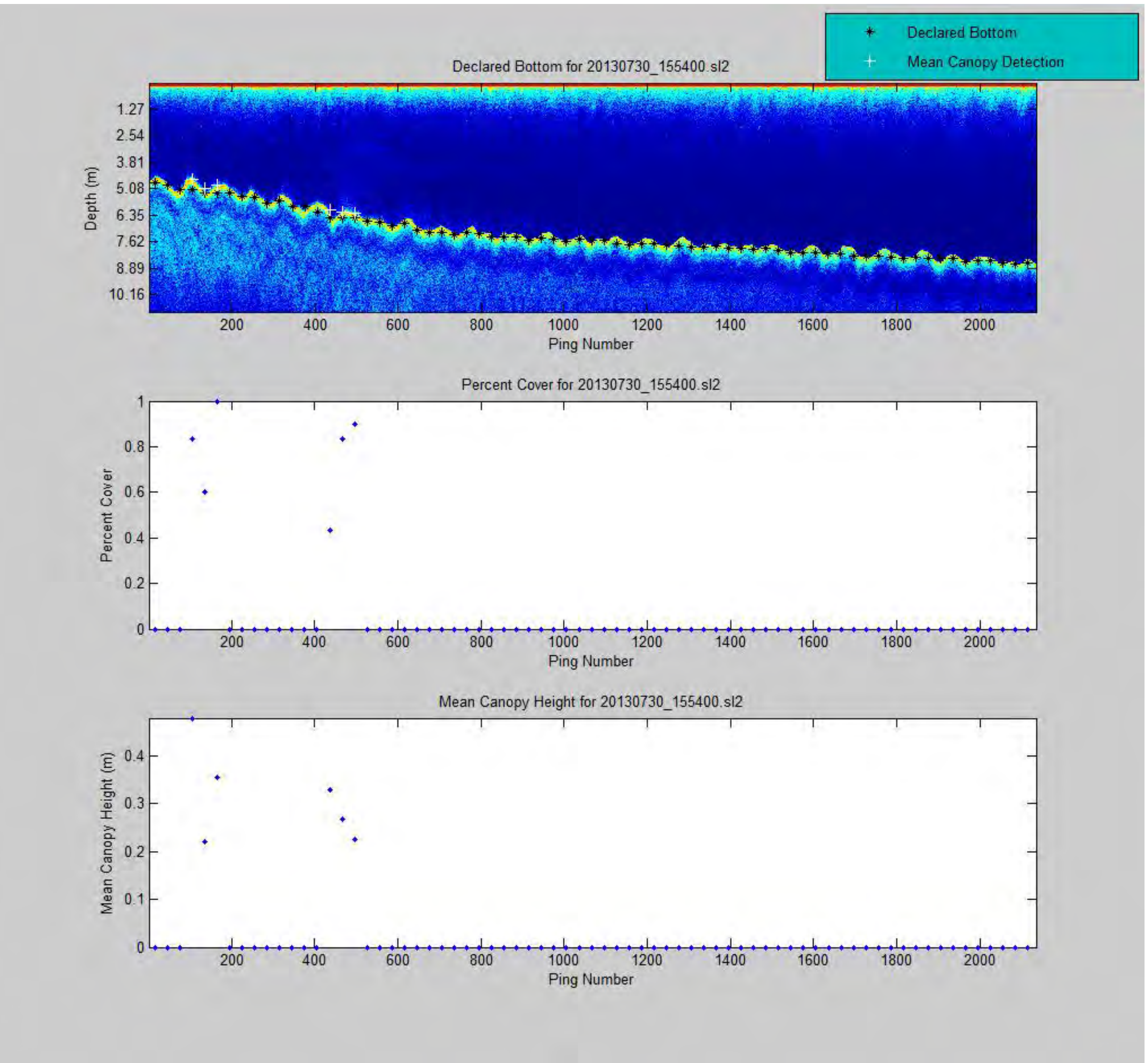

PISCATAQUA RIVER FNP
JULY 2013 SAVEWS PERCENT COVER
NEWBURY, MA

APPENDIX A

SAVEWS JR DATA OUTPUT AND CONFIGURATION FILES

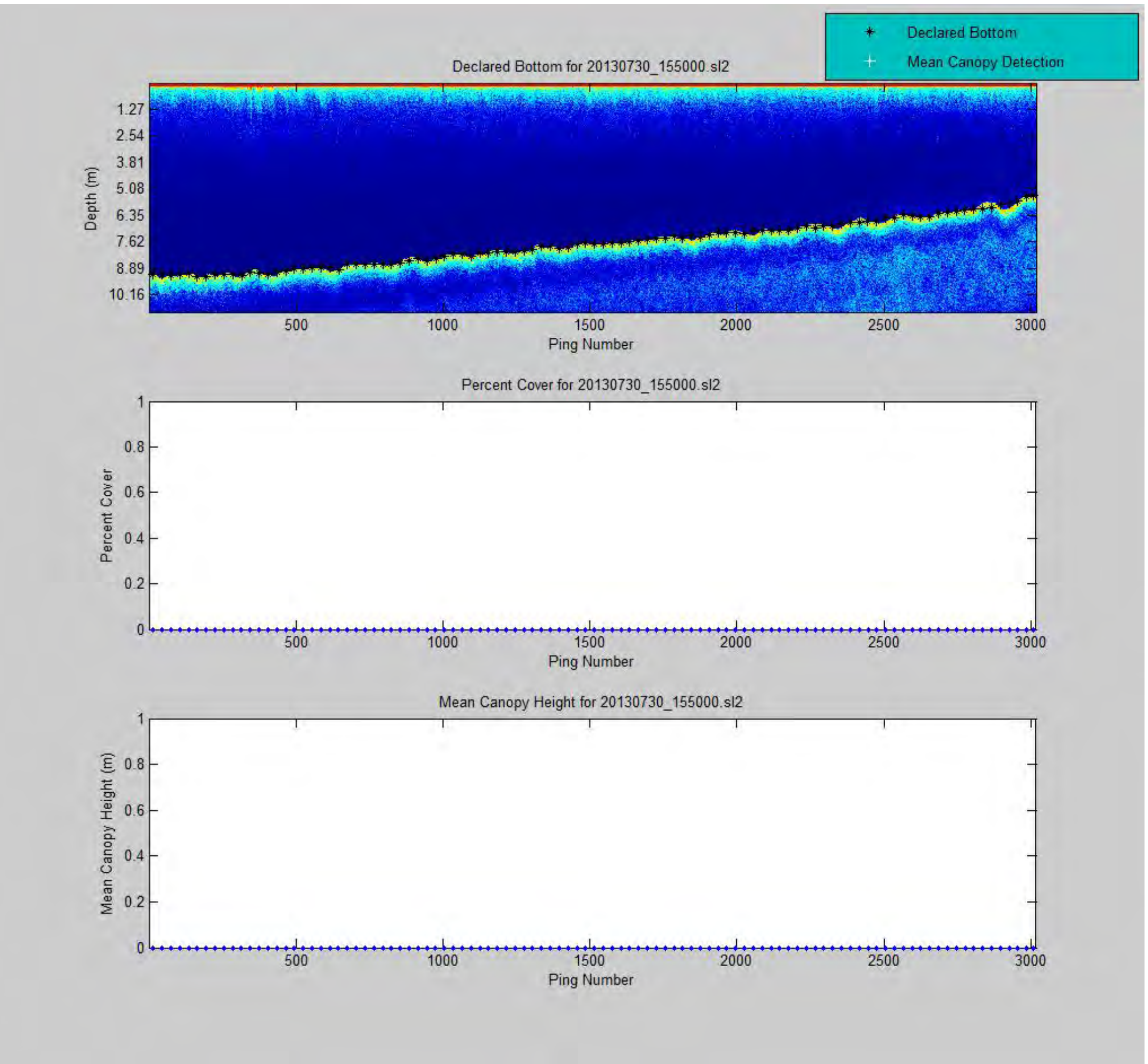
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

WELLS, ME - TRANSECT 1 (20130730_155400.SL2)

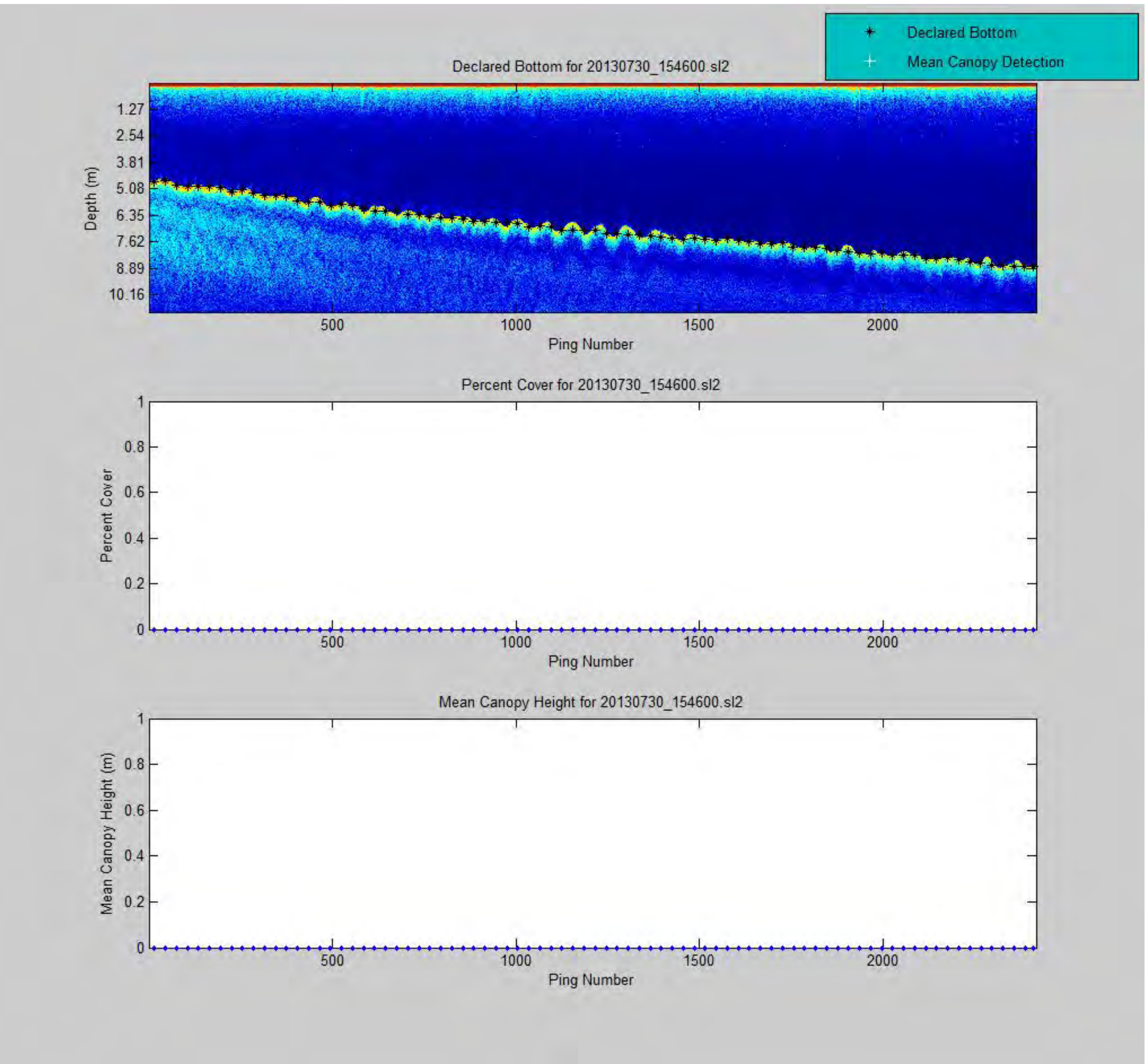


Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

WELLS, ME - TRANSECT 2 (20130730_155000.SL2)

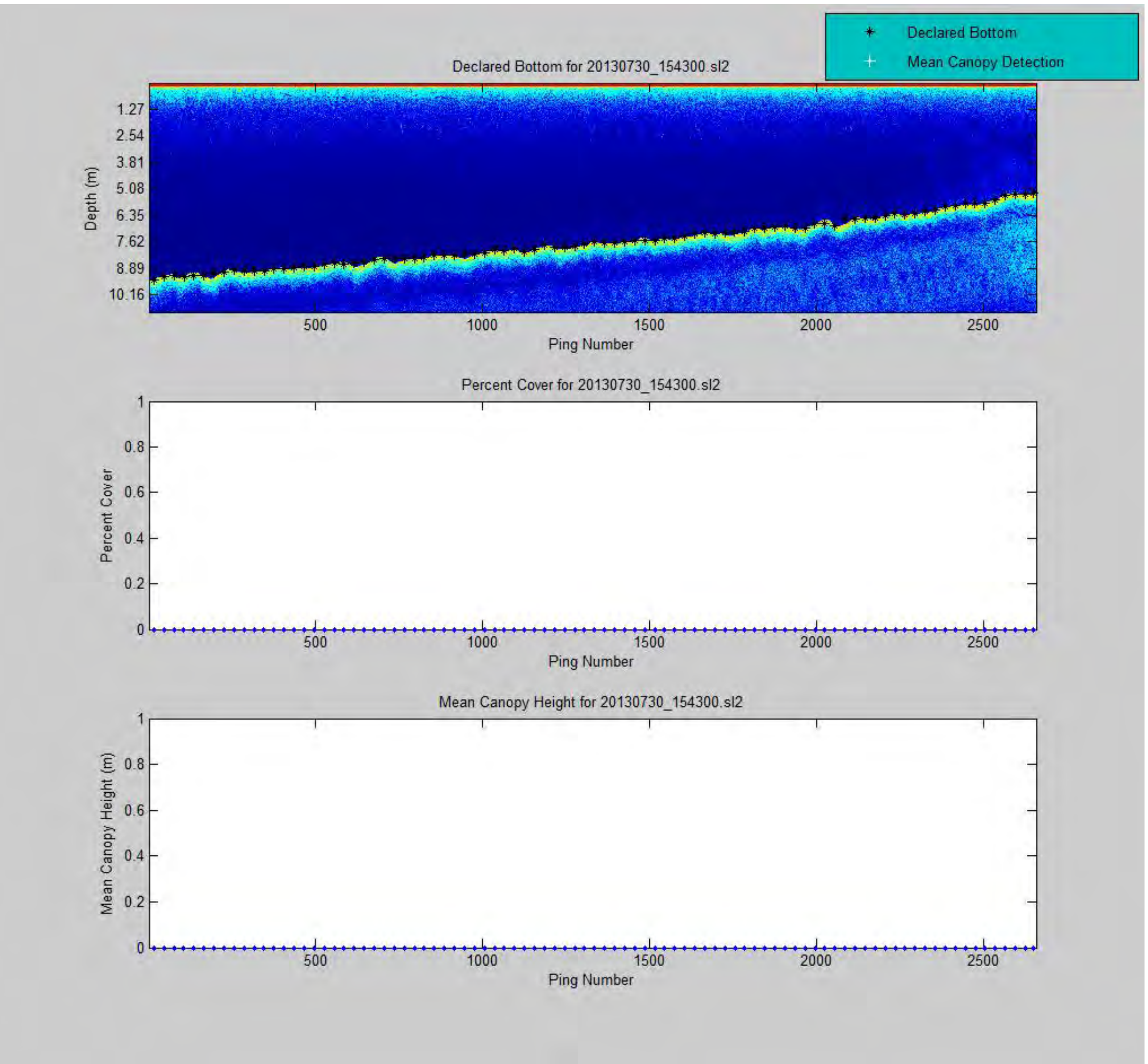


WELLS, ME - TRANSECT 3 (20130730_154600.SL2)

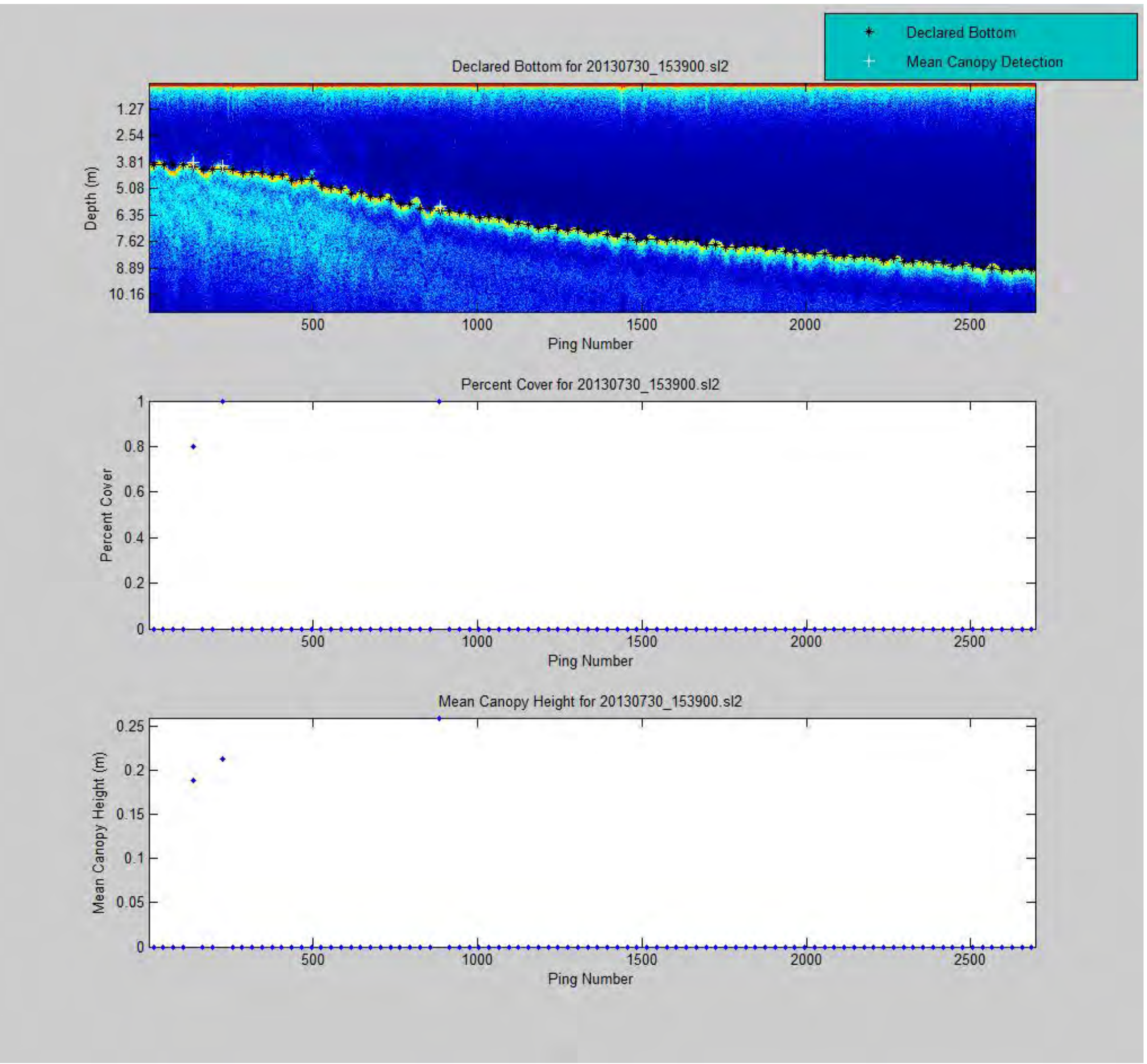


Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

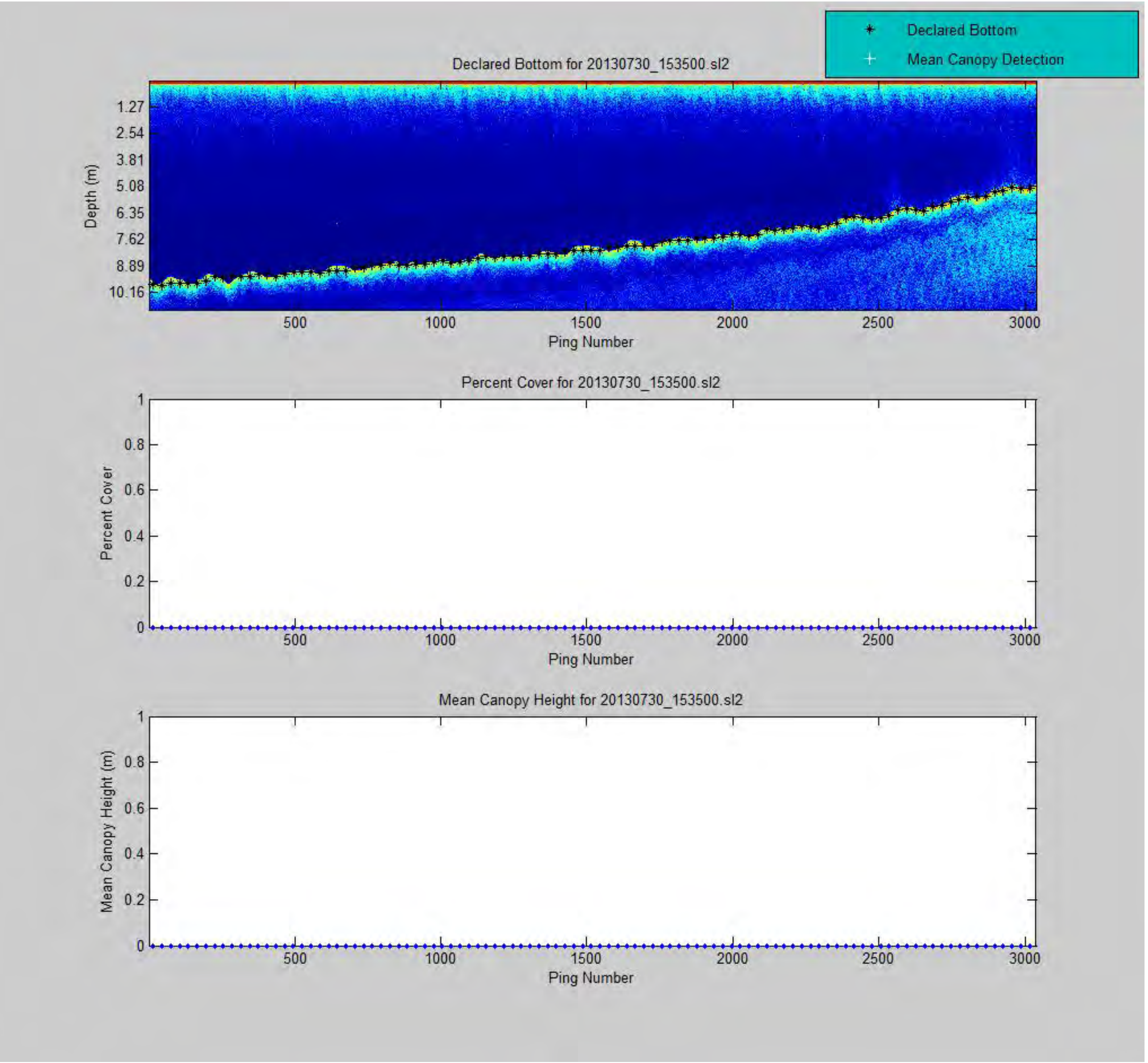
WELLS, ME - TRANSECT 4 (20130730_154300.SL2)



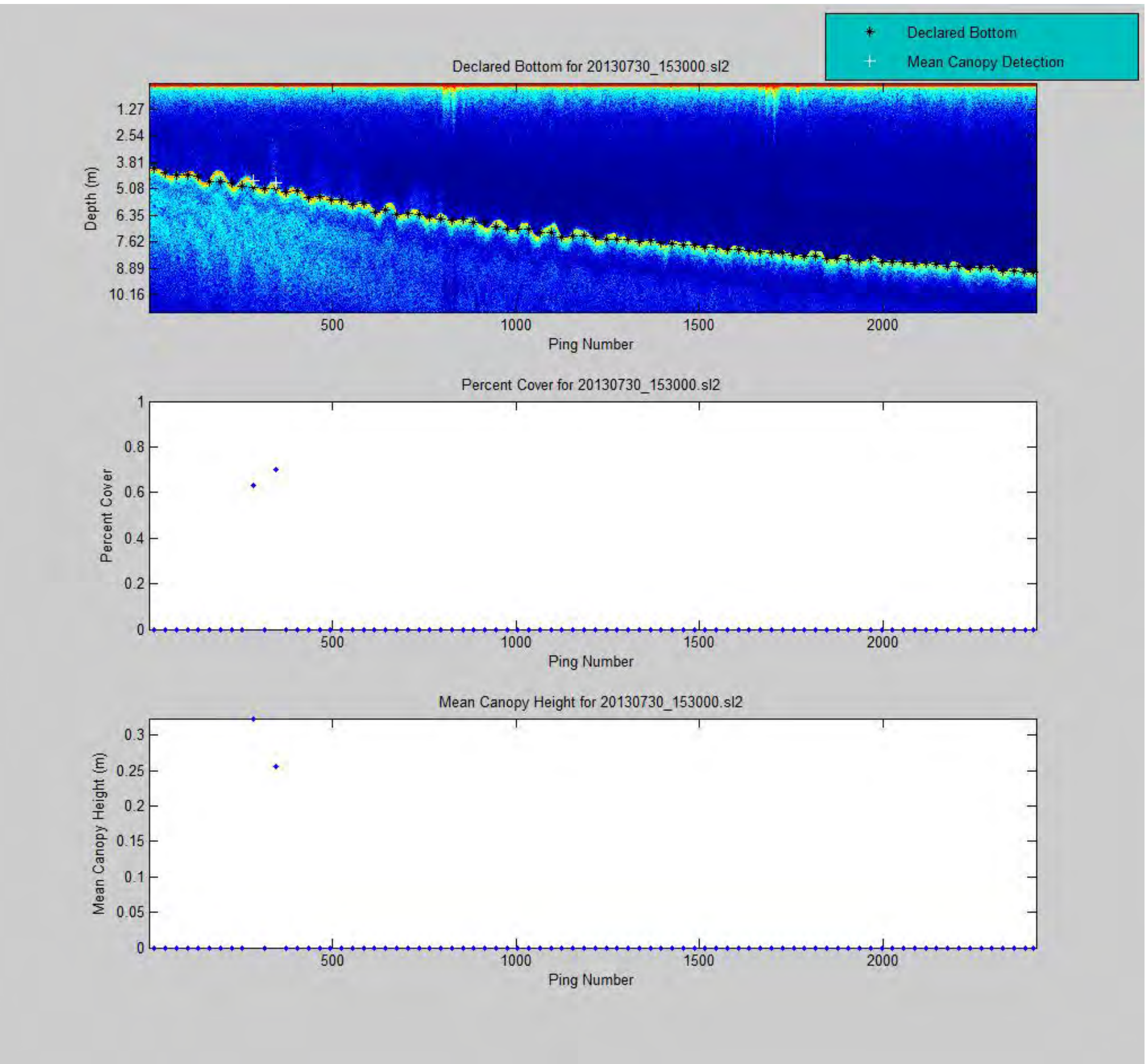
WELLS, ME - TRANSECT 5 (20130730_153900.SL2)



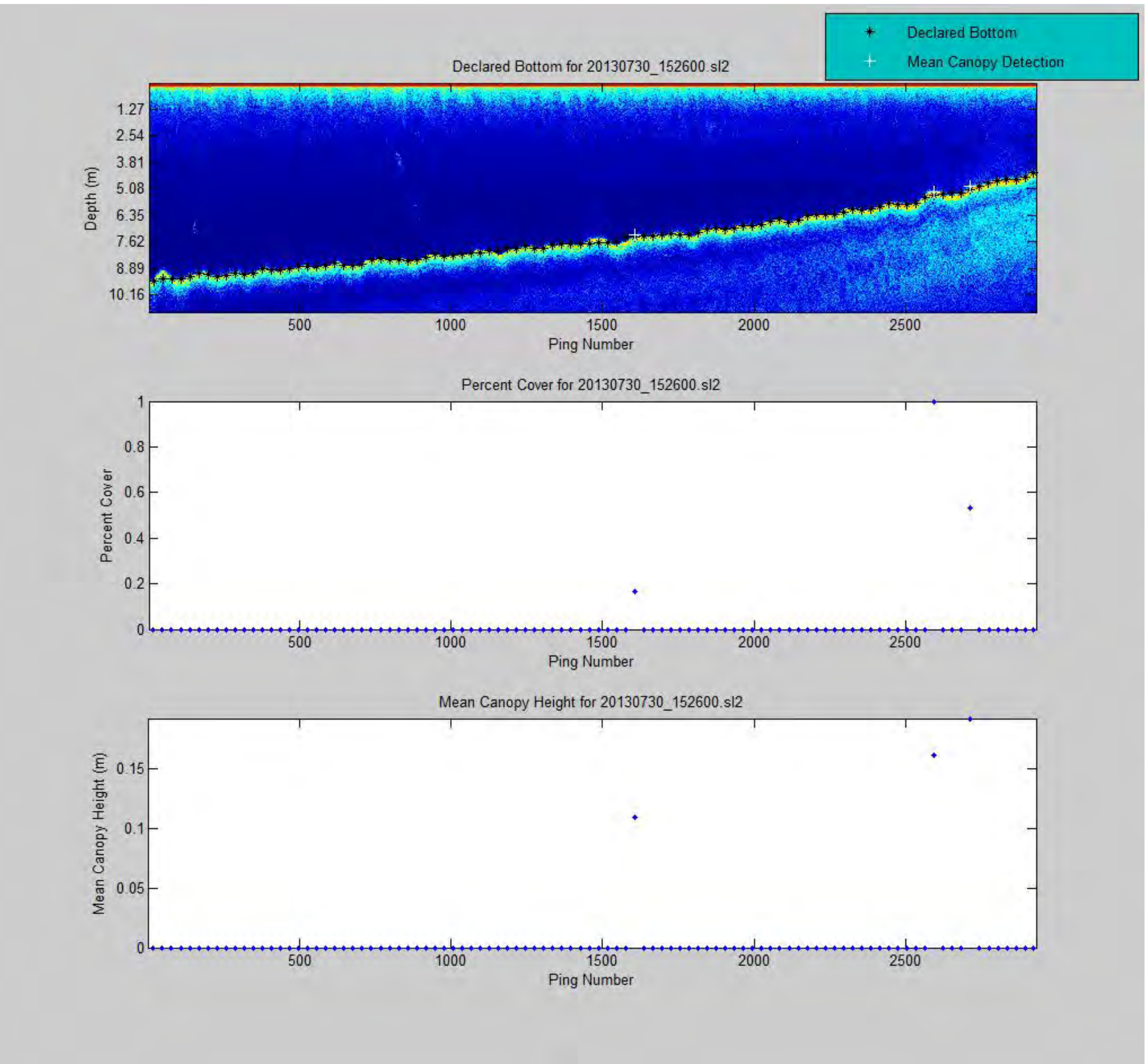
WELLS, ME - TRANSECT 6 (20130730_153500.SL2)



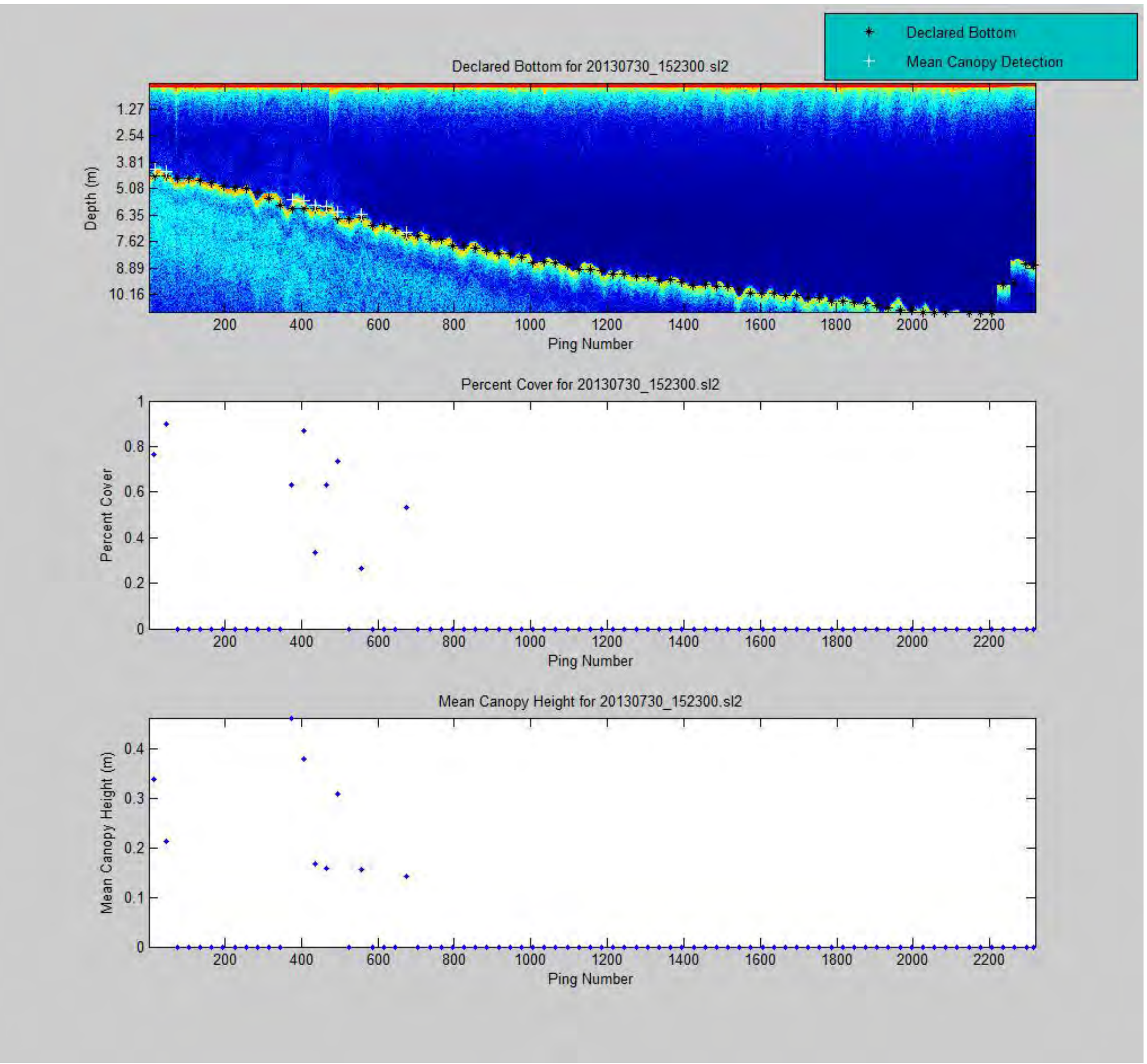
WELLS, ME - TRANSECT 7 (20130730_153000.SL2)



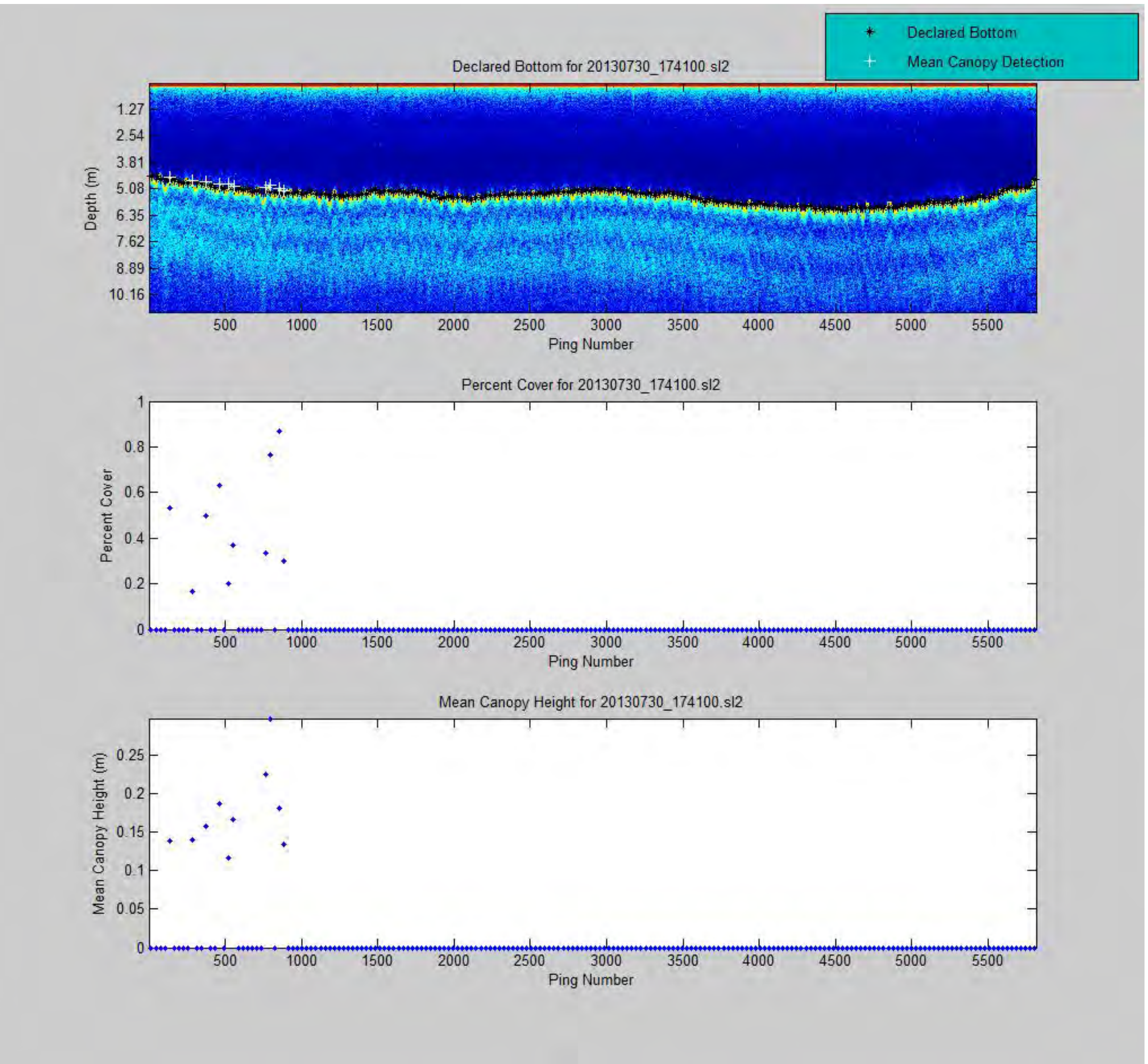
WELLS, ME - TRANSECT 8 (20130730_152600.SL2)



WELLS, ME - TRANSECT 9 (20130730_152300.SL2)

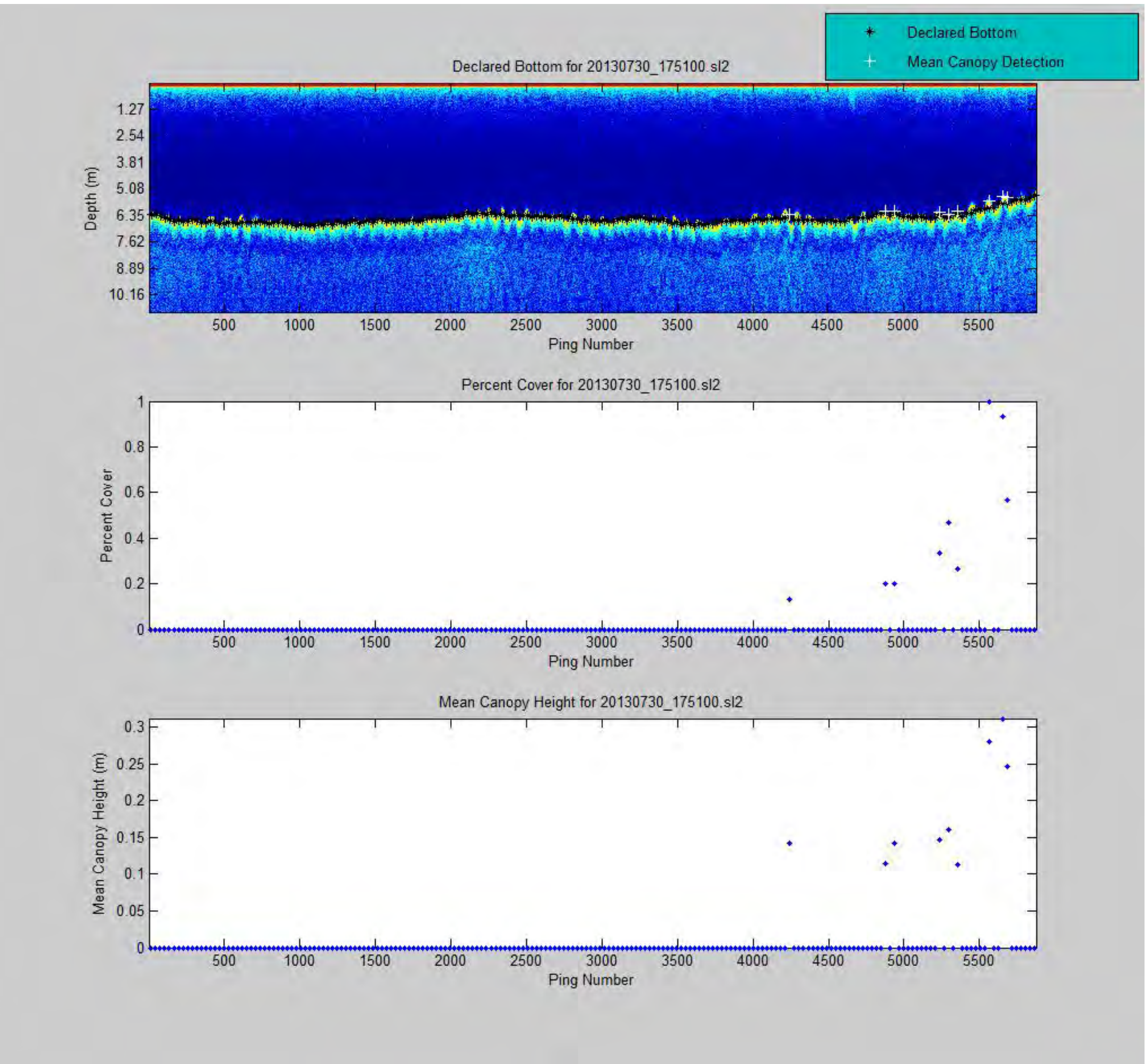


WELLS, ME - TRANSECT 10 (20130730_174100.SL2)

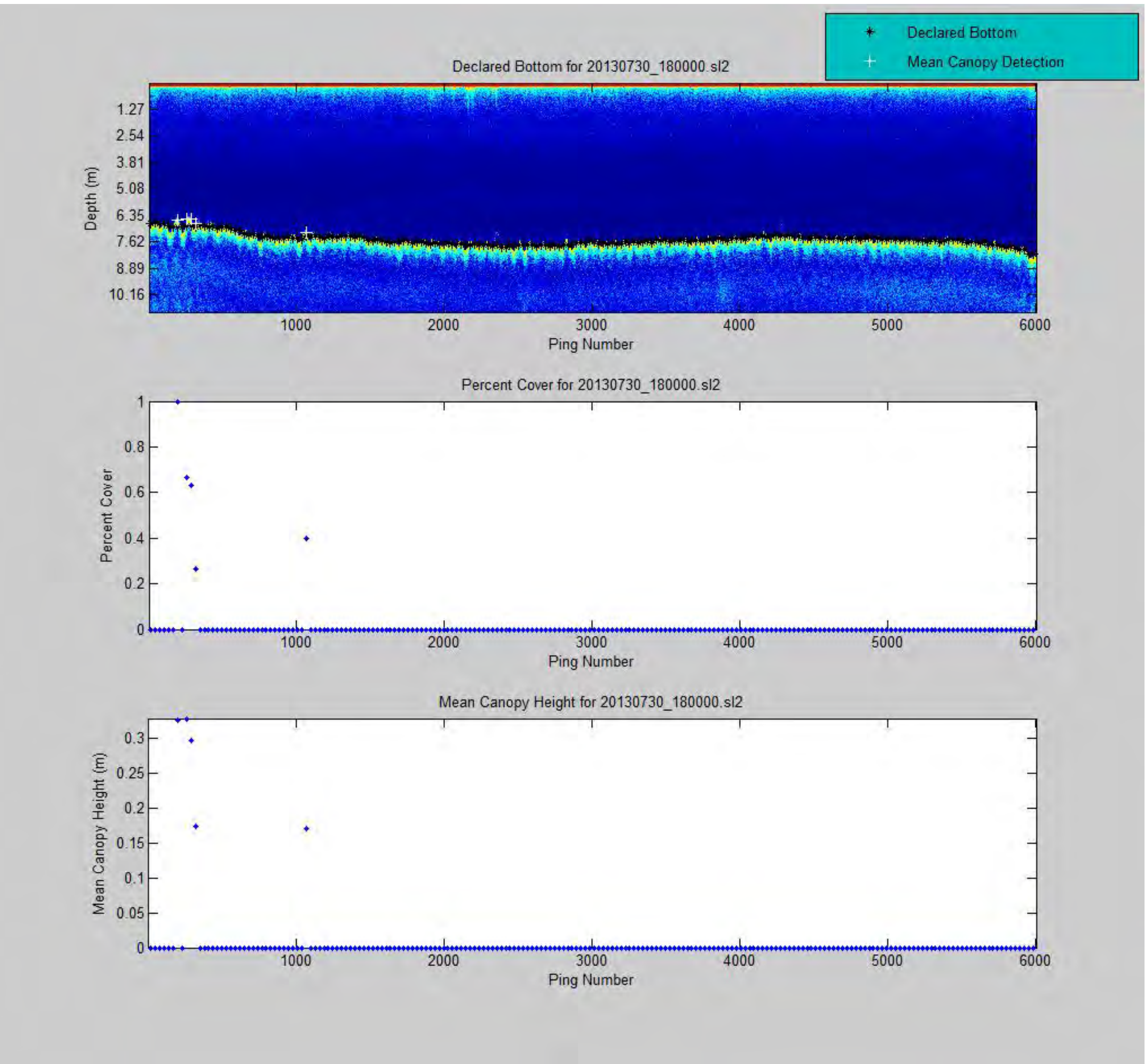


Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

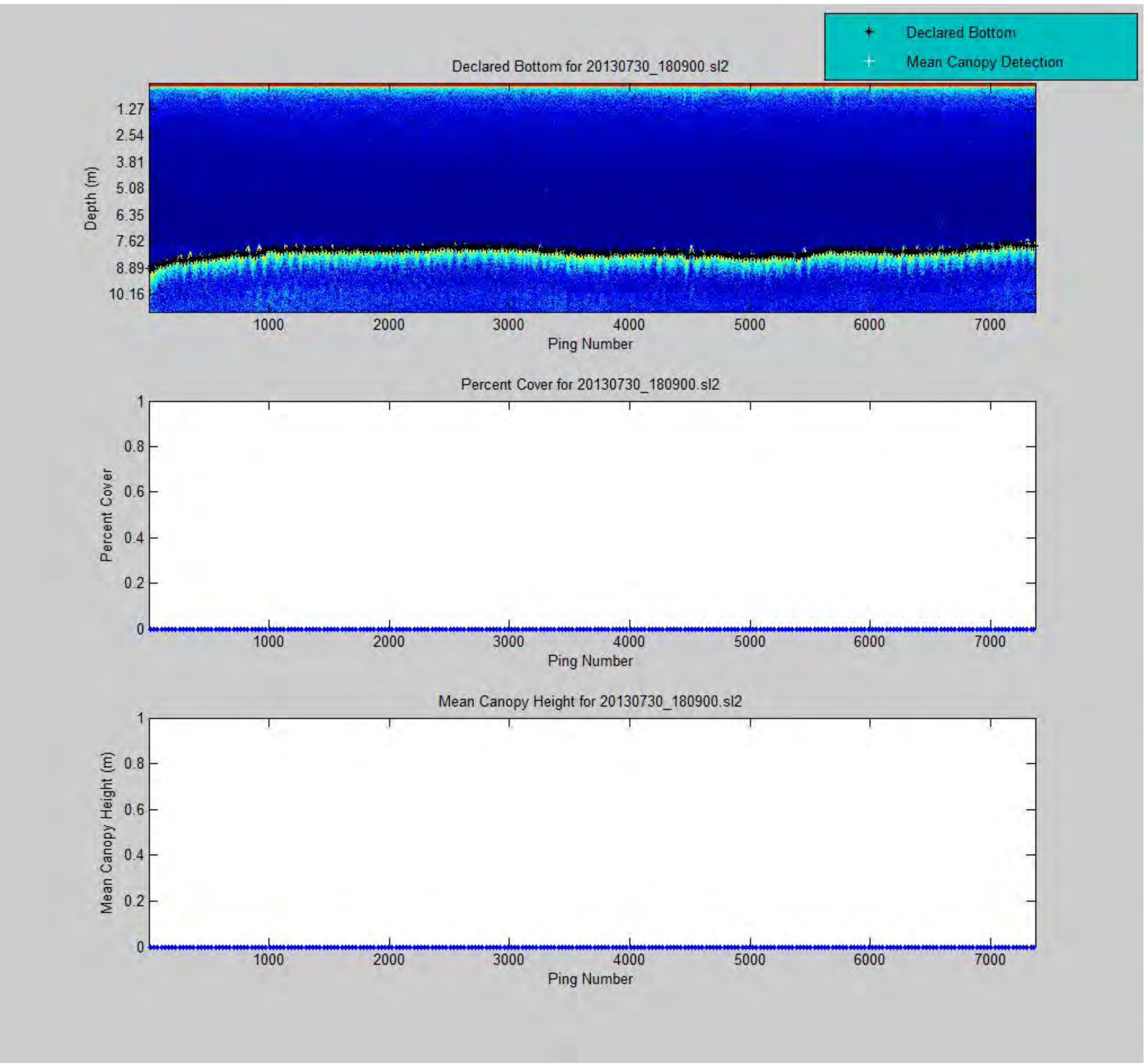
WELLS, ME - TRANSECT 11 (20130730_175100.SL2)



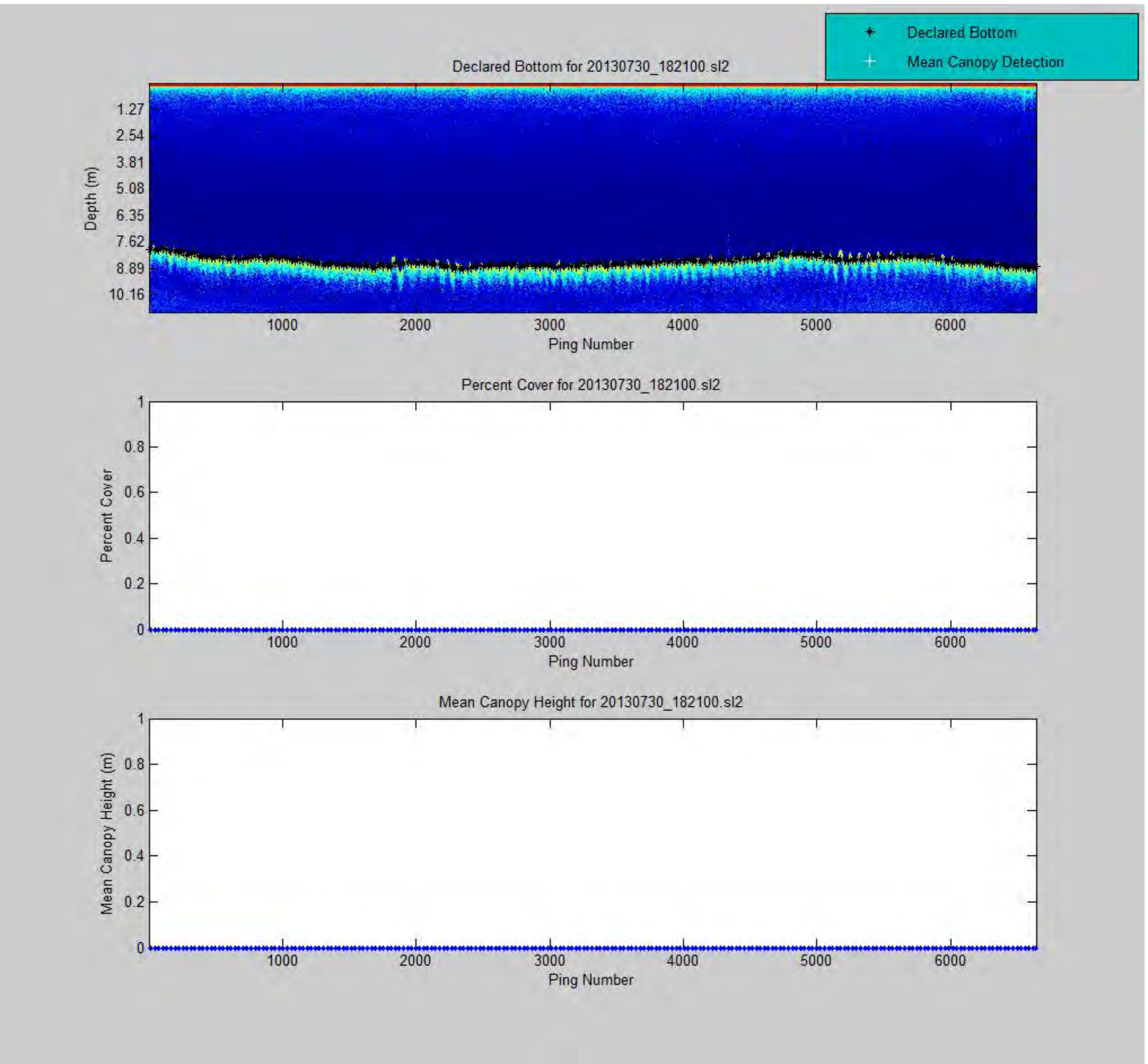
WELLS, ME - TRANSECT 12 (20130730_180000.SL2)



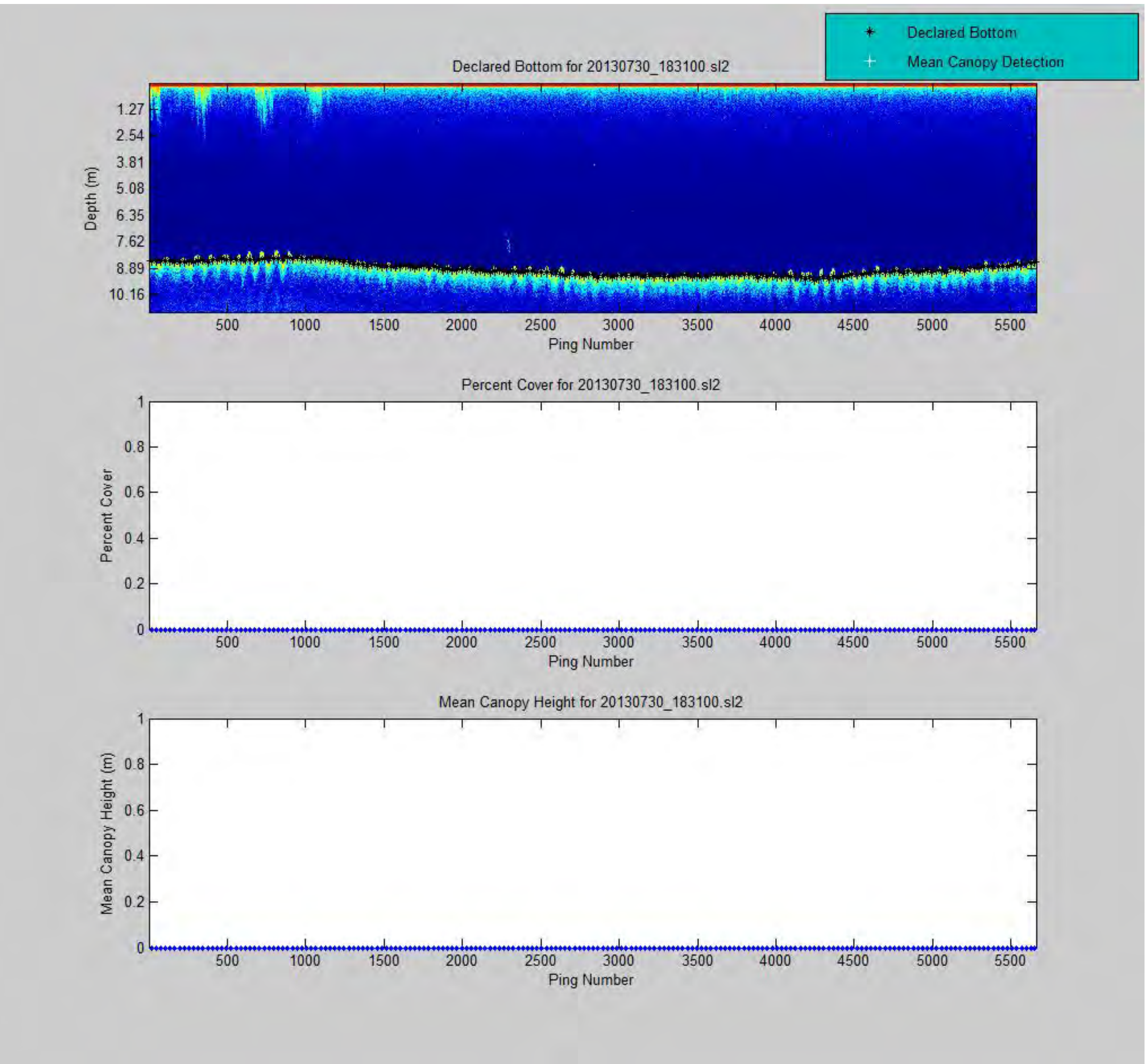
WELLS, ME - TRANSECT 13 (20130730_180900.SL2)



WELLS, ME - TRANSECT 14 (20130730_182100.SL2)

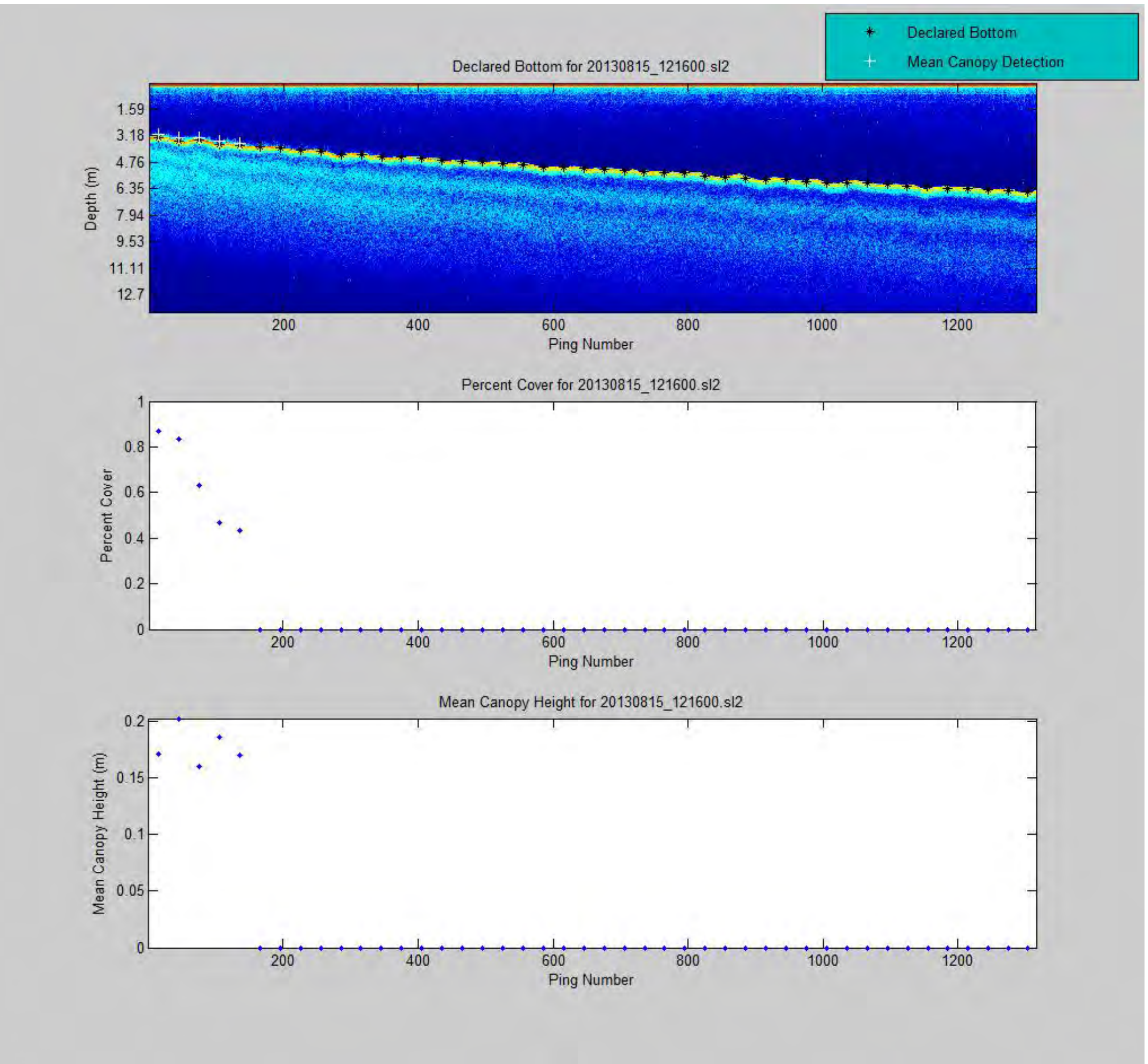


WELLS, ME - TRANSECT 15 (20130730_183100.SL2)



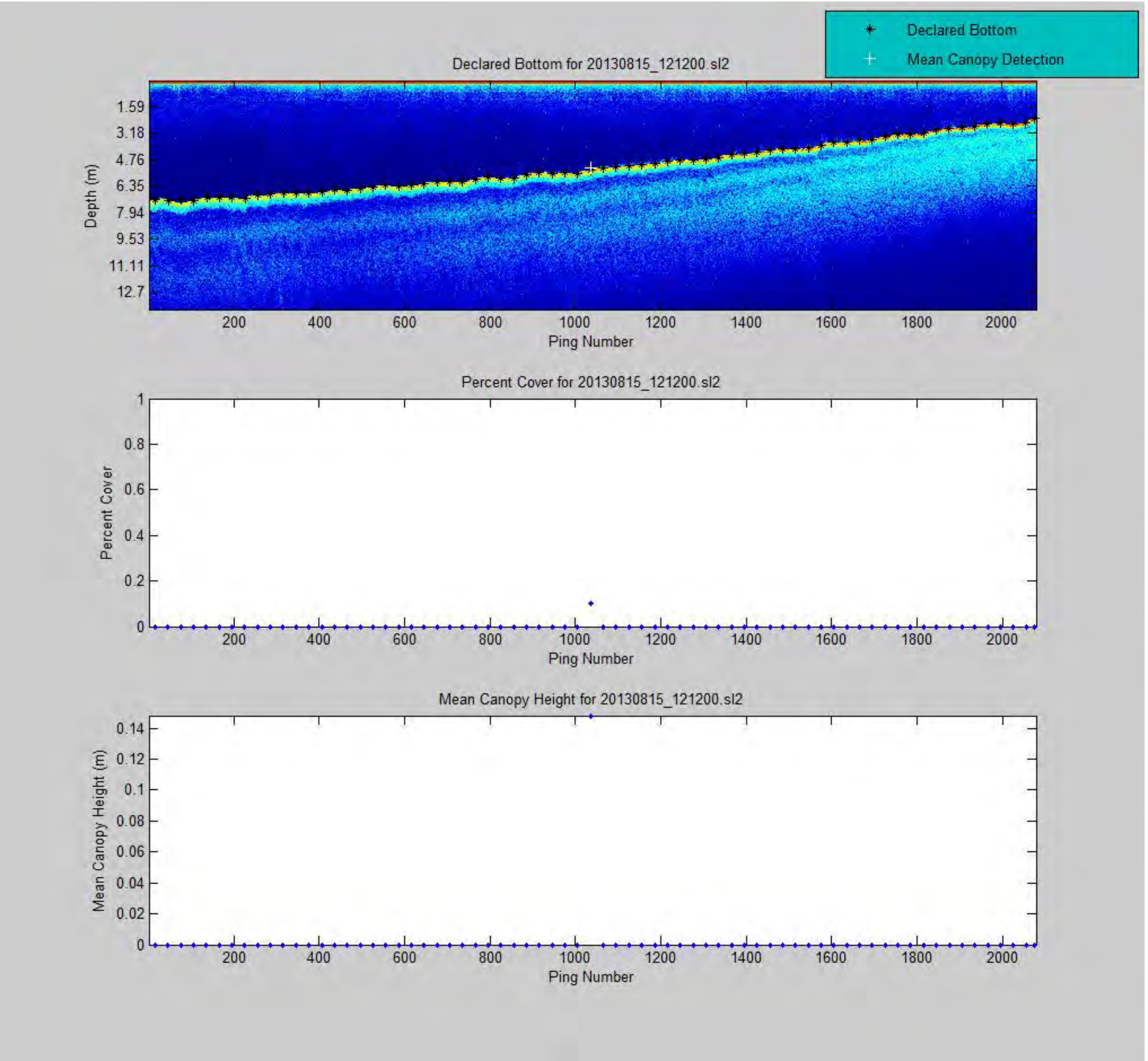
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

SALISBURY, MA - TRANSECT 1 (20130815_121600.SL2)



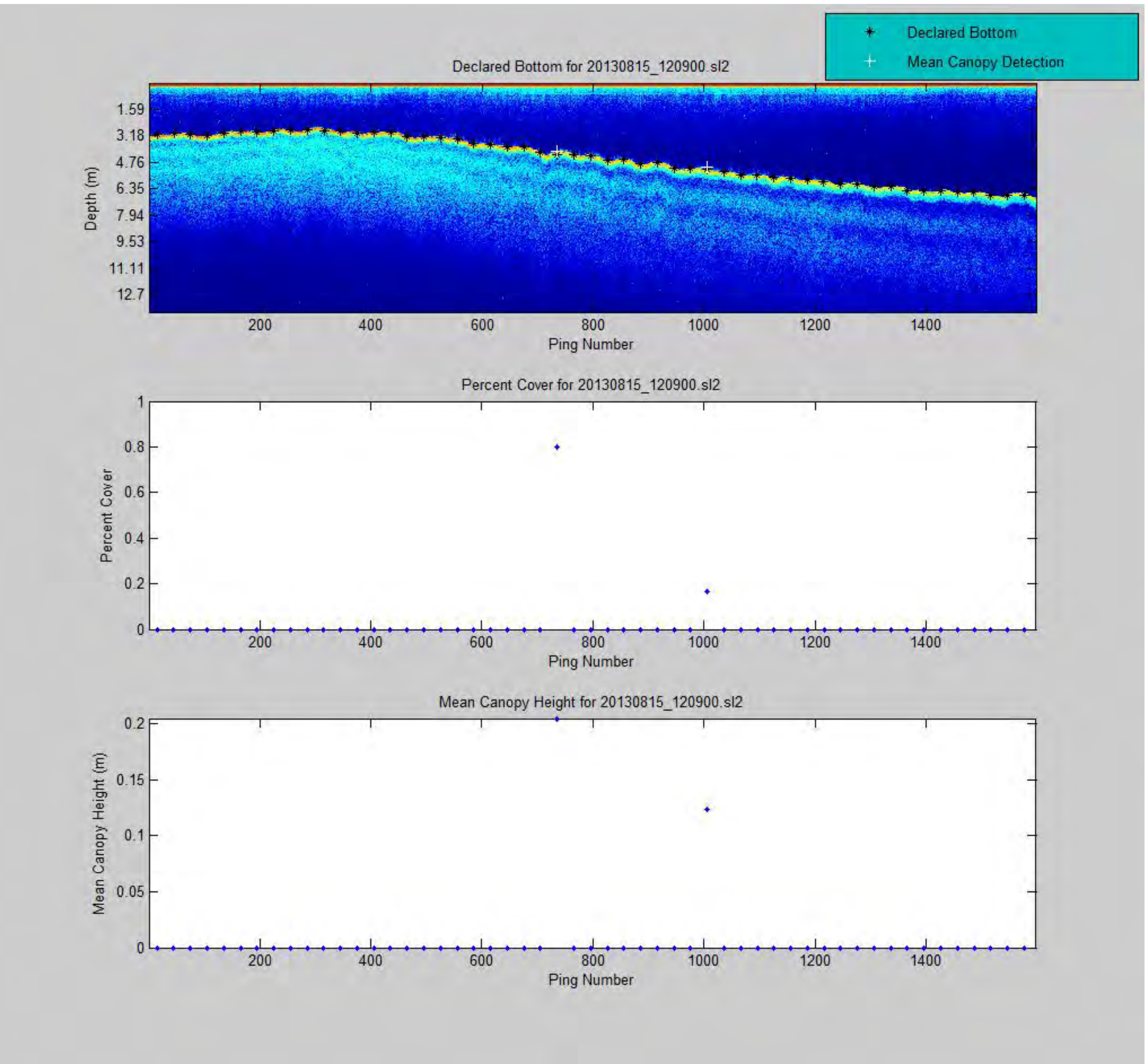
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

SALISBURY, MA - TRANSECT 2 (20130815_121200.SL2)



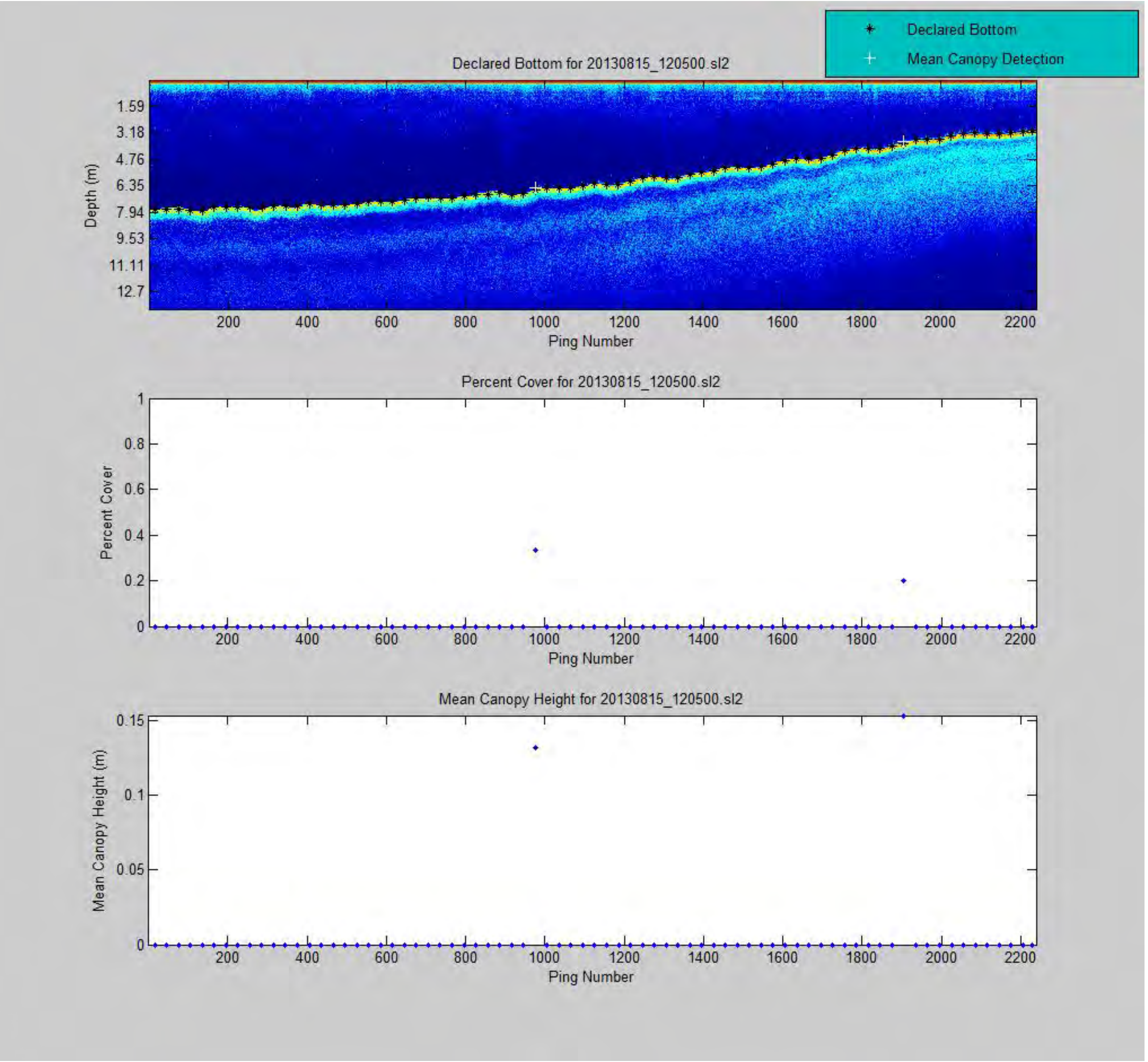
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

SALISBURY, MA - TRANSECT 3 (20130815_120900.SL2)

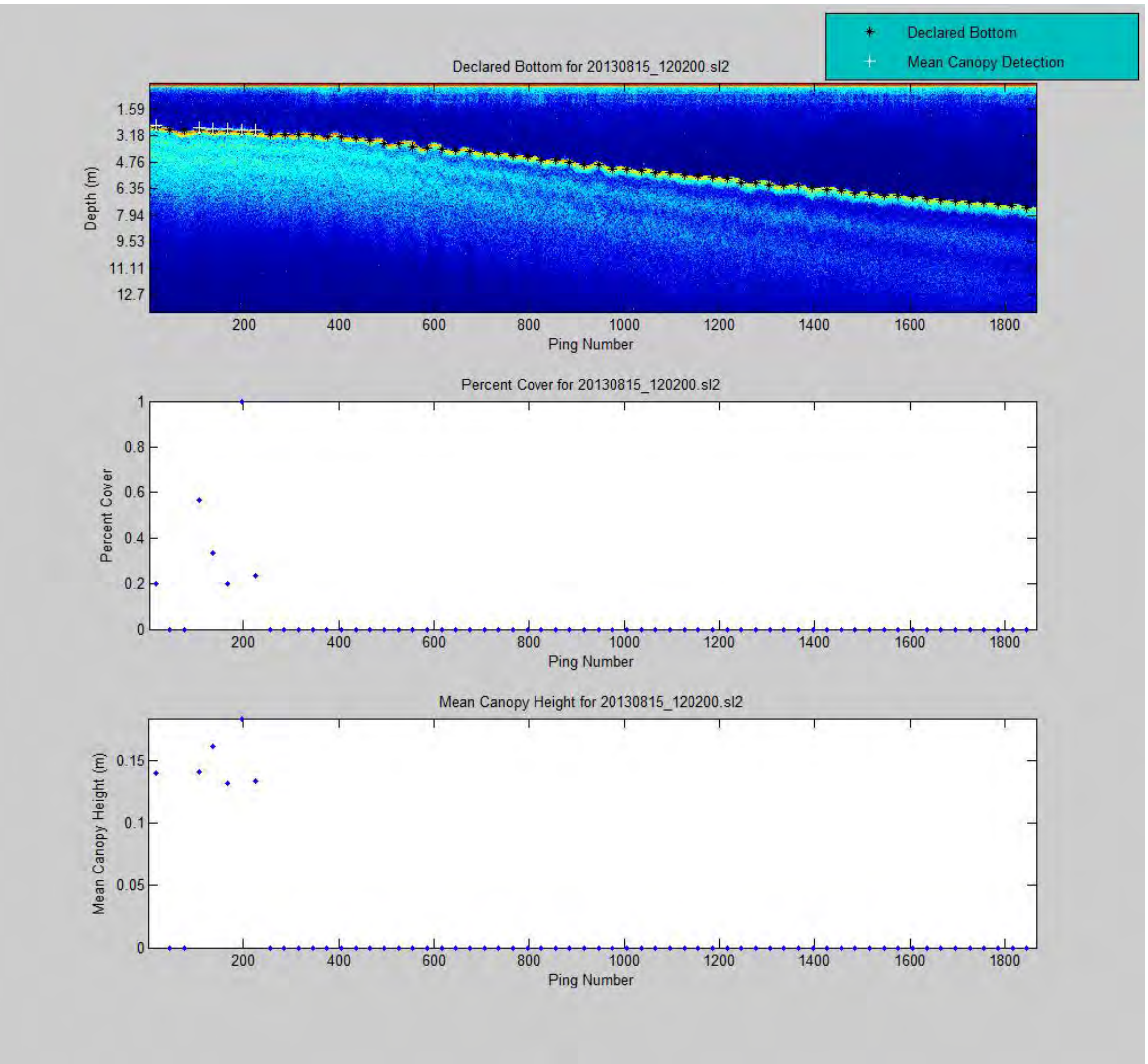


Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

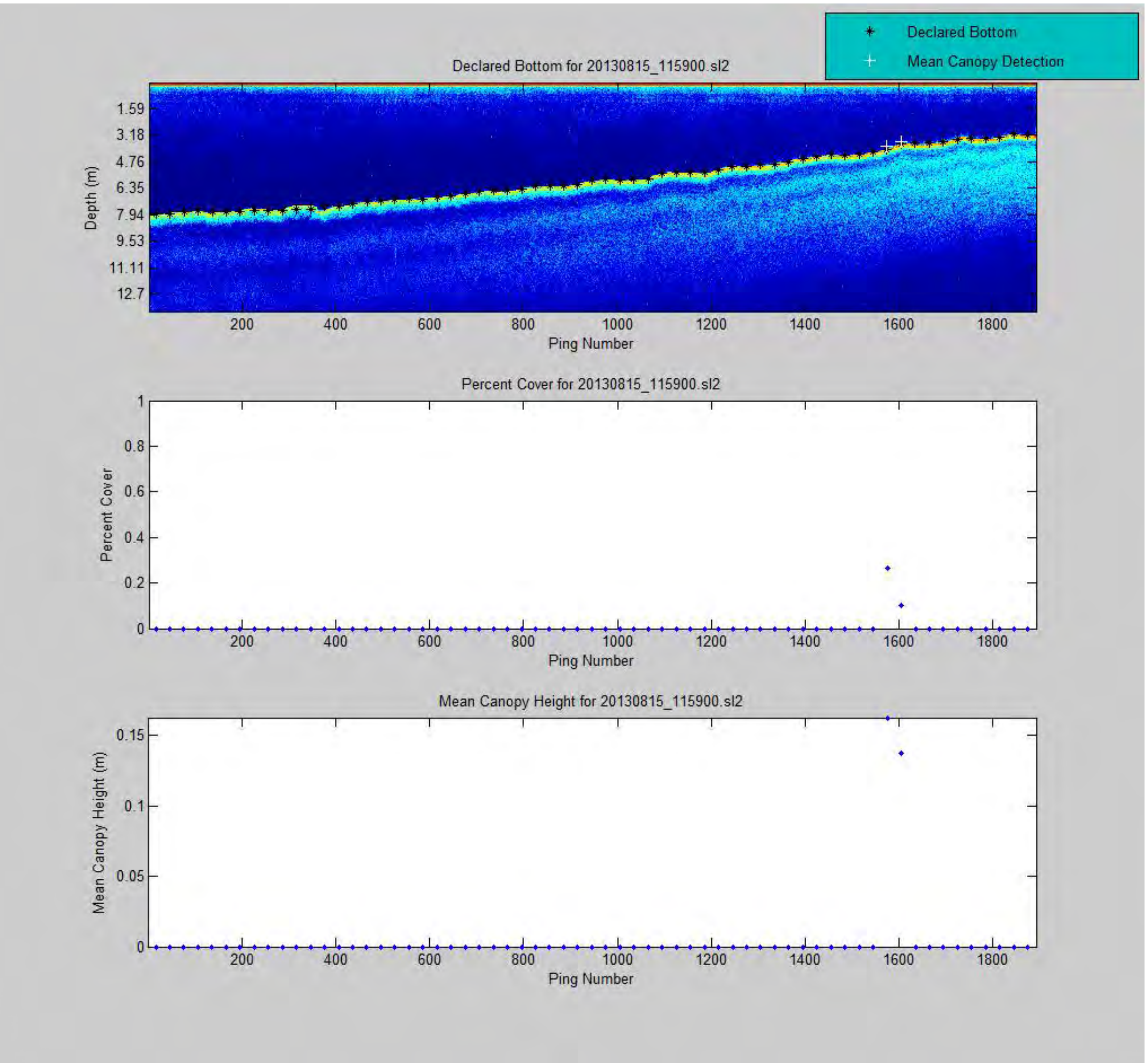
SALISBURY, MA - TRANSECT 4 (20130815_120500.SL2)



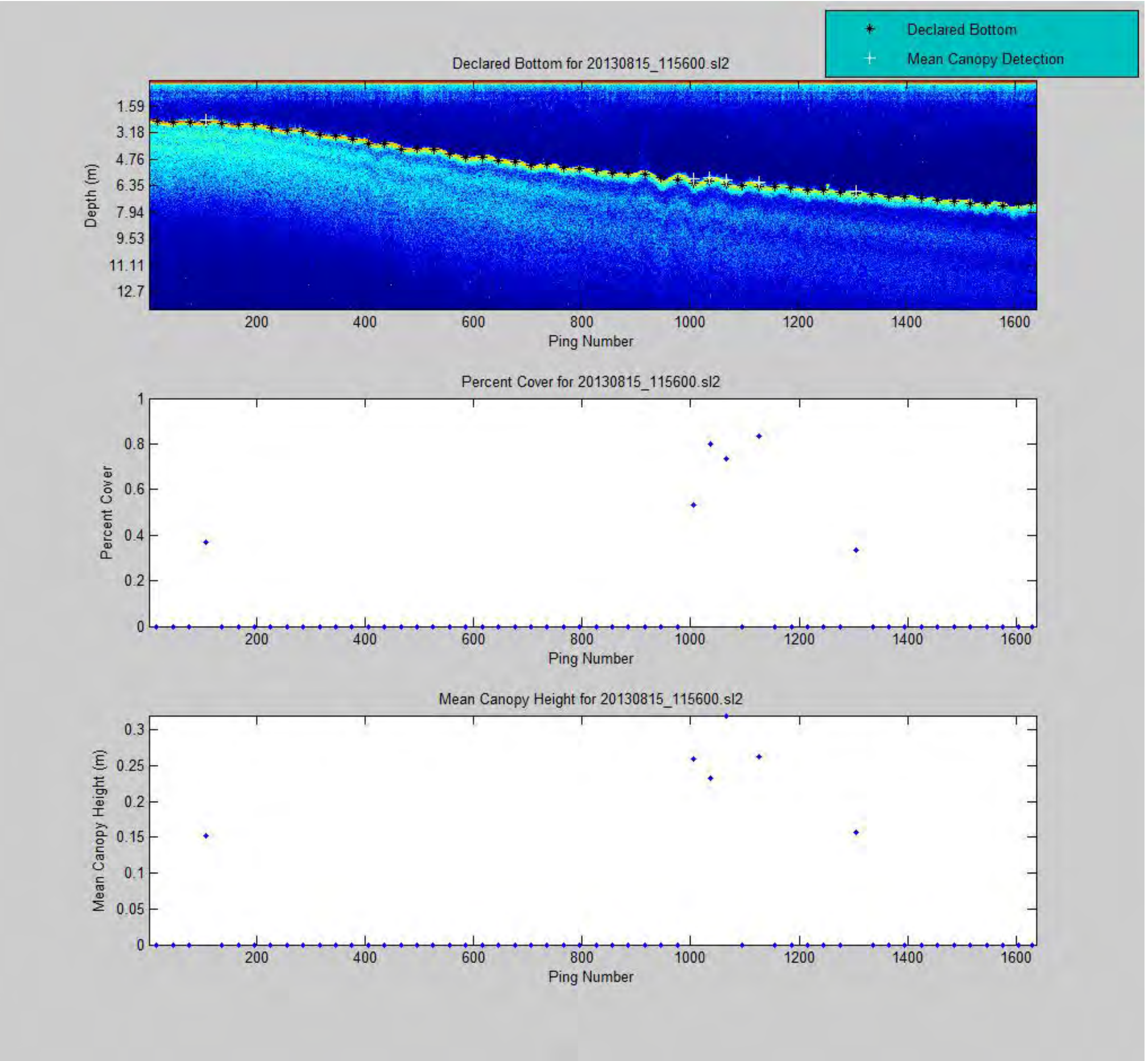
SALISBURY, MA - TRANSECT 5 (20130815_120200.SL2)



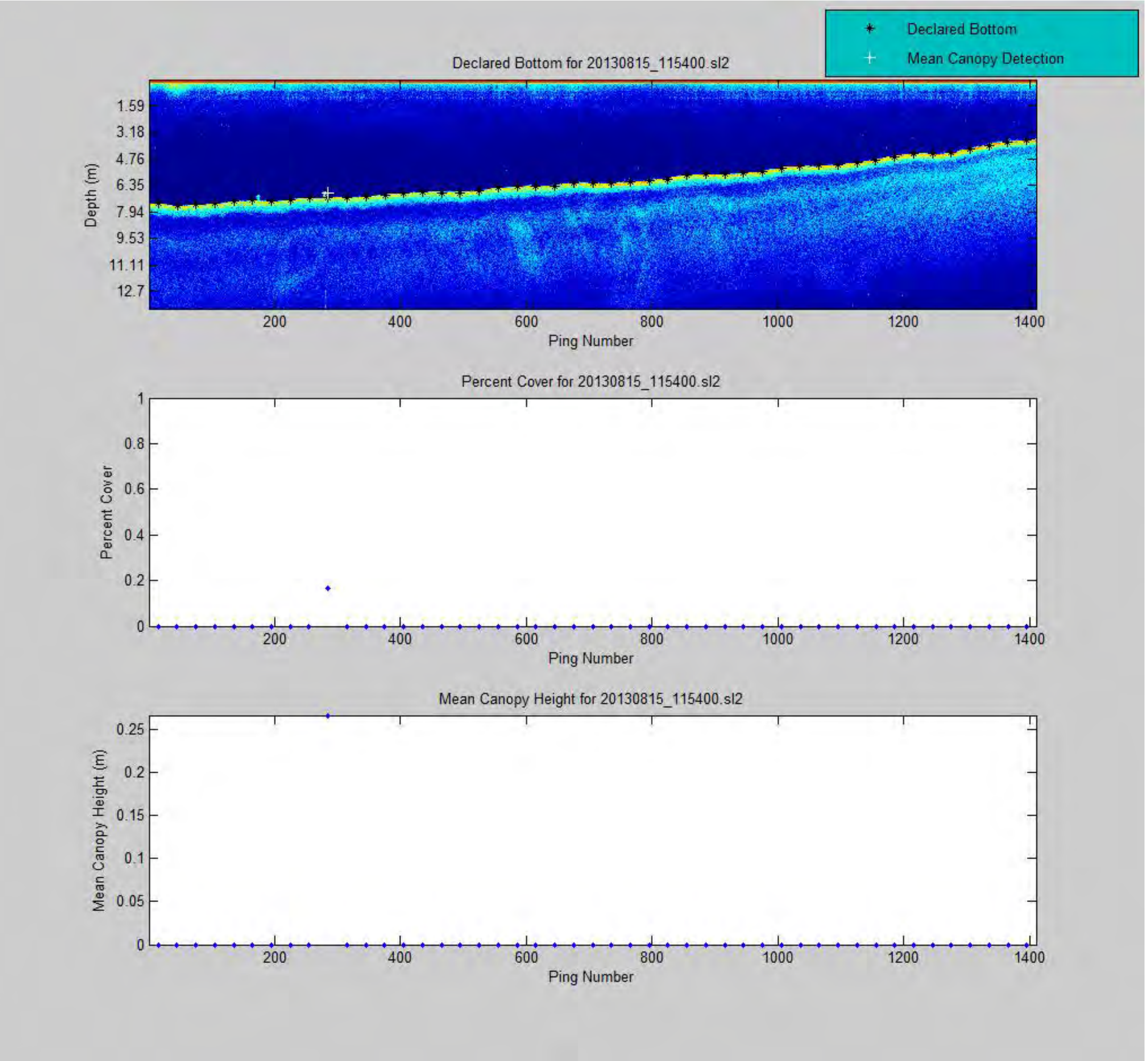
SALISBURY, MA - TRANSECT 6 (20130815_115900.SL2)



SALISBURY, MA - TRANSECT 7 (20130815_115600.SL2)

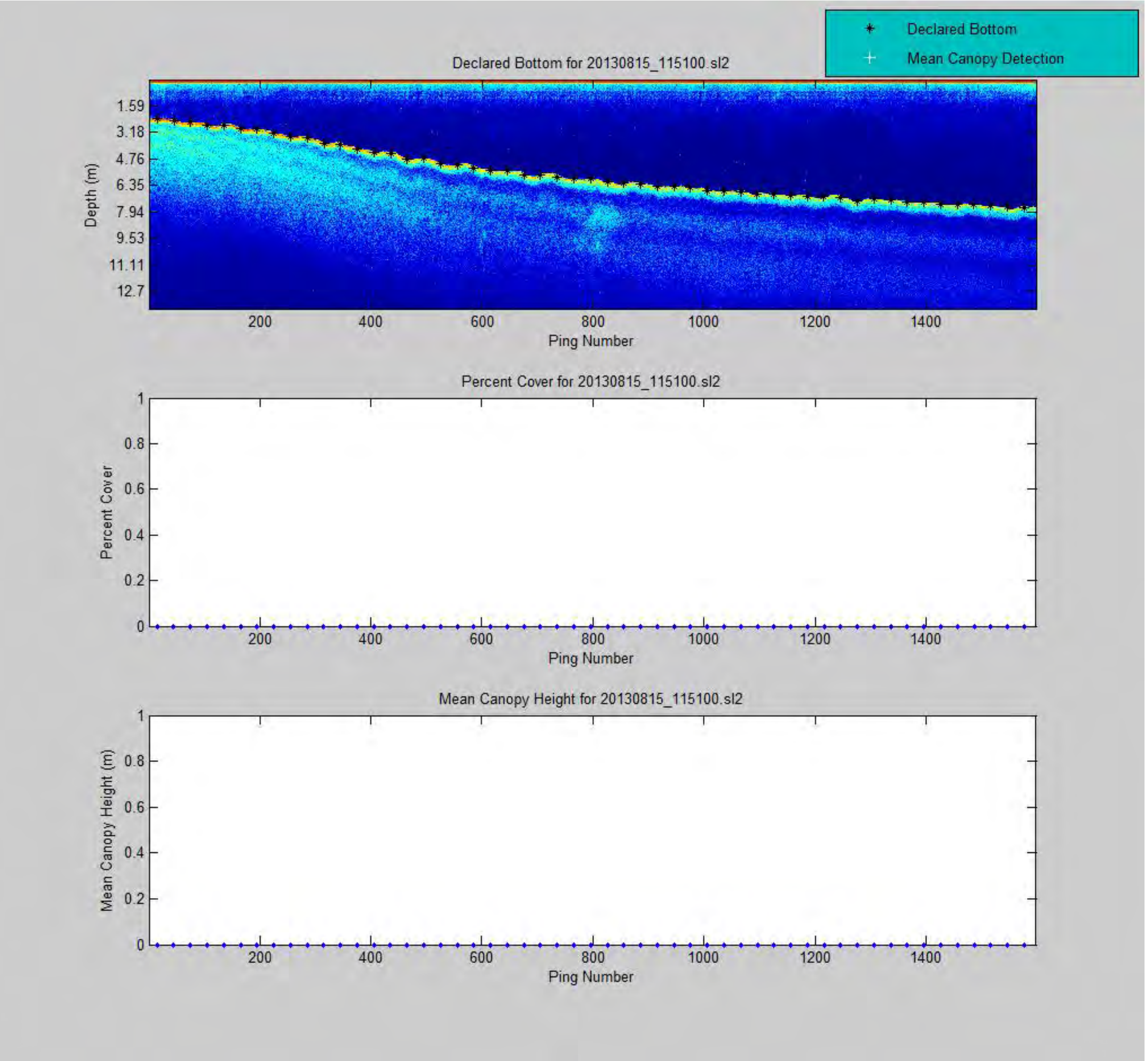


SALISBURY, MA - TRANSECT 8 (20130815_115400.SL2)



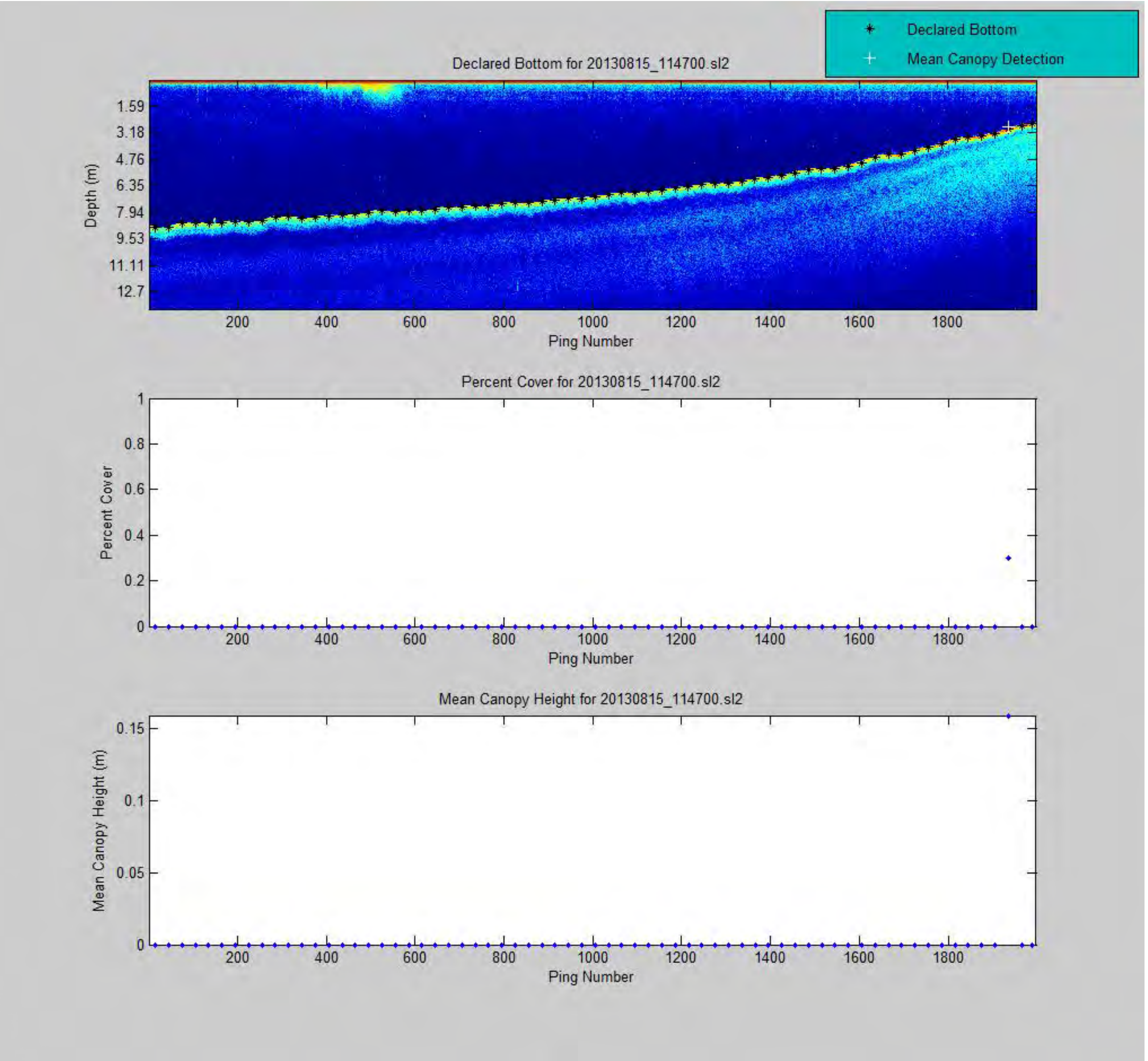
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

SALISBURY, MA - TRANSECT 9 (20130815_115100.SL2)



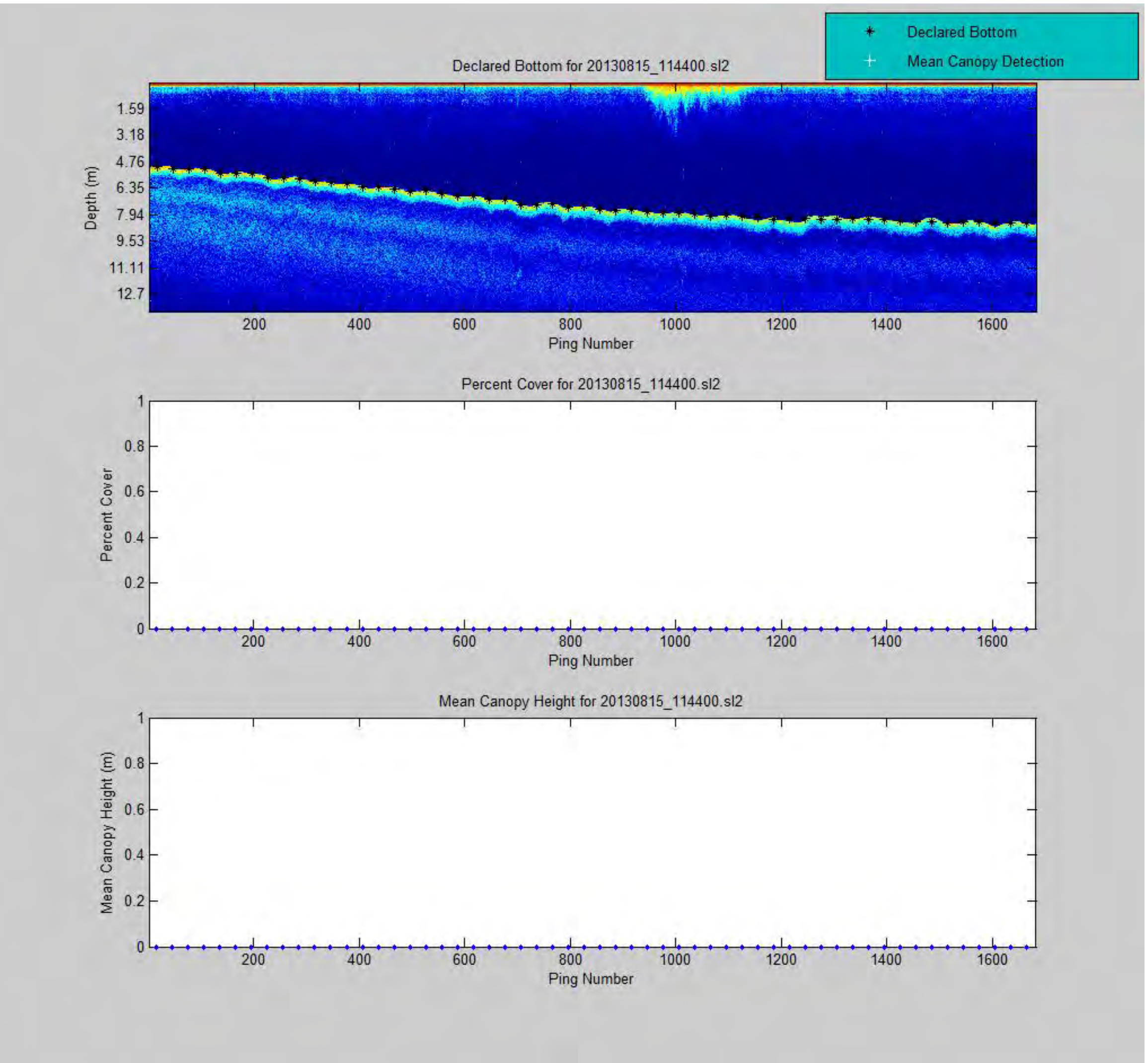
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

SALISBURY, MA - TRANSECT 10 (20130815_114700.SL2)



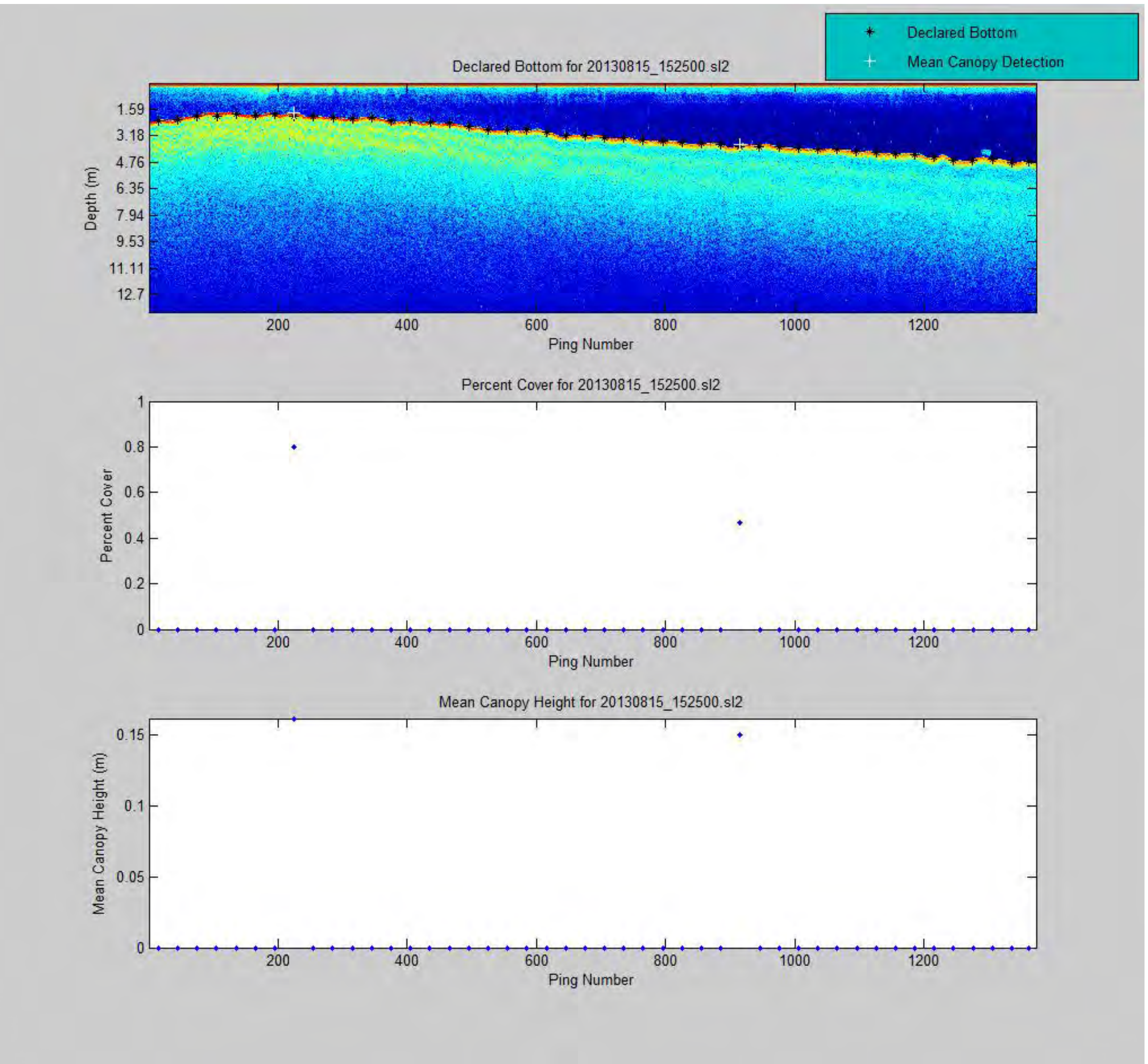
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

SALISBURY, MA - TRANSECT 11 (20130815_114400.SL2)



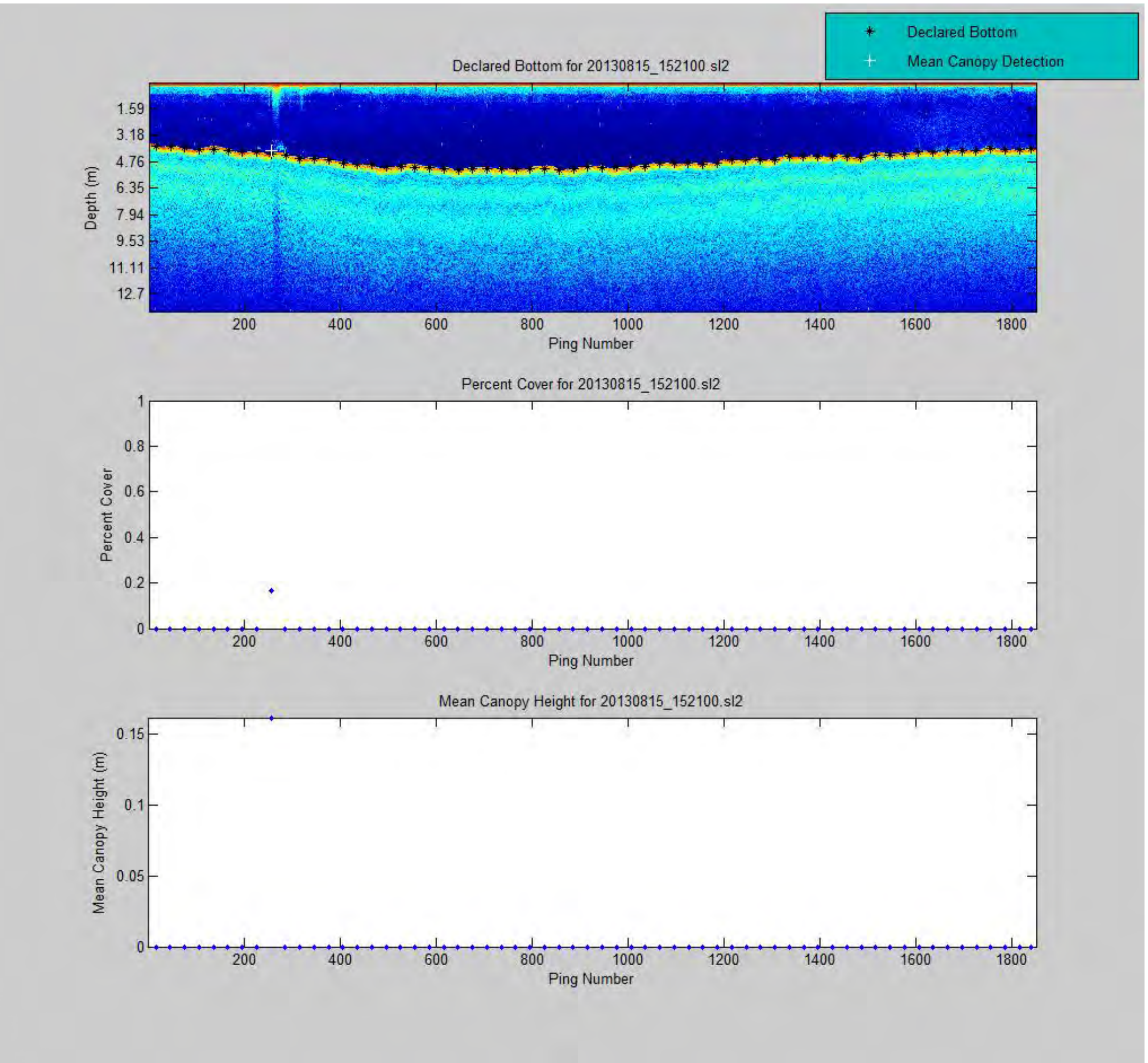
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

NEWBURYPORT, MA - TRANSECT 1 (20130815_152500.SL2)



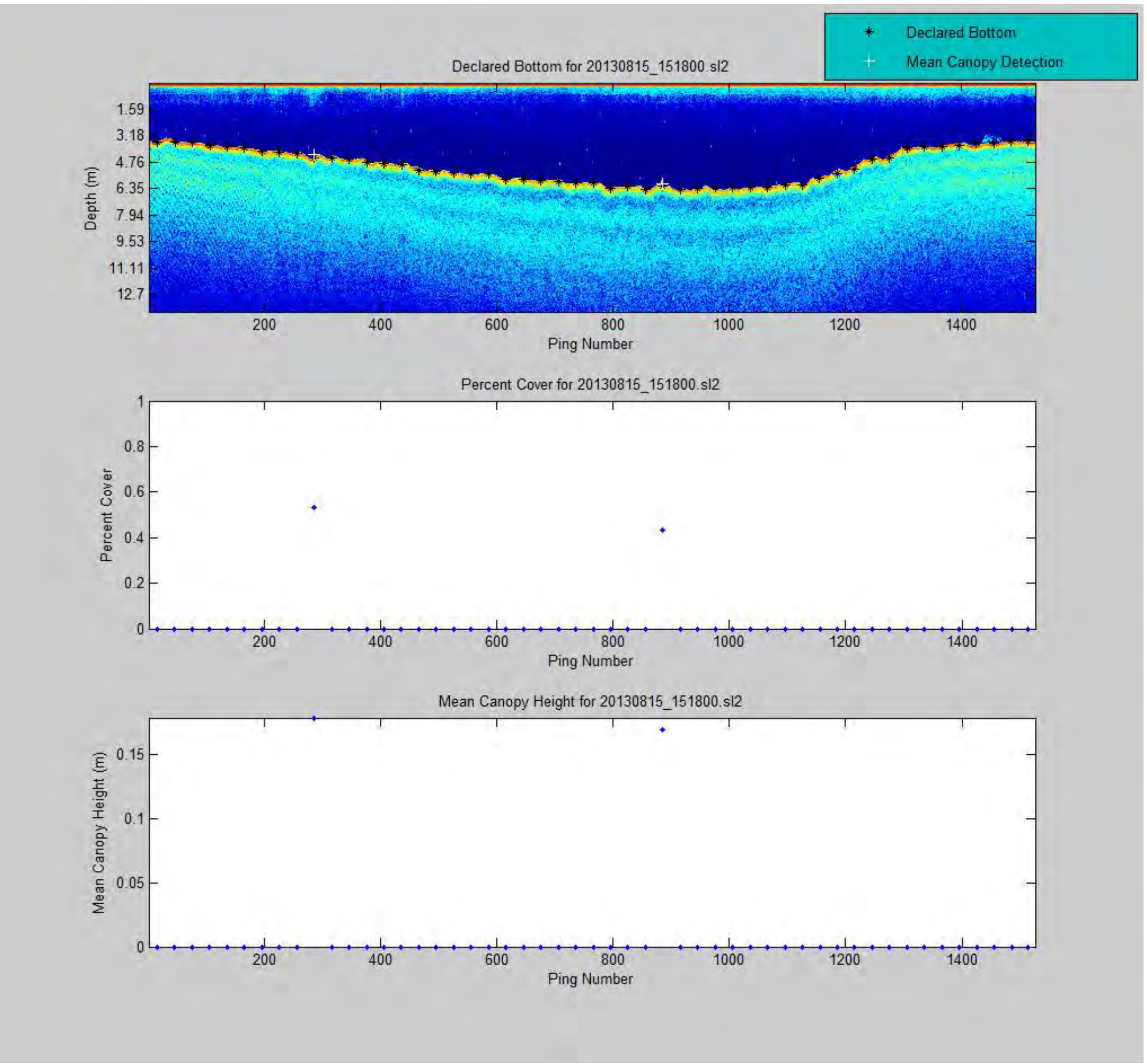
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

NEWBURYPORT, MA - TRANSECT 2 (20130815_152100.SL2)

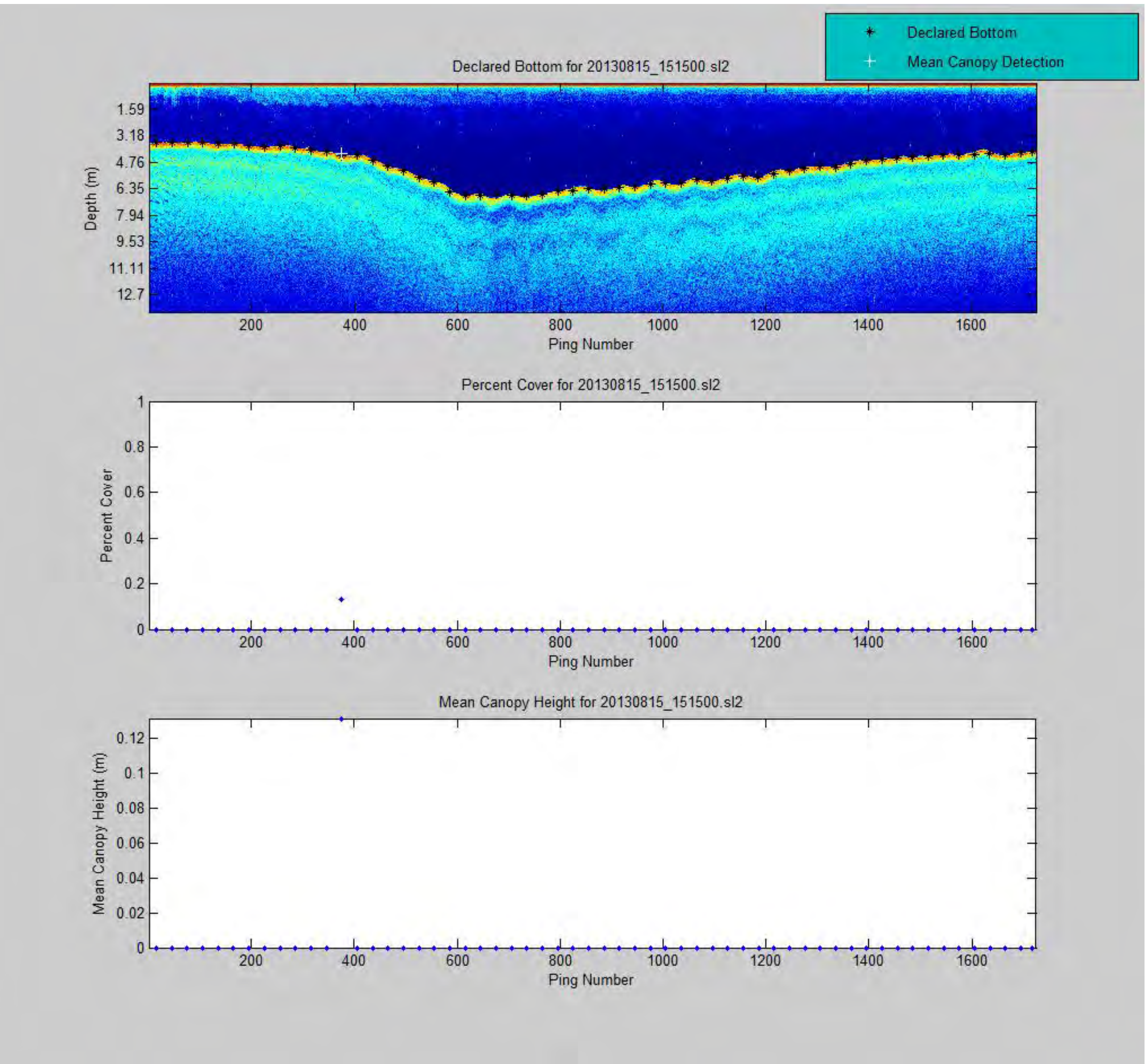


Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

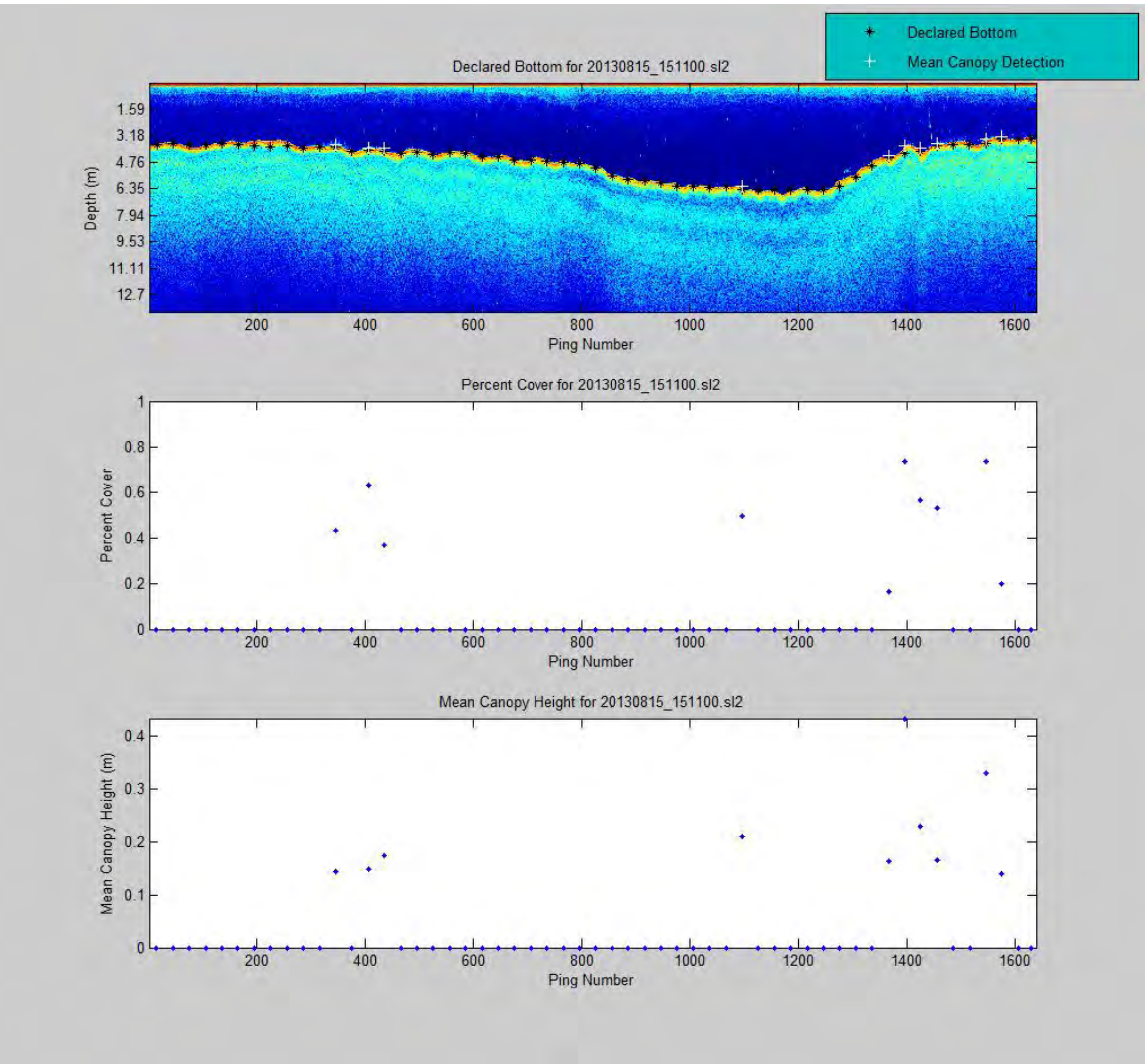
NEWBURYPORT, MA - TRANSECT 3 (20130815_151800.SL2)



NEWBURYPORT, MA - TRANSECT 4 (20130815_151500.SL2)

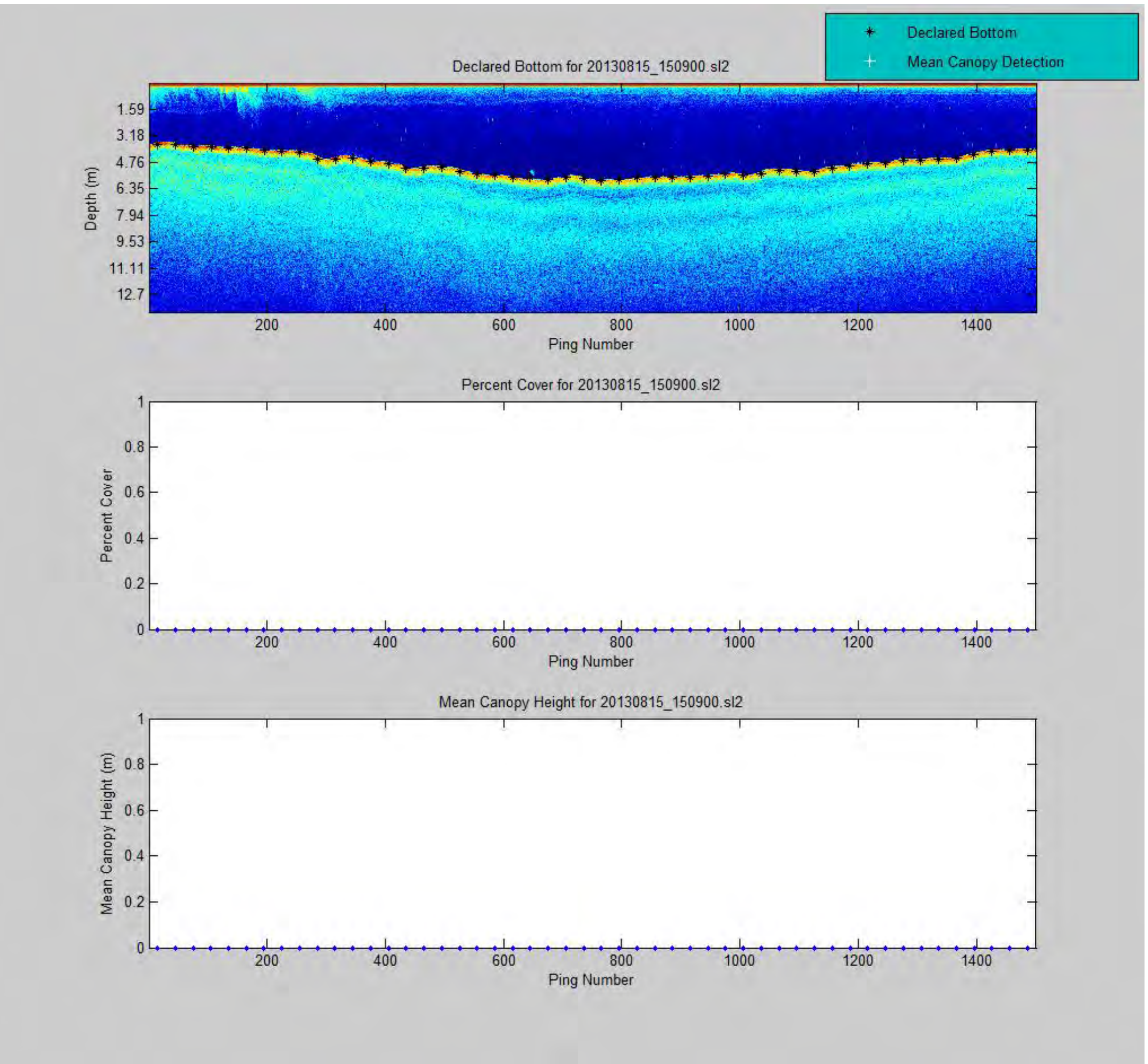


NEWBURYPORT, MA - TRANSECT 5 (20130815_151100.SL2)



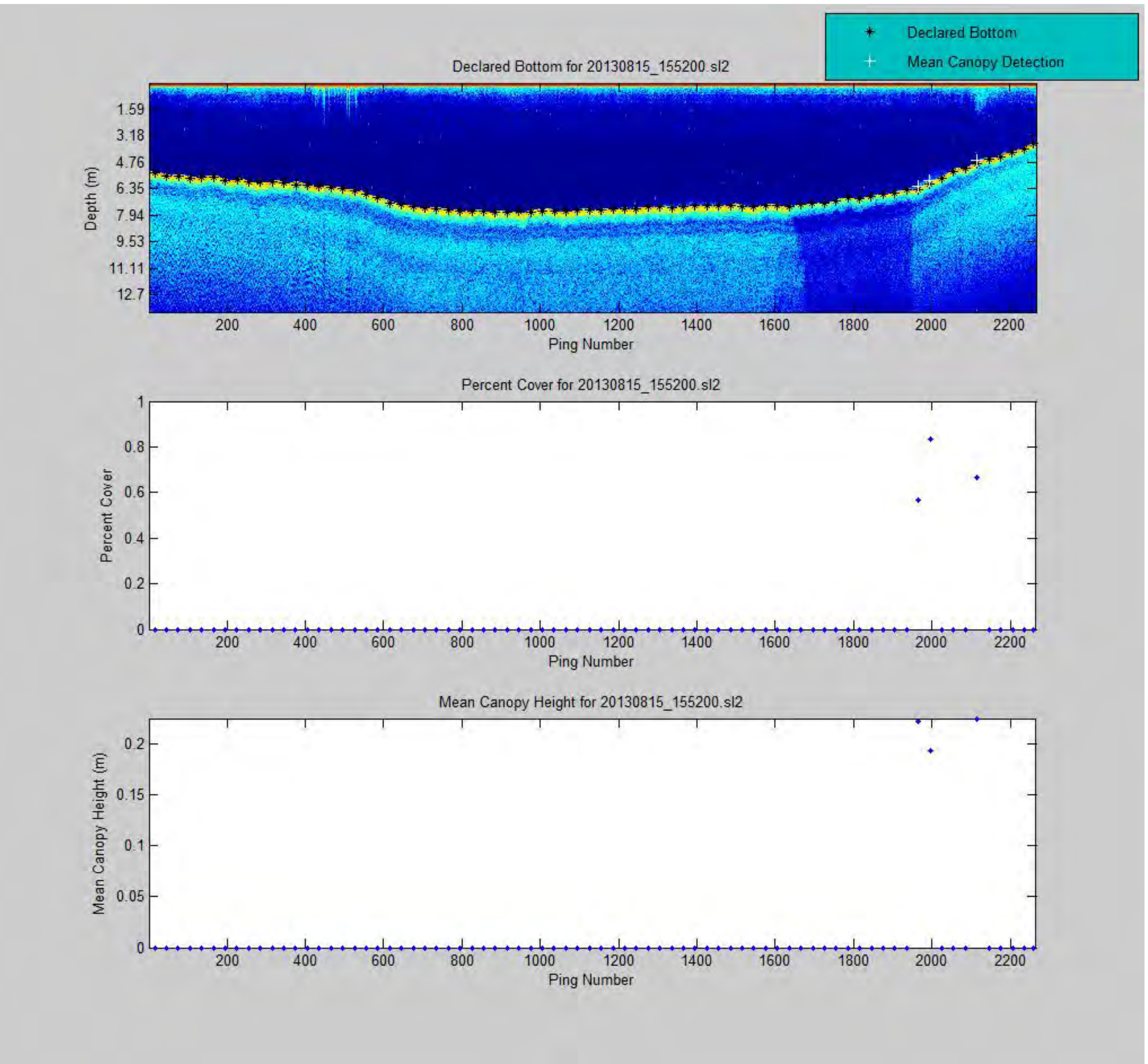
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

NEWBURYPORT, MA - TRANSECT 6 (20130815_150900.SL2)



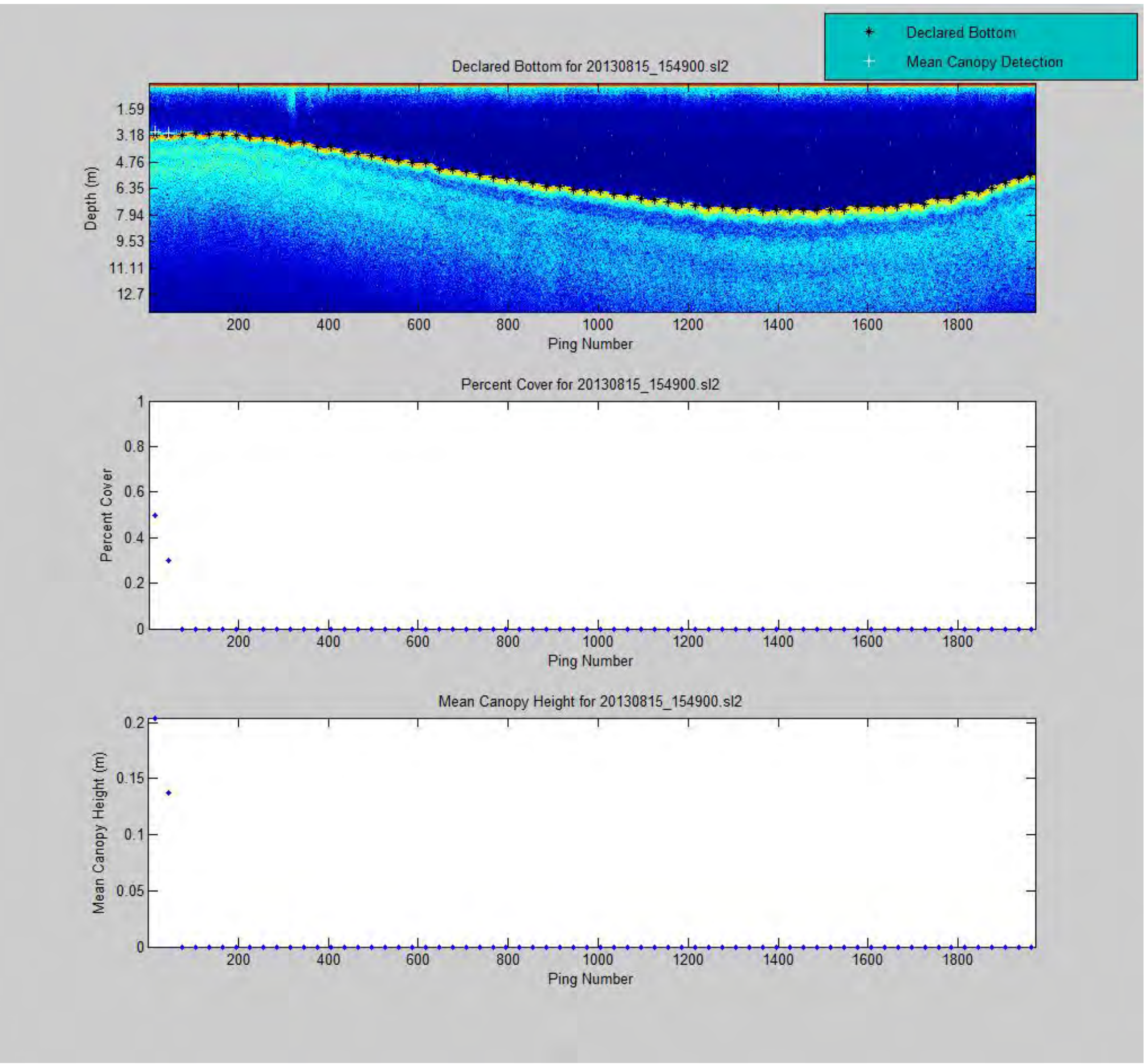
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

NEWBURY, MA - TRANSECT 1 (20130815_155200.SL2)



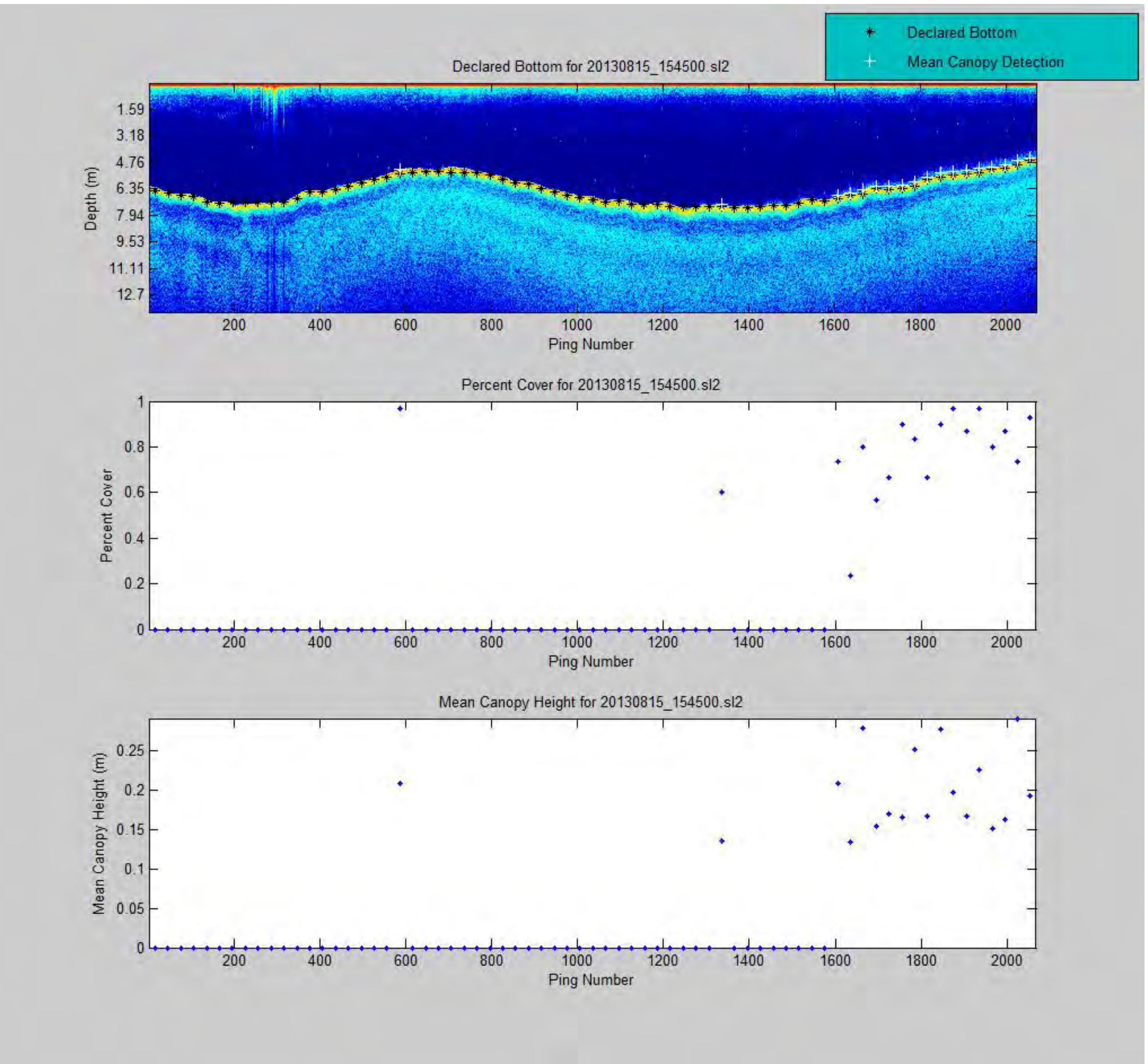
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

NEWBURY, MA - TRANSECT 2 (20130815_154900.SL2)



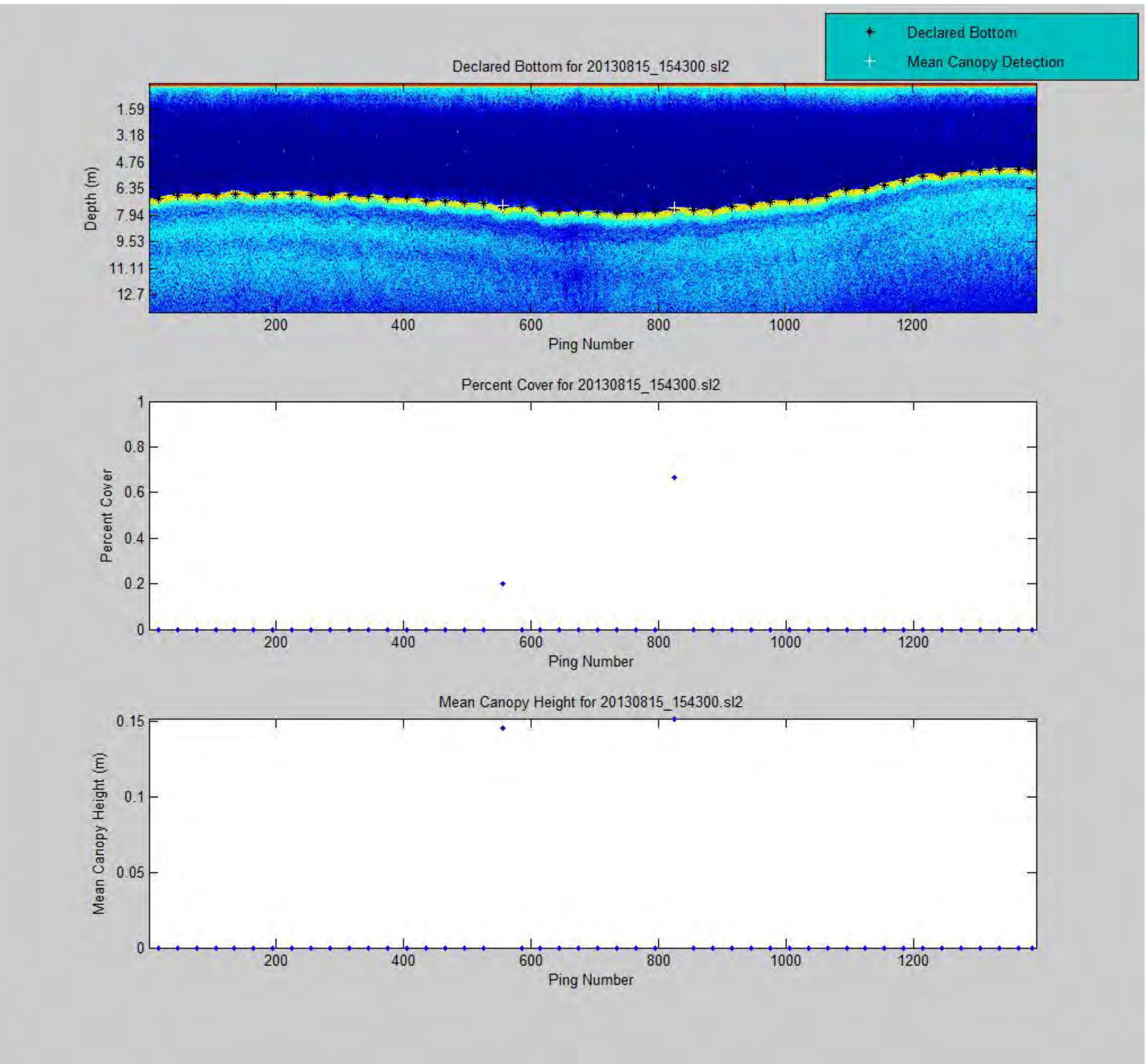
Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

NEWBURY, MA - TRANSECT 3 (20130815_154500.SL2)

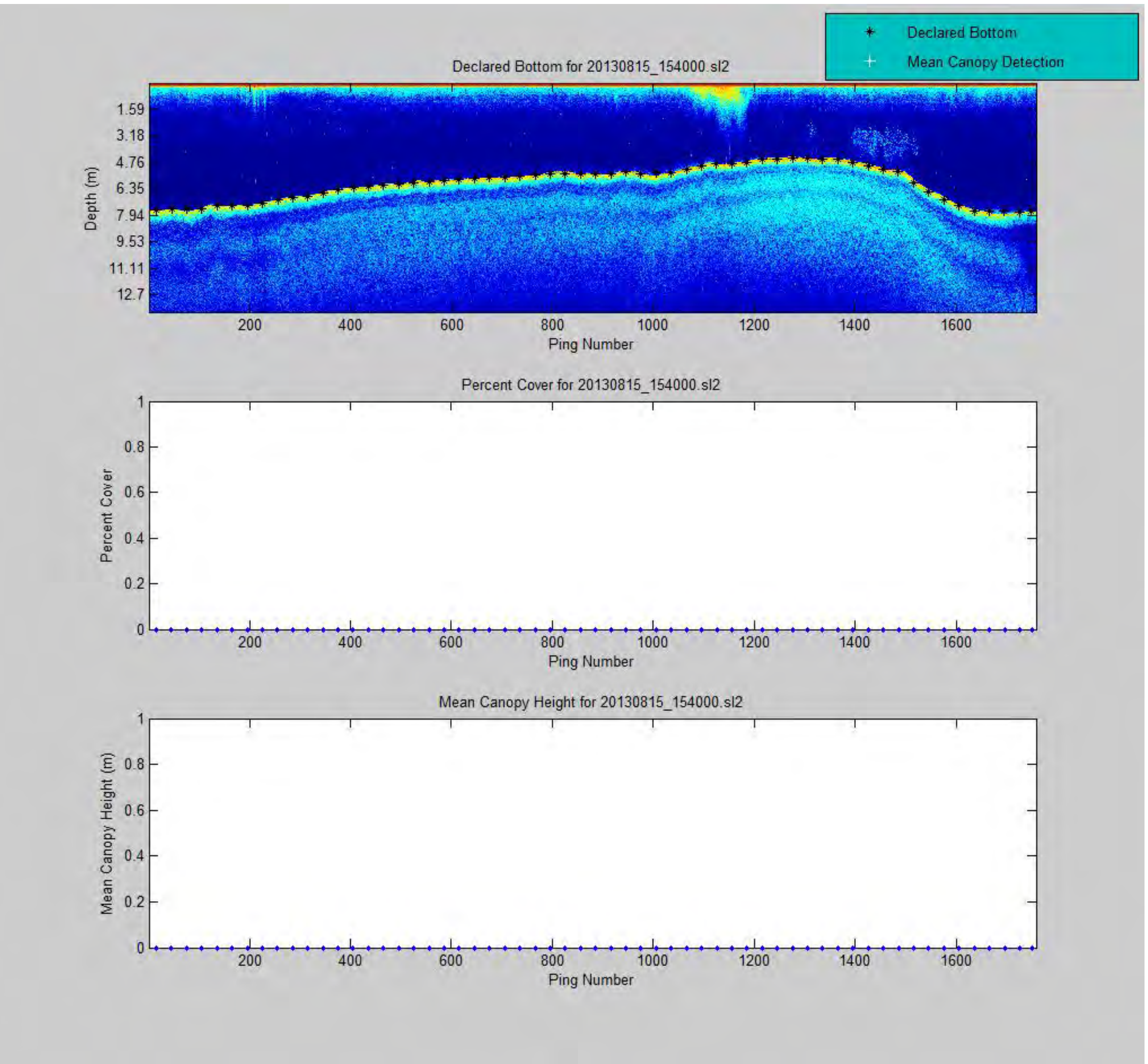


Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

NEWBURY, MA - TRANSECT 4 (20130815_154300.SL2)

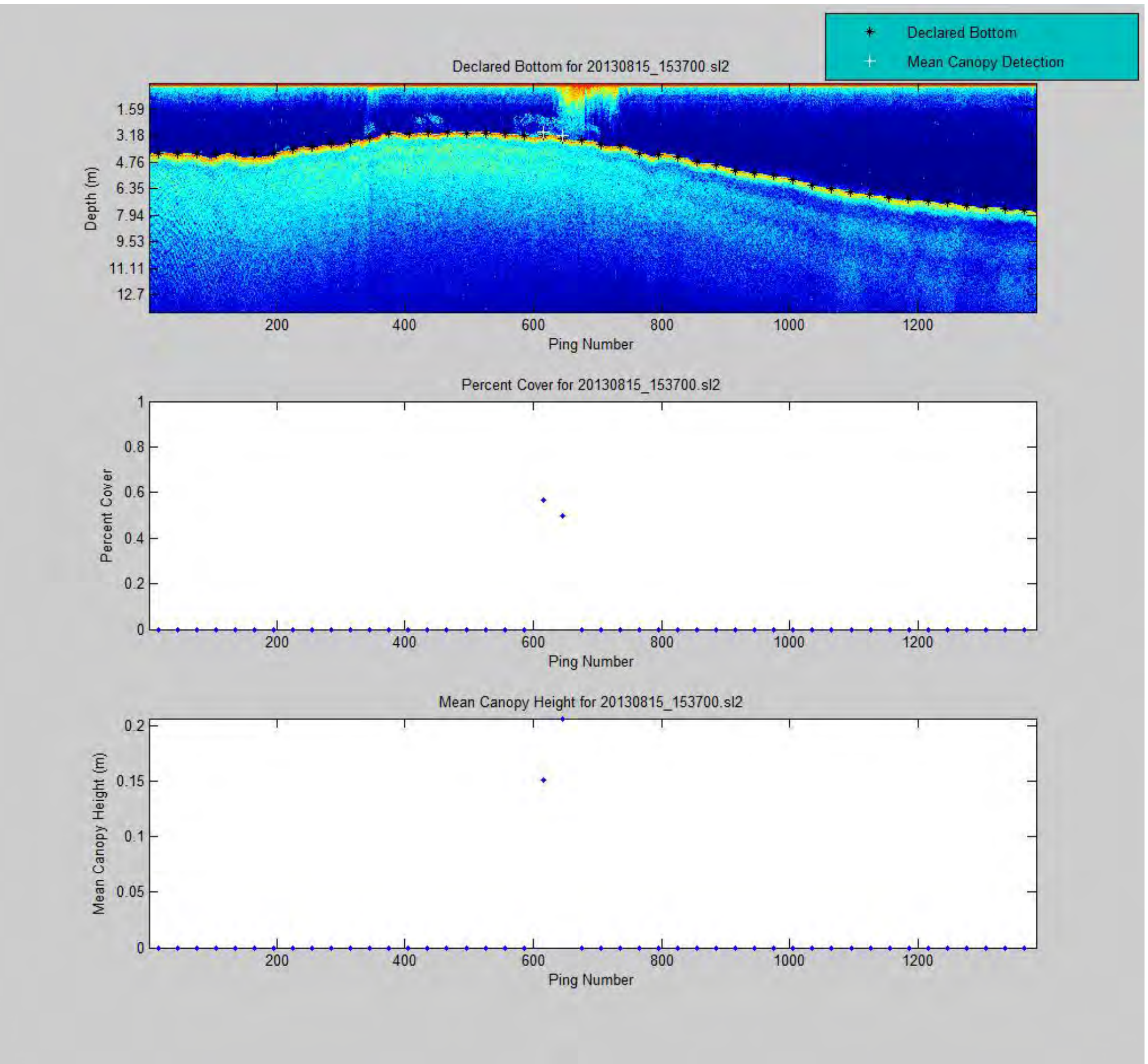


NEWBURY, MA - TRANSECT 5 (20130815_154000.SL2)

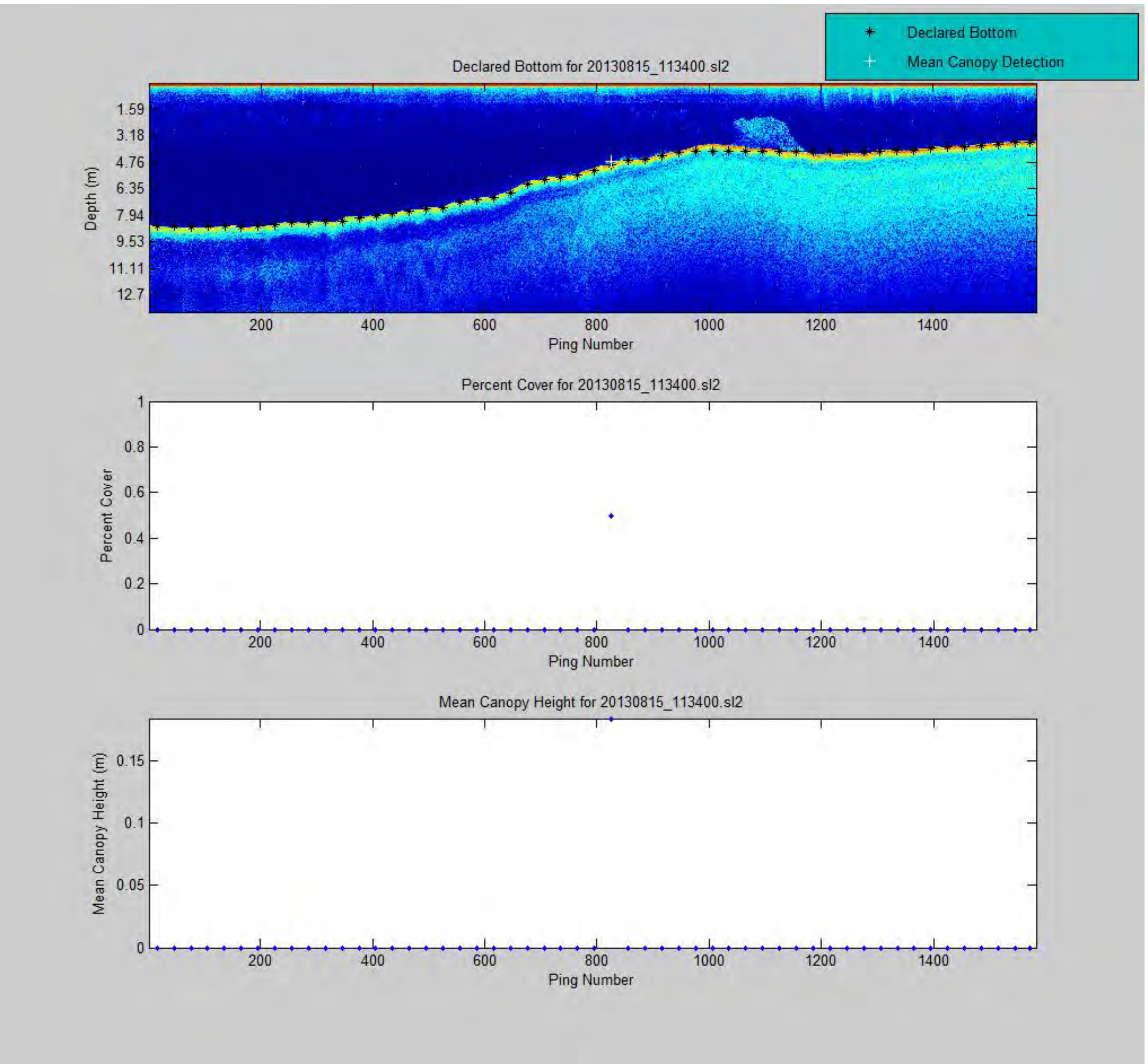


Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

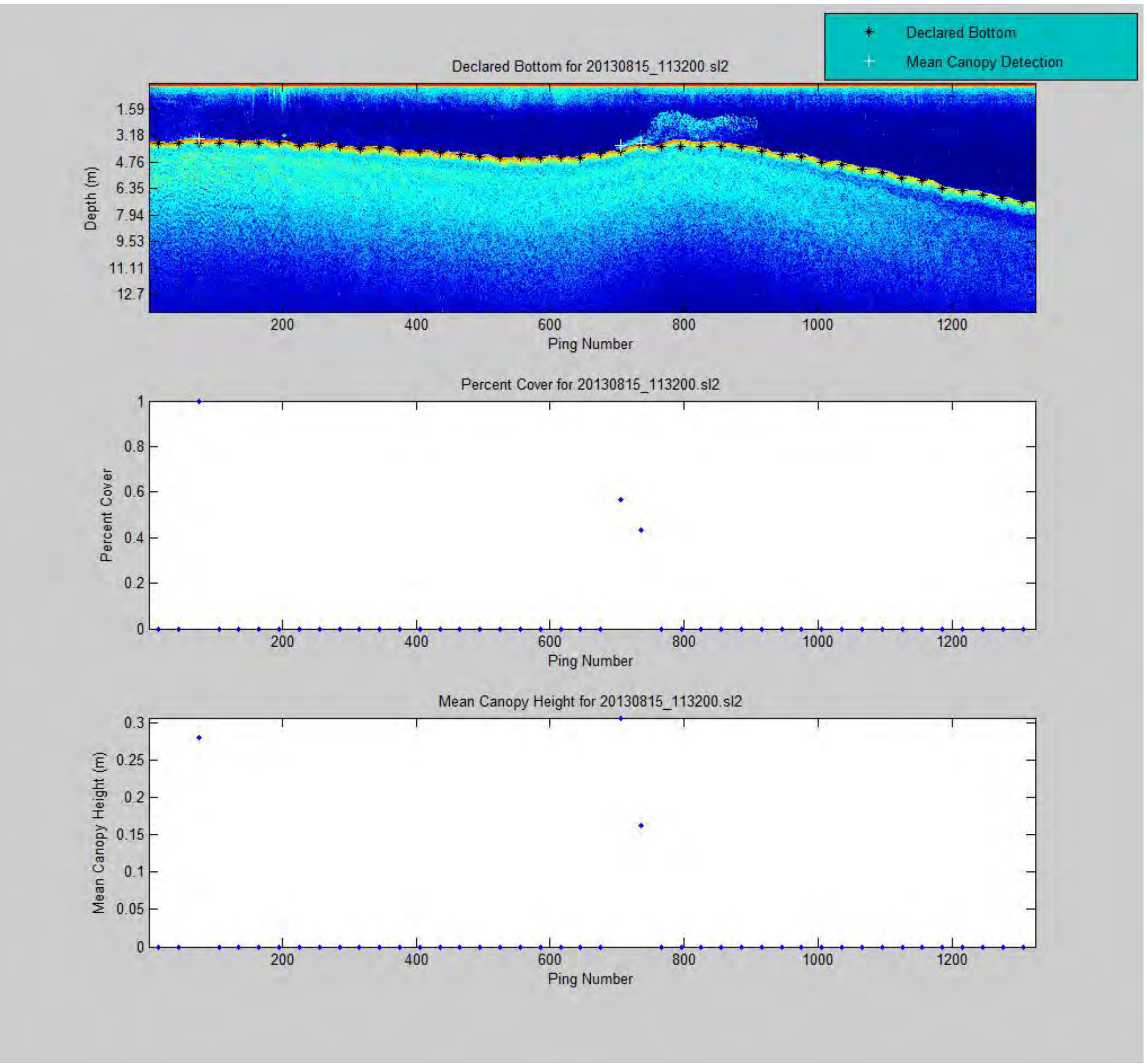
NEWBURY, MA - TRANSECT 6 (20130815_153700.SL2)



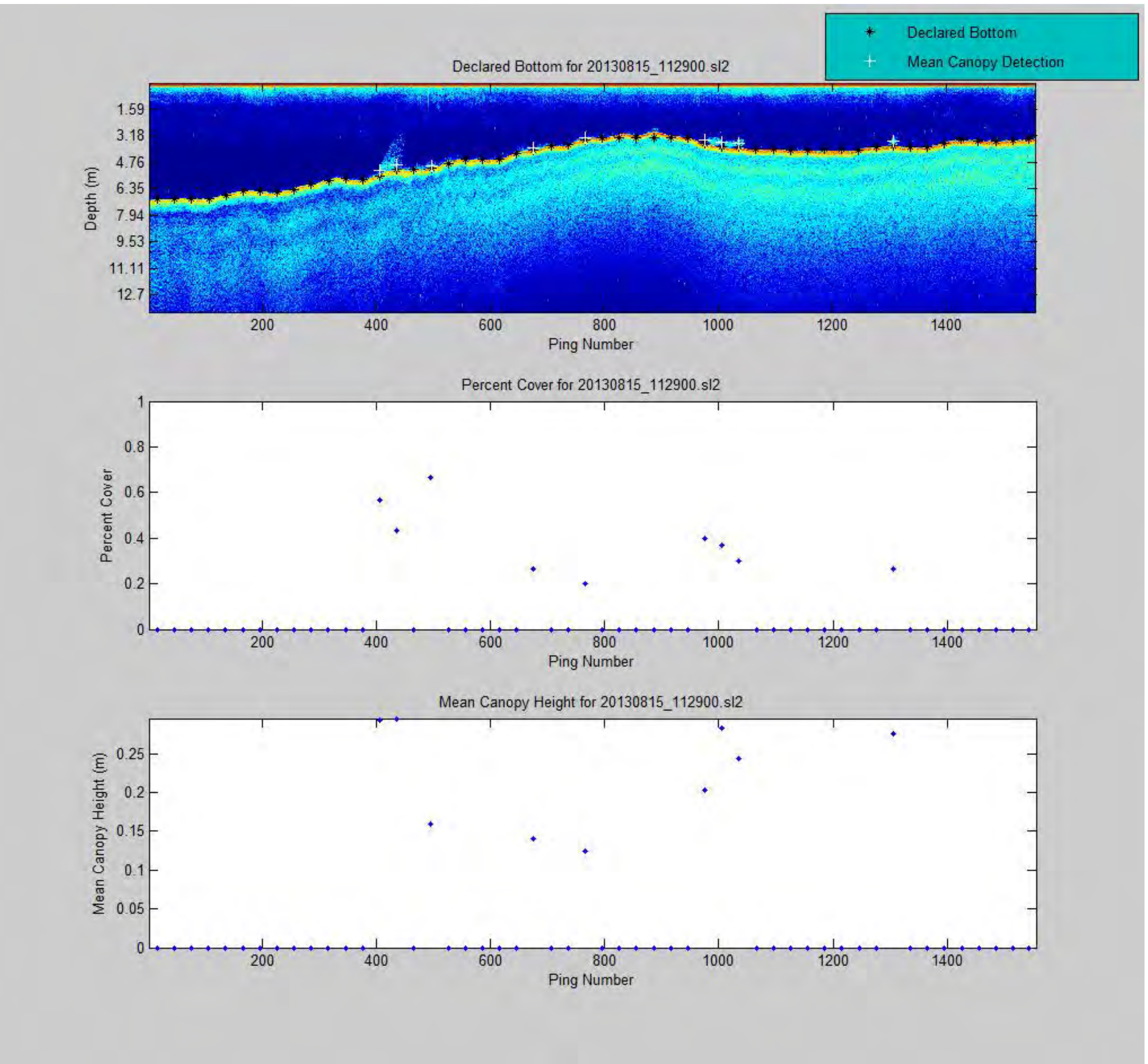
NEWBURY, MA - TRANSECT 7 (20130815_153400.SL2)



NEWBURY, MA - TRANSECT 8 (20130815_153200.SL2)



NEWBURY, MA - TRANSECT 9 (20130815_112900.SL2)



Appendix A: SAVEWS JR OUTPUT AND CONFIGURATION FILES

```
Configuration file PISCATAQUA_NSDS.sjrcfg
File created 8/26/13

****************************************************
Basic Parameters
****************************************************


n                  30                  The number of StructureScan pings used per report cycle. Structure-
                                       Scan operated as a fixed rate of 30 Hz.

heightmin          0.10                Minimum plant height (m) (distance between declared  bottom and
                                       shallowest above-threshold signal) required for a candidate plant
                                       detection declaration.


stdmin             0.03                Standard deviation (m) of difference between plant height of adjoining
                                       pings. Both STDMIN and HEIGHTMIN must exceed this minimum for a
                                       declared plant detection (AND function). To use only one feature set
                                       the other to zero.

maxplantdepth       8                  The maximum bottom depth (m), uncorrected for transducer depth or
                                       tides, at which plants are found. This eliminates any candidate
                                       detection below this depth, and output is declared unvegetated.

****************************************************
Intermediate Parameters
****************************************************
startdepth         1.0                 The depth (m) below transducer  (zero depth) to start processing. This
                                       value can be set to higher value if it is necessary to read past an
                                       interference such as reflection from the motor lower unit. All data
                                       prior to this depth is ignored.

usernoise           90                 Setting this value to zero will activate automated determination of
                                       noise threshold using Percentile value below. If set to a non-zero
                                       value, that number will be used as the noise threshold value.

percentile          75                 The percentile of program-generated noise threshold data to be
                                       represented by the programatically-determined overall noise
                                       threshold. Higher percentile values result in higher stresholds, with
                                       less sensitivity to noise and to plant detection.

mingap              0.05               The minimum quiet zone distance (m) that must be below noise
                                       threshold in order to detect vegetation.  If this quiet zone minimum is
                                       not met the ping is rejected as bad data. Only decrease this value from
                                       0.10 m if working in extremely shallow water or inherently "noisy"
                                       water. In this situation, an alternate approach would be to increase
                                       the usernoise value.

bot_med_filt_size      11              Parameter for smoothing bottom declarations. Size of median filter
                                       (number of elements) used in median filter. Current value is the center
                                       element of this filter. Use only odd numbers between 5 and 13.
```

```
bot_change_tol   0.10              Parameter for smoothing bottom declarations. If deviation (m)
                                   between current value and the median determined by median filter of
                                   size bot_med_filt_size exceeds this value, then the current value will
                                   be replaced by the median. Deactivate this feature by setting it to a
                                   very large value, such as 10 m.

cand_veg_amt     5                 The minimum percentage of pings in a report cycle that must be
                                   candidate vegetation before output is declared to be vegetation.
                                   If this percentage is not met, the report is declared unvegetated.

required_good    30                Minimum percentage of pings in report cycle (set as n above) that
                                   must be valid data before that report cycle is output. 30 is considered
                                   the minimum recommended value.



****************************************************
Advanced Parameters
****************************************************

swin             9                 The width of the median filter to be used in smoothing the pings. If
                                   changing this parameter, refer to filterflag in the "Intermediate
                                   Parameters" section to complete parameter setup.

th_limit         230               The maximum allowable noise threshold for a ping.

use_all          1                 Set this value to 1 for all data to be used, or 0 for only half of  the data
                                   (depth-wise) to be used. This is a data reduction option that achieves
                                   processing time cost savings if depth recording is > 2x bottom depth.

hist_width       0.02              The width (m) of the bins to use in the histogram analysis that is used
                                   to make bottom declarations. This represents the bin widths into
                                   which bottom candidates are placed in order to make accurate bottom
                                   declarations.


bot_wid_percent  1                 The percentage of bottom widths that can have a width of 0.  This is
                                   used to set the threshold value to calculate the width of the bottom.
                                   The threshold value is increased until (bot_wid_percent) percent of
                                   pings have no bottom width.


filterflag     0                   Set this value to 1 if median filtering of the original ping data is
                                   desired, or 0 is median filtering is NOT desired. For 200khz input data,
                                   this filtering must always be used. If using median filtering, refer to
                                   "swin" in the "Advanced Parameters" section to complete parameter
                                   setup.



**************************************************************
```

APPENDIX B

VIDEO SCREEN CAPTURE LIBRARY

Appendix B: Video Screen Capture Library

Wells T1 – 1 (Bare sand)

Wells T1 – 2 (Bare sand)

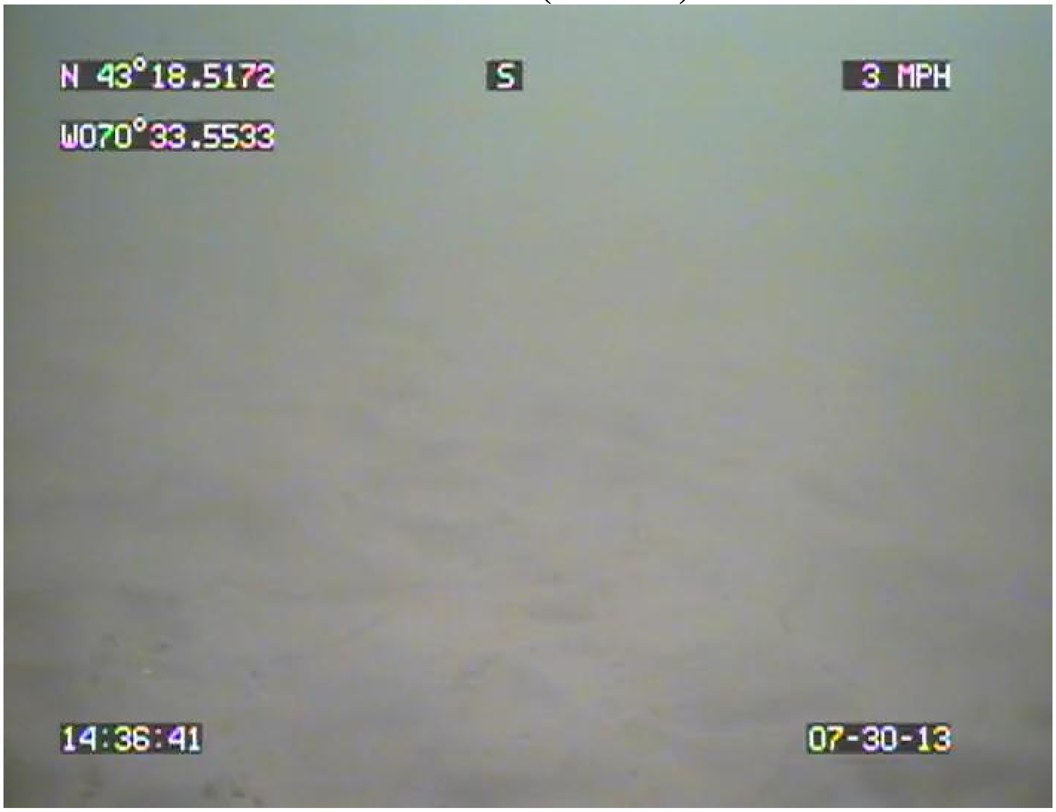
Appendix B: Video Screen Capture Library

Wells T1 – 3 (Bare sand)

Wells T1 – 4 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T1 – 5 (Bare sand)



Wells T1 – 6 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T1 – 7 (Bare sand)

Wells T1 – 8 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T1 – 9 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T2 – 1 (Bare sand)

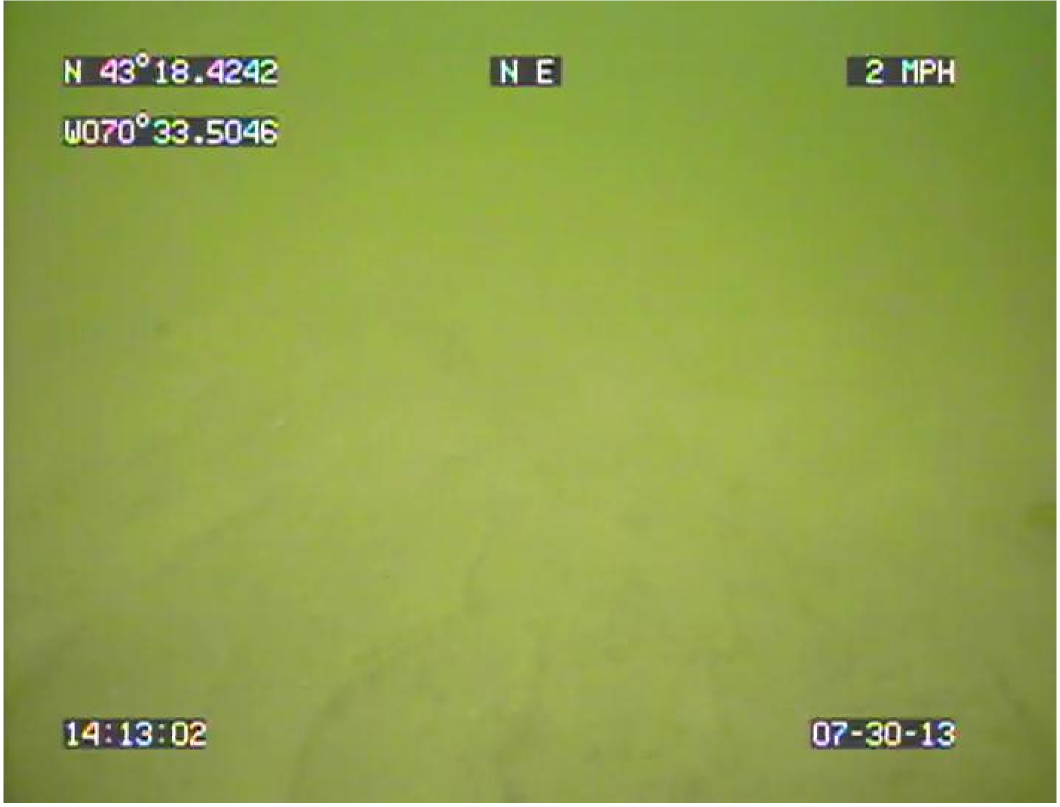
Wells T2 – 2 (Bare sand)

Wells T2 – 3 (Bare sand)

Wells T2 – 4 (Bare sand)

Wells T2 – 5 (Bare sand)

Wells T2 – 6 (Bare sand)



Appendix B: Video Screen Capture Library

Wells T2 – 7 (Bare sand)

Wells T2 – 8 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T2 – 9 (Bare sand)

Wells T2 – 10 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T3 – 1 (Bare sand with algal debris)

Wells T3 – 2 (Bare sand)

Wells T3 – 3 (Bare sand)

Wells T3 – 4 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T3 – 5 (Bare sand and lobster)

Wells T3 – 6 (Bare sand)

Appendix B: Video Screen Capture Library


Wells T3 – 7 (Bare sand)


Wells T3 – 8 (Bare sand and lobster)

Appendix B: Video Screen Capture Library

Wells T3 – 9 (Bare sand)

Wells T3 – 10 (Bare sand and lobster)

Appendix B: Video Screen Capture Library

Wells T4 – 1 (Bare sand)

Wells T4 – 2 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T4 – 3 (Bare sand with individual clump of unidentified macroalgae)

Wells T4 – 4 (Bare sand)

Appendix B: Video Screen Capture Library

Wells T4 – 5 (Bare sand and lobsters)

Wells T4 – 6 (Bare sand and lobster)

Appendix B: Video Screen Capture Library

Wells T4 – 7 (Bare sand)

Wells T4 – 8 (Bare sand)

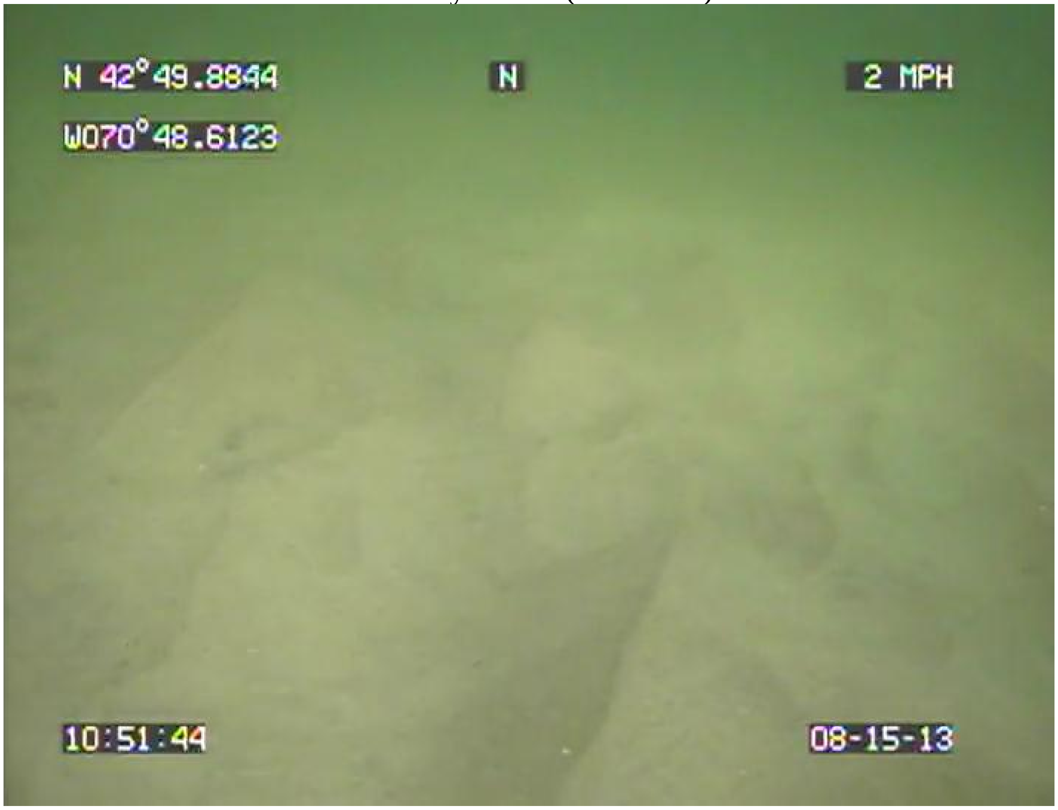
Appendix B: Video Screen Capture Library

Wells T4 – 9 (Bare sand and lobster)

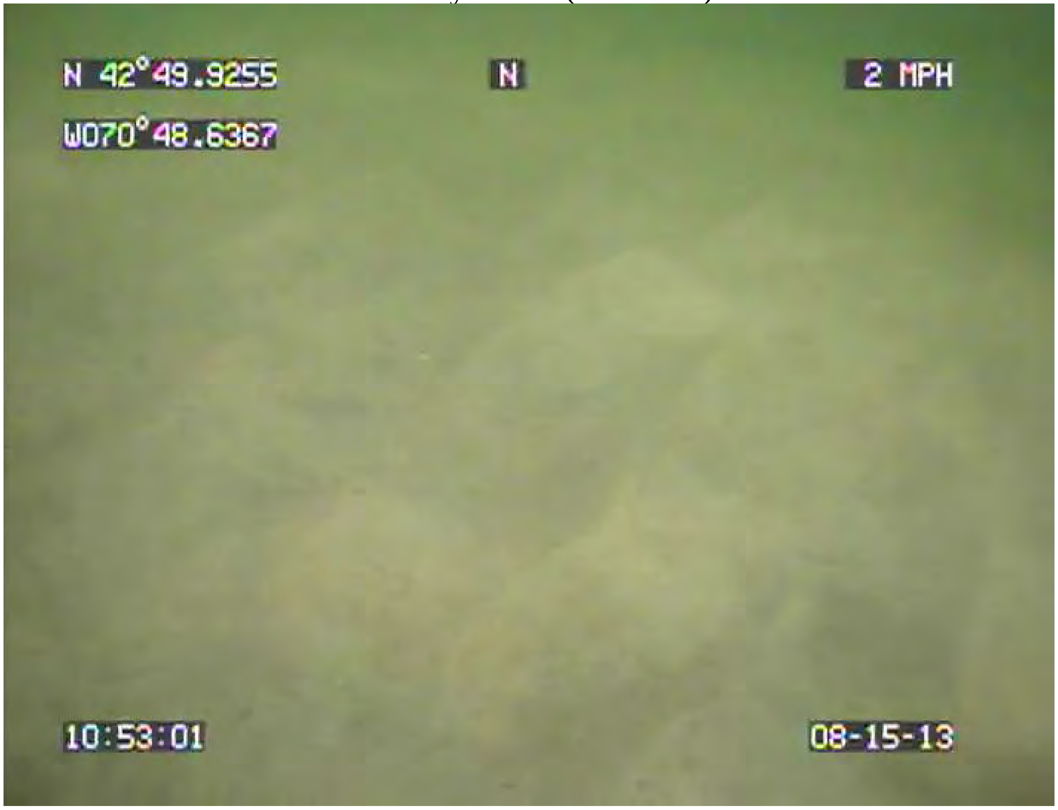
Wells T4 – 10 (Bare sand and algal debris)

Appendix B: Video Screen Capture Library

Salisbury T1 – 1 (Bare sand)



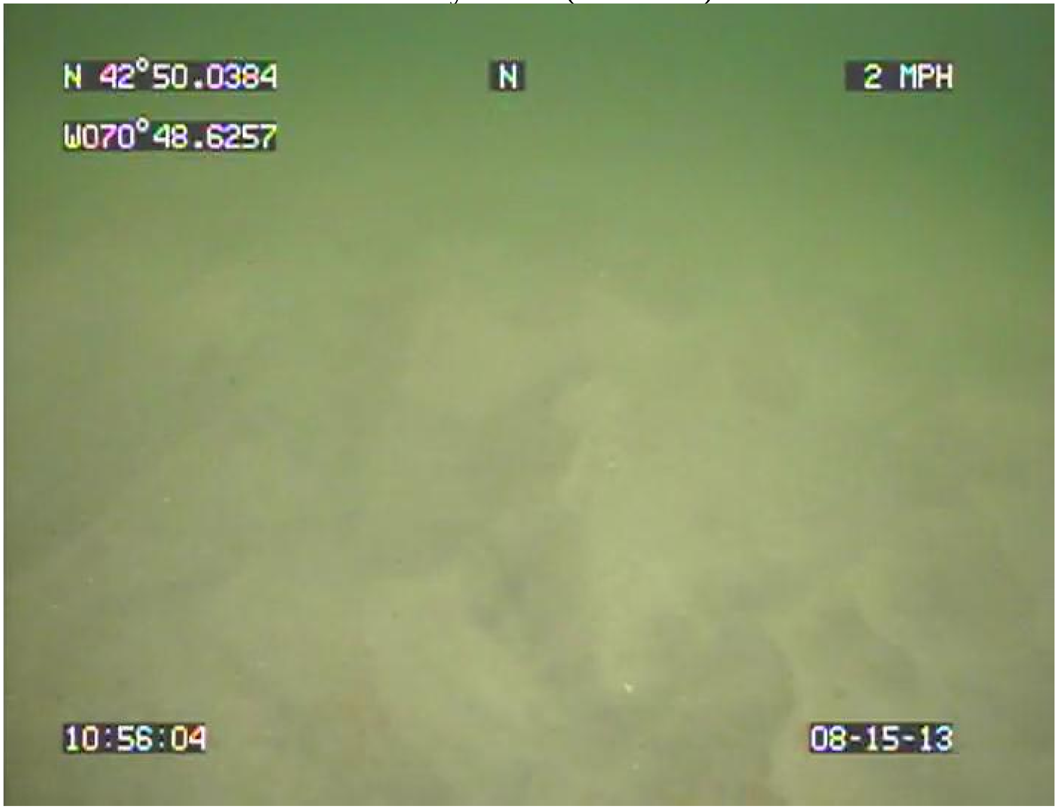
Salisbury T1 – 2 (Bare sand)



Appendix B: Video Screen Capture Library

Salisbury T1 – 3 (Bare sand)

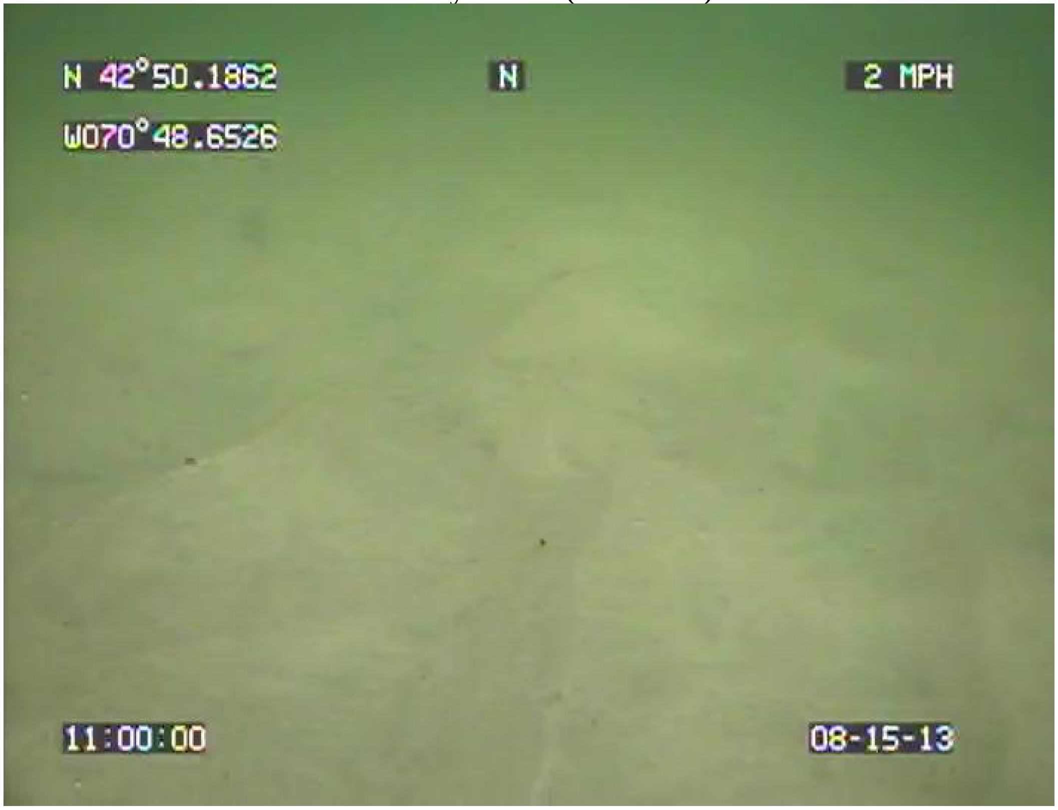
Salisbury T1 – 4 (Bare sand)



Appendix B: Video Screen Capture Library

Salisbury T1 – 5 (Bare sand)

Salisbury T1 – 6 (Bare sand)



Appendix B: Video Screen Capture Library

Salisbury T1 – 7 (Bare sand)

Salisbury T1 – 8 (Bare sand)

Appendix B: Video Screen Capture Library

Salisbury T1 – 9 (Bare sand)

Salisbury T1 – 10 (Bare sand)

Appendix B: Video Screen Capture Library

Salisbury T2 – 1 (Sand and drift algae)

Salisbury T2 – 2 (Sand and drift algae)

Appendix B: Video Screen Capture Library

Salisbury T2 – 3 (Sand and drift algae)

Salisbury T2 – 4 (Sand, drift algae, and lobster)

Appendix B: Video Screen Capture Library

Salisbury T2 – 5 (Sand, drift algae, and lobster)

Salisbury T2 – 6 (Bare Sand)

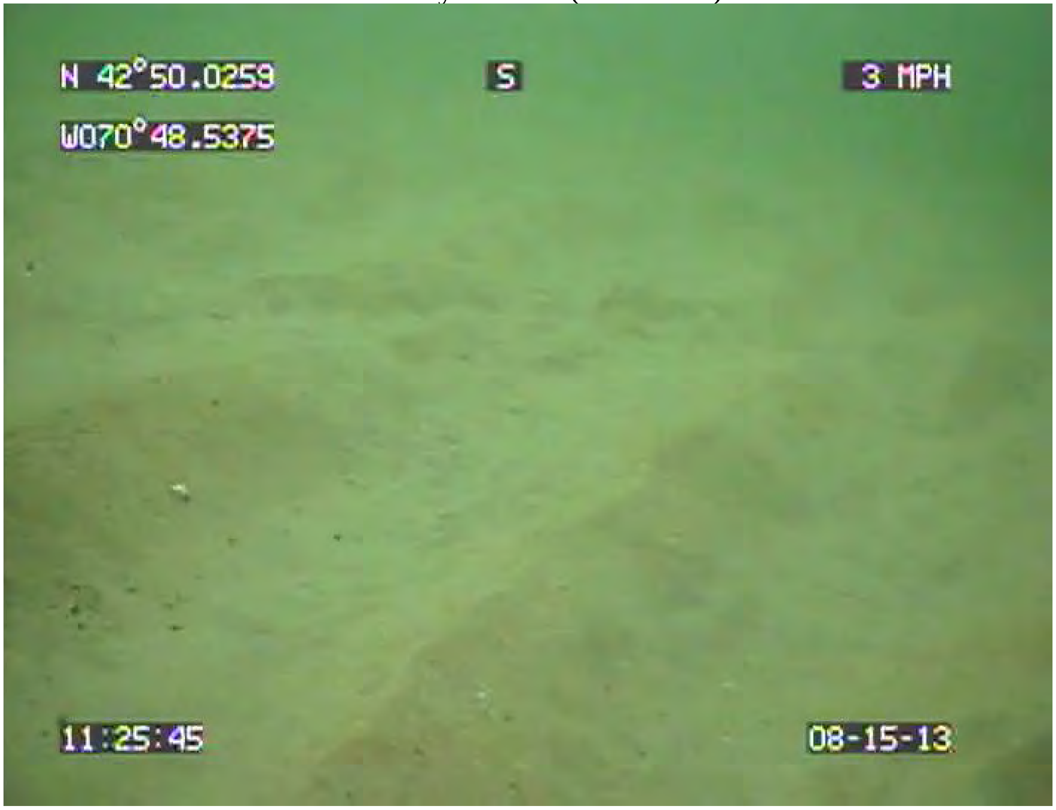
Appendix B: Video Screen Capture Library

Salisbury T2 – 7 (Bare Sand)

Salisbury T2 – 8 (Bare Sand)

Salisbury T2 – 9 (Bare Sand)

Salisbury T2 – 10 (Bare Sand)



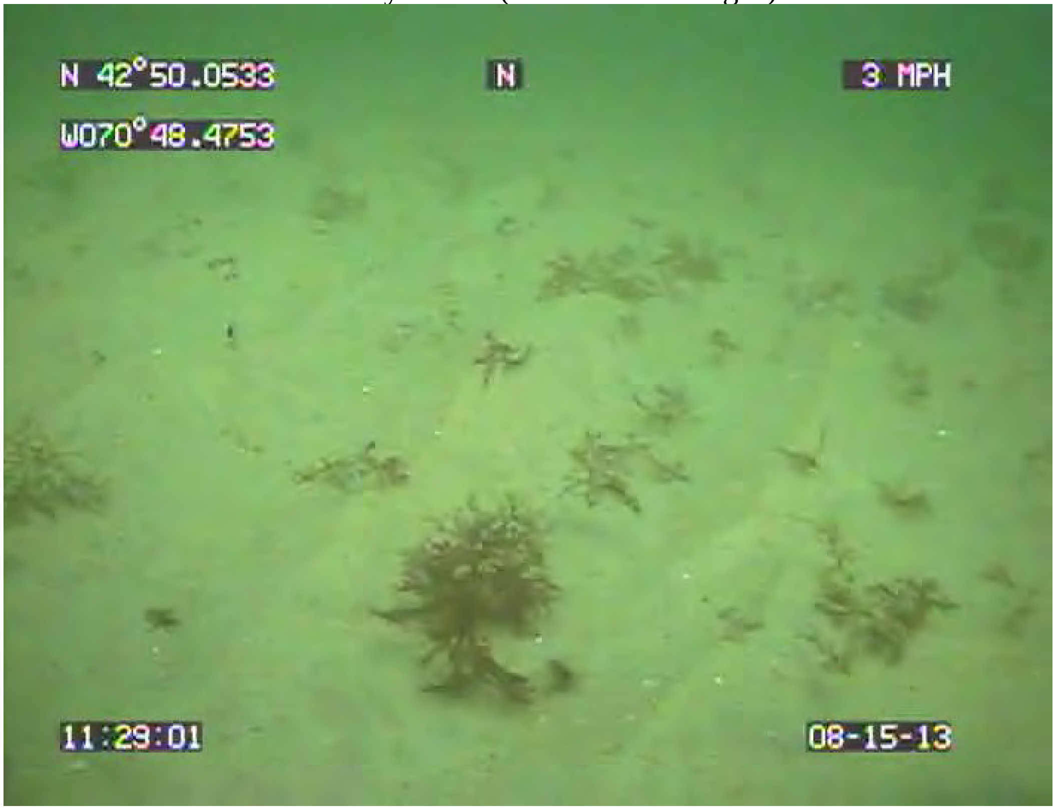
Appendix B: Video Screen Capture Library

Salisbury T3 – 1 (Sand and drift algae)

Salisbury T3 – 2 (Sand and drift algae)

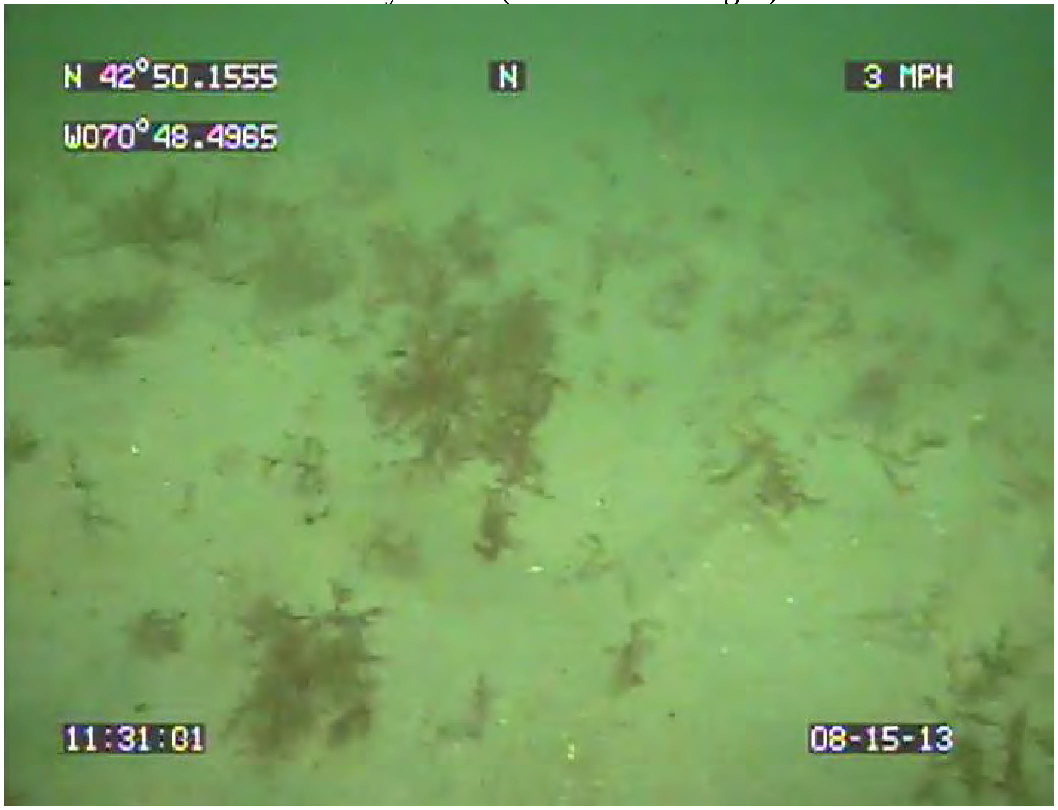
Appendix B: Video Screen Capture Library

Salisbury T3 – 3 (Sand and drift algae)



Salisbury T3 – 4 (Sand and drift algae)

Salisbury T3 – 5 (Sand and drift algae)



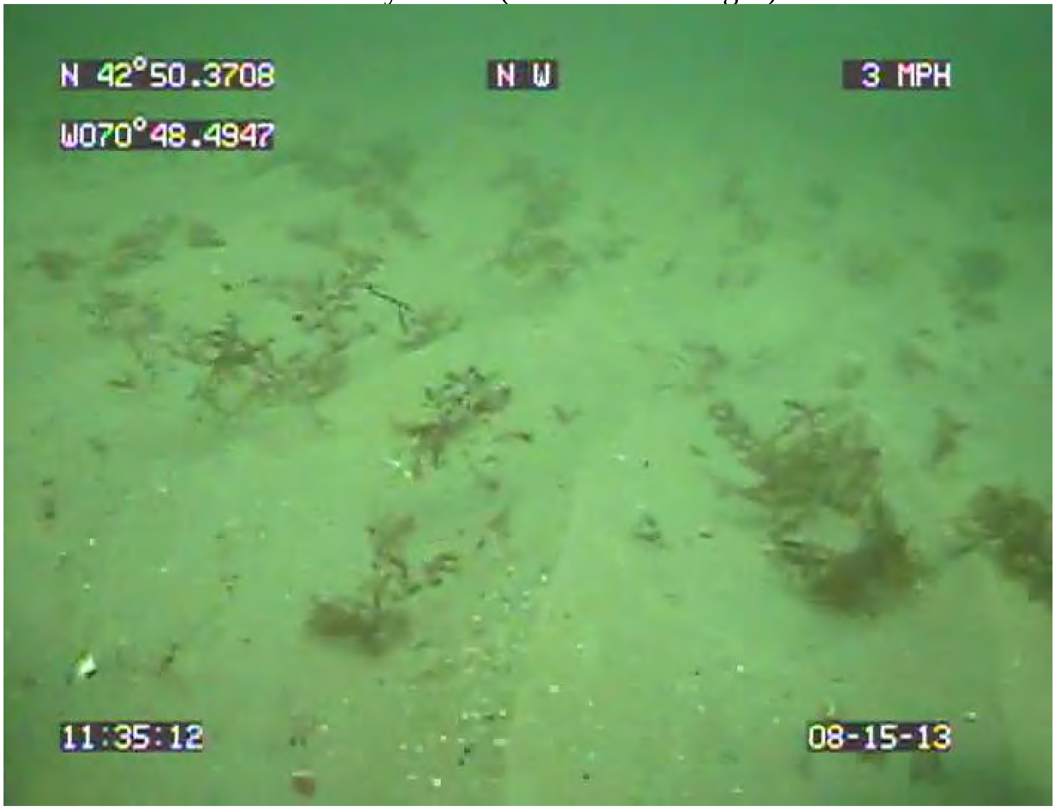
Salisbury T3 – 6 (Sand and drift algae)

Salisbury T3 – 7 (Sand and drift algae)

Salisbury T3 – 8 (Sand and drift algae)

Appendix B: Video Screen Capture Library

Salisbury T3 – 9 (Sand and drift algae)



Salisbury T3 – 10 (Sand and drift algae)

Appendix B: Video Screen Capture Library

Newburyport T1 – 1 (Bare sand and shell fragments)

Newburyport T1 – 2 (Bare sand and shell fragments)

Appendix B: Video Screen Capture Library

Newburyport T1 – 3 (Bare sand)

Newburyport T1 – 4 (Bare sand)

Appendix B: Video Screen Capture Library

Newburyport T1 – 5 (Bare sand)

Newburyport T1 – 6 (Bare sand)

Appendix B: Video Screen Capture Library

Newburyport T1 – 7 (Bare sand)

Newburyport T1 – 8 (Bare sand and moon snail)

Appendix B: Video Screen Capture Library

Newburyport T1 – 9 (Bare sand)

Newburyport T1 – 10 (Bare sand)

Appendix B: Video Screen Capture Library

Newburyport T2 – 1 (Bare sand)

Newburyport T2 – 2 (Bare sand)

Appendix B: Video Screen Capture Library

Newburyport T2 – 3 (Bare sand)

Newburyport T2 – 4 (Bare sand and surf clam shell)

Appendix B: Video Screen Capture Library

Newburyport T2 – 5 (Bare sand)

Newburyport T2 – 6 (Bare sand and surf clam shells)

Appendix B: Video Screen Capture Library

Newburyport T2 – 7 (Bare sand)

Newburyport T2 – 8 (Bare sand)

Appendix B: Video Screen Capture Library

Newburyport T2 – 9 (Bare sand)

Newburyport T2 – 10 (Bare sand and surf clam shell with crab)

Appendix B: Video Screen Capture Library

Newburyport T3 – 1 (Bare sand)

Newburyport T3 – 2 (Bare sand)

Appendix B: Video Screen Capture Library

Newburyport T3 – 3 (Bare sand and shell fragments)

Newburyport T3 – 4 (Bare sand and surf clam shell)

Appendix B: Video Screen Capture Library

Newburyport T3 – 5 (Bare sand)

Newburyport T3 – 6 (Bare sand and surf clam shells)

Appendix B: Video Screen Capture Library

Newburyport T3 – 7 (Bare sand and surf clam shells)

Newburyport T3 – 8 (Bare sand)

Newburyport T3 – 9 (Bare sand)

Newburyport T3 – 10 (Bare sand)

Appendix B: Video Screen Capture Library

Newbury T1 – 1 (Bare sand)

Newbury T1 – 2 (Bare sand)

Appendix B: Video Screen Capture Library

Newbury T1 – 3 (Bare sand)

Newbury T1 – 4 (Bare sand)

Appendix B: Video Screen Capture Library

Newbury T1 – 5 (Bare sand)

Newbury T1 – 6 (Bare sand and drift algae)

Newbury T1 – 7 (Bare sand and drift algae)

Newbury T1 – 8 (Bare sand and drift algae)

Appendix B: Video Screen Capture Library

Newbury T1 – 9 (Bare sand)

Newbury T1 – 10 (Bare sand)

Appendix B: Video Screen Capture Library

Newbury T2 – 1 (Bare sand)

Newbury T2 – 2 (Macroalgae wrack and lobster)

Newbury T2 – 3 (Bare sand)

Newbury T2 – 4 (Bare sand)

Appendix B: Video Screen Capture Library

Newbury T2 – 5 (Bare sand)

Newbury T2 – 6 (Bare sand and surf clam shell)

Appendix B: Video Screen Capture Library

Newbury T2 – 7 (Bare sand, shell fragment, and drift algae)

Newbury T2 – 8 (Bare sand)

Appendix B: Video Screen Capture Library

Newbury T2 – 9 (Bare sand)

Newbury T2 – 10 (Bare sand)

APPENDIX C

ANALYTICAL REPORT

US Army Corps
of Engineers®
New England District

NAE ENVIRONMENTAL LABORATORY
Project Name: Nearshore Disposal Sites
Project Location: Salisbury/Newburyport, MA; Wells, ME

Date Collected: 07/30/13
Date Recieved: 08/01/13
Date Analyzed: 08/05/13

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: Five samples for each location (a total of twenty 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:

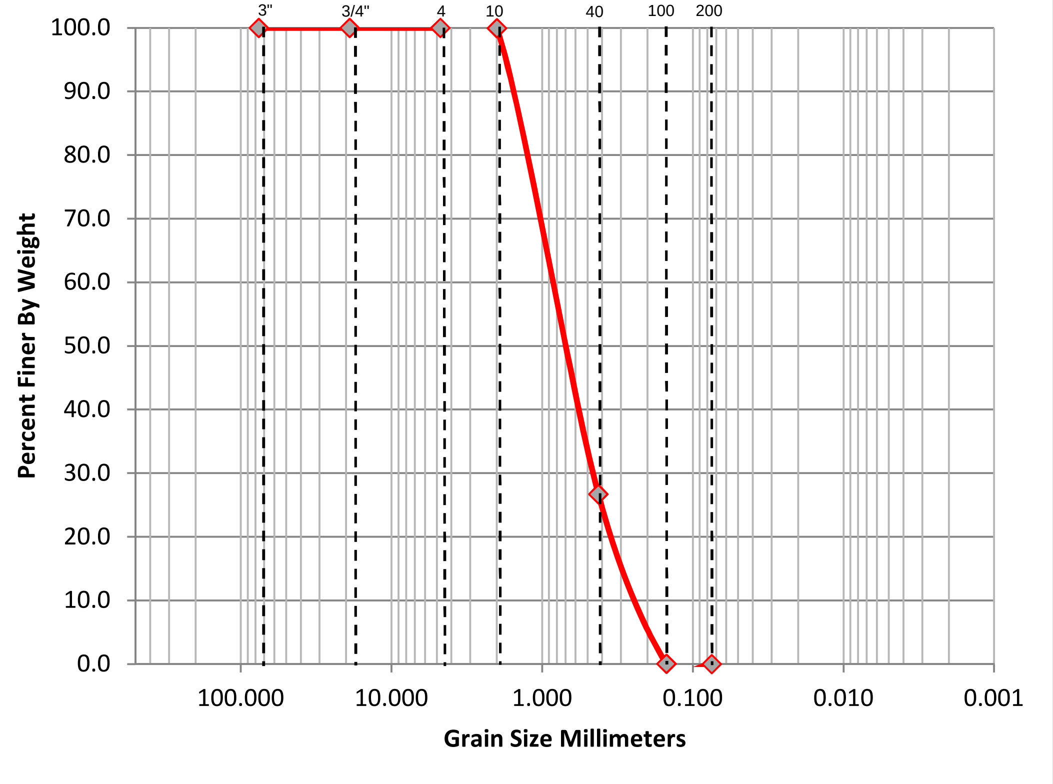
Sample ID	%Cobble	%Gravel		%Sand			%Fines
		Coarse	Fine	Coarse	Medium	Fine	
Salis-A	0.0	0.0	0.0	0.1	73.2	26.7	0.0
Salis-B	0.0	0.0	0.0	0.0	2.7	97.3	0.0
Salis-C	0.0	0.0	0.0	0.0	74.9	25.0	0.0
Salis-D	0.0	0.0	0.0	0.1	83.1	16.8	0.0
Salis-E	0.0	0.0	0.0	0.0	1.4	98.5	0.0
Newb-A	0.0	0.0	1.6	8.6	85.4	4.4	0.0
Newb-B	0.0	0.0	0.0	0.9	98.1	1.0	0.0
Newb-C	0.0	0.0	0.2	3.2	85.9	10.7	0.0
Newb-D	0.0	0.0	5.1	4.3	36.2	54.5	0.0
Newb-E	0.0	0.0	0.8	2.2	74.1	22.9	0.0
PI-A	0.0	0.0	0.0	0.1	49.1	50.8	0.0
PI-B	0.0	0.0	0.3	0.7	87.2	11.9	0.0
PI-C	0.0	0.0	0.0	0.0	66.0	34.0	0.0
PI-D	0.0	0.0	0.1	0.2	57.2	42.6	0.0
PI-E	0.0	0.0	0.0	0.2	96.5	3.2	0.0
Wells-A	0.0	0.0	0.0	0.1	1.0	98.9	0.0
Wells-B	0.0	0.0	0.2	0.4	1.4	98.1	0.0
Wells-C	0.0	0.0	0.1	0.0	0.6	99.3	0.0
Wells-D	0.0	0.0	0.0	0.1	1.2	98.7	0.0
Wells-E	0.0	0.0	0.5	0.2	0.5	98.8	0.0

US Army Corps of Engineers®
New England District

Project Name: Nearshore Disposal Sites
Project Location: Salisbury/Newburyport, MA; Wells, ME
Sample ID: Salis-A

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	73.2	26.7	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2526	0.3041	0.4956	0.9257	1.1408	1.6785	3.44	4.52

Original Sample Weight (g)			571.5	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	494.0	494.0	0.0	0.0	0.0	100.0
#10	2.000	470.5	470.8	0.3	0.1	0.1	99.9
#40	0.425	353.1	771.6	418.5	73.2	73.3	26.7
#100	0.150	328.9	481.3	152.4	26.7	99.9	0.1
#200	0.075	313.6	313.9	0.3	0.1	100.0	0.0

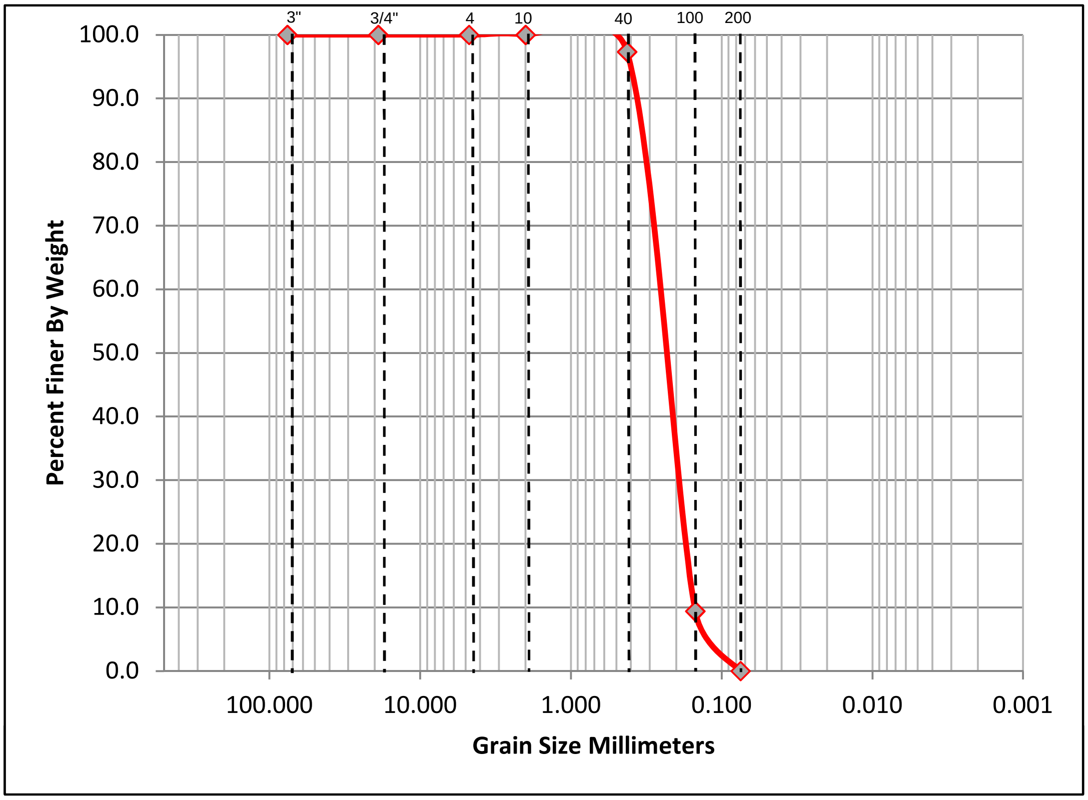
Sample Notes: SP- Grey and tan, subangular, medium to fine sand.

US Army Corps of Engineers®
New England District

Project Name: Nearshore Disposal Sites
Project Location: Salisbury/Newburyport, MA; Wells, ME
Sample ID: Salis-B

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.7	97.3	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1519	0.1675	0.2144	0.2770	0.3083	0.3864	9.16	2.03

Original Sample Weight (g)			472.7	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.4	489.4	0.0	0.0	0.0	100.0
#10	2.000	463.6	463.6	0.0	0.0	0.0	100.0
#40	0.425	355.0	367.6	12.6	2.7	2.7	97.3
#100	0.150	325.7	741.4	415.7	87.9	90.6	9.4
#200	0.075	316.8	361.2	44.4	9.4	100.0	0.0

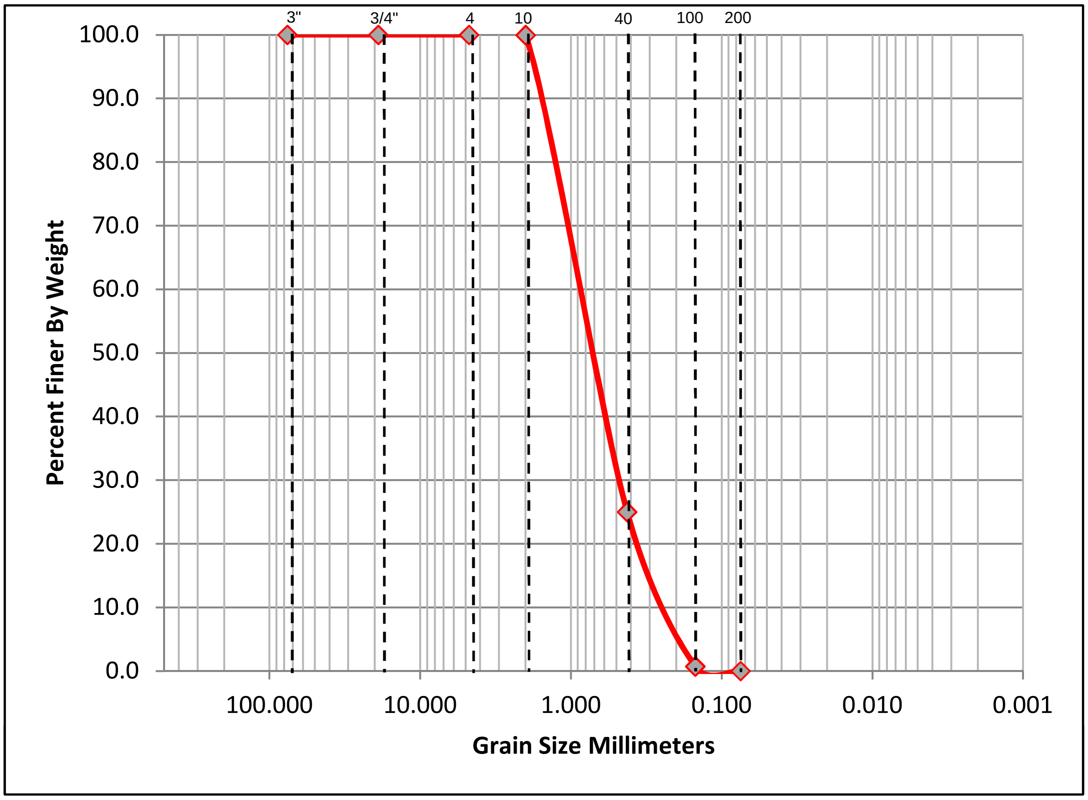
Sample Notes: SP- Medium to fine, grey and tan, subangular sand.

US Army Corps of Engineers®
New England District

Project Name: Nearshore Disposal Sites
Project Location: Salisbury/Newburyport, MA; Wells, ME
Sample ID: Salis-C

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	74.9	25.0	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2551	0.3117	0.5299	0.9501	1.1603	1.6856	3.58	4.55

Original Sample Weight (g)		485.0	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	494.0	494.0	0.0	0.0	0.0	100.0
#10	2.000	470.5	470.7	0.2	0.0	0.0	100.0
#40	0.425	352.9	716.4	363.5	74.9	75.0	25.0
#100	0.150	328.9	446.7	117.8	24.3	99.3	0.7
#200	0.075	313.6	317.1	3.5	0.7	100.0	0.0

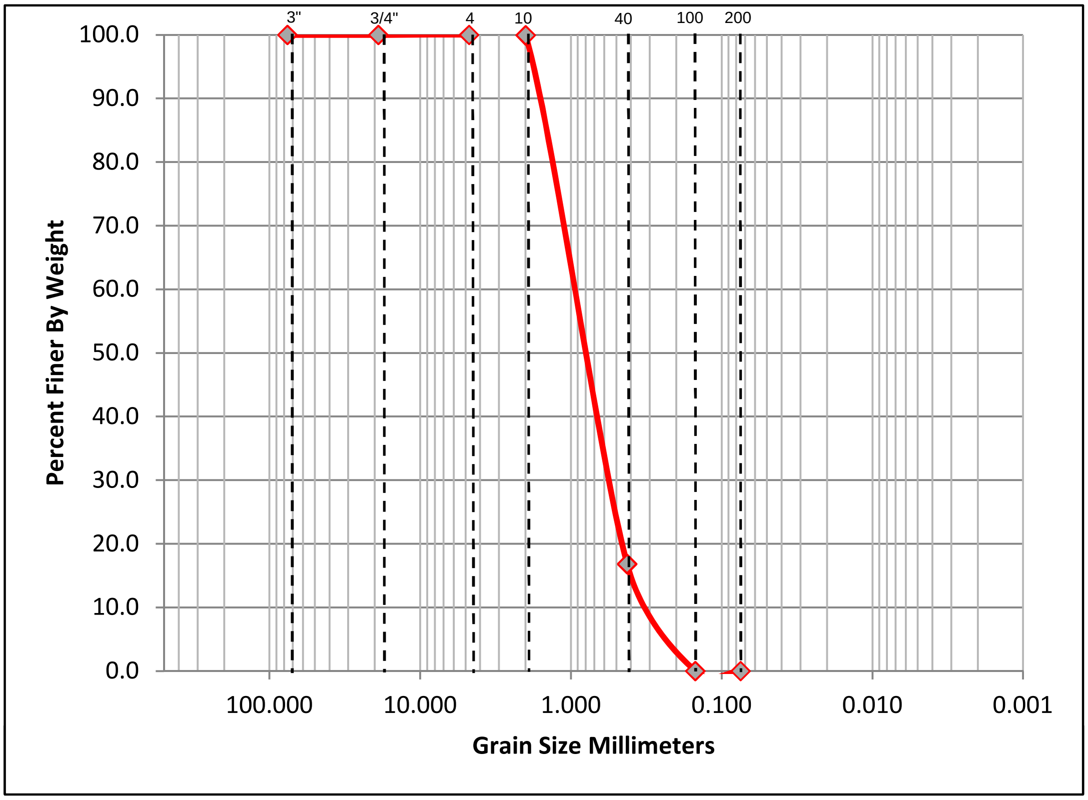
Sample Notes: SP- Medium to fine, grey, subangular sand.

US Army Corps of Engineers®
New England District

Project Name: Nearshore Disposal Sites
Project Location: Salisbury/Newburyport, MA; Wells, ME
Sample ID: Salis-D

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	83.1	16.8	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.3133	0.3950	0.6745	1.0535	1.2430	1.7168	3.46	3.97

Original Sample Weight (g)			507.8	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.4	489.4	0.0	0.0	0.0	100.0
#10	2.000	463.6	463.9	0.3	0.1	0.1	99.9
#40	0.425	354.8	776.8	422.0	83.1	83.2	16.8
#100	0.150	325.6	411.1	85.5	16.8	100.0	0.0
#200	0.075	316.8	316.8	0.0	0.0	100.0	0.0

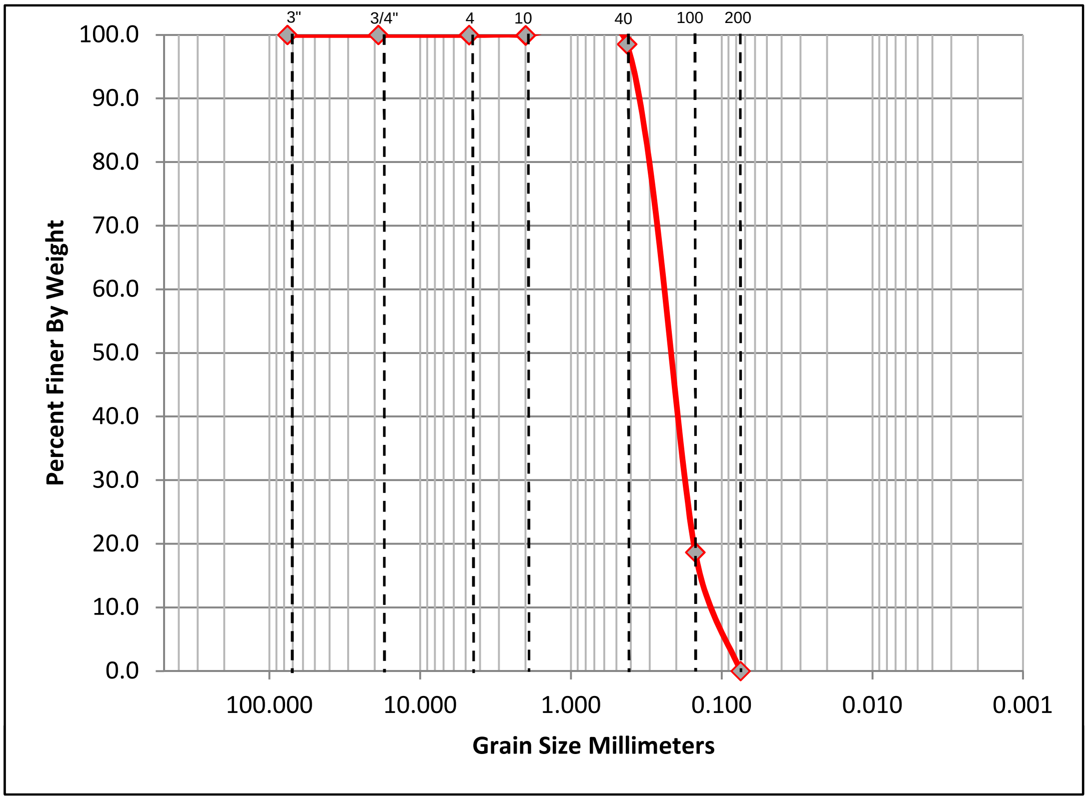
Sample Notes: SP- Medium to fine, sub-angular, tan sand.

US Army Corps
of Engineers®
New England District

Project Name: Nearshore Disposal Sites
Project Location: Salisbury/Newburyport, MA; Wells, ME
Sample ID: Salis-E

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.4	98.5	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1152	0.1352	0.1890	0.2579	0.2923	0.3784	11.23	2.54

Original Sample Weight (g)			452.0	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	494.0	494.1	0.1	0.0	0.0	100.0
#10	2.000	470.6	470.8	0.2	0.0	0.1	99.9
#40	0.425	353.1	359.4	6.3	1.4	1.5	98.5
#100	0.150	328.9	689.9	361.0	79.9	81.3	18.7
#200	0.075	313.7	398.1	84.4	18.7	100.0	0.0

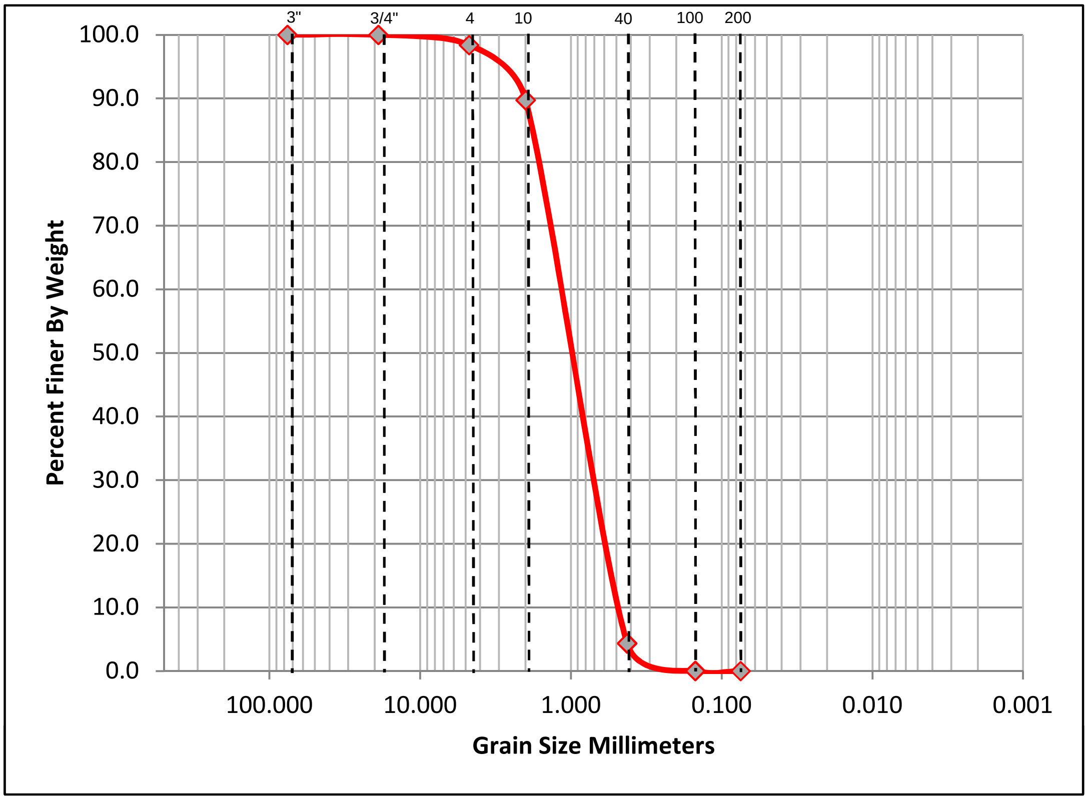
Sample Notes: SP- Mostly fine, grey and tan, sub-angular sand.

US Army Corps of Engineers
New England District

Project Name: Newburyport
Project Location: Newburyport, MA
Sample ID: Newb-A

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	8.6	85.4	4.4	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.5290	0.6212	0.8979	1.2668	1.4512	1.9123	2.34	2.74

Original Sample Weight (g)			603.1	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.3	499.0	9.7	1.6	1.6	98.4
#10	2.000	463.6	515.7	52.1	8.6	10.2	89.8
#40	0.425	354.8	869.8	515.0	85.4	95.6	4.4
#100	0.150	325.7	351.9	26.2	4.3	100.0	0.0
#200	0.075	316.6	316.7	0.1	0.0	100.0	0.0

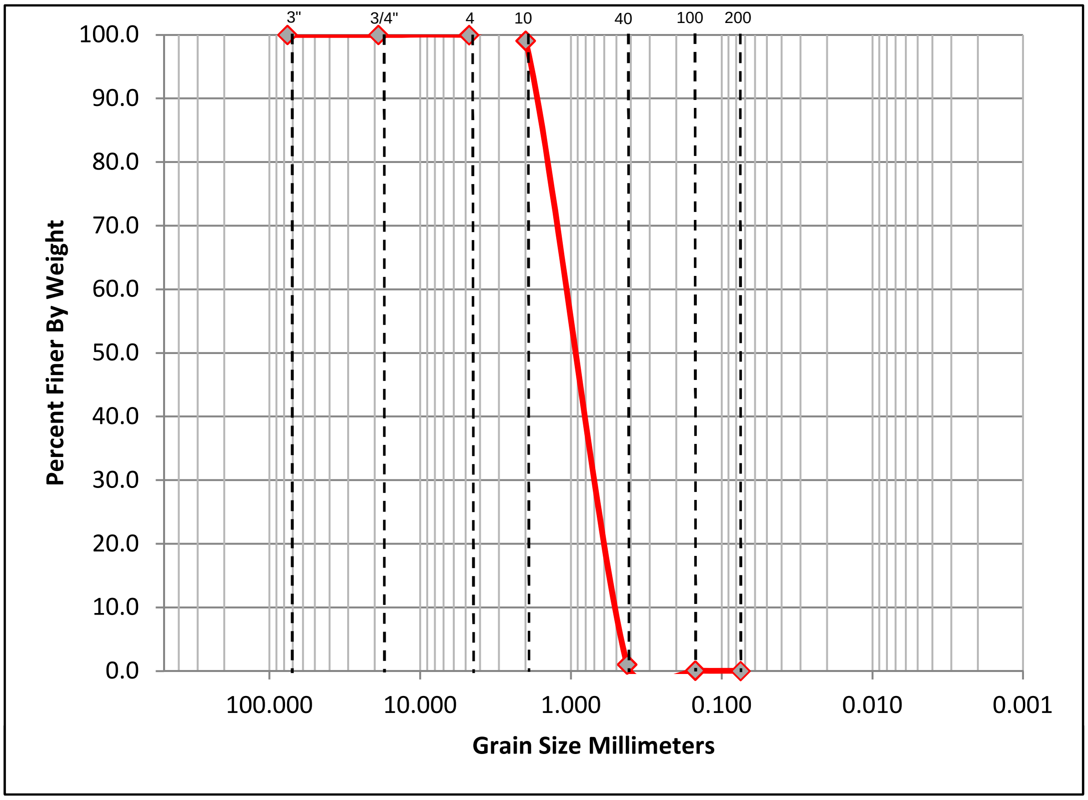
Sample Notes: SP- Coarse to medium, subangular, brown and tan sand with small pea-sized gravel.

US Army Corps of Engineers®
New England District

Project Name: Newburyport
Project Location: Newburyport, MA
Sample ID: Newb-B

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.9	98.1	1.0	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.5692	0.6495	0.8904	1.2117	1.3723	1.7739	2.28	2.41

Original Sample Weight (g)			595.4	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.4	489.6	0.2	0.0	0.0	100.0
#10	2.000	470.3	475.6	5.3	0.9	0.9	99.1
#40	0.425	352.9	936.7	583.8	98.1	99.0	1.0
#100	0.150	328.9	334.5	5.6	0.9	99.9	0.1
#200	0.075	316.6	317.1	0.5	0.1	100.0	0.0

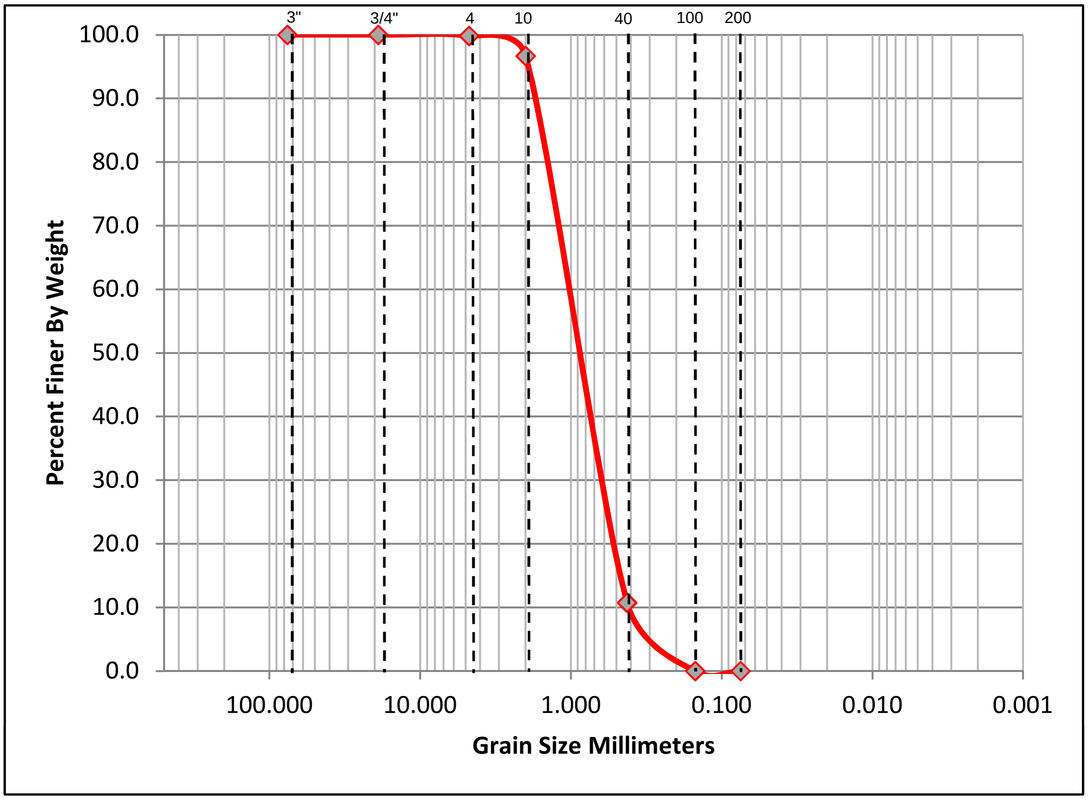
Sample Notes: SP- Coarse to medium, subangular, tan sand with small pea-sized gravel.

US Army Corps of Engineers®
New England District

Project Name: Newburyport
Project Location: Newburyport, MA
Sample ID: Newb-C

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	3.2	85.9	10.7	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.4059	0.5030	0.7779	1.1444	1.3277	1.7859	2.89	3.27

Original Sample Weight (g)			627.2	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.3	490.3	1.0	0.2	0.2	99.8
#10	2.000	463.5	483.3	19.8	3.2	3.3	96.7
#40	0.425	354.7	893.7	539.0	85.9	89.3	10.7
#100	0.150	325.6	393.0	67.4	10.7	100.0	0.0
#200	0.075	316.8	316.8	0.0	0.0	100.0	0.0

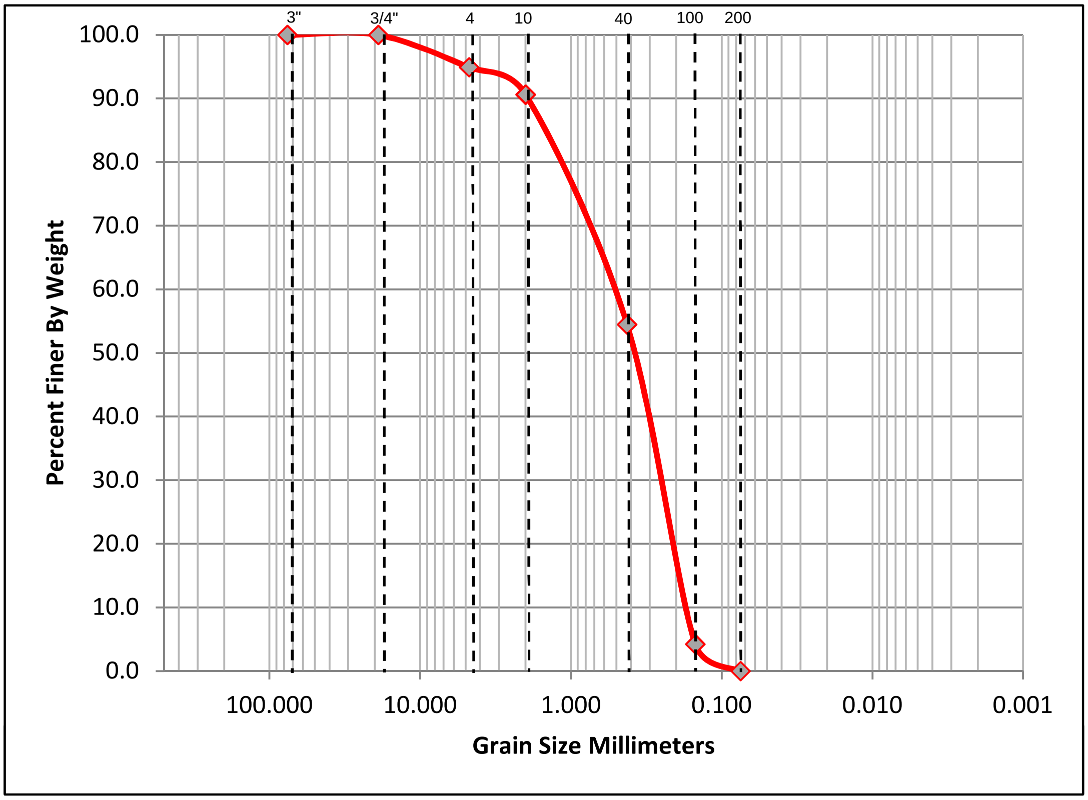
Sample Notes: SP- Very coarse to medium, subangular, tan and brown sand with multi-colored small pea-sized gravel.

US Army Corps
of Engineers®
New England District

Project Name: Newburyport
Project Location: Newburyport, MA
Sample ID: Newb-D

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.1	4.3	36.2	54.5	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1815	0.2089	0.2910	0.4005	0.6658	1.7549	4.82	3.67

Original Sample Weight (g)			603.8	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.2	519.9	30.7	5.1	5.1	94.9
#10	2.000	463.4	489.3	25.9	4.3	9.4	90.6
#40	0.425	354.6	572.9	218.3	36.2	45.5	54.5
#100	0.150	325.5	628.8	303.3	50.2	95.8	4.2
#200	0.075	316.6	342.2	25.6	4.2	100.0	0.0

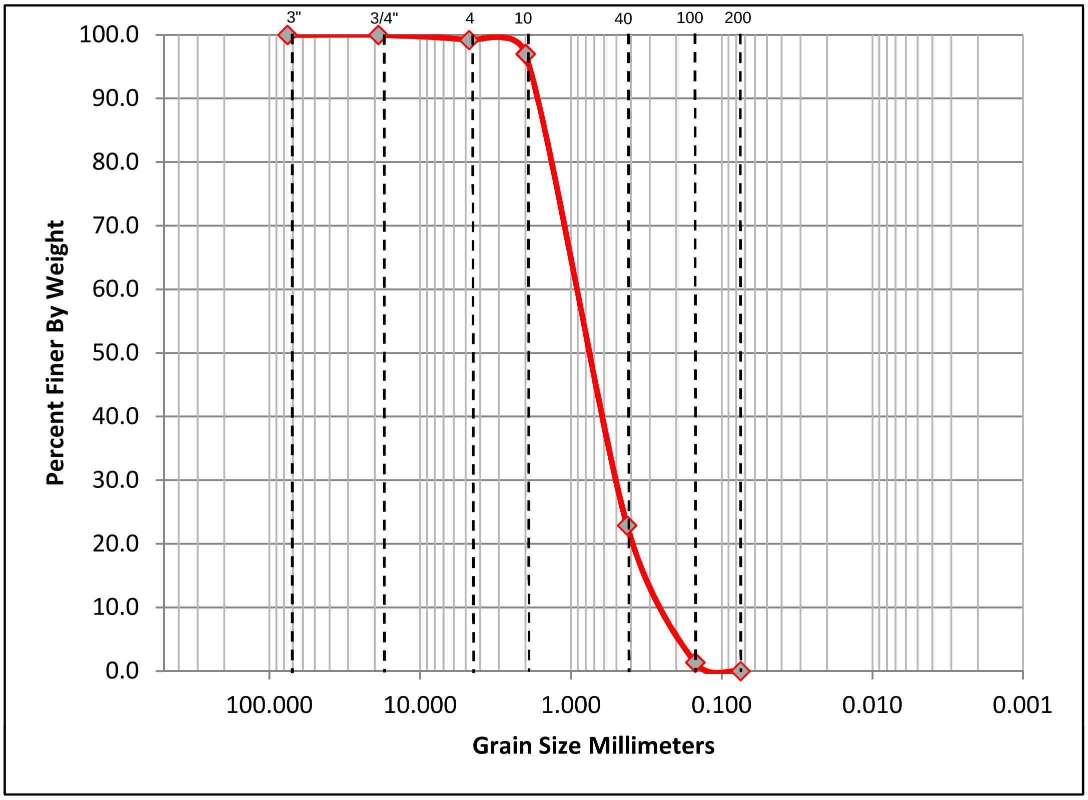
Sample Notes: SP- Very coarse to fine, subangular, multi-colored sand.

US Army Corps of Engineers®
New England District

Project Name: Newburyport
Project Location: Newburyport, MA
Sample ID: Newb-E

Date: 08/05/13

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.2	74.1	22.9	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2605	0.3243	0.5760	1.0011	1.2136	1.7449	3.64	4.66

Original Sample Weight (g)			617.2	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	494.0	499.0	5.0	0.8	0.8	99.2
#10	2.000	470.7	484.2	13.5	2.2	3.0	97.0
#40	0.425	353.0	810.4	457.4	74.1	77.1	22.9
#100	0.150	329.1	462.1	133.0	21.5	98.7	1.3
#200	0.075	313.7	322.0	8.3	1.3	100.0	0.0

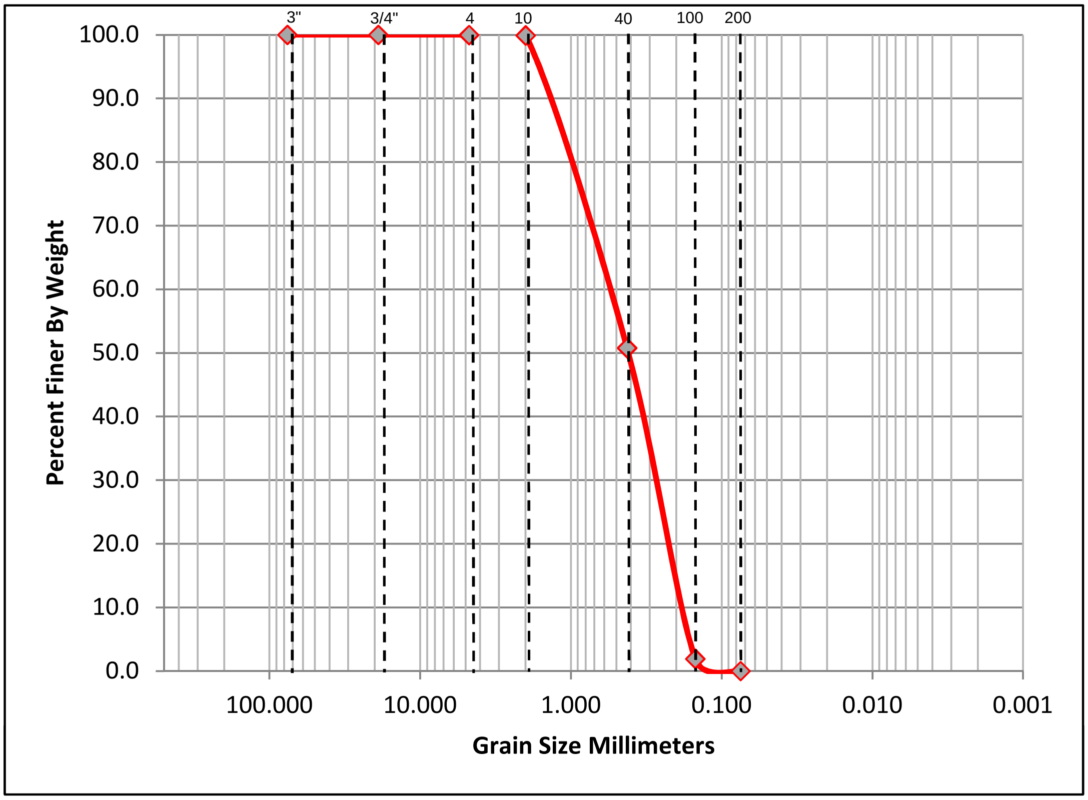
Sample Notes: SP- Very coarse to medium, subangular, orange, tan and brown sand with pea sized gravel.

US Army Corps of Engineers®
New England District

Project Name: Plum Island
Project Location: Plum Island, MA
Sample ID: PI-A

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	49.1	50.8	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1955	0.2236	0.3080	0.4206	0.7205	1.5220	4.37	3.69

Original Sample Weight (g)			561.2	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.3	489.4	0.1	0.0	0.0	100.0
#10	2.000	463.5	463.9	0.4	0.1	0.1	99.9
#40	0.425	354.8	630.5	275.7	49.1	49.2	50.8
#100	0.150	325.6	599.8	274.2	48.9	98.1	1.9
#200	0.075	316.7	327.5	10.8	1.9	100.0	0.0

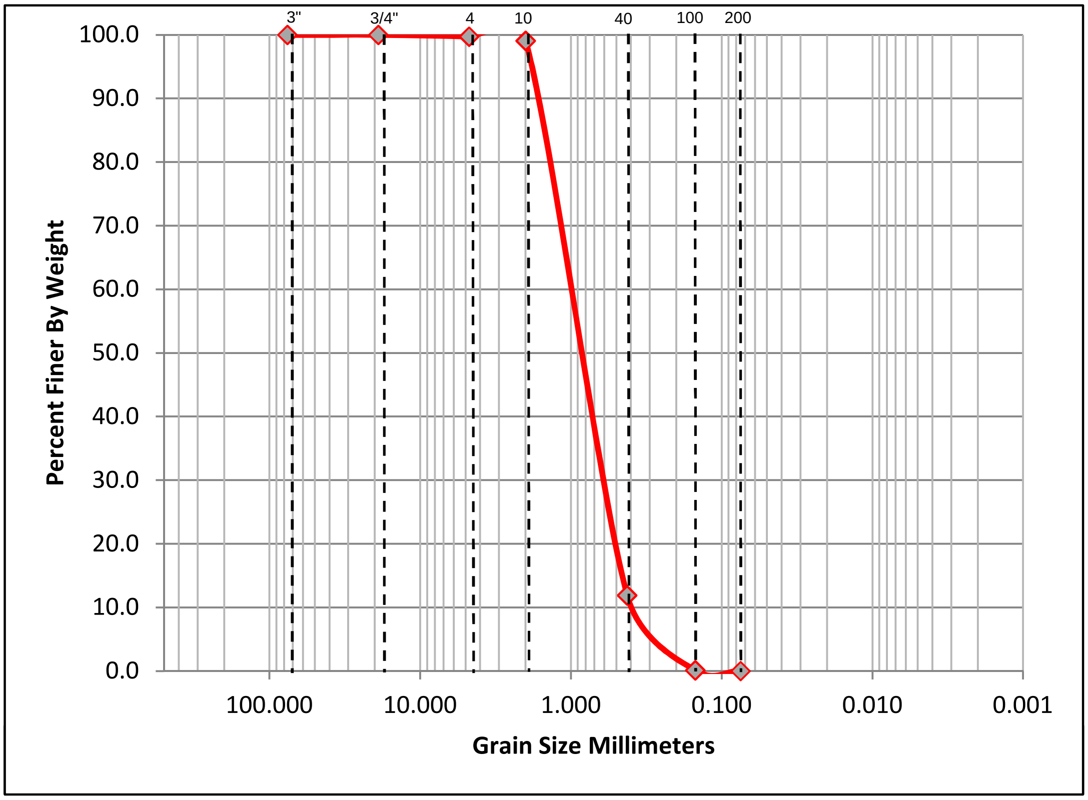
Sample Notes: SP- Medium to fine, tan and grey, subangular sand.

US Army Corps of Engineers®
New England District

Project Name: Plum Island
Project Location: Plum Island, MA
Sample ID: PI-B

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.7	87.2	11.9	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.3807	0.4811	0.7521	1.1134	1.2941	1.7458	3.05	3.40

Original Sample Weight (g)			484.2	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	493.8	495.1	1.3	0.3	0.3	99.7
#10	2.000	470.4	473.6	3.2	0.7	0.9	99.1
#40	0.425	352.9	775.0	422.1	87.2	88.1	11.9
#100	0.150	329.0	386.0	57.0	11.8	99.9	0.1
#200	0.075	313.6	314.2	0.6	0.1	100.0	0.0

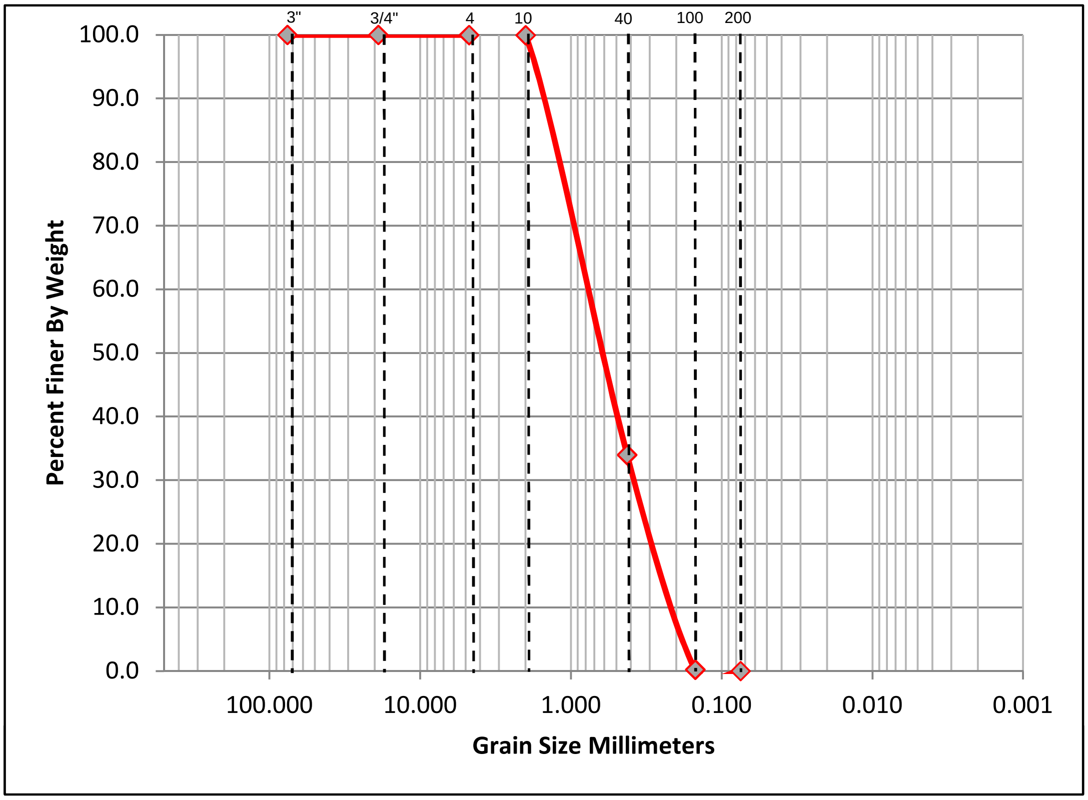
Sample Notes: SP- Medium to fine, orange and tan, subangular sand with a few small subrounded rocks.

US Army Corps of Engineers®
New England District

Project Name: Plum Island
Project Location: Plum Island, MA
Sample ID: PI-C

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	66.0	34.0	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2296	0.2703	0.3925	0.8074	1.0462	1.6431	3.27	4.56

Original Sample Weight (g)			568.8	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	493.9	494.0	0.1	0.0	0.0	100.0
#10	2.000	470.4	470.6	0.2	0.0	0.1	99.9
#40	0.425	353.0	728.2	375.2	66.0	66.0	34.0
#100	0.150	328.9	520.9	192.0	33.8	99.8	0.2
#200	0.075	313.6	314.9	1.3	0.2	100.0	0.0

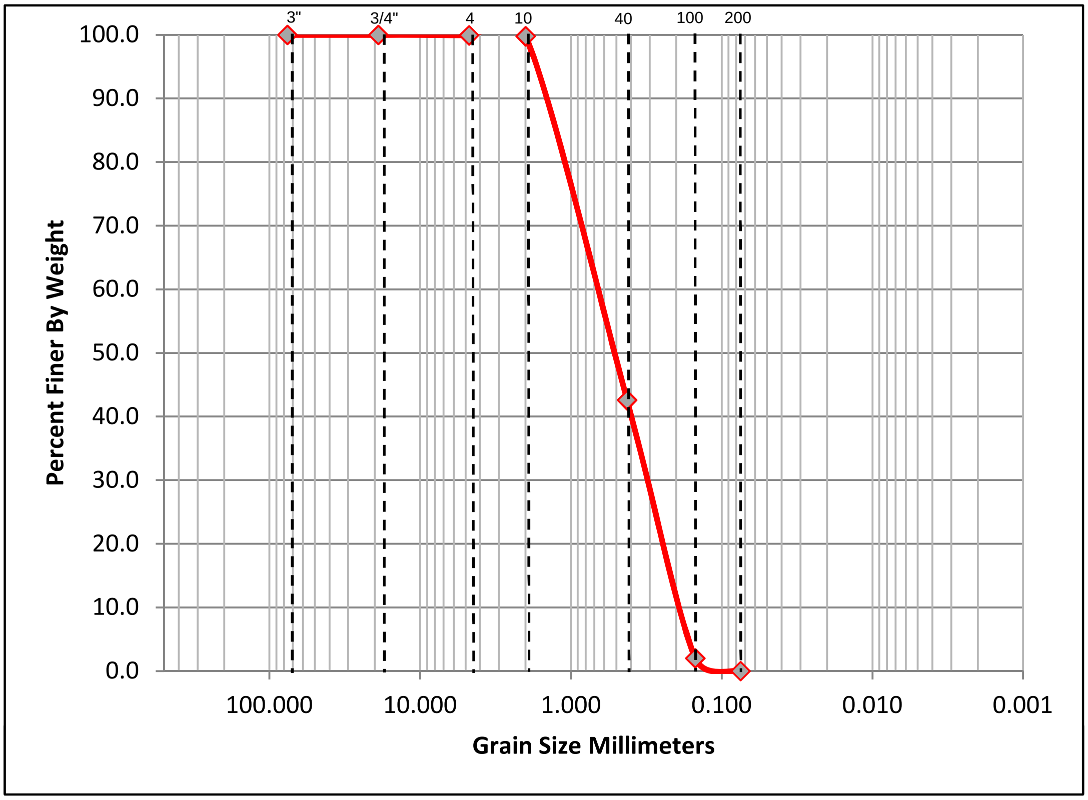
Sample Notes: SP- Tan and orange, medium to fine, subangular sand.

US Army Corps of Engineers
New England District

Project Name: Plum Island
Project Location: Plum Island, MA
Sample ID: PI-D

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	57.2	42.6	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.2041	0.2380	0.3397	0.6289	0.9043	1.5927	3.68	4.43

Original Sample Weight (g)		522.6	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.4	489.7	0.3	0.1	0.1	99.9
#10	2.000	463.6	464.4	0.8	0.2	0.2	99.8
#40	0.425	354.7	653.6	298.9	57.2	57.4	42.6
#100	0.150	325.7	537.8	212.1	40.6	98.0	2.0
#200	0.075	316.6	327.1	10.5	2.0	100.0	0.0

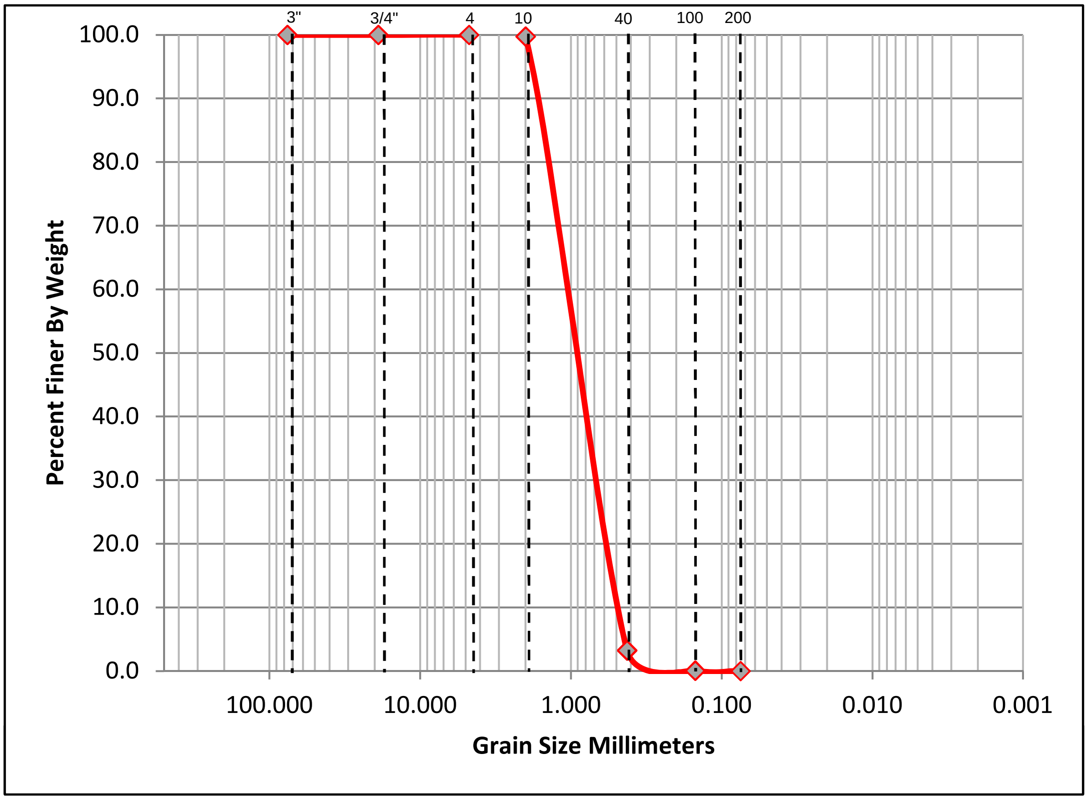
Sample Notes: SP- Tan and brown, medium to fine, subangular sand.

US Army Corps of Engineers®
New England District

Project Name: Plum Island
Project Location: Plum Island, MA
Sample ID: PI-E

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	96.5	3.2	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.5352	0.6168	0.8616	1.1880	1.3512	1.7592	2.38	2.52

Original Sample Weight (g)			612.4	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.3	489.3	0.0	0.0	0.0	100.0
#10	2.000	463.4	464.9	1.5	0.2	0.2	99.8
#40	0.425	354.7	945.7	591.0	96.5	96.8	3.2
#100	0.150	325.7	345.2	19.5	3.2	99.9	0.1
#200	0.075	316.6	317.0	0.4	0.1	100.0	0.0

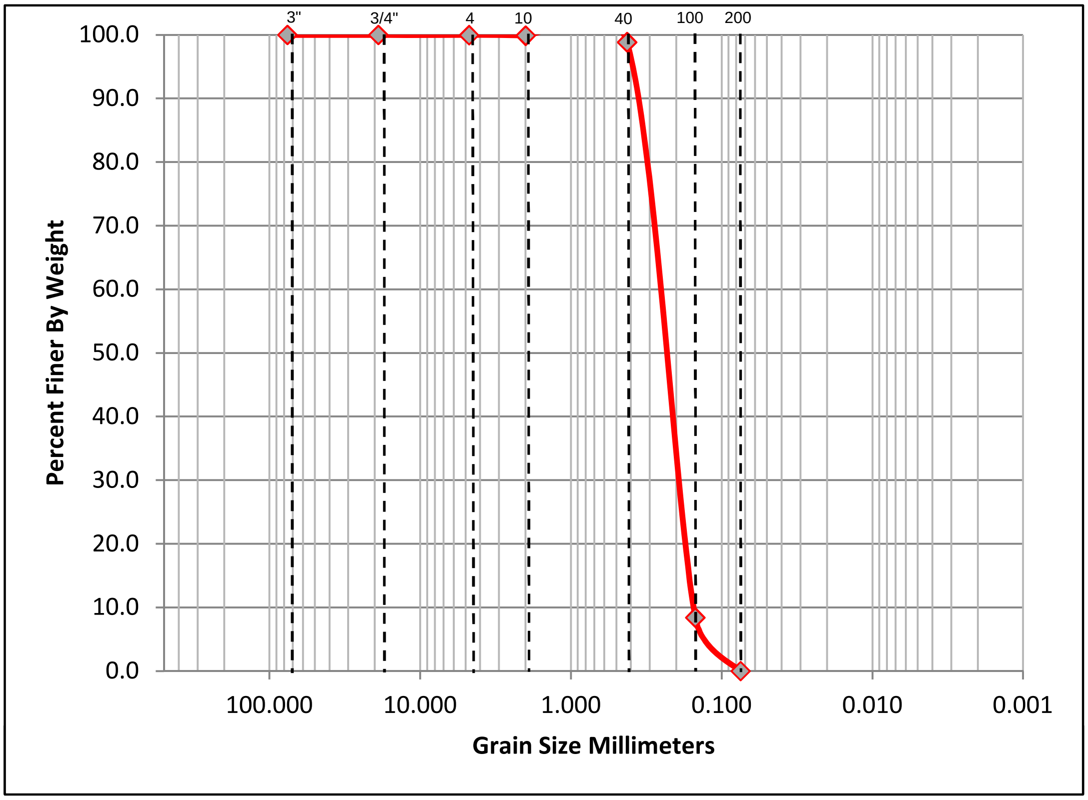
Sample Notes: SP- Tan and brown, coarse to medium, subangular sand.

US Army Corps of Engineers®
New England District

Project Name: Wells
Project Location: Wells, ME
Sample ID: Wells-A

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.0	98.9	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1548	0.1700	0.2156	0.2765	0.3069	0.3829	9.08	1.98

Original Sample Weight (g)			540.9	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	493.9	494.1	0.2	0.0	0.0	100.0
#10	2.000	470.4	470.8	0.4	0.1	0.1	99.9
#40	0.425	353.1	358.7	5.6	1.0	1.1	98.9
#100	0.150	328.9	818.1	489.2	90.4	91.6	8.4
#200	0.075	313.6	359.1	45.5	8.4	100.0	0.0

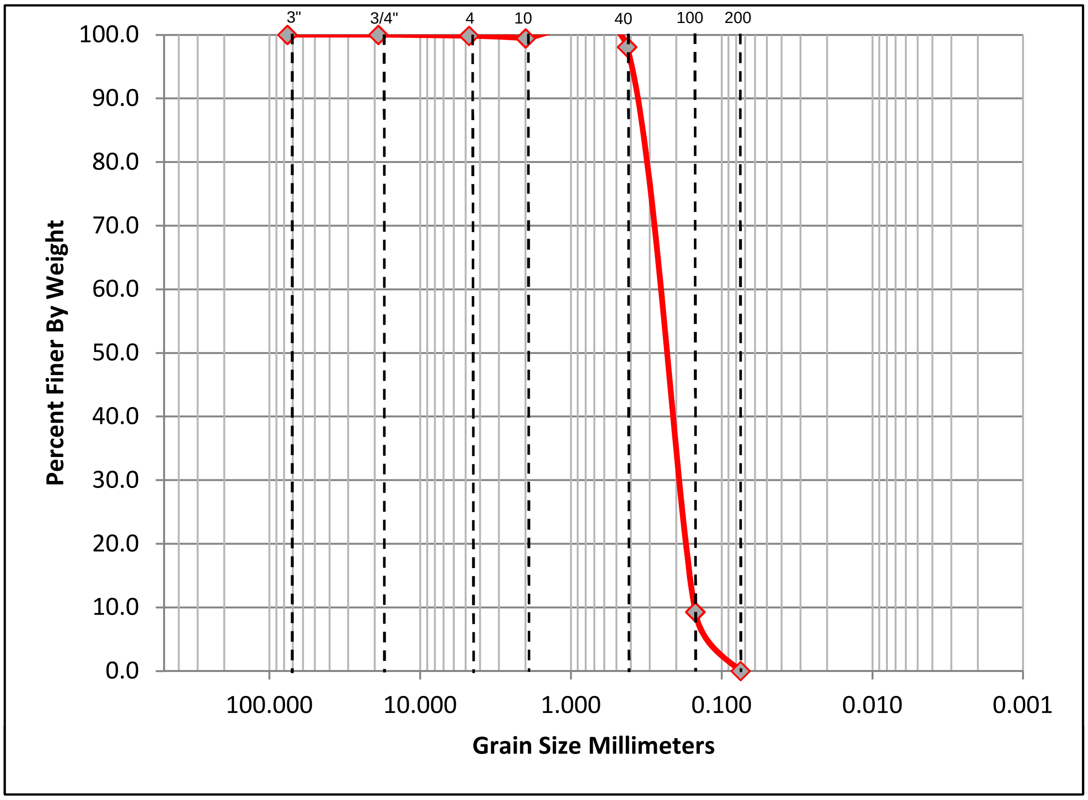
Sample Notes: SP- Tan and grey, subangular, fine sand.

US Army Corps of Engineers®
New England District

Project Name: Wells
Project Location: Wells, ME
Sample ID: Wells-B

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.4	1.4	98.1	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1522	0.1677	0.2141	0.2761	0.3071	0.3845	9.16	2.02

Original Sample Weight (g)			511.4	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	493.9	494.7	0.8	0.2	0.2	99.8
#10	2.000	470.4	472.4	2.0	0.4	0.5	99.5
#40	0.425	352.9	359.9	7.0	1.4	1.9	98.1
#100	0.150	328.9	783.0	454.1	88.8	90.7	9.3
#200	0.075	313.6	361.1	47.5	9.3	100.0	0.0

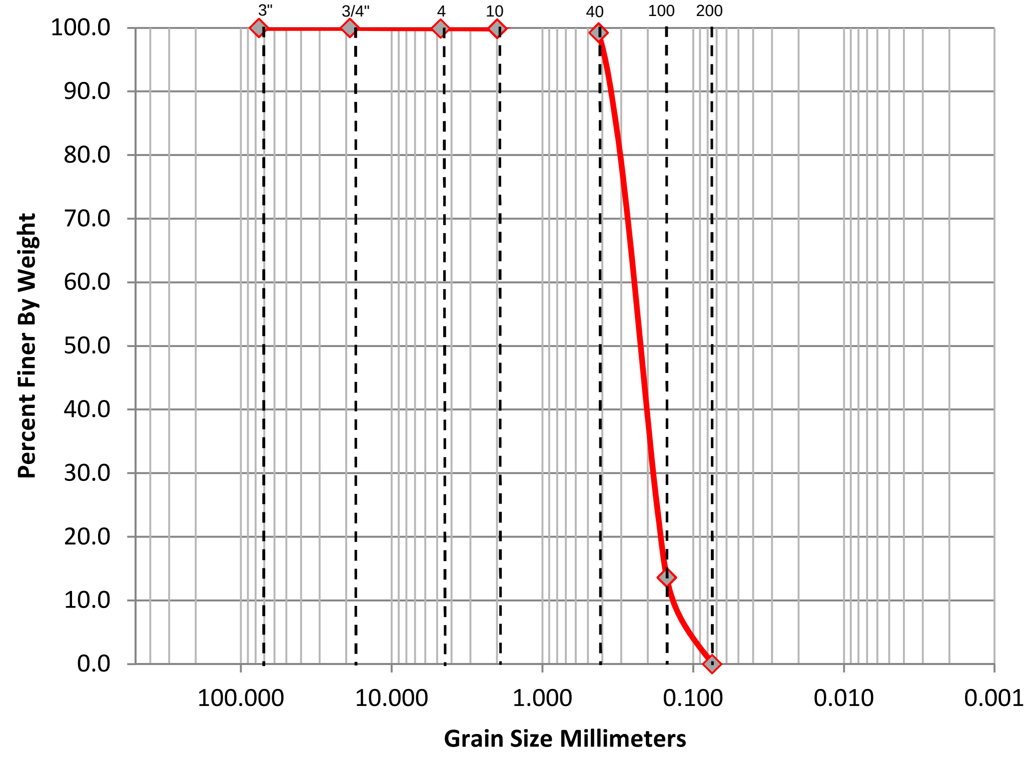
Sample Notes: SP- Tan, fine, subangular sand.

US Army Corps of Engineers®
New England District

Project Name: Wells
Project Location: Wells, ME
Sample ID: Wells-C

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	0.6	99.3	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1301	0.1544	0.2026	0.2668	0.2989	0.3792	10.42	2.30

Original Sample Weight (g)			523.6	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.4	489.9	0.5	0.1	0.1	99.9
#10	2.000	463.7	463.8	0.1	0.0	0.1	99.9
#40	0.425	354.7	358.0	3.3	0.6	0.7	99.3
#100	0.150	325.7	774.1	448.4	85.6	86.4	13.6
#200	0.075	316.7	388.0	71.3	13.6	100.0	0.0

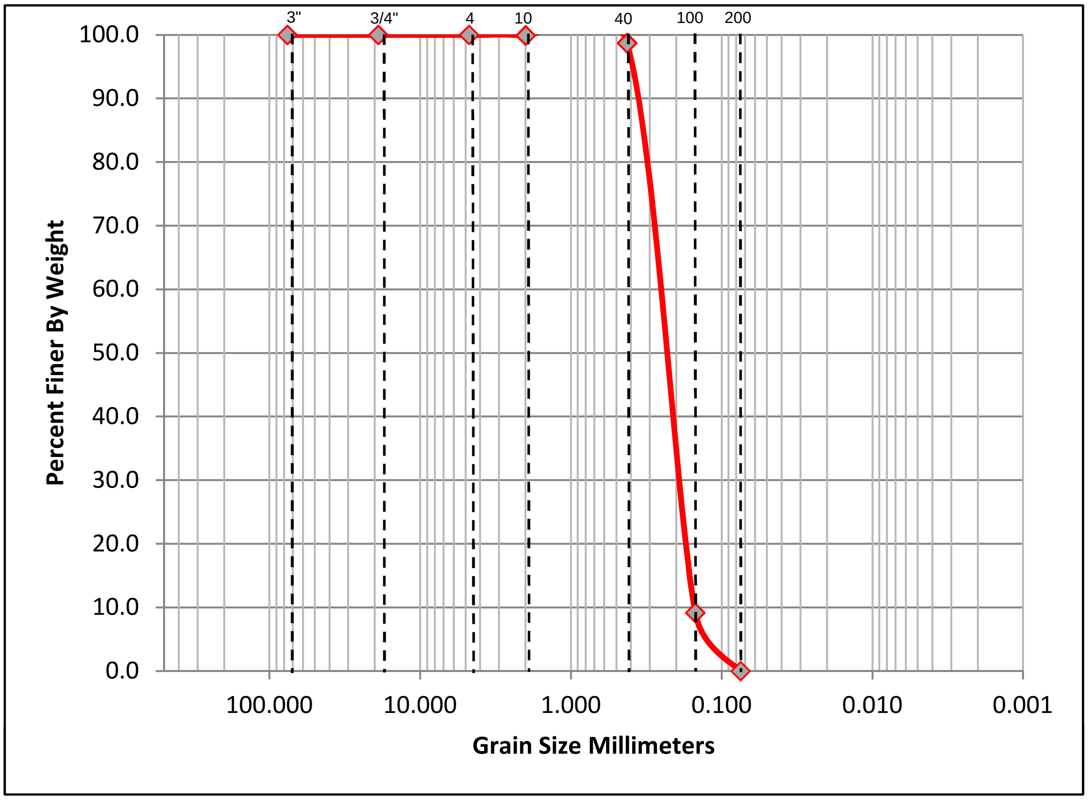
Sample Notes: SP- Grey and tan, fine, subangular sand.

US Army Corps of Engineers®
New England District

Project Name: Wells
Project Location: Wells, ME
Sample ID: Wells-D

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.2	98.7	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1526	0.1679	0.2140	0.2754	0.3061	0.3829	9.16	2.01

Original Sample Weight (g)			435.8	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	489.3	489.3	0.0	0.0	0.0	100.0
#10	2.000	463.5	463.9	0.4	0.1	0.1	99.9
#40	0.425	354.7	359.9	5.2	1.2	1.3	98.7
#100	0.150	325.7	716.0	390.3	89.6	90.8	9.2
#200	0.075	316.7	356.6	39.9	9.2	100.0	0.0

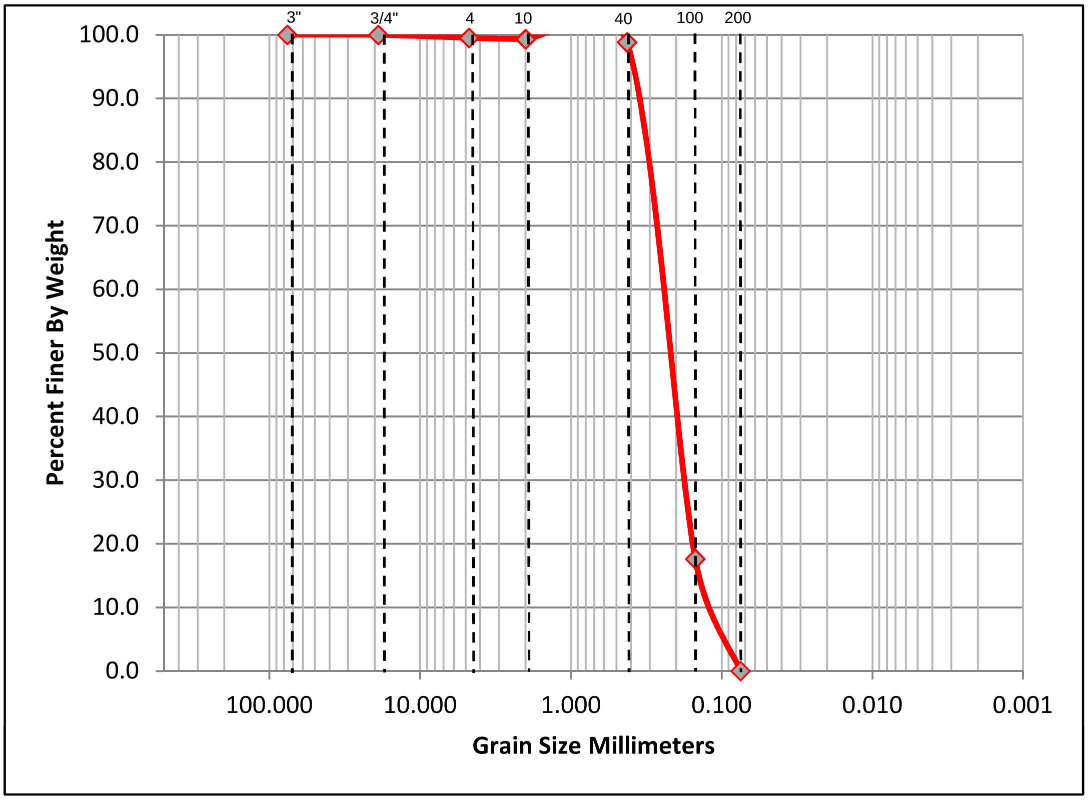
Sample Notes: SP- Tan, subangular, fine sand.

US Army Corps of Engineers®
New England District

Project Name: Wells
Project Location: Wells, ME
Sample ID: Wells-E

Date: 8/6/2013

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



%Cobble	%Gravel		%Sand			%Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.2	0.5	98.8	0.0	

D10	D15	D30	D50	D60	D85	Cc	Cu
0.1176	0.1389	0.1919	0.2597	0.2935	0.3782	11.12	2.50

Original Sample Weight (g)			394.0	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"	76.200	-	-	0.0	0.0	0.0	100.0
3/4"	19.000	-	-	0.0	0.0	0.0	100.0
#4	4.750	494.0	495.9	1.9	0.5	0.5	99.5
#10	2.000	470.5	471.3	0.8	0.2	0.7	99.3
#40	0.425	352.9	354.8	1.9	0.5	1.2	98.8
#100	0.150	329.0	649.0	320.0	81.2	82.4	17.6
#200	0.075	313.6	383.0	69.4	17.6	100.0	0.0

Sample Notes: SP- Tan and grey, subangular, fine sand with a few small pieces of gravel.

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX O

SEDIMENT SAMPLING & TESTING FOR THE LONG SANDS BEACH CONSIDERED NEARSHORE ALTERNATIVE PLACEMENT SITE

This appendix presents the results of two investigations of an alternative nearshore sand placement site offshore of Long Sands Beach in York, Maine. This site was identified by the Maine Geological Survey as a potential placement site for a feeder berm to address loss of sand from Long Beach. Samples taken by the Corps of Engineers from the proposed placement site were analyzed for bottom sediment grain size and benthic community analysis. The first part of this appendix presents the benthic community analysis. The second part presents the sampling trip report and grain size results.

IDENTIFICATION AND ENUMERATION OF BENTHIC MACROFAUNA FROM LONG SANDS, YORK BEACH, MAINE

Contract No. W912WJ-10-M-0029

SUBMITTED BY:

PETER FOSTER LARSEN

COASTAL SCIENCES
91 KNICKERBOCKER ROAD
BOOTHBAY, MAINE 04537

This report represents analytical results of benthic samples received by Coastal Sciences on November 10, 2009 from the US Army Corps of Engineers.

Peter F. Larsen, Ph.D.
Coastal Sciences

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CASE NARRATIVE

Five benthic samples from offshore of Long Sands Beach, York Beach, Maine were transferred in November 2009 to Coastal Sciences by representatives of the US Army Corps of Engineers (Fig. 1). The samples had been collected by Corps personnel just previously using a 0.04 m^2 modified Van Veen grab. The samples were then sieved on a 0.5 mm screen and fixed in formalin with the vital stain Rose Bengal.

In the laboratory, the formalin was removed from the samples by gentle washing on a 0.5 mm sieve and the samples were then preserved in 70% ethanol. The benthic macrofauna in each sample was separated from the limited inorganic debris and sorted to major taxonomic categories. This process was accomplished by trained personnel using binocular dissecting microscopes. A subsample of the residue of each sample was reexamined to insure complete removal of the fauna. No problems were detected. Each taxonomic group was examined by an experienced marine taxonomist who identified each individual to the lowest practical taxonomic level, usually the species level, and enumerated the number of individuals in each taxon. Individuals of two species, a cumacean and an amphipod, have been sent to a crustacean taxonomist for confirmation and identification. An update will follow. A common member of the community was a juvenile bivalve of the genus *Euspira*. This is most likely *Euspira heros*, but due to the absence of adults this could not be determined with certainty. The results were tabulated and are presented in the enclosed tables. The report will be submitted electronically.

The tabular results are presented as individuals per sample. A summary tabulation is presented on each station sheet indicating the number of species in the sample, density on a per square meter basis and species diversity on a natural log base.

A total of 38 putative species were identified (Table 1). This number of species is typical for a small benthic survey of a sandy nearshore environment on the Maine coast. The stations appeared to be rather homogeneous with the range of species varying only between 18 and 24. Density was rather high with a mean of 22,056 per meter square. Arthropods were the overwhelming numerical dominants lead by the burrowing amphipod *Acanthohaustorius millsi,* that is known to be locally abundant in fine sand habitats. The low informational diversity values encountered (1.34-2.22) are a reflection of the high dominance and relatively low species richness.

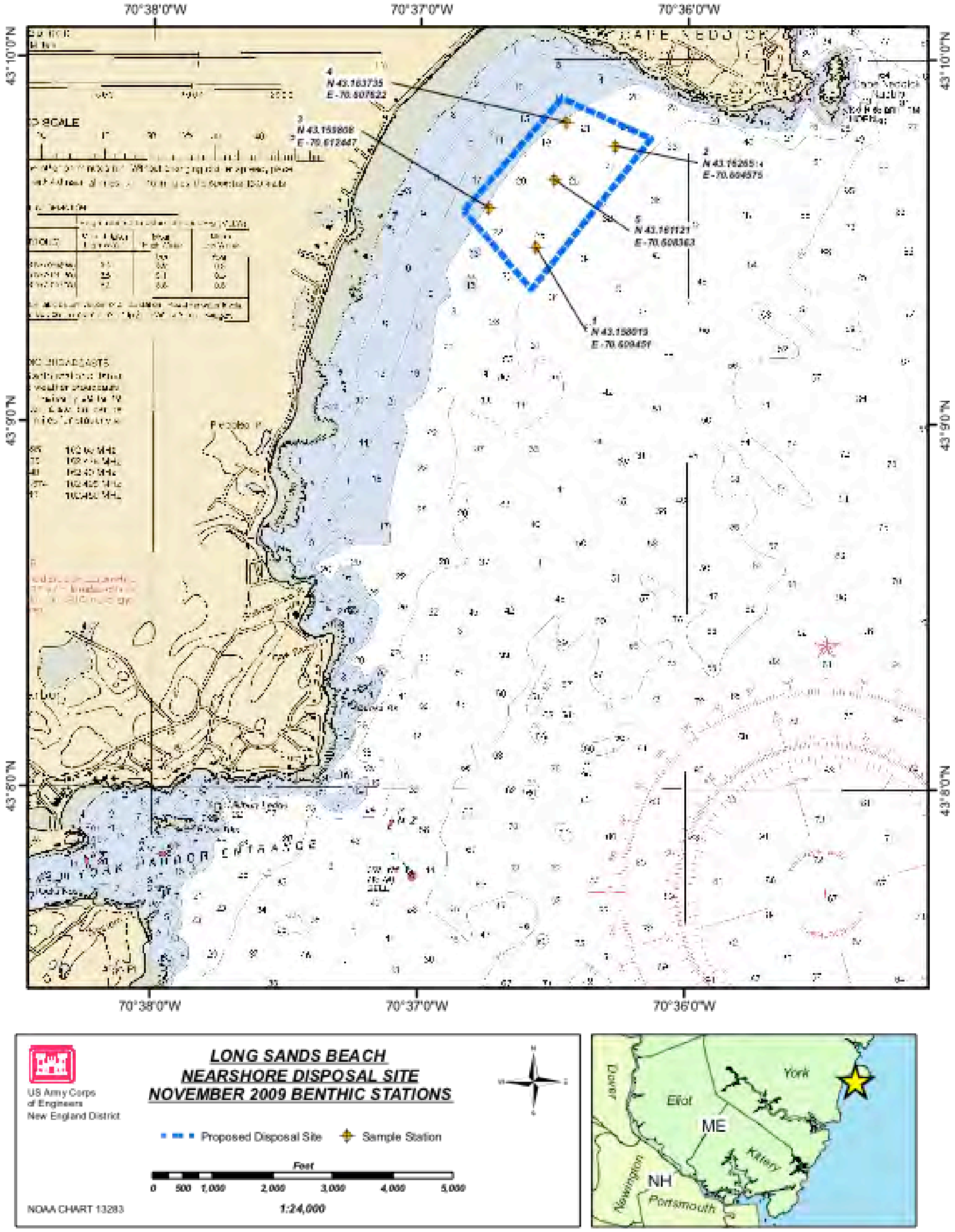


Figure 1. Long Sands station locations.

Table 1. List of species encountered during the Long Sands benthic survey.

PHYLUM CNIDARIA
- Hydroid

PHYLUM RHYNCHOCOELA
- *Oerstedia dorsalis*

PHYLUM MOLLUSCA
- *Ensis directus*
- *Euspira* juvenile
- *Modiolus modiolus*
- *Nassarius trivittatus*
- *Spisula solidissima*
- *Tellina agilis*
- Unknown bivalve

PHYLUM ANNELIDA
- *Aricidea suecica*
- *Eteone longa*
- *Hartmania moorei*
- *Nephtys longosetosa*
- *Paraonis fulgens*
- *Pholoe minuta*
- *Phyllodoce mucosa*
- *Phyllodoce* sp.
- *Owenia fusiformis*
- *Scoloplos armiger*
- *Scoloplos* sp.
- *Spio filicornis*
- *Spiophanes bombyx*
- *Tharyx acutus*

PHYLUM ARTHROPODA
- *Acanthohaustorius millsi*
- Amphipod A
- *Cancer irroratus*
- *Chiridotea tuftsii*
- *Crangon septemspinosa*
- *Diastylis polita*
- *Diastylis* sp.
- *Edotia triloba*
- *Gammarus lawrencianus*
- *Mancocuma stellifera*
- *Photis macrocoxa*
- *Salemia caeca*
- *Synchelidium americanum*

Unciola irrorata

PHYLUM ECHINODERMATA
Echinarachnius parma

Table 2. Summary of species numbers, densities (m^2) and diversity in the Long Sands samples.

	Long Sands Samples		
Sample #	# Species	Density	Diversity
1	24	15,280	2.22
2	18	27,680	1.67
3	22	22,800	1.49
4	18	31,960	1.39
5	20	12,560	1.34
Mean	20	22,056	1.62
Min	18	12,560	1.34
Max	24	31,960	2.22

Long Sands 1

Number of Species: 24
Density (m^{-2}): 15280
Diversity (H'): 2.2240

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Acanthohaustorius millsi	145	145	38.0	38.0	Arthropoda
Tellina agilis	53	198	13.9	51.8	Mollusca
Unciola irrorata	31	229	8.1	59.9	Arthropoda
Nassarius trivittatus	25	254	6.5	66.5	Mollusca
Paraonis fulgens	25	279	6.5	73.0	Annelida
Synchelidium americanum	19	298	5.0	78.0	Arthropoda
Euspira juvenile	15	313	3.9	81.9	Mollusca
Amphipod A	13	326	3.4	85.3	Arthropoda
Mancocuma stellifera	12	338	3.1	88.5	Arthropoda
Photis macrocoxa	9	347	2.4	90.8	Arthropoda
Echinarachnius parma	7	354	1.8	92.7	Echinodermata
Nephtys longosetosa	6	360	1.6	94.2	Annelida
Aricidea suecica	5	365	1.3	95.5	Annelida
Owenia fusiformis	4	369	1.0	96.6	Annelida
Modiolus modiolus	3	372	0.8	97.4	Mollusca
Tharyx acutus	2	374	0.5	97.9	Annelida
Spisula solidissima	1	375	0.3	98.2	Mollusca
Pholoe minuta	1	376	0.3	98.4	Annelida
Phyllodoce sp.	1	377	0.3	98.7	Annelida
Hartmania moorei	1	378	0.3	99.0	Annelida
Cancer irroratus	1	379	0.3	99.2	Arthropoda
Edotia triloba	1	380	0.3	99.5	Arthropoda
Chiridotea tuftsii	1	381	0.3	99.7	Arthropoda
Gammarus lawrencianus	1	382	0.3	100.0	Arthropoda

Long Sands 2

Number of Species: 18

Density (m^{-2}): 27680

Diversity (H'): 1.6739

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Acanthohaustorius millsi	388	388	56.1	56.1	Arthropoda
Tellina agilis	67	455	9.7	65.8	Mollusca
Mancocuma stellifera	56	511	8.1	73.8	Arthropoda
Edotia triloba	45	556	6.5	80.3	Arthropoda
Synchelidium americanum	34	590	4.9	85.3	Arthropoda
Nassarius trivittatus	27	617	3.9	89.2	Mollusca
Unciola irrorata	19	636	2.7	91.9	Arthropoda
Chiridotea tuftsii	13	649	1.9	93.8	Arthropoda
Spiophanes bombyx	10	659	1.4	95.2	Annelida
Photis macrocoxa	10	669	1.4	96.7	Arthropoda
Euspira juvenile	8	677	1.2	97.8	Mollusca
Echinarachnius parma	4	681	0.6	98.4	Echinodermata
Spisula solidissima	3	684	0.4	98.8	Mollusca
Nephtys longosetosa	3	687	0.4	99.3	Annelida
Paraonis fulgens	2	689	0.3	99.6	Annelida
Scoloplos armiger	2	691	0.3	99.9	Annelida
Aricidea suecica	1	692	0.1	100.0	Annelida
Hydroid	+				Cnidaria

Long Sands 3

Number of Species: 22
Density (m^{-2}): 22800
Diversity (H'): 1.4897

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Acanthohaustorius millsi	349	349	61.2	61.2	Arthropoda
Tellina agilis	72	421	12.6	73.9	Mollusca
Synchelidium americanum	46	467	8.1	81.9	Arthropoda
Mancocuma stellifera	30	497	5.3	87.2	Arthropoda
Paraonis fulgens	16	513	2.8	90.0	Annelida
Spiophanes bombyx	14	527	2.5	92.5	Annelida
Spio filicornis	7	534	1.2	93.7	Annelida
Photis macrocoxa	7	541	1.2	94.9	Arthropoda
Nassarius trivittatus	6	547	1.1	96.0	Mollusca
Edotia triloba	6	553	1.1	97.0	Arthropoda
Unciola irrorata	4	557	0.7	97.7	Arthropoda
Phyllodoce mucosa	2	559	0.4	98.1	Annelida
Chiridotea tuftsii	2	561	0.4	98.4	Arthropoda
Modiolus modiolus	1	562	0.2	98.6	Mollusca
Aricidea suecica	1	563	0.2	98.8	Annelida
Scoloplos armiger	1	564	0.2	98.9	Annelida
Eteone longa	1	565	0.2	99.1	Annelida
Amphipod A	1	566	0.2	99.3	Arthropoda
Diastylis polita	1	567	0.2	99.5	Arthropoda
Oerstedia dorsalis	1	568	0.2	99.6	Rhynchocoela
Crangon septemspinosa	1	569	0.2	99.8	Arthropoda
Salemia caeca	1	570	0.2	100.0	Arthropoda

Long Sands 4

Number of Species: 18

Density (m^{-2}): 31960

Diversity (H'): 1.3905

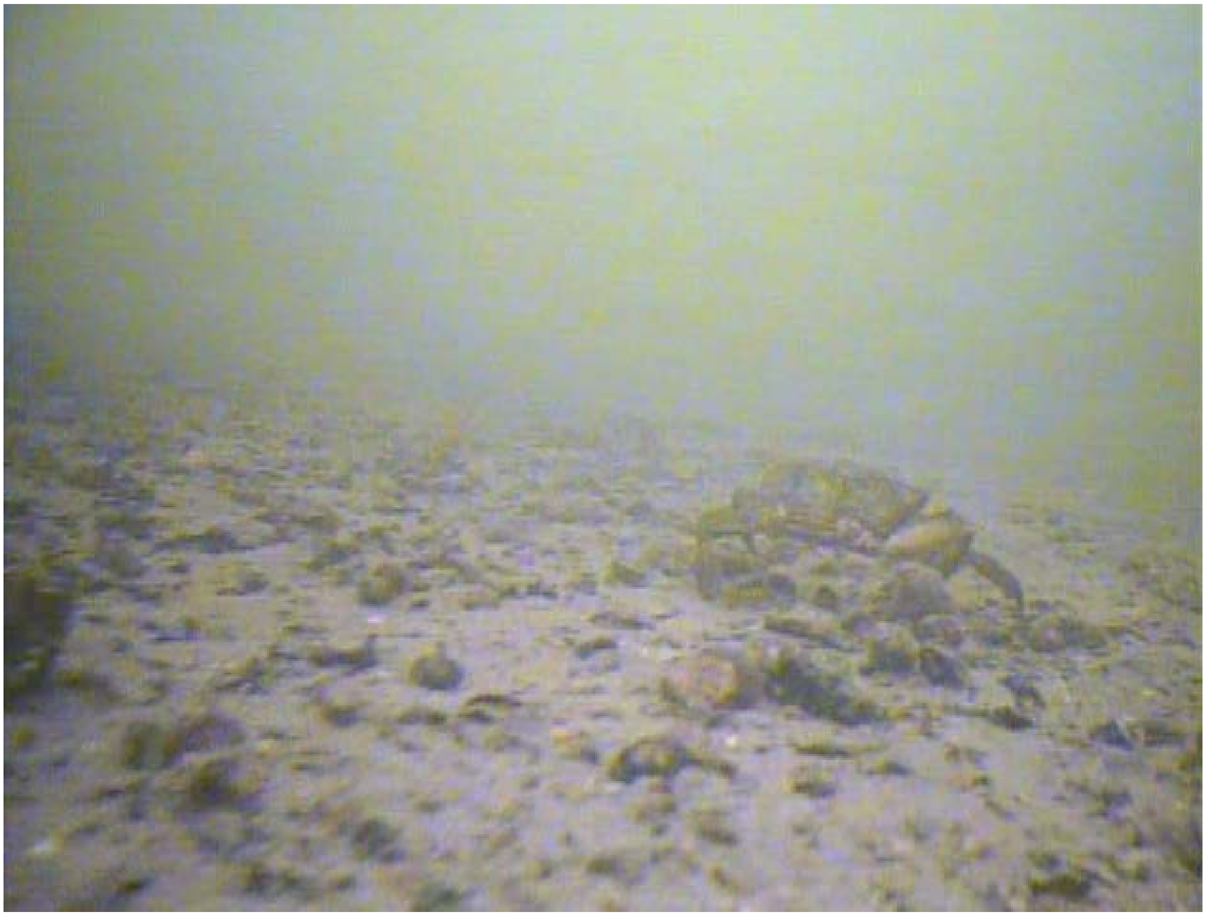
Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Acanthohaustorius millsi	474	474	59.3	59.3	Arthropoda
Mancocuma stellifera	156	630	19.5	19.5	Arthropoda
Synchelidium americanum	41	671	5.1	5.1	Arthropoda
Tellina agilis	39	710	4.9	4.9	Mollusca
Edotia triloba	37	747	4.6	4.6	Arthropoda
Nassarius trivittatus	12	759	1.5	1.5	Mollusca
Paraonis fulgens	9	768	1.1	1.1	Annelida
Diastylis polita	8	776	1.0	1.0	Arthropoda
Euspira juvenile	7	783	0.9	0.9	Mollusca
Spiophanes bombyx	5	788	0.6	0.6	Annelida
Aricidea suecica	2	790	0.3	0.3	Annelida
Chiridotea tuftsii	2	792	0.3	0.3	Arthropoda
Amphipod A	2	794	0.3	0.3	Arthropoda
Spisula solidissima	1	795	0.1	0.1	Mollusca
Nephtys longosetosa	1	796	0.1	0.1	Annelida
Cancer irroratus	1	797	0.1	0.1	Arthropoda
Photis macrocoxa	1	798	0.1	0.1	Arthropoda
Bivalve A	1	799	0.1	0.1	Mollusca

Long Sands 5

Number of Species: 20
Density (m^{-2}): 12560
Diversity (H'): 1.3417

Species	Total	Cum. Tot.	%	Cum. %	Higher Taxon
Acanthohaustorius millsi	217	217	69.1	69.1	Arthropoda
Tellina agilis	27	244	8.6	77.7	Mollusca
Synchelidium americanum	16	260	5.1	82.8	Arthropoda
Mancocuma stellifera	11	271	3.5	86.3	Arthropoda
Euspira juvenile	7	278	2.2	88.5	Mollusca
Spiophanes bombyx	7	285	2.2	90.8	Annelida
Paraonis fulgens	6	291	1.9	92.7	Annelida
Nassarius trivittatus	5	296	1.6	94.3	Mollusca
Unciola irrorata	5	301	1.6	95.9	Arthropoda
Spio filicornis	2	303	0.6	96.5	Annelida
Chiridotea tuftsii	2	305	0.6	97.1	Arthropoda
Echinarachnius parma	1	306	0.3	97.5	Echinodermata
Ensis directus	1	307	0.3	97.8	Mollusca
Spisula solidissima	1	308	0.3	98.1	Mollusca
Nephtys longosetosa	1	309	0.3	98.4	Annelida
Tharyx acutus	1	310	0.3	98.7	Annelida
Scoloplos sp.	1	311	0.3	99.0	Annelida
Edotia triloba	1	312	0.3	99.4	Arthropoda
Gammarus lawrencianus	1	313	0.3	99.7	Arthropoda
Photis macrocoxa	1	314	0.3	100.0	Arthropoda

TRIP REPORT
Piscataqua River Turning Basin Underwater Video Survey and Sediment Sampling Long Sands Beach Nearshore Placement Site Maine and New Hampshire



US ARMY CORPS
OF ENGINEERS
New England District

November 2009

1.0 INTRODUCTION

The objective of this trip was to perform a video survey to confirm the presence or absence of eelgrass in the vicinity of the proposed project area in the Piscataqua River and to collect sediment grabs from the proposed nearshore disposal site at Long Sands Beach in York, ME. The sediment grab samples were collected to evaluate site suitability and potential impacts to the benthic community.

2.0 MATERIALS AND METHODS

The video survey and sediment sampling efforts were conducted on November 5, 2009. Work was carried out on board the 24 foot Corps of Engineers Environmental Survey Launch (CEESL). In attendance were U.S. Army Corps of Engineers (USACE) marine ecologists, Todd Randall, and Ben Loyd, and Department of the Army intern Jesse Morrill-Winter. Positioning was achieved using a Garmin GPSMAP 492 WAAS enabled chart plotter and Garmin external antenna.

General areas for the video survey (i.e., proposed dredging areas and historic eelgrass areas) were plotted on the Garmin chart plotter prior to the start of field activities. Individual points for the video survey were chosen in the field (Figure 1) based on comments from Dr. Fred Short of the University of New Hampshire indicating that historic eelgrass beds had been reestablished in the area to the north of the proposed project area. Each point was recorded on the Garmin chart plotter along with the vessel track for the duration of the video feed at each station. Video footage was collected using a Sea Viewer Sea-Drop 950 Underwater Video Camera and recorded to an onboard DVR system outfitted with an LCD monitor for real time viewing. The camera was deployed off the bow of the vessel. Depth and directional adjustments were made manually by USACE personnel positioned on the bow.

Sediment grab locations at the proposed Long Sands Nearshore Disposal Site (see Figure 2) were selected by USACE team members prior to sampling activities with the intent to represent surficial sediments adequately throughout the disposal site. These locations were stored on the Garmin chart plotter which was used for navigation in the field. Sediment samples were collected by USACE personnel using a 0.04m^2 Van Veen grab which was retrieved with a commercial grade pot hauler mounted on the CEESL.

The first grab from each station was transferred to a sample container and set aside for grain size analysis. The contents of the second grab were washed through a # 35 (0.5 mm) sieve, and the material retained was transferred to a sample container where it was treated with the biological stain rose bengal and preserved in a 10% formalin solution for benthic community analysis.

3.0 RESULTS

A video survey was successfully carried out by the above USACE personnel in the vicinity of the proposed project area in the Piscataqua River which were reported to have eelgrass beds. Depths in the area surveyed ranged from 5 to 24 feet at the time of survey (intertidal to 19 feet adjusted to MLLW). No eelgrass was observed in the survey area. Bottom type consisted of sand with cobble gravel and shell, and several areas with dense kelp beds. A record of the video survey log is presented in Table 1. Screen captures from each of the video survey stations can be found in Appendix A.

Sediment grabs were collected by USACE personnel at each of the 5 sample locations at the Long Sands Beach Nearshore Disposal Site. Sediments in the sample area uniformly consisted of well graded, medium to fine grained brownish-gray sand (see Table 1). Samples from stations LS1, LS2, LS4, and LS5 all contained polychaete worm tubes. The sample from station LS1 also included a green crab (*Carcinus maenas*) and a sand dollar (*Echinarachnius parma*). Two attempts were required to retrieve sufficient sample volume at each of the five locations. Grain size samples were transported to Geotesting Express in Boxborough, MA. Samples for benthic community analysis were sent to the Bigelow Lab for Ocean Sciences in West Boothbay Harbor, ME.

TABLE 1. Video Survey Log

Station	Easting NAD 83	Northing NAD83	Depth (ft)	Water Temp (°F)	Comments
A	-70.8094	43.12047	9.5	53.6	Sandy bottom with some gravel and shell. Hermit crabs noted.
B	-70.8099	43.12103	5.1	52.3	Sandy bottom with some gravel and shell.
C	-70.8108	43.12087	11.2	51.6	Sandy bottom with gravel cobble and shell. Patches of green algae.
D	-70.8098	43.12016	6.2	52.2	Sand, gravel, and some shell. Kelp bed with red algae.
E	-70.8093	43.11955	17.9	52.2	Sandy bottom with cobble, gravel, and some shell. Several small boulders. Patches of green algae.
F	-70.8087	43.11978	7.9	52.3	Sandy bottom with cobble, gravel, and some shell. Green crab noted.
G	-70.8079	43.11994	8.2	52.2	Sand bottom with scattered gravel and shell. Hermit crabs noted.
H	-70.8088	43.12057	7.6	52.1	Sandy bottom with gravel and shell.
I	-70.8067	43.11928	6.9	52.3	Sandy bottom. Dropped to 19 feet at end and still all sand.
J	-70.8076	43.1188	18.3	52.4	Sand and shell with gravel.
K	-70.8075	43.12038	6.0	52.7	Sand with scattered gravel and shell. Spider crab noted.
L	-70.8073	43.11781	13.5	52.4	Thick kelp bed on edge of channel.
M	-70.8065	43.11749	10.4	52.0	Gravel and shell bottom adjacent to kelp bed.
N	-70.8061	43.11825	24.4	52.5	Sandy bottom with cobble, gravel, and some shell.

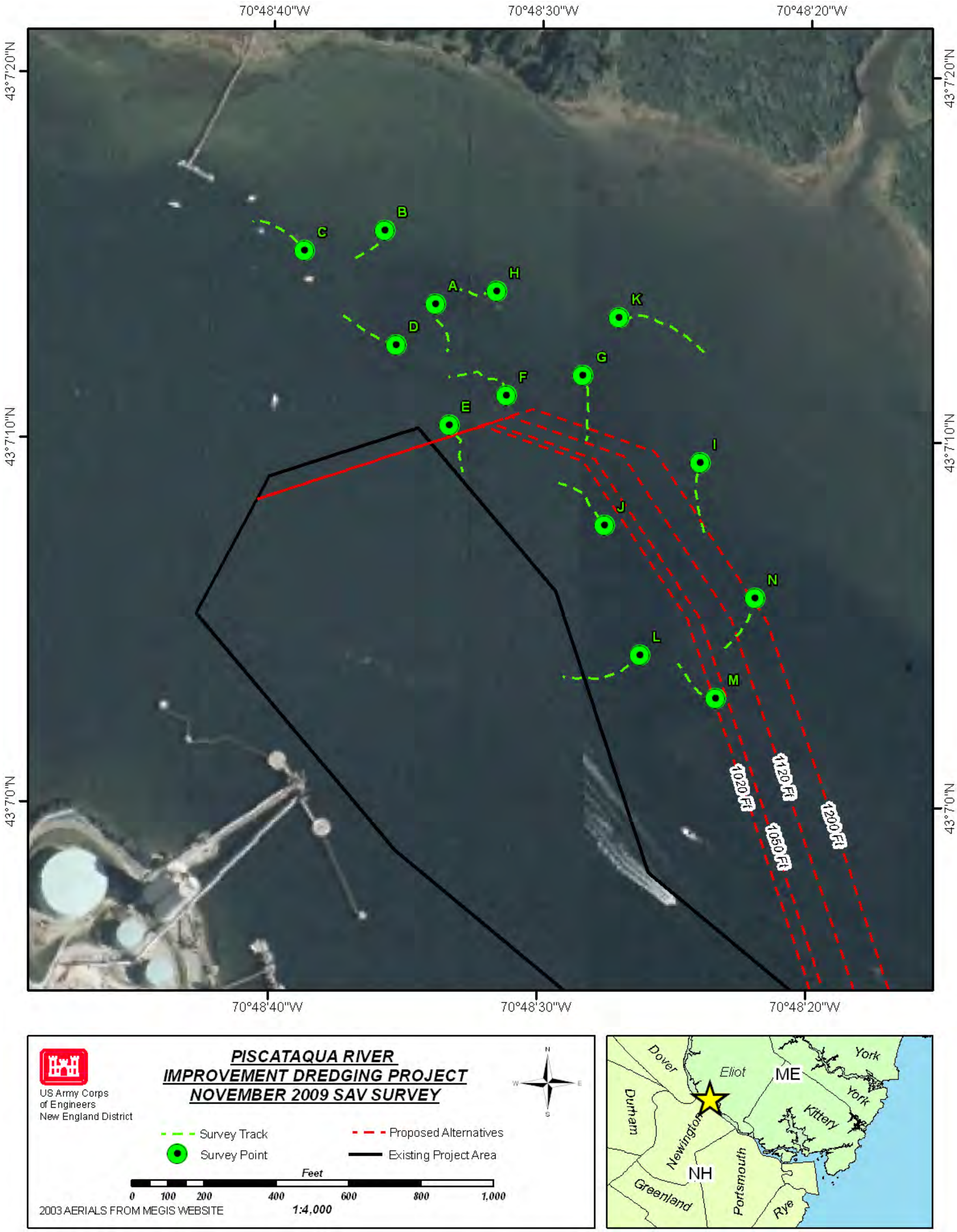
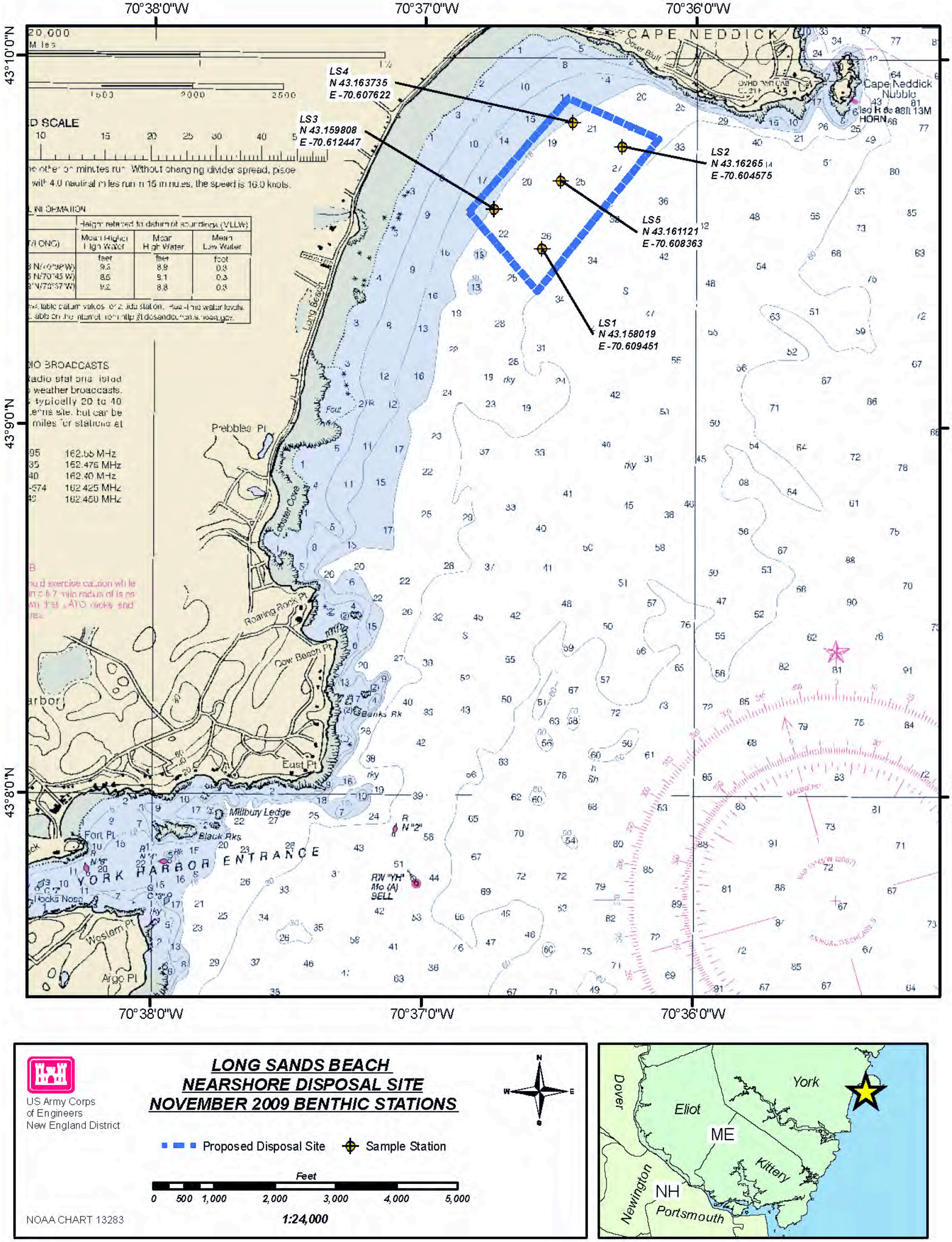

PISCATAQUA RIVER
IMPROVEMENT DREDGING PROJECT
NOVEMBER 2009 SAV SURVEY

Figure 1



LONG SANDS BEACH
NEARSHORE DISPOSAL SITE
NOVEMBER 2009 BENTHIC STATIONS

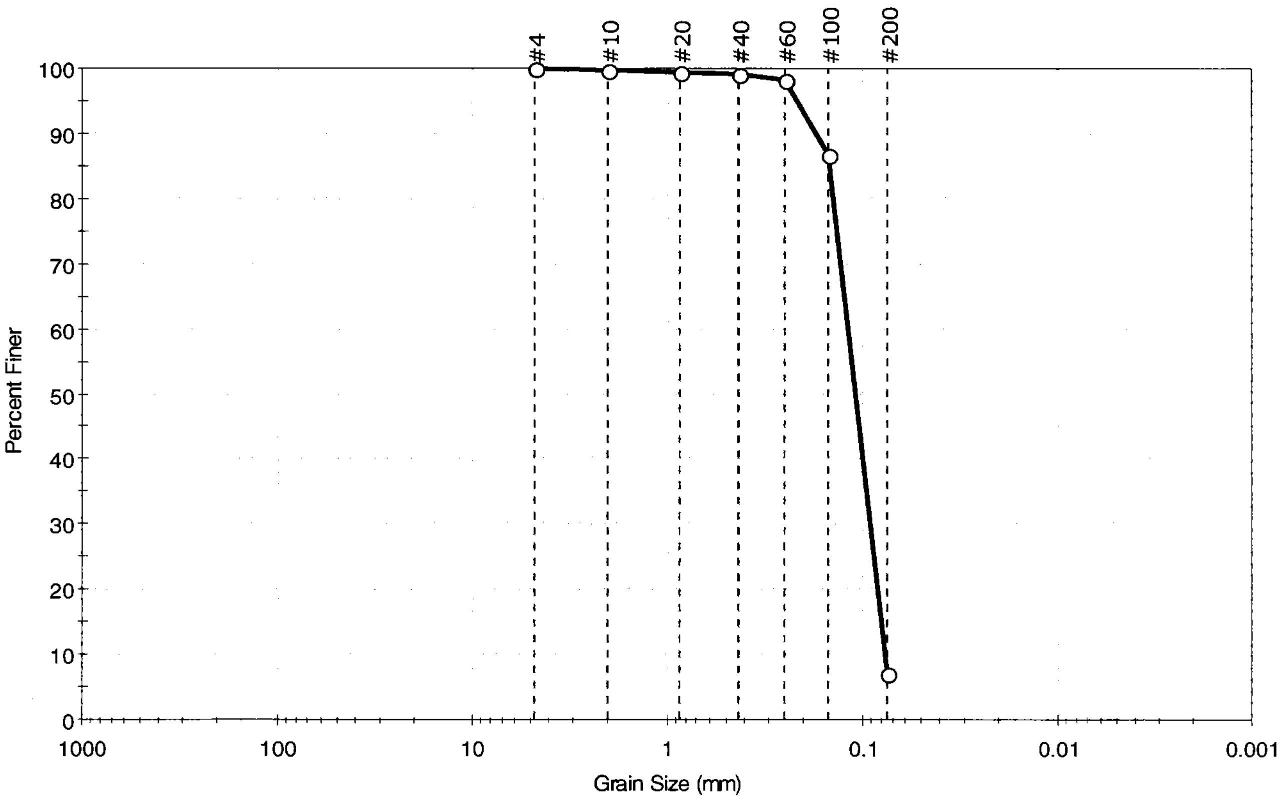
Figure 2

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers		
Project:	Portsmouth Harbor/Piscataqua River-Nov 09		
Location:	ME/NH	Project No:	GTX-9499
Boring ID: LS-1	Sample Type: bag	Tested By:	jbr
Sample ID:Long Sands Beach	Test Date: 12/03/09	Checked By:	jdt
Depth : ---	Test Id: 169489		

Test Comment: ---
Sample Description: Moist, olive brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	93.1	6.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	98		
#100	0.15	87		
#200	0.075	7		

Coefficients

D_{85} =0.1476 mm D_{30} =0.0916 mm
D_{60} =0.1189 mm D_{15} =0.0804 mm
D_{50} =0.1090 mm D_{10} =0.0770 mm
C_u =1.544 C_c =0.916

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

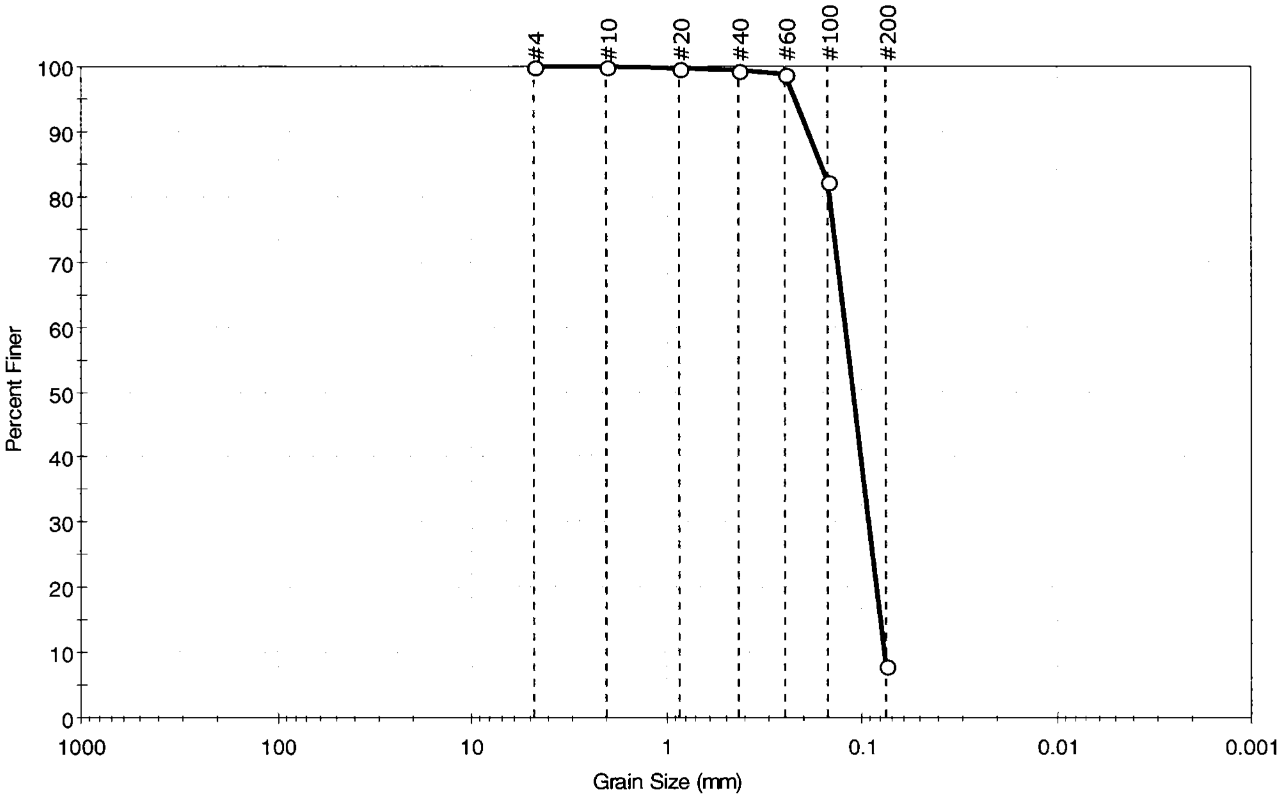
Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers				
Project:	Portsmouth Harbor/Piscataqua River-Nov 09				
Location:	ME/NH			Project No:	GTX-9499
Boring ID:	LS-2	Sample Type:	bag	Tested By:	jbr
Sample ID:	Long Sands Beach	Test Date:	12/03/09	Checked By:	jdt
Depth :	---	Test Id:	169490		

Test Comment: ---
Sample Description: Moist, olive brown sand with silt
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	92.0	8.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	82		
#200	0.075	8		

Coefficients

D_{85} =0.1629 mm
D_{30} =0.0921 mm
D_{60} =0.1218 mm
D_{15} =0.0801 mm
D_{50} =0.1110 mm
D_{10} =0.0764 mm
C_u =1.594
C_c =0.912

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

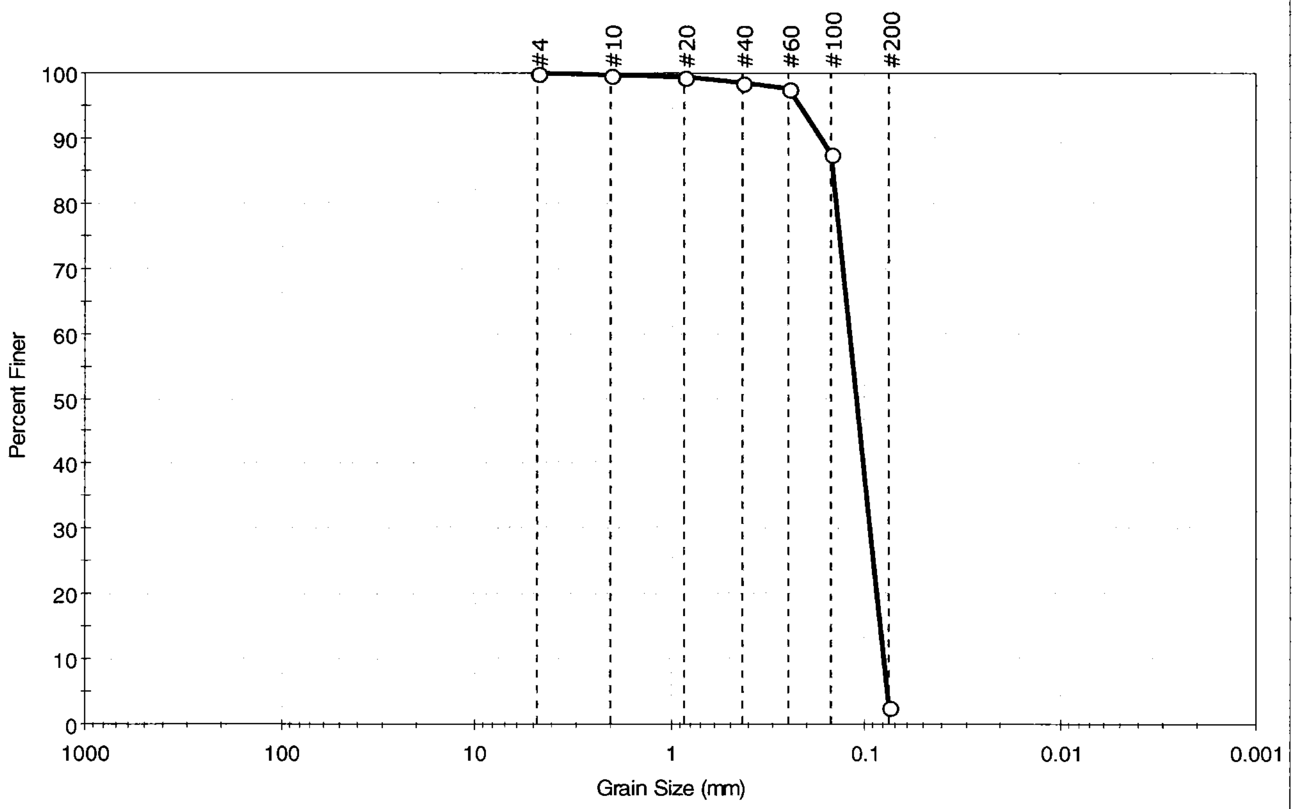
GeoTesting
express
a subsidiary of Geocomp Corporation

Client: US Army Corp of Engineers
Project: Portsmouth Harbor/Piscataqua River-Nov 09
Location: ME/NH
Project No: GTX-9499

Boring ID: LS-3
Sample Type: bag
Tested By: jbr
Sample ID: Long Sands Beach
Test Date: 12/03/09
Checked By: jdt
Depth : ---
Test Id: 169491

Test Comment: ---
Sample Description: Moist, olive brown sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	97.3	2.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	98		
#100	0.15	88		
#200	0.075	3		

Coefficients

D_{85} = 0.1468 mm	D_{30} = 0.0937 mm
D_{60} = 0.1197 mm	D_{15} = 0.0829 mm
D_{50} = 0.1103 mm	D_{10} = 0.0796 mm
C_u = 1.504	C_c = 0.921

Classification

ASTM	Poorly graded sand (SP)
AASHTO	Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

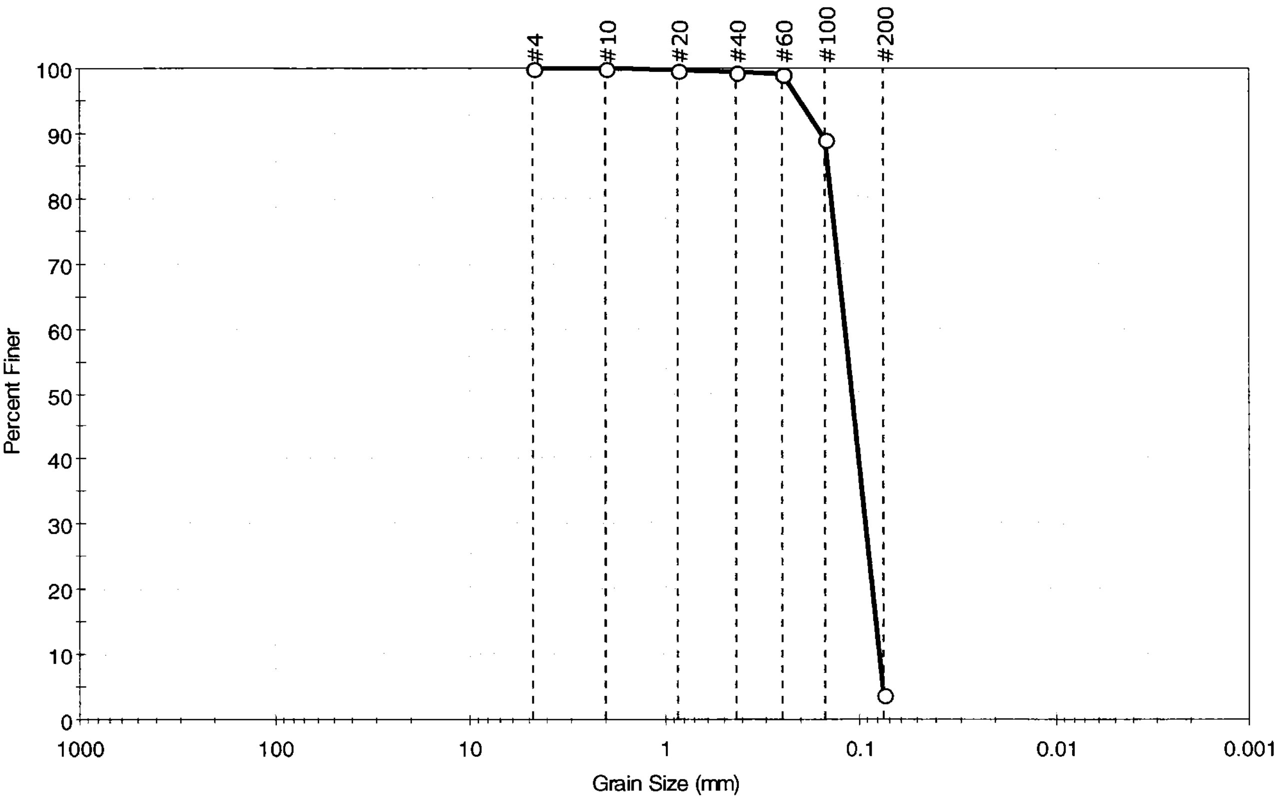
Sand/Gravel Hardness : ---

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers		
Project:	Portsmouth Harbor/Piscataqua River-Nov 09		
Location:	ME/NH	Project No:	GTX-9499
Boring ID: LS-4	Sample Type: bag	Tested By:	jbr
Sample ID:Long Sands Beach	Test Date: 12/03/09	Checked By:	jdt
Depth : ---	Test Id: 169492		

Test Comment: ---
Sample Description: Moist, olive gray sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	—	96.2	3.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	89		
#200	0.075	4		

Coefficients

D_{85} =0.1450 mm
D_{30} =0.0928 mm
D_{60} =0.1184 mm
D_{15} =0.0821 mm
D_{50} =0.1091 mm
D_{10} =0.0789 mm
C_u =1.501
C_c =0.922

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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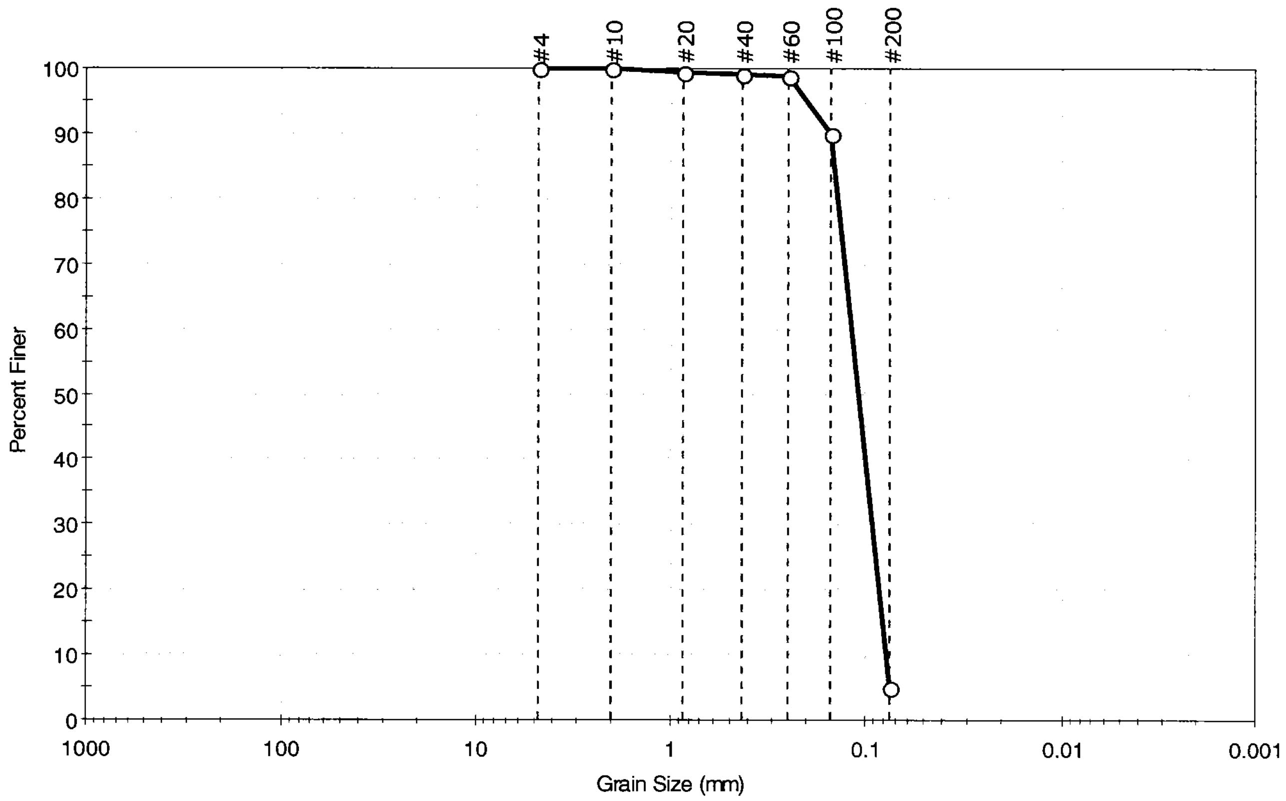
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	US Army Corp of Engineers		
Project:	Portsmouth Harbor/Piscataqua River-Nov 09		
Location:	ME/NH	Project No:	GTX-9499
Boring ID: LS-5	Sample Type: bag	Tested By:	jbr
Sample ID:Long Sands Beach	Test Date: 12/03/09	Checked By:	jdt
Depth : ---	Test Id: 169493		

Test Comment: ---
Sample Description: Moist, greenish gray sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	95.0	5.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	99		
#100	0.15	90		
#200	0.075	5		

Coefficients

D_{85} =0.1440 mm
D_{30} =0.0920 mm
D_{60} =0.1174 mm
D_{15} =0.0814 mm
D_{50} =0.1082 mm
D_{10} =0.0781 mm
C_u =1.503
C_c =0.923

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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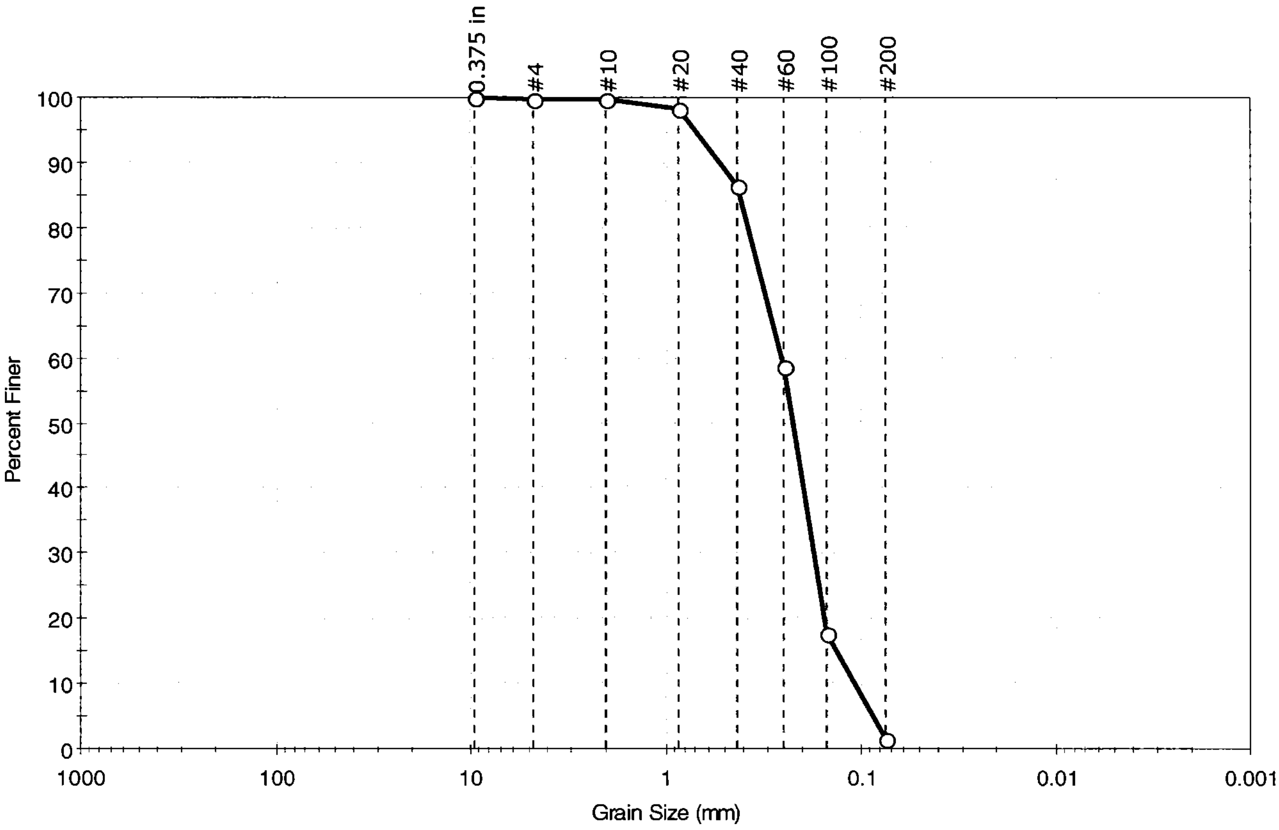
Client: US Army Corp of Engineers			
Project: Portsmouth Harbor/Piscataqua River-Nov 09			
Location: ME/NH		Project No:	GTX-9499
Boring ID: WS-1	Sample Type: bag	Tested By:	jbr
Sample ID:Wallis Sands Beach	Test Date: 12/03/09	Checked By:	jdt
Depth : ---	Test Id: 169494		

Test Comment: ---
Sample Description: Moist, light yellowish brown sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.3	98.2	1.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	86		
#60	0.25	59		
#100	0.15	18		
#200	0.075	1		

Coefficients

D_{85} =0.4131 mm	D_{30} =0.1747 mm
D_{60} =0.2560 mm	D_{15} =0.1334 mm
D_{50} =0.2241 mm	D_{10} =0.1078 mm
C_u =2.375	C_c =1.106

Classification

ASTM	Poorly graded sand (SP)
AASHTO	Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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GeoTesting express
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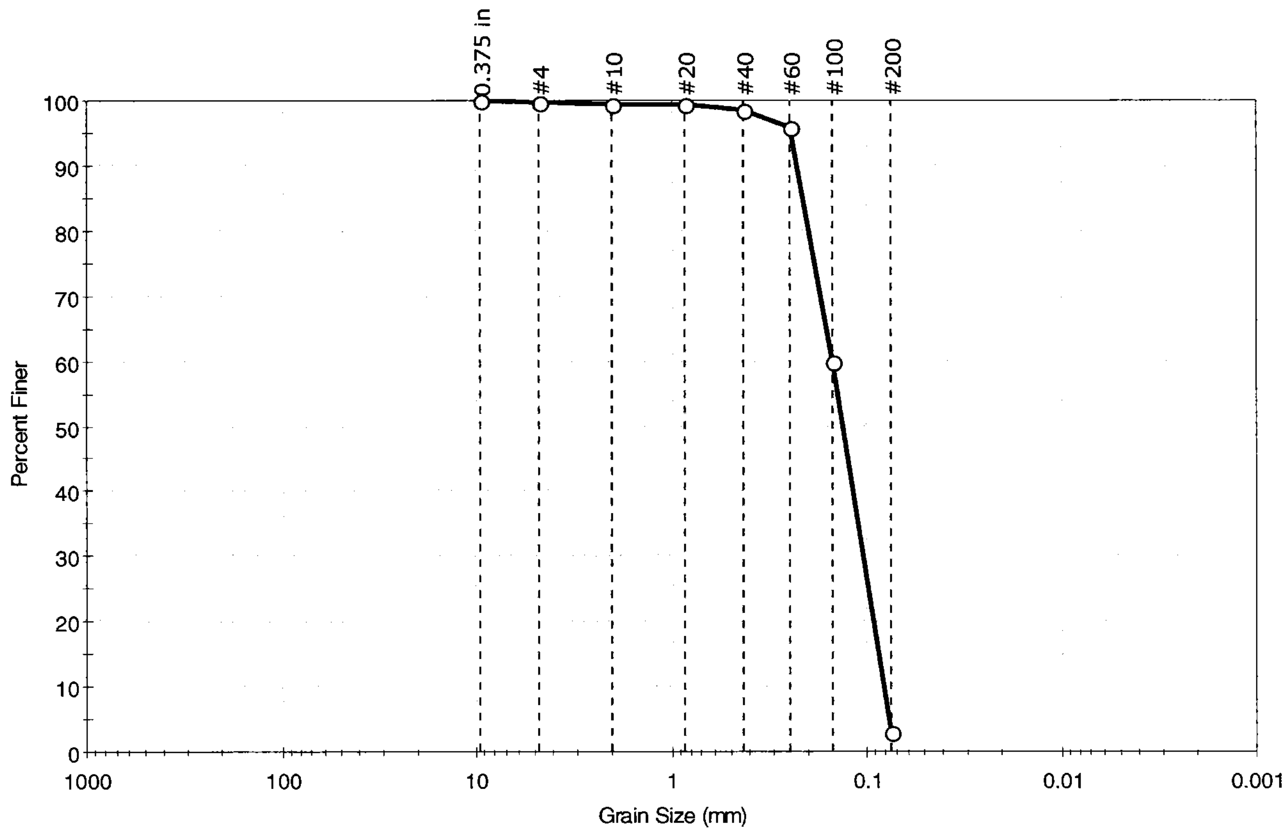
Client: US Army Corp of Engineers			
Project: Portsmouth Harbor/Piscataqua River-Nov 09			
Location: ME/NH		Project No:	GTX-9499
Boring ID: WS-2	Sample Type: bag	Tested By:	jbr
Sample ID:Wallis Sands Beach	Test Date: 12/03/09	Checked By:	jdt
Depth : ---	Test Id: 169495		
Test Comment: ---			
Sample Description: Moist, dark brown sand			
Sample Comment: ---			

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.3	96.7	3.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	96		
#100	0.15	60		
#200	0.075	3		

Coefficients

D_{85} =0.2143 mm	D_{30} =0.1042 mm
D_{60} =0.1501 mm	D_{15} =0.0868 mm
D_{50} =0.1329 mm	D_{10} =0.0816 mm
C_u =1.839	C_c =0.886

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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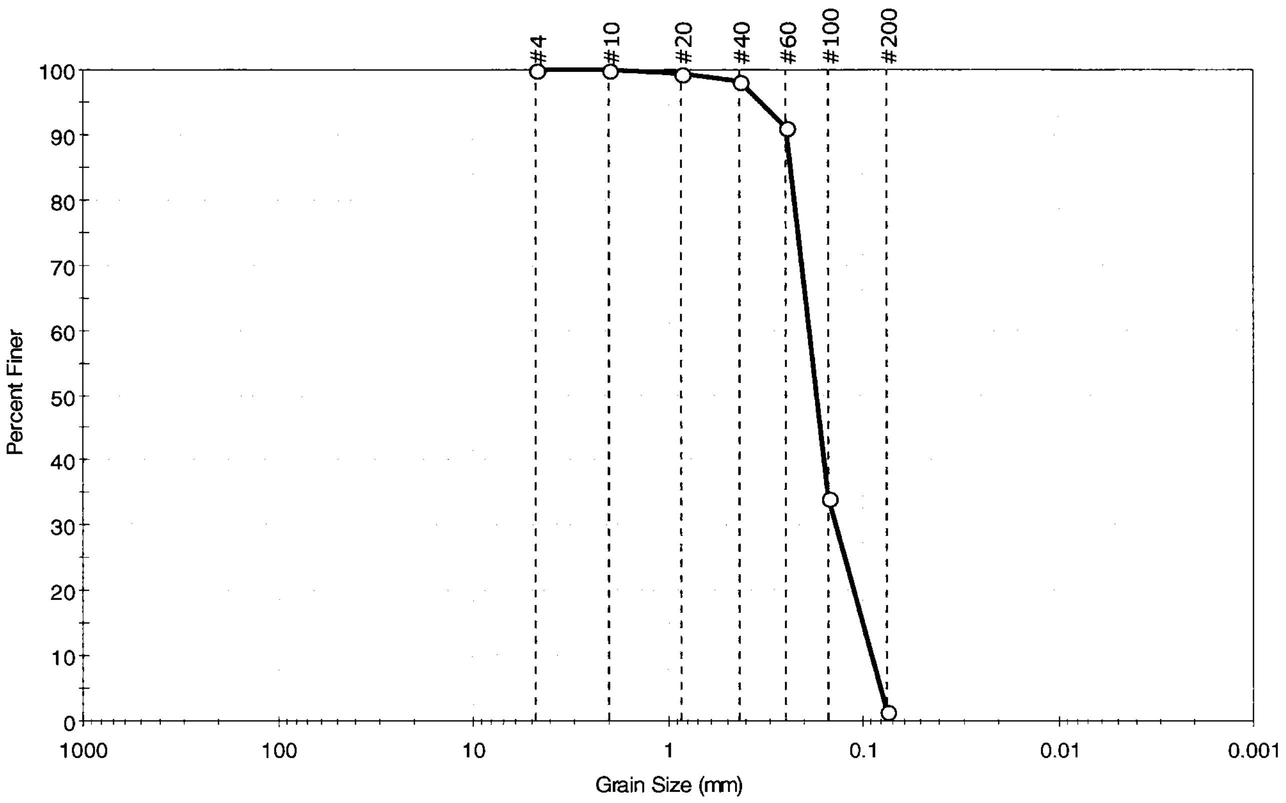
GeoTesting express
a subsidiary of Geocomp Corporation

Client: US Army Corp of Engineers			
Project: Portsmouth Harbor/Piscataqua River-Nov 09			
Location: ME/NH		Project No:	GTX-9499
Boring ID: WS-3	Sample Type: bag	Tested By:	jbr
Sample ID:Wallis Sands Beach	Test Date: 12/03/09	Checked By:	jdt
Depth : ---	Test Id: 169496		
Test Comment: ---			
Sample Description: Moist, light yellowish brown sand			
Sample Comment: ---			

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	98.5	1.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	98		
#60	0.25	91		
#100	0.15	34		
#200	0.075	1		

Coefficients

D_{85} =0.2367 mm
D_{30} =0.1369 mm
D_{60} =0.1890 mm
D_{15} =0.0997 mm
D_{50} =0.1727 mm
D_{10} =0.0898 mm
C_u =2.105
C_c =1.104

Classification

ASTM	Poorly graded sand (SP)
AASHTO	Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

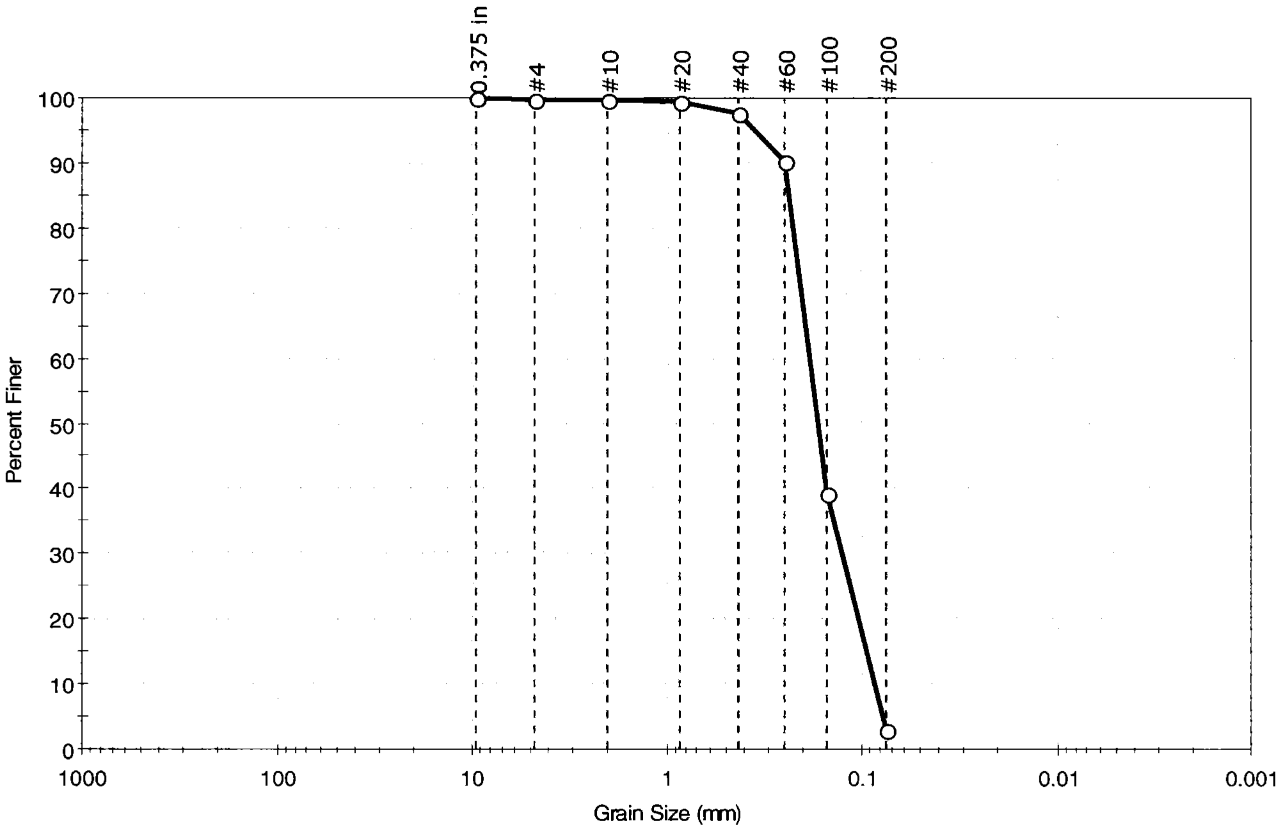
Sand/Gravel Hardness : ---

GeoTesting express
a subsidiary of Geocomp Corporation

Client: US Army Corp of Engineers			
Project: Portsmouth Harbor/Piscataqua River-Nov 09			
Location: ME/NH		Project No:	GTX-9499
Boring ID: WS-4	Sample Type: bag	Tested By:	jbr
Sample ID:Wallis Sands Beach	Test Date: 12/03/09	Checked By:	jdt
Depth : ---	Test Id: 169497		

Test Comment: ---
Sample Description: Moist, light yellowish brown sand
Sample Comment: ---

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



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.3	96.7	3.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	98		
#60	0.25	90		
#100	0.15	39		
#200	0.075	3		

Coefficients

D_{85} =0.2372 mm	D_{30} =0.1255 mm
D_{60} =0.1846 mm	D_{15} =0.0942 mm
D_{50} =0.1670 mm	D_{10} =0.0857 mm
C_u =2.154	C_c =0.996

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX P
ESSENTIAL FISHERIES HABITAT ASSESSMENT

PORTSMOUTH HARBOR AND PISCATAQUA RIVER NAVIGATION IMPROVEMENT PROJECT ESSENTIAL FISHERIES HABITAT ASSESSMENT

The following list of managed species and their appropriate life stage history for the designated 10' x 10' square which includes the Piscataqua River, Isle of Shoals-North, and the Wells, Maine, and Salisbury, Newburyport, and Newbury, Massachusetts nearshore disposal sites can be found below.

Atlantic Salmon (*Salmo salar*) –

Juveniles: Bottom habitats of shallow gravel/cobble riffles interspersed with deeper riffles and pools in rivers and estuaries. Generally, the following conditions exist where Atlantic salmon parr are found: clean, well-oxygenated fresh water, water temperatures below 25^0 C, water depths between 10 cm and 61 cm, and water velocities between 30 and 92 cm per second. As they grow, parr transform into smolts. Atlantic salmon smolts require access downstream to make their way to the ocean. Upon entering the sea, "post-smolts" become pelagic and range from Long Island Sound north to the Labrador Sea.

Adults: For adult Atlantic salmon returning to spawn, habitats with resting and holding pools in rivers and estuaries. Returning Atlantic salmon require access to their natal streams and access to the spawning grounds. Generally, the following conditions exist where returning Atlantic salmon adults are found migrating to the spawning grounds: water temperatures below 22.8^0 C, and dissolved oxygen above five ppm. Oceanic adult Atlantic salmon are primarily pelagic and range from the waters of the Continental Shelf off southern New England north throughout the Gulf of Maine.

Spawning Adults: Bottom habitats with a gravel or cobble riffle (redd) above or below a pool of river. Generally, the following conditions exist where spawning Atlantic salmon adults are found: water temperatures below 10^0 C, water depths between 30 cm and 61 cm, water velocities around 61 cm per second, and clean, well-oxygenated fresh water. Spawning Atlantic salmon adults are most frequently observed during October and November.

Atlantic cod (*Gadus morhua*) –

Eggs: Surface waters around the perimeter of the Gulf of Maine, George's Bank, and the eastern portion of the Continental Shelf off southern New England. Generally, the following conditions exist where cod eggs are found: sea surface temperatures below 12^0 C, water depths less than 110 meters, and a salinity range from 32-33‰. Cod eggs are most often observed beginning in the fall, with peaks in the winter and spring.

Larvae: Pelagic waters of the Gulf of Maine, Georges Bank, and the eastern portion of the Continental Shelf off of southern New England. Generally, the following conditions exist where cod larvae found: sea surface temperatures below 10^0 C, water depths from 30 to 70 meters, and a salinity range from 32-33‰. Cod larvae are most often observed in the spring.

Juveniles: Bottom habitats with a substrate of cobble or gravel in the Gulf of Maine, Georges Bank, and the eastern portion of the Continental Shelf off southern New England. Generally, the following conditions exist where cod juveniles found: water temperatures below 20^0 C, water depths from 25 to 75 meters, and a salinity range from 30-35‰.

Adults: Bottom habitats with a substrate of rocks, pebbles, or gravel in the Gulf of Maine, Georges Bank, southern New England, and the middle Atlantic south to Delaware Bay. Generally, the following conditions exist where cod adults are found: water temperatures below 10^0 C, water depths from 10 to 150 meters, and a wide range of oceanic salinities.

Spawning Adults: Bottom habitats with a substrate of smooth sand, rocks, pebbles, or gravel in the Gulf of Maine, Georges Bank, southern New England, and the middle Atlantic south to Delaware Bay. Generally, the following conditions exist where spawning cod adults are found: water temperatures below 10^0 C, water depths from 10 to 150 meters, and a wide range of oceanic salinities. Cod are most often observed spawning during fall, winter, and early spring.

Haddock (*Melanogrammus aeglefinus*) –

Eggs: Surface waters over Georges Bank southwest to Nantucket Shoals and the coastal areas of the Gulf of Maine. Generally, the following conditions exist where haddock eggs are found: sea surface temperatures below 10^0 C, water depths from 50 to 90 meters, and salinity ranges from 34-36‰. Haddock eggs are most often observed during the months from March to May, April being the most important.

Larvae: Surface temperatures over Georges Bank southwest to the middle Atlantic south to Delaware Bay. Generally, the following conditions exist where haddock larvae are found: sea surface temperatures below 14^0 C, water depths from 30 to 90 meters, and salinity ranges from 34-36‰. Haddock larvae are most often observed in these areas from January through July with peaks in April and May.

Juveniles: Bottom habitats with a substrate of pebble gravel on the perimeter of Georges Bank, the Gulf of Maine, and the middle Atlantic south to Delaware Bay. Generally, the following conditions exist where haddock juveniles are found: water temperatures below 11^0 C, depth from 35 to 100 meters, and a salinity range from 31.5–34‰.

Adults: Bottom habitats with a substrate of broken ground, pebbles, smooth hard sand and smooth areas between rocky patches on Georges Bank and the eastern side of Nantucket Shoals, and throughout the Gulf of Maine, plus additional area of Nantucket Shoals and the Great South Channel inclusive of the historic range. Generally, the following conditions exist where haddock adults are found: water temperatures below 7^0 C, depths from 40 to 150 meters, and a salinity range from 31.5–35‰.

Spawning Adults: Bottom habitats with a substrate of pebble gravel or gravelly sand on Georges Bank, Nantucket Shoals, along the Great South Channel, and throughout the Gulf of Maine. Generally, the following conditions exist where spawning haddock adults are found: water temperatures below 6^0 C, depths from 40 to 150 meters, and a salinity range from 31.5–34‰. Haddock are observed spawning most often during the months of January to June.

Pollock (*Pollachius virens*) –

Eggs: Pelagic waters of the Gulf of Maine and Georges Bank. Generally, the following conditions exist where pollock eggs are found: sea surface temperatures less than 17^0 C, water depths from 30 to 270 meters, and salinities between 32-32.8‰. Pollock eggs are often observed from October through June with peaks from November to February.

Larvae: Pelagic waters of the Gulf of Maine and Georges Bank. Generally, the following conditions exist where pollock larvae are found: sea surface temperatures less than 17^0 C, water depths from 10 to 250 meters. Pollock larvae are often observed from September to July with peaks from December to February.

Juveniles: Bottom habitats with aquatic vegetation or a substrate of sand, mud or rocks in the Gulf of Maine and Georges Bank. Generally, the following conditions exist where pollock juveniles are found: water temperatures below 18^0 C, water depths from 0 to 250 meters, and salinities between 29-32‰.

Adults: Bottom habitats in the Gulf of Maine and Georges Bank and hard bottom habitats (including artificial reefs) off southern New England and the middle Atlantic south to New Jersey. Generally, the following conditions exist where pollock adults are found: water temperatures below 14^0 C, water depths from 15 to 365 meters, and salinities between 31-34‰.

Spawning Adults: Bottom habitats with a substrate of hard, stony, or rock bottom in the Gulf of Maine and hard bottom habitats (including artificial reefs) off southern New England and the middle Atlantic south to New Jersey. Generally, the following conditions exist where pollock adults are found: water temperatures below 8^0 C, water depths from 15 to 365 meters, and salinities between 32-32.8‰. Pollock are most often observed spawning during the months of September to April with peaks from December to February.

Whiting (*Merluccius bilinearis*) –

Eggs: Surface waters of the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where most whiting eggs are found: sea surface temperatures below 20^0 C and water depths between 50 and 150 meters. Whiting eggs are observed all year, with peaks from June through October.

Larvae: Surface waters of the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where most whiting larvae are found: sea surface temperatures below 20^0 C and water depths between 50 and 130 meters. Whiting larvae are observed all year, with peaks from July through September.

Juveniles: Bottom habitats of all substrate types in the Gulf of Maine, on Georges Bank, the Continental Shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where most whiting juveniles are found: water temperatures below 21^0 C, water depths from 20 to 270 meters, and salinities greater than 20‰.

Adults: Bottom habitats of all substrate types in the Gulf of Maine, on Georges Bank, the Continental Shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where most whiting juveniles are found: water temperatures below 21^0 C, water depths from 20 to 270 meters, and salinities greater than 20‰.

Spawning Adults: Bottom habitats of all substrate types in the Gulf of Maine, on Georges Bank, the Continental Shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where most spawning whiting adults are found: water temperatures below 13^0 C and water depths from 30 to 325 meters.

Red hake (*Urophycis chuss*) –

Eggs: Surface waters of the Gulf of Maine, Georges Bank, the Continental Shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where hake eggs are found: sea surface temperatures below 10^0 C along the inner Continental Shelf with salinity less than 25‰. Hake eggs are most often observed during the months from May to November, with peaks in June and July.

Larvae: Surface waters of the Gulf of Maine, Georges Bank, the Continental Shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where red hake larvae are found: sea surface temperatures below 19^0 C, water depths less than 200 meters, and salinity greater than 0.5‰. Red hake larvae are most often observed from May through December, with peaks in September through October.

Juveniles: Bottom habitats with a substrate of shell fragments, including areas with an abundance of live scallops, in the Gulf of Maine, on Georges Bank, the Continental Shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where red hake juveniles are found: water temperatures below 16^o C, depths less than 100 meters and a salinity range from 31-33‰.

Adults: Bottom habitats in depressions with a substrate of sand and mud in the Gulf of Maine, on Georges Bank, the Continental Shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where red hake adults are found: water temperatures below 12 ° C, depths from 10 to 130 meters, and a salinity range from 33-34‰.

Spawning Adults: Bottom habitats in depressions with a substrate of sand and mud in the Gulf of Maine, the southern edge of Georges Bank, the Continental Shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where spawning red hake adults are found: water temperatures below 10° C, depths less than 100 meters, and salinity less than 25‰. Red hake are most often observed spawning during the months from May – November, with peaks in June and July.

<u>White hake (*Urophycis tenuis*)</u> –

Eggs: Surface waters of the Gulf of Maine, Georges Bank, and southern New England. White hake eggs are most often observed in August and September.

Larvae: Pelagic waters of the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic. White hake larvae are most often observed in May in the mid-Atlantic area and August and September in the Gulf of Maine and Georges Bank.

Juveniles: *Pelagic stage* – Pelagic waters of the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic. White hake juveniles in the pelagic stage are most often observed from May through September. *Demersal stage* – Bottom habitats with seagrass beds or a substrate of mud or fine-grained sand in the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic. Generally, the following conditions exist where white hake juveniles are found: water temperatures below 19 ° C and depths from 5 to 225 meter.

Adults: Bottom habitats with a substrate of mud or fine-grained sand in the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic. Generally, the following conditions exist where white hake adults are found: water temperatures below 14 ° C and depths from 5 to 325 meter.

Spawning Adults: Bottom habitats with a substrate of mud or fine-grained sand in deep water in the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic. Generally, the following conditions exist where white hake adults are found: water temperatures below 14 ° C and depths from 5 to 325 meter. White hake are most often observed spawning during the months April – May in the southern portion of their range and August – September in the northern portion of their range.

<u>Redfish (*Sebastes fasciatus*)</u> –

Larvae: Pelagic waters in the Gulf of Maine and southern Georges Bank. Generally, the following conditions exist where redfish larvae are found: sea surface temperatures below 15^0 C and water depths between 50 and 270 meters. Redfish larvae are most often observed from March through October, with a peak in August.

Juvenile: Bottom habitats with a substrate of silt, mud or hard bottom in the Gulf of Maine and on the southern edge of Georges Bank. Generally, the following conditions exist where redfish juveniles are found: water temperatures below 13^0 C, depths from 25 to 400 meters, and a salinity range from 31-34‰.

Adults: Bottom habitats with a substrate of silt, mud or hard bottom in the Gulf of Maine and on the southern edge of Georges Bank. Generally, the following conditions exist where redfish adults are found: water temperatures below 13^0 C, depths from 50 to 350 meters, and a salinity range from 31-34‰.

Spawning Adults: Bottom habitats with a substrate of silt, mud or hard bottom in the Gulf of Maine and on the southern edge of Georges Bank. Generally, the following conditions exist where redfish adults are found: water temperatures below 13^0 C, depths from 50 to 350 meters, and a salinity range from 31-34‰. Redfish females are most often observed spawning (larvae) during the months of April through August.

Witch flounder (*Glyptocephalus cynoglossus*) –

Juveniles: Bottom habitats with a fine-grained substrate in the Gulf of Maine and along the outer continental shelf from Georges Bank south to Cape Hatteras. Generally, the following conditions exist where witch flounder juveniles are found: water temperatures below 13^0 C, depths from 50 to 450 meters, although they have been observed as deep as 1500 meters, and salinity from 34-36‰.

Winter flounder (*Pleuronectes americanus*) –

Eggs: Bottom habitats with a substrate of sand, muddy sand, mud, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay. Generally, the following conditions exist where winter flounder eggs are found: water temperatures below 10^0 C, salinities between 10-30‰ and water depths less than five meters. On Georges Bank, winter flounder eggs are generally found in water less than 8^0 C, and less than 90 meters deep. Winter flounder eggs are often observed from February to June with a peak in April on Georges Bank.

Larvae: Pelagic and bottom waters of Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay. Generally, the following conditions exist where winter flounder larvae are found: sea surface temperatures less than 15^0 C, salinities between 4-30‰, and water depths less than six meters. On Georges Bank, winter flounder larvae are generally found in water less than 8^0 C, and less than 90 meters deep. Winter flounder larvae are often observed from March to July with peaks in April and May on Georges Bank.

Juveniles: *Young-of-the-Year*: Bottom habitats with a substrate of mud or fine-grained sand on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay. Generally, the following conditions exist where winter flounder young-of-the-year are found: water temperatures below 28^0 C, and depths from 0.1 to10 meters, and salinities between 5-33‰. *Age 1 + Juveniles*: Bottom habitats with a substrate of mud or fine-grained sand on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay. Generally, the following conditions exist where juvenile winter flounder are found: water temperatures below 25^o C, and depths from 1 to 50 meters, and salinities between 10-30‰.

Adults: Bottom habitats including estuaries with a substrate of mud, sand and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay. Generally, the following conditions exist where adult winter flounder are found: water temperatures below 25^o C, and depths from 1 to 100 meters, and salinities between 15-33‰.

Spawning Adults: Bottom habitats including estuaries with a substrate of sand, muddy sand, mud, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay. Generally, the following conditions exist where spawning adult winter flounder are found: water temperatures below 15^o C, depths less than six meters, except on Georges Bank where they spawn as deep as 80 meters, and salinities 5.5-36‰. Winter flounder are most often observed spawning during the months of February to June.

Yellowtail flounder (*Pleuronectes ferruginea*) –

Eggs: Surface waters of Georges Bank, Massachusetts Bay, Cape Cod Bay, and the southern New England continental shelf south to Delaware Bay. Generally, the following conditions exist where yellowtail eggs are found: sea surface temperatures below 15^0 C, water depths from 30 to 90 meters and a salinity range from 32.4-33.5‰. Yellowtail flounder eggs are most often observed during the months from mid-March to July, with peaks in April to June in southern New England.

Larvae: Surface waters of Georges Bank, Massachusetts Bay, Cape Cod Bay, the southern New England shelf and throughout the middle Atlantic south to the Chesapeake Bay. Generally, the following conditions exist where yellowtail larvae are found: sea surface temperatures below 17^0 C, water depths from 10 to 90 meters, and a salinity range from 32.4–33.5‰. Yellowtail flounder larvae are most often observed from March through April in the New York bight and from May through July in southern New England and southeastern Georges Bank.

Adults: Bottom habitats with a substrate of sand or sand and mud on Georges Bank, the Gulf of Maine, and the southern New England shelf south to Delaware Bay. Generally, the following conditions exist where yellowtail flounder adults are found: water temperatures below 15^0 C, water depths from 20 to 50 meters, and a salinity range from 32.4–33.5‰.

Spawning Adults: Bottom habitats with a substrate of sand or sand and mud on Georges Bank, the Gulf of Maine, and the southern New England shelf south to Delaware Bay.

Generally, the following conditions exist where spawning yellowtail flounder adults are found: water temperatures below 17^0 C, water depths from 10 to 125 meters, and a salinity range from 32.4–33.5‰.

Windowpane flounder (*Scopthalmus aquosus*) –

Eggs: Surface waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where windowpane flounder eggs are found: sea surface temperatures less than 20^0 C, water depths less than 70 meters. Windowpane flounder eggs are often observed from February to November with peaks in May and October in the middle Atlantic and July through August on Georges Bank.

Larvae: Pelagic waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where windowpane flounder larvae are found: sea surface temperatures less than 20^0 C, water depths less than 70 meters. Windowpane flounder larvae are often observed from February to November with peaks in May and October in the middle Atlantic and July through August on Georges Bank.

Juveniles: Bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where windowpane flounder juveniles are found: water temperatures below 25^0 C, water depths from 1 to 100 meters, and a salinity range from 5.5–36‰.

Adults: Bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border. Generally, the following conditions exist where windowpane flounder adults are found: water temperatures below 26.8^0 C, water depths from 1 to 75 meters, and salinities between 5.5–36‰.

Spawning Adults: Bottom habitats with a substrate of mud or fine-grained sand in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border. Generally, the following conditions exist where spawning windowpane flounder adults are found: water temperatures below 21^0 C, water depths from 1 to 75 meters, and salinities between 5.5–36‰. Windowpane flounder are most often observed spawning during the months February to December with a peak in May in the middle Atlantic.

American plaice (*Hippoglossoides platessoides*) –

Eggs: Surface waters of the Gulf of Maine and Georges Bank. Generally, the following conditions exist where the most American plaice eggs are found: sea surface temperatures below 12^0 C, water depths between 30 and 90 meters and a wide range of salinities.

American plaice eggs are observed all year in the Gulf of Maine, but only from December through June on Georges Bank, with peaks in both areas in April and May.

Juveniles: Bottom habitats with fine-grained sediments or a substrate of sand or gravel in the Gulf of Maine. Generally, the following conditions exist where the most American plaice juveniles are found: water temperatures below 17^0 C, water depths between 45 and 150 meters and a wide range of salinities.

Adults: Bottom habitats with fine-grained sediments or a substrate of sand or gravel in the Gulf of Maine and Georges Bank. Generally, the following conditions exist where most American plaice adults are found: water temperatures below 17^0 C, water depths between 45 and 175 meters, and a wide range of salinities.

Spawning Adults: Bottom habitats of all substrate types in the Gulf of Maine and Georges Bank. Generally, the following conditions exist where most spawning American plaice adults are found: water temperatures below 14^0 C, water depths less than 90 meters, and a wide range of salinities. Spawning begins in March and continues through June.

Ocean pout (*Macrozoarces americanus*) –

Eggs: Bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay. Due to low fecundity, relatively few eggs (<4200) are laid in gelatinous masses, generally in hard bottom sheltered nests, holes, or crevices where they are guarded by either female or both parents. Generally, the following conditions exist where ocean pout eggs are found: water temperatures below 10^0 C, depths less than 50 meters, and a salinity range from 32-34%. Ocean pout egg development takes two to three months during late fall and winter.

Larvae: Bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay. Larvae are relatively advanced in development ad are believed to remain in close proximity to hard bottom nesting area. Generally, the following conditions exist where ocean pout larvae are found: sea surface temperatures below 10^0 C, depths less than 50 meters, and salinities greater than 25‰. Ocean pout larvae development are most often observed from late fall through spring.

Juveniles: Bottom habitats, often smooth bottom near rocks or algae in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay. Generally, the following conditions exist where ocean pout juveniles are found: water temperatures below 14^0 C, depths less than 80 meters, and salinities greater than 25‰.

Adults: Bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay. Generally, the following conditions exist where ocean pout adults are found: water temperatures below 15^0 C, depths less than 110 meters, and a salinity range from 32-34‰.

Spawning Adults: Bottom habitats with a hard bottom substrate, including artificial reefs and shipwrecks, in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay. Generally, the following conditions exist where spawning ocean pout adults are found: water temperatures below 10^0 C, depths less than 50 meters, and a salinity range from 32-34‰. Ocean pout spawn from late summer though early winter, with peaks in September and October.

<u>Atlantic halibut (*Hippoglosus hippoglossus*)</u> –

Eggs: Pelagic waters to the sea floor of the Gulf of Maine and Georges Bank. Generally, the following conditions exist where Atlantic halibut eggs are found: water temperatures between 4 and 7^0 C, water depths less than 700 meters, and salinities less than 35‰. Atlantic halibut eggs are observed between late fall and early spring, with peaks in November and December.

Larvae: Surface waters of the Gulf of Maine and Georges Bank. Generally, the following conditions exist where Atlantic halibut larvae are found: salinities between 30 and 35‰.

Juveniles: Bottom habitats with a substrate of sand, gravel, or clay in the Gulf of Maine and Georges Bank. Generally, the following conditions exist where Atlantic halibut juveniles are found: water temperatures above 2^0 C, water depths from 20 to 60 meters.

Adults: Bottom habitats with a substrate of sand, gravel, or clay in the Gulf of Maine and Georges Bank. Generally, the following conditions exist where Atlantic halibut adults are found: water temperatures below 13.6^0 C, water depths from 100 to 700 meters, and salinities between 30.4–35.3‰.

Spawning Adults: Bottom habitats with a substrate of soft mud, clay, sand, or gravel in the Gulf of Maine and Georges Bank, as well as rough or rocky bottom locations along the slopes of the outer banks. Generally, the following conditions exist where spawning Atlantic halibut adults are found: water temperatures below 7^0 C, water depths less than 700 meters, and salinities less than 35‰. Atlantic halibut are most often observed spawning between late fall and early spring, with peaks in November and December.

<u>Atlantic sea scallop (*Placopecten magellanicus*)</u> –

Eggs: Bottom habitats in the Gulf of Maine, Georges Bank, southern New England the middle Atlantic south to the Virginia-North Carolina border. Eggs are heavier than seawater and remain on the seafloor until they develop into the first free-swimming larval stage. Generally, sea scallop eggs are thought to occur where water temperatures are below 17^0 C. Spawning occurs from May through October, with peaks in May and June in the middle Atlantic area and in September and October on Georges Bank and in Gulf of Maine.

Larvae: Pelagic waters and bottom habitats with a substrate of gravelly sand, shell fragments, and pebbles, or on various red algae, hydroids, amphipod tubes and bryozoans in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-

North Carolina border. Generally, the following conditions exist where sea scallop larvae are found: sea surface temperatures below 18^0 C and salinities between 16.9-30‰.

Juveniles: Bottom habitats with a substrate of cobble, shells and silt in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border that support the highest densities of sea scallops. Generally, the following conditions exist where most sea scallop juveniles are found: water temperatures below 15^0 C, and water depths from 18 to 110 meters and salinities above 16.5‰.

Adults: Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand in the Gulf of Maine, Georges Bank, southern New England and middle Atlantic south to the Virginia-North Carolina border that support the highest densities of sea scallops. Generally, the following conditions exist where most sea scallop adults are found: water temperatures below 21^0 C, water depths from 18 to110 meters, and salinities above 16.5‰.

Spawning Adults: Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border that support the highest densities of sea scallop adults are found: water temperatures below 16^0 C, depths from 18 to 110 meters, and salinities above 16.5‰. Spawning occurs from May through October, with peaks in May and June in the middle Atlantic area, and in September and October on Georges Bank and in the Gulf of Maine.

Atlantic sea herring (*Clupea harengus*) –

Larvae: Pelagic waters in the Gulf of Maine, Georges Bank, and southern New England that comprise 90% of the observed range of Atlantic herring larvae. Generally, the following conditions exist where Atlantic herring larvae are found: sea surface temperatures below 16^0 C, water depths from 50 to 90 meters, and salinities around 32‰. Atlantic herring larvae are observed between August and April, with peaks from September through November.

Juveniles: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where Atlantic herring juveniles are found: water temperatures below 10^0 C, water depths from 15 to 135 meters, and salinity range from 26 to 32‰.

Adults: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where Atlantic herring adults are found: water temperatures below 10^0 C, water depths from 20 to 130 meters, and salinities above 28‰.

Spawning Adults: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay. Generally, the following conditions exist where spawning Atlantic herring adults are found: water temperatures below

15^0 C, water depths from 20 to 80 meters, and salinity range from 32-33‰. Herring eggs are spawned in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring are most often observed spawning during the months from July through November.

Monkfish (*Lophius americanus*) –

Eggs: Surface waters of the Gulf of Maine, Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where monkfish egg veils are found: sea surface temperatures below 18^0 C and water depths from 15 to 1000 meters. Monkfish egg veils are most often observed during the months from March to September.

Larvae: Pelagic waters of the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where monkfish larvae are found: water temperatures 15^0 C and water depths from 25 to 1000 meters. Monkfish larvae are most often observed during the months from March to September.

Juveniles: Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud along the outer continental shelf in the middle Atlantic, the mid-shelf off southern New England, and all areas of the Gulf of Maine. Generally, the following conditions exist where monkfish juveniles are found: water temperatures below 13^0 C, depths from 25 to 200 meters, and a salinity range from 29.9–36.7‰.

Adults: Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud along the outer continental shelf in the middle Atlantic, the mid-shelf off southern New England, along the outer perimeter of Georges Bank, and all areas of the Gulf of Maine. Generally, the following conditions exist where monkfish adults are found: water temperatures below 15^0 C, depths from 25 to 200 meters, and a salinity range from 29.9–36.7‰.

Spawning Adults: Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud along the outer continental shelf in the middle Atlantic, the mid-shelf off southern New England, along the outer perimeter of Georges Bank, and all areas of the Gulf of Maine. Generally, the following conditions exist where spawning monkfish adults are found: water temperatures below 13^0 C, depths from 25 to 200 meters, and a salinity range from 29.9–36.7‰. Monkfish are observed spawning most often during the months from February to August.

Bluefish (*Pomatomus saltatrix*) –

Juveniles: 1) North of Cape Hatteras, pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ) from Nantucket Island, Massachusetts south to Cape Hatteras, in the highest 90% of the area where juvenile bluefish are collected in the NEFSC trawl survey; 2) south of Cape Hatteras, 100% of the pelagic waters over the Continental

Shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; 3) the "slope sea" and Gulf Stream Between latitudes 29^0 00 N and 40^0 00 N; and 4) all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Generally, juvenile bluefish occur in North Atlantic estuaries from June through October, mid-Atlantic estuaries from May through October, and south Atlantic estuaries March through December, within the "mixing" and "seawater" zone. Distribution of juveniles by temperature, salinity, and depth over the Continental Shelf is undescribed.

Adults: 1) North of Cape Hatteras, over the Continental Shelf (from the coast out to the limits of the EEZ), from Cape Cod Bay, Massachusetts south to Cape Hatteras, in the highest 90% of the area where adult bluefish were collected in the NEFSC trawl survey; 2) south of Cape Hatteras, 100% of the pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; and all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Adult bluefish are found in North Atlantic estuaries from June through October, mid-Atlantic estuaries from April through October, and south Atlantic estuaries from May through January in the "mixing" and "seawater" zones. Bluefish adults are highly migratory and distribution varies seasonally and according to the size of the individuals comprising the schools. Bluefish are generally found in normal shelf salinities (>25 ppt).

Long finned squid (*Loligo pealei*) –

Juveniles: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where juvenile squid were collected. Generally, juvenile long finned squid are collected from shore to 700 feet and in temperatures between 4^0 F and 27^0 F.

Adults: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where adult squid were collected. Generally, adult long finned squid are collected from shore to 1000 feet and in temperatures between 39^0 F and 81^0 F.

Short finned squid (*Illex illecebrosus*) –

Juveniles: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where juvenile squid were collected. Generally, juvenile short finned squid are collected from shore to 600 feet and in temperatures between 36^0 F and 73^0 F.

Adults: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where adult squid were collected. Generally, adult short finned squid are collected from shore to 600 feet and in temperatures between 39^0 F and 66^0 F.

Atlantic butterfish (*Peprilus triacanthus*) –

Eggs: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where butterfish eggs were collected. The “mixing” and/or “seawater” portions of all the estuaries where butterfish are “common”, “abundant”, or “highly abundant” on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish eggs are collected from shore to 6000 feet and in temperatures between 52^0 F and 63^0 F.

Larvae: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where butterfish larvae were collected. The “mixing” and/or “seawater” portions of all the estuaries where butterfish are “common”, “abundant”, or “highly abundant” on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish larvae are collected from 33 feet to 6000 feet and in temperatures between 48^0 F and 66^0 F.

Juveniles: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where butterfish juvenile were collected. The “mixing” and/or “seawater” portions of all the estuaries where butterfish are “common”, “abundant”, or “highly abundant” on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish larvae are collected from 33 feet to 1200 feet and in temperatures between 37^0 F and 82^0 F.

Adults: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where butterfish adults were collected. The “mixing” and/or “seawater” portions of all the estuaries where butterfish are “common”, “abundant”, or “highly abundant” on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, adult butterfish are collected in depths from 33 feet to 1200 feet and in temperatures between 37^0 F and 82^0 F.

Atlantic mackerel (*Scomber scombrus*) –

Eggs: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina; in areas that encompass the highest 75% of the catch where Atlantic mackerel eggs were collected. EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, Atlantic mackerel eggs are collected from shore to 50 feet and temperatures between 41^0 F and 73^0 F.

Larvae: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina; in areas that encompass the highest 75% of the catch where juvenile Atlantic mackerel were collected in NEFSC trawl surveys. EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel are "common", "abundant", or "highly abundant" on the

Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, Atlantic mackerel larvae are collected in depths between 33 feet to 425 feet and temperatures between 43^0 F and 72^0 F.

Juveniles: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina; in areas that encompass the highest 75% of the catch where juvenile Atlantic mackerel were collected in NEFSC trawl surveys. EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, juvenile Atlantic mackerel are collected from shore to 1,050 feet and temperatures between 39^0 F and 72^0 F.

Adults: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina; in areas that encompass the highest 75% of the catch where adult Atlantic mackerel were collected in NEFSC trawl surveys. EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, adult Atlantic mackerel are collected from shore to 1,250 feet and temperatures between 39^0 F and 61^0 F.

Summer flounder (*Paralicthys dentatus*) –

Adults: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where adult summer flounder were collected. Generally, summer flounder inhabit shallow coastal and estuarine waters during the warmer months and move offshore on the outer continental shelf at depths of 500 feet in colder months. Inshore, EFH is the estuaries where summer flounder were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones.

Scup (*Stenotomus chrysops*) –

Juveniles: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where juvenile scup were collected. Generally, juvenile scup are found in water temperatures greater than 45^0 F and where salinities are greater than 15 ppt. Inshore, EFH is the estuaries where scup were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones. Juvenile scup are generally found in water temperatures greater than 45^0 F and where salinities are greater than 15 ppt. Juvenile scup, in general during the summer and spring are found in estuaries and bays between Virginia and Massachusetts. They are found in association with various sands, mud, mussel and eelgrass bed type substrates.

Adults: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where adult scup were collected. Wintering adults (November through April) are usually offshore, south of New York to North Carolina, in waters above 45^0 F. Inshore, EFH is the estuaries where scup were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones.

Black sea bass (*Centropristus striata*) –

Juveniles: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where juvenile black sea bass were collected. Temperature preference is for areas warmer than 6^0 F with salinities greater than 18 ppt. Juvenile black sea bass are found in association with rough bottom, shellfish, and eelgrass beds, man-made structures in sandy-shelly areas; offshore clam beds and shell patches may also be used during the winter. They are found in coastal areas between Massachusetts and Virginia, but they winter offshore from New Jersey and south. Inshore, EFH is the estuaries where black sea bass were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones. Juveniles are found in the estuaries in the summer and spring.

Surf clam (*Spisula solidissima*) –

Juveniles and adults: Throughout the substrate to a depth of three feet within federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of the area where surf clams were caught. Surf clams generally occur from the beach zone to depth of about 200 feet, but beyond about 125 feet abundance is low.

Ocean quahog (*Artica islandica*) –

Juveniles and Adults: Throughout the substrate to a depth of three feet within Federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of the area where ocean quahogs were caught. Distribution in the western Atlantic ranges in depths from 25 feet to about 800 feet. Ocean quahogs are rarely found where bottom water temperatures exceed 65^0 F, and occur progressively further offshore between Cape Cod and Cape Hatteras.

Spiny dogfish (*Squalus acanthias*) –

Juveniles: EFH ranges from the Gulf of Maine through Cape Hatteras, North Carolina across the continental shelf in areas that encompass the highest 90% of the area where juvenile dogfish were collected. Generally, dogfish are collected in depths between 33 feet and 1,280 feet and temperatures between 37^0 F and 68^0 F. EFH is also the “seawater” portions of all estuaries where dogfish are common or abundant on the Atlantic coast, from Passamaquoddy

Bay, Maine to Cape Cod Bay, Massachusetts, generally in water temperatures ranging between 37^0 F and 82^0 F.

Adults: EFH ranges from the Gulf of Maine through Cape Hatteras, North Carolina across the continental shelf in areas that encompass the highest 90% of the area where adult dogfish were collected. Generally, dogfish are collected in depths between 33 feet and 1,476 feet and temperatures between 37^0 F and 66^0 F. EFH is also the "seawater" portions of all estuaries where dogfish are common or abundant on the Atlantic coast, from Passamaquoddy Bay, Maine to Cape Cod Bay, Massachusetts, generally in water temperatures ranging between 37^0 F and 82^0 F.

Bluefin tuna (*Thunnus thynnus*)

Juveniles and subadults: All inshore and pelagic surface waters warmer than 12^0 C of the Gulf of Maine and Cape Cod Bay from Cape Ann, east including waters of the Great South Channel; continuing south to and including Nantucket Shoals to off Cape Hatteras, North Carolina. In pelagic surface waters warmer than 12^0 C between the 25 to 200 meter isobaths.

Adults: In pelagic waters of the Gulf of Maine from the 50 m isobath to the EEZ boundary, including the Great South Channel, then south of Georges Bank to 39^0 N from the 50 m isobath to the EEZ boundary; also, south of 39^0 N, from the 50 m isobath to the 2,000 m isobath to offshore Cape Lookout, North Carolina at 34.5^0 N.

Atlantic butterfish (*Peprilus triacanthus*)

Eggs: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where butterfish eggs were collected. The "mixing" and/or "seawater" portions of all the estuaries where butterfish are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish eggs are collected from shore to 6000 feet and in temperatures between 52^0 F and 63^0 F.

Larvae: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where butterfish larvae were collected. The "mixing" and/or "seawater" portions of all the estuaries where butterfish are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish larvae are collected from 33 feet to 6000 feet and in temperatures between 48^0 F and 66^0 F.

Juveniles: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where butterfish juvenile were collected. The "mixing" and/or "seawater" portions of all the estuaries where butterfish are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish larvae are collected from 33 feet to 1200 feet and in temperatures between 37^0 F and 82^0 F.

Adults: Pelagic waters found over the continental shelf, from the Gulf of Maine through Cape Hatteras in areas that encompass the highest 75% of the catches where butterfish adults were collected. The “mixing” and/or “seawater” portions of all the estuaries where butterfish are “common”, “abundant”, or “highly abundant” on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, adult butterfish are collected in depths from 33 feet to 1200 feet and in temperatures between 37^0F and 82^0F.

Atlantic mackerel (*Scomber scombrus*)

Eggs: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina; in areas that encompass the highest 75% of the catch where Atlantic mackerel eggs were collected. EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, Atlantic mackerel eggs are collected from shore to 50 feet and temperatures between 41^0 F and 73^0 F.

Larvae: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina; in areas that encompass the highest 75% of the catch where juvenile Atlantic mackerel were collected in NEFSC trawl surveys. EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, Atlantic mackerel larvae are collected in depths between 33 feet to 425 feet and temperatures between 43^0 F and 72^0 F.

Juveniles: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina; in areas that encompass the highest 75% of the catch where juvenile Atlantic mackerel were collected in NEFSC trawl surveys. EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, juvenile Atlantic mackerel are collected from shore to 1,050 feet and temperatures between 39^0 F and 72^0 F.

Adults: EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina; in areas that encompass the highest 75% of the catch where adult Atlantic mackerel were collected in NEFSC trawl surveys. EFH is also the "mixing" and/or "seawater" portions of all the estuaries where Atlantic mackerel are "common", "abundant", or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, adult Atlantic mackerel are collected from shore to 1,250 feet and temperatures between 39^0 F and 61^0 F.

Summer flounder (*Paralicthys dentatus*)

Adults: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where adult summer flounder were collected. Generally, summer flounder inhabit shallow coastal and estuarine waters during the warmer months and move offshore on the outer continental shelf at depths of 500 feet in colder months. Inshore, EFH is the estuaries where summer flounder were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones.

Scup (*Stenotomus chrysops*)

Juveniles: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where juvenile scup were collected. Generally, juvenile scup are found in water temperatures greater than 45^0 F and where salinities are greater than 15 ppt. Inshore, EFH is the estuaries where scup were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones. Juvenile scup are generally found in water temperatures greater than 45^0 F and where salinities are greater than 15 ppt. Juvenile scup, in general during the summer and spring are found in estuaries and bays between Virginia and Massachusetts. They are found in association with various sands, mud, mussel and eelgrass bed type substrates.

Adults: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where adult scup were collected. Wintering adults (November through April) are usually offshore, south of New York to North Carolina, in waters above 45^0 F. Inshore, EFH is the estuaries where scup were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones.

Black sea bass (*Centropristus striata*)

Juveniles: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where juvenile black sea bass were collected. Temperature preference is for areas warmer than 6^0 F with salinities greater than 18 ppt. Juvenile black sea bass are found in association with rough bottom, shellfish, and eelgrass beds, man-made structures in sandy-shelly areas; offshore clam beds and shell patches may also be used during the winter. They are found in coastal areas between Massachusetts and Virginia, but they winter offshore from New Jersey and south. Inshore, EFH is the estuaries where black sea bass were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones. Juveniles are found in the estuaries in the summer and spring.

Adults: North of Cape Hatteras, EFH is the demersal waters over the continental shelf from the Gulf of Maine to Cape Hatteras, in the highest 90% of the area where adult black sea bass were collected. Wintering adults (November through April) are usually offshore, south of

New York to North Carolina. Temperatures above 6^0 F seem to be the minimum requirements. Structured habitats (natural and man-made), sand and shell are substrate preferences. Inshore, EFH is the estuaries where adult black sea bass were identified as being common, abundant, or highly abundant for the “mixing” and “seawater” salinity zones. Black sea bass are generally found in estuaries from May through October.

Surf clam (*Spisula solidissima*)

Juveniles and adults: Throughout the substrate to a depth of three feet within federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of the area where surf clams were caught. Surf clams generally occur from the beach zone to depth of about 200 feet, but beyond about 125 feet abundance is low.

Bluefin tuna (*Thunnus thynnus*)

Juveniles and subadults: All inshore and pelagic surface waters warmer than 12^0 C of the Gulf of Maine and Cape Cod Bay from Cape Ann, east including waters of the Great South Channel; continuing south to and including Nantucket Shoals to off Cape Hatteras. In pelagic surface waters warmer than 12^0 C between the 25 to 200 meter isobaths.

PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

APPENDIX Q
ENDANGERED SPECIES ASSESSMENT

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

December 9, 2013

Engineering/Planning Division
Evaluation Branch

John Bullard
Northeast Regional Administrator
NOAA Fisheries
Northeast Regional Office
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Dear Mr. Bullard:

This letter is to conclude informal consultation under Section 7 of the Endangered Species Act (ESA) concerning the potential effects to listed species that could occur from the proposed Portsmouth Harbor and Piscataqua River Upper Turning Basin Expansion Navigation Improvement Project, in New Hampshire, and Maine. The project will require the dredging of approximately 728,000 cubic yards (cy) of mostly coarse sand and gravel in the Piscataqua River in Maine, and New Hampshire, in order to widen the upper turning basin from 800 feet to approximately 1,200 feet at a depth of 35 feet mean lower low water (MLLW). In addition, approximately 25,200 cy of bedrock ledge will need to be removed. The dredging will be accomplished using a mechanical dredge, with the ledge removal likely requiring blasting. The dredged material will be beneficially used as nourishment by placement at four nearshore areas off beaches in Wells, Maine; and Salisbury, Newbury and Newburyport, Massachusetts. The ledge rock removed will be placed at an ocean site located seaward of the three nautical mile limit of the territorial sea in Federal waters, just northeast of the Isle of Shoals (IOS-N, see Figure 1). This site is in water approximately 250 to 310 feet deep. The widening of the turning basin will allow vessels up to 800 feet in length to turn without the risk of grounding.

In addition to the material described that would be removed as part of the improvement project, approximately 7,800 cy of maintenance material within the existing turning basin limits and channel upstream of Frankfort Island could be removed concurrently if it meets the suitability requirement for placement at the nearshore placement sites. Testing of the maintenance material for suitability for placement in these nearshore areas would occur in the next project phase (Design Phase). All other maintenance material removed from the river over the several decades since the 35-foot deepening has been clean sandy material. It is anticipated that construction will take about six months to complete and is planned to be done during the months of mid-October to mid-April with all blasting completed no later than March 31 in the year that funding becomes available.

Please recall your letter of November 15, 2013 as well as letters from Peter Colosi (September 2, 2011) and from Louis Chariella (May 27, 2008) from your agency, concerning this project and its potential effects to listed species. As noted in your letters, several species protected under the ESA may be present in the proposed dredging and disposal areas at some time during the year and could be affected by the proposed project. These include the Federally endangered shortnose sturgeon (*Acipenser brevirostrum*), as well as the possibility of four Distinct Population Segments (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) which are listed as endangered (New York Bight, Chesapeake Bay, Carolina, and South Atlantic) and one DPS of Atlantic sturgeon listed as threatened (Gulf of Maine). Also, as stated in your letter of September 2, 2011, seaward migrating juvenile Gulf of Maine (GOM) DPS Atlantic salmon (*Salmo salar*) (listed as Federally endangered) have been recorded by acoustic telemetry moving southward toward the vicinity of the proposed Isles of Shoals Disposal area (IOS-N). In your letter of November 15, 2013, you state that consultation under Section 7 of the ESA would be required for this project, and that we should submit an effects assessment on listed species and mitigation strategies with our request for consultation.

The information presented in the following pages constitutes our assessment of effects which we believe will sufficiently show that the proposed navigation improvement project may affect, but not likely adversely affect the Federally endangered shortnose sturgeon; the Federally endangered Atlantic Bight DPS, Chesapeake Bay DPS, Carolina DPS, South Atlantic DPS, and the Federally threatened Gulf of Maine DPS of Atlantic sturgeon; the Federally endangered GOM DPS of Atlantic salmon; as well as listed whales or sea turtles that may occur in the vicinities of the proposed dredging and disposal areas. If you need any further information you may contact Ms. Catherine Rogers at catherine.j.rogers@usace.army.mil or phone (978) 318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Portsmouth Harbor and Piscataqua River Upper Turning Basin Expansion Navigation Improvement Project

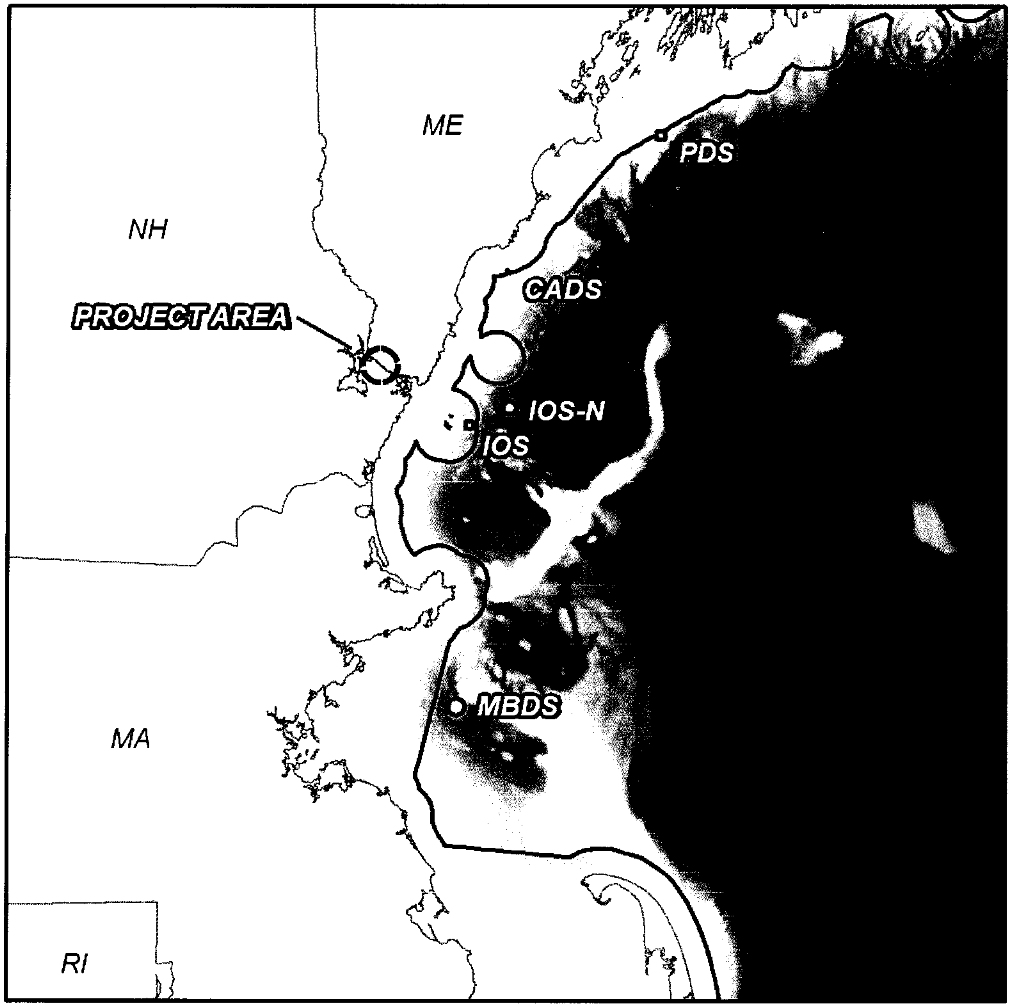
Please find below our discussion of the Federally listed species that may occur in the proposed project dredge and placement areas. Figure 1 shows the location of the alternative placement locations mentioned above in relation to the dredge area.

Shortnose Sturgeon

As stated in your letter of November 15, 2013, "federally endangered shortnose sturgeon (*Acipenser brevirostrum*) occur along the U.S. Atlantic coast. It is thought that shortnose sturgeon were once historically abundant in the Piscataqua River; however, the river does not currently support a known spawning population of shortnose sturgeon. Available information indicates that shortnose sturgeon making coastal migrations within the Gulf of Maine (i.e. between the Merrimack and Kennebec Rivers) make at least occasional short visits to Great Bay. Species presence was recently confirmed through the detection of four tagged shortnose sturgeon by acoustic receivers placed in Great Bay (Micah Kieffer, personal conversation, 2013). Based on the pattern of detections it is thought that shortnose sturgeon visit Great Bay at least during the spring and fall. Detections in the Bay indicate that individual sturgeon may be spending several hours to a few weeks in the area; however the limited number of receivers and their arrangement in the Bay makes any assessment of sturgeon presence in the river or in proximity to the dredging and blasting area difficult. Habitat within the area to be dredged appears to be consistent with shortnose sturgeon foraging habitat; given that, combined with the detection of sturgeon in the Bay, it is reasonable to expect that at least some individual shortnose sturgeon will be present in the river from the spring through the fall and may be engaged in foraging. There is no recent targeted study investigating shortnose sturgeon habitat use and behavior in the Piscataqua River. Based upon the life history characteristics of shortnose sturgeon, the Piscataqua River could serve as an overwintering area. However, current detections in Great Bay have not indicated shortnose sturgeon overwintering behavior."

General Description of Shortnose Sturgeon/Life History - Although information on shortnose sturgeon in the Piscataqua River is limited, there is information on shortnose sturgeon populations in other river systems along the Atlantic coast, including the Kennebec and Merrimack Rivers which are located approximately 70 and 20 miles (respectively) from the Piscataqua River, as well populations in the Penobscot and Connecticut Rivers which are located 100 or more miles from the Piscataqua River. It is presumed that information on feeding, migratory, and overwintering behavior that is known from these rivers is applicable in determining the possibility of this species occurring in the proposed Piscataqua River dredging area. In addition, as noted in your letter, it is believed that the individual shortnose sturgeon detected in Great Bay may have been migrating between the Kennebec and Merrimack Rivers.

Shortnose sturgeon inhabit riverine, estuarine, and nearshore marine waters (Dadswell, et.al. 1984). They are most commonly found in productive mesohaline environments with salinities between 1‰ and 20‰ usually in and around the salt-wedge portion of estuaries. Shortnose sturgeon are considered anadromous; but spend considerable amount of time in freshwater. The species appears to be estuarine anadromous in the southern part of its range, but in some northern rivers it is "freshwater amphidromous", i.e., adults spawn in freshwater but regularly enter saltwater habitats during their life (Kieffer and Kynard 1993 as cited in NOAA,



PDS=Portland Disposal Site; CADS=Cape Arundel Disposal Site; IOS-N=Isle of Shoals North; IOS=Isle of Shoals; MBDS=Massachusetts Bay Disposal Site

FIGURE -1. Location of Alternative Placement Sites for Dredged Material

1998). However, some shortnose sturgeon, such as the landlocked population in the Connecticut River, spend all their time in freshwater (Taubert and Reed, 1978). Another shortnose sturgeon population in the Connecticut River has been documented within the estuary and lower reaches of the Connecticut River throughout June, July, and into August as well as other additional sites further upstream (Savoy, 1989). Adult shortnose sturgeon in the Merrimack River, the Saint John River and the Connecticut River remain in freshwater for years, although some fish spend time in saline waters (Kieffer and Kynard, 1993). Generally, the within-river distributions of adult shortnose and subadult Atlantic sturgeon in Northeast Rivers are correlated with salinity, where shortnose sturgeon occupy freshwater reaches and subadult Atlantic sturgeon occupy saline reaches (Kieffer and Kynard, 1993).

Shortnose Sturgeon Spawning - Shortnose sturgeon populations spawn during the spring of each year, although this may not always be a yearly occurrence for every fish. Based on limited data, females spawn every three to five years, while males spawn approximately every two years. The spawning period is estimated to last from a few days to several weeks **(**NMFS, 2004**)**. Spawning begins in late winter/early spring in southern rivers along the east coast and in mid to late spring in northern rivers when the freshwater temperatures increase to 8-9^{0}C. Temperature is probably the major factor affecting spawning (Dadswell, et.al., 1984). Spawning has been reported to occur between 10^0 and 12^{0}C in the Saint John River in New Brunswick (Dadswell, 1979), between 12^0 and 15^{0}C in the Connecticut River in Massachusetts (Taubert, 1980) and between 12^0 and 15^{0}C in the Connecticut River in Connecticut (Buckly and Kynard (1985). An overall temperature range for shortnose sturgeon spawning as reported by Crance (1986) is between 10^0 and 15^{0}C. Shortnose sturgeon quickly leave the spawning grounds for summer foraging areas when temperatures exceed 15^{0}C (Squiers et al., 1982). Spawning habitat consists of gravel/boulder substrate in riverine habitat, as well as sand and gravel. As noted in your letter, although it is thought that shortnose sturgeon were once historically abundant in the Piscataqua River; the river does not currently support a known spawning population of shortnose sturgeon.

Overwintering - Shortnose sturgeon over-wintering sites are discrete and generally occur in deep areas of lakes and river channels or in halocline regions of the lower estuary (Dadswell, 1979). In the Saint John estuary in New Brunswick, overwintering sites are characterized by 20‰ salinity and water temperatures between 2^0 and 13^{0}C. These areas contained primarily non-ripening adults, stage IV males and large juveniles. The remaining portion of the population, including ripening adults, some non-ripening adults, and juveniles, overwintered in freshwater near the spawning grounds. Dadswell (1979) described a freshwater overwintering site in the Saint John River with water depths greater than 10 meters, moderate tidal currents, and water temperatures between 0^0 and 2^{0}C. This differs from the overwintering site in the Merrimack River where fish tend to aggregate in an area that narrows to 180 meters wide, with gently sloping banks and depths less than four meters (Kieffer and Kynard, 1993). It should be noted that this area of the Merrimack River is located approximately three miles upstream from the area of maximum saltwater penetration.

Migratory Behavior - In the northern extent of their range, shortnose sturgeon exhibit three distinct movement patterns, which are associated with spawning, feeding and overwintering activities (NOAA, 1998). In the Kennebec River system, general movement of shortnose sturgeon appears to be a composite of both the spawning migration and feeding migration (Squires, et.al., 1982). In addition, shortnose sturgeon seasonally move to and from overwintering areas (Squires, 2001). Water temperatures of 6^0 and 8^0 C appear to trigger a portion of the population that is ripe, and possibly some non-ripe fish to migrate upstream to the spawning grounds (in rivers where the overwintering sites are downstream from the spawning sites). The number of shortnose sturgeon peaks on the spawning grounds at water temperatures of 7.5^0 to 14.5^0 C (Squires, et.al., 1982). These water temperatures occur from mid-April to mid-May, depending on weather and river flows. In addition, although from previous studies shortnose sturgeon were not known to participate in coastal migrations (Dadwsell et al.1984, cited in NMFS, 2004 and NOAA, 1998), recent information has shown migration of acoustically tagged shortnose sturgeon moving between the Penobscot and Kennebec Rivers (Fernandes et al, 2008), and as noted in your letter above, the shortnose sturgeon tracked in the Piscataqua River were believed to be moving between the Kennebec and Merrimack Rivers.

Feeding/Foraging (Adults and Juveniles) – Shortnose sturgeon are benthic omnivores but have also been observed feeding off plant surfaces (Dadswell et al. 1984 in NMFS, 1998). Adult shortnose sturgeon in the Saint John estuary foraged on sand/mud or mud substrate with emergent macrophyte vegetation in 5-10 m depths in summer and overwintered in deep water with mud substrate. Adults captured in freshwater foraged in backwaters of estuarine lakes with aquatic vegetation or on mud substrate along river banks (Dadswell 1979). Kennebec and Androscoggin River adults foraged during the summer in Montsweag Bay, in tidal mud-flats with 18-25 ppt salinity, while tolerating rapid salinity changes (~ 10 ppt salinity/two hours) (McCleave et al. 1977). Other adult sturgeon in the estuary system used shallow and deep tidal channels (salinity of 0-21 ppt), some of which were surrounded by aquatic vegetation (Squiers and Smith 1979; Squiers et al. 1981).

Feeding studies of shortnose sturgeon in the Connecticut River showed differences in feeding between cold and warmwater periods, with fish sampled during coldwater periods showing only trace amounts of food, supporting the life history strategy of decreased activity as temperatures approached winter conditions (Savoy and Benway, 2004 in NMFS Biological Assessment). In the Connecticut and Merrimack Rivers, the "concentration areas" used by fish were reaches where natural or artificial features cause a decrease in river flow, possibly creating suitable substrate conditions for freshwater mussels (Kieffer and Kynard 1993), a major prey item for adult sturgeon (Dadswell et al. 1984 in NMFS 1998).

In the summer, foraging adults in the Connecticut River prefer curved or island reaches, not straight runs. Connecticut River sturgeon appear to prefer gravel and rubble substrate in summer, but sand in winter. Most adult sturgeon occur in slightly deeper water during the day than at night. In daytime, sturgeon seek regions with bottom water velocities of 0.25-0.5 cm/s, and illumination levels <2,555 lx (from NMFS, 1998).

Shortnose Sturgeon in Dredging Area - As noted in your November 2013 letter referenced above, shortnose sturgeon could potentially use the Piscataqua River as an overwintering area; however there have been no indications of overwintering activity in the river. Based upon the life history information presented above from other Northeast rivers in close proximity to the Piscataqua, it appears that shortnose sturgeon overwintering areas have generally been associated with deeper areas of the rivers, with reduced salinities, and moderate tidal currents. This does not appear to be the case for the dredging area in the Piscataqua River.

According to Jones (2000), the Piscataqua River is one of the fastest flowing tidal waterways among commercial ports in the northeastern United States. The average current velocity at full strength in the lower Portsmouth Harbor varies from about 2.6 to 4.0 knots. Strong tidal currents and mixing throughout the estuary limit vertical stratification during most of the year. Partial stratification may occur during periods of intense freshwater runoff, particularly at the upper tidal reaches of rivers entering the estuary. A horizontal gradient of decreasing salinity exists from the mouth of the harbor to the tidal reaches of the tributaries and the upper portions of Great Bay. The range of this salinity gradient (0-30 ppt) depends on tidal cycle, season and rainfall conditions (Jones, 2000). Therefore the areas of reduced salinity in the Piscataqua River would most likely occur in areas upstream, rather than in the proposed dredging area, which is relatively close to the mouth of the river compared to the upstream areas in Great Bay. Based upon the above flow and salinity characteristics of the Piscataqua River, it would appear that the actual dredging area would not likely be used by shortnose sturgeon for overwintering. Areas of Great Bay upstream from the dredging area would be more likely overwintering areas for this species. Therefore, as noted in your letter of 2013, the dredging area would only be considered a potential migratory corridor for both shortnose and Atlantic sturgeon.

Your letter also notes that habitat within the area to be dredged appears to be consistent with shortnose sturgeon foraging habitat, and that combined with the detection of sturgeon in the Bay it is reasonable to expect that at least some individual shortnose sturgeon may be present in the river from the spring to the fall and may be engaged in foraging.

Based upon foraging information noted above from the Merrimack and Connecticut Rivers, it appears that foraging shortnose sturgeon are more concentrated in areas of decreased river flow that possibly create suitable substrate conditions for freshwater mussels, which are a major prey item for sturgeon.

The proposed dredge area in the Piscataqua River is characterized by swift currents, which would less likely be used by shortnose sturgeon for foraging, and as noted previously salinities are assumed to be more saline than fresh. The area is also frequently used for turning large cargo vessels with tug assist, subjecting the turning basin and adjacent areas to heavy prop wash and vessel movement effects (wakes, drawdown, and currents). However, there are tidal flats along the shore in the vicinity of the proposed dredge area that may provide suitable forage habitat for shortnose sturgeon and as noted above for the Kennebec and Androscoggin River, adult shortnose sturgeon foraged during the summer in tidal mud-flats with salinities ranging from 18-25 ppt while being able to tolerate rapid salinity changes (~10 ppt salinity/two hours) (McCleave et al. 1977). Therefore, the flats adjacent to the dredging area may be suitable forage habitat for shortnose sturgeon in the Piscataqua River. However, the information also notes that in the Kennebec River estuary, other adult sturgeon in the estuary system used shallow and deep tidal channels (salinity of 0-21 ppt), some of which were surrounded by aquatic vegetation (Squiers and Smith 1979; Squiers et al. 1981), so it may be possible that the actual dredging area (the expanded turning basin) could provide some forage habitat, particularly since shellfish have been found in this area.

From information noted above, it also appears that feeding/foraging activity of shortnose sturgeon is typically higher during the summer months than during the winter. As noted, studies of shortnose sturgeon from the Connecticut River showed that fish sampled during coldwater periods showed only trace amounts of food, compared to (those sampled in the summer). Since the dredging activities are proposed for the cooler months when feeding activity of shortnose sturgeon is reduced, it would appear that the likelihood of shortnose sturgeon actively feeding in vicinity of the proposed dredging area would be less than during the warmer months. It is more likely that shortnose sturgeon would be occupying overwintering areas during this time rather than foraging along the tidal flats of the Piscataqua River.

Effects of Dredging on Shortnose Sturgeon - The proposed dredging activities at the Portsmouth Harbor upper turning basin are planned to be conducted during the late fall/early winter and late winter/early spring, during the months of mid-October to mid-April. Drilling and blasting activities would occur during winter with all blasting completed no later than March 31. Information that you provided in your letter indicated that shortnose sturgeon were detected in the Piscataqua River during the spring and fall. Therefore it is not likely that shortnose sturgeon will be in the proposed dredging and blasting area during the bulk of the dredging and blasting activities. In addition, based upon the information noted above concerning overwintering, it is not likely that the actual dredging area would be an overwintering site for shortnose sturgeon. Also, due to the time of year that the construction will occur, it does not appear that shortnose sturgeon would be foraging in that area during the time of construction. However it is possible that shortnose sturgeon migrating to and from the Great Bay estuary during the early spring and late fall could encounter the construction activities and be affected by them.

Potential impacts that could occur from dredging and disposal include physical injury or death from direct contact with the mechanical dredge itself, burial from dredged material disposal, and injury to larvae or juveniles (if present) from dredging operations. In addition, lethal interactions have occurred between sturgeon and mechanical dredges (NMFS, 2004). Dredging could also have a beneficial impact on sturgeon by creating deeper channel regions which both juveniles and adults seem to prefer (Hastings, 1983).

Effects of Mechanical Dredge/Interaction with Dredging Equipment - A mechanical dredge is planned to be used for the Piscataqua River dredging project. Although both shortnose and Atlantic sturgeon have been reported to have been killed by mechanical dredges (NMFS, 2004), the fact that mechanical dredges move more slowly than other types of dredging equipment (allowing any fish that may be in the direct path of the dredge bucket to avoid it) reduces the probability of lethal interaction between the fish and the dredge bucket. A Biological Opinion prepared by your agency for dredging of the Kennebec River at Bath Iron Works (BIW) with a mechanical dredge, states that: "Based on the best available information, the risk that a shortnose sturgeon would be captured in the slow moving dredge bucket is relatively low. This is evidenced by the small number of shortnose sturgeon captured during dredging operations at BIW since 1997, despite the occurrence of over 10 dredge events, with dredging happening nearly every year." (NMFS, 2009). Given the fact that shortnose sturgeon are less likely to be in the dredging area during the time of active dredging and lower risk of contact with a mechanical dredge, the likelihood of a lethal interaction between a sturgeon and the dredge in the Piscataqua River during the active time of dredging would appear to be low.

Water Quality Effects - Dredging operations cause sediment to be suspended in the water column. This results in a sediment plume in the water, typically radiating from the dredge site and decreasing in concentration as sediment falls out of the water column as distance increases from the dredge site. Suspended sediments can clog and harm the gills of fish, degrade or eliminate spawning and rearing habitats, and impede feeding which negatively affects the growth and survival of anadromous species (US EPA 2003 in NMFS, 2010). Elevated suspended sediments have also been shown to disrupt the schooling behavior of migratory fish (Wildish and Power 1985; Chiasson 1993). In addition dredging can result in mortality of benthic species through direct impact with the dredging equipment; egg and larval stages of fish may be most susceptible to such impacts (Newcombe and Jensen 1996, as cited in NMFS, 2011 Letter for Middletown, CT). In addition, your letter of November 15, 2013 (referenced above) notes the following potential dredging related impacts on fishery resources, which will need to be addressed in our assessment:

a) displacing benthic organisms during dredging and after disposal;
b) interference with respiration;
c) decreased feeding in finfish and invertebrates;
d) temporary dispersal of benthic prey;
e) burial of habitat that serves as foraging and shelter sites;
f) potential burial of demersal and benthic species;
g) interrupted or delayed migration; and
h) mortality of species at vulnerable life stages, such as eggs, larvae, and juveniles.

You also note that total suspended solids (TSS) are most likely to affect sturgeon if a plume causes a barrier to normal behaviors or if a thick sediment layer settles on the bottom affecting their prey. In addition, since the proposed dredging is expected to take several months to complete, the suspended sediment is likely to persist throughout each working day. While the river is nearly 3000 feet wide at the upper turning basin, two miles downstream it narrows to under 700 feet at Atlantic Heights near the I-95 Bridge. Therefore our impact assessment will need to consider how far downstream the sediment plume will extend, how persistent it will be and what impact it may have on individuals present in this narrower region of the river.

The following is excerpted from the Portsmouth Harbor and Piscataqua River Upper Turning Basin Expansion Navigation Improvement Project, New Hampshire and Maine, Draft Environmental Assessment Finding of No Significant Impact (FONSI) and Clean Water Act Section 404 (B)(1) Evaluation, Section VII A.1, Environmental Consequences Section, as well as from the Environmental Assessment for the Kennebec River Federal Navigation Project, in order to address the above potential impacts of turbidity and TSS on fisheries resources.

Water Quality - Ward (1994) measured the suspended sediment concentrations in the lower estuary (Portsmouth Harbor) and near the mid-estuary (Dover Point) over a number of tidal cycles in July, 1992. The concentrations were low and varied little across the channel and with depth in Portsmouth Harbor. The total suspended sediment concentrations ranged from 1.1 to 3.7 mg/l over a complete tidal cycle at the mouth of the Harbor and from 1.5 to 5.9 mg/l at a cross-section near Seavey Island. Similarly, Shevenell (1974) found suspended sediment concentrations were generally less than 3 mg/l at a station in the mouth of the Piscataqua River in 1972-1973, except during winter when concentrations exceeded 6 mg/l. According to Shevenell (1974), the main sources of particulate matter in the coastal shelf waters adjacent to the Piscataqua River were biological productivity, resuspension of bottom sediments and estuarine discharge from the Piscataqua River. Shevenell (1974) also noted particulate matter concentrations fluctuated seasonally and spatially due to meteorological effects (e.g., storms, high river discharges). Total suspended sediment concentrations were higher in the mid-estuary, ranging from 2.4 to 12.7 mg/l over a tidal cycle at a cross-section at Dover Point in July, 1992 (Ward, 1994). The increase in total suspended sediments in the mid-estuary over the concentrations measured near the mouth reflects the impact of higher suspended sediment inputs from the upper estuary (e.g., Great Bay, upper Piscataqua River, tributaries). The spatial pattern of the total suspended sediment concentrations from the mouth of the estuary in Portsmouth to the upper estuary is reflected in the results of transects run in July, 1992 (Ward, 1994). The concentrations measured at about high tide or early ebb ranged from 1.3 mg/l at the mouth to 17.7 mg/l at the entrance to the Squamscott River. Concentrations along the same transect run at about low tide and during the early flood ranged from 2.4 mg/l to over 50 mg/l at the Squamscott River.

The amount of turbidity generated during dredging operations depends on the sediment characteristics, ambient currents and the skill of the dredge operators. Dredging operations will have no significant impact on turbidity levels or water column chemistry, since the material is mostly clean sand and gravel. The removal of material from the expanded turning basin in the Piscataqua River will resuspend sediments into the water column. This will result in slight localized increases in turbidity during the dredging operation.

Although suspended solid concentrations at the cutterhead are usually less than that of the clam shell, barge overflow reintroduces fine sediment to the water column and turbidity impacts are generally less localized. Because of the coarse nature of the sediment (<l% fines) turbidity impacts associated with dredging are not likely to be significant.

The majority of the material from the expanded turning basin consists of coarse sand, and any overflow would therefore settle rapidly. Most would settle out in a matter of minutes. Applying Stokes settling equation to grain size data it can be shown that the average (50%) of the material would settle to the bottom within 460 feet based on a worse-case four knot current. The small amount of suspended sediments that would remain in the water column would not be expected to exceed natural turbidity levels typical of estuaries (see section V.B.1 of Portsmouth Harbor Piscataqua River Upper Turning Basin Navigation Improvement Project, New Hampshire, Maine Draft Environmental Assessment). The strong currents of the Piscataqua River may carry the turbidity plume beyond the immediate vicinity of the dredging area, but because of the minor amount of material likely to be re-suspended, the impact of any turbidity plume would likely be minimal.

The effects of dredging on the water column chemistry are likely to be minor. The material to be dredged is considered to be uncontaminated because water quality in the area is high and because the shoal area is a relatively high energy sandy environment with a low percentage of fines. Therefore little release of sediment contaminants into the water column is expected. Any release of contaminants would be quickly diluted by the tidal flushing in the area. There should be no degradation of Class B waters.

Although the duration and concentration gradients of suspended sediment plumes from dredging are dependent on numerous factors, such as specific dredge plant, sediment characteristics, and environmental conditions (Collins, 1995) studies of dredging operations from other rivers have shown that the turbidity effects of dredging sand decreases rapidly with distance from the dredging areas. These effects would decrease even more rapidly if the material is coarse sand and gravel as in the Piscataqua River. Since the dredged material from the river is coarse sand, with low silt content, very little turbidity is expected. Also, sandy material is generally not associated with high levels organic carbon or considered a carrier of contaminants (40 CFR 230.60 (a)), and dredging the sandy material from the channel is not likely to result in the release of nutrients or decreases in dissolved oxygen levels. Therefore since the material is expected to rapidly settle, it is unlikely that there would be any elevated levels of suspended sediment two miles downstream near the Piscataqua River Bridge that would negatively affect any sturgeon that could be migrating through that area. In addition, since most of the dredging would be occurring during the time of year when sturgeon were not detected, it would be even less likely for them to be affected by the dredging activities.

Effects on Marine Organisms - Potential impacts of dredging to marine organisms is restricted to physical effects, as dredging operations are not likely to have any effect on water column chemistry. Benthic organisms inhabiting the dredging area would be destroyed during the dredging process. Turbidity plumes from dredging may also impact adjacent habitat. The amount of impact would be dependent on the spatial and temporal size of the plume. As the material is generally coarse-grained sand and gravel, a large or substantial turbidity plume is not expected. Dredging is not expected to take longer than about five months and will occur during the colder months of the year when biological productivity is low. Recolonization following dredging should take place within a few months. Any temporary loss of fish foraging area would be extremely localized and short-lived.

The only commercial shellfish species of note that were recovered in the dredging area were the softshell clam and the blue mussel. This resource species would be impacted by direct removal of the individuals and their habitat. Softshell clams along the intertidal banks of the Piscataqua River would not be threatened by dredging operations as any increases in turbidity levels would be short-lived and extremely localized. Softshell clams spawn in the area during two periods, spring and late summer-fall (Jones, 2000). Blue mussels' peak spawning period is June through August (Jones, 2000). The new exposed substrate is expected to be similar to the existing substrate; thereby providing the same firm substrate for blue mussel settlement and softshell clam recruitment.

Therefore, it is unlikely that this would significantly affect shortnose sturgeon foraging habitat in the Piscatqua River in the vicinity of the dredging operations. In addition, based upon the preferred foraging habitat for shortnose sturgeon, it would appear that during the summer months (when most foraging/feeding activity occurs) the tidal flats adjacent to the dredging area would more likely be used by these fish. Since these areas will not be dredged, the only effects to benthic prey species potentially utilized by sturgeon would be from elevated turbidities or suspended solids associated with the previous dredging activity, which are expected to be insignificant. In addition, areas of the actual dredged site where these benthic species have been killed are expected to recolonize rapidly. Since relatively few shortnose sturgeon have been detected in the Piscataqua River, any impacts to their food supply would appear to be insignificant and minor, considering the overall productivity of the Great Bay estuary upstream and adjacent areas of Piscataqua River.

Effects of Dredging on Shortnose Sturgeon Spawning, Eggs and Larvae – Since shortnose sturgeon are not known to spawn in the Piscataqua River, there would not be any effects on these life stages of this species resulting from the dredging operations.

Effects of Disposal Operations on Shortnose Sturgeon - As noted, four nearshore disposal sites will be used to dispose of the coarse grained material dredged from the Piscataqua River. These include the Wells nearshore disposal site in Maine, located approximately 31 miles from the dredging area; and the Salisbury Beach, Newbury and Newburyport nearshore disposal sites, near the Merrimack River, all located approximately 30 miles from the Piscataqua River dredging area. In addition, the Isle of Shoals-N site which will be used for the rock disposal is located approximately 20 miles from the dredging area. As noted in your November 15, 2013 letter, shortnose sturgeon that were detected in the Piscataqua River were believed to be migrating between the Kennebec and Merrimack Rivers. Since all of these nearshore disposal areas as well as the Isle of Shoals-N site are located between the Kennebec River and the Merrimack River, any shortnose sturgeon migrating between these two areas could potentially be affected by the disposal activities at these sites. Effects of the disposal of the coarse grained sand and gravel dredged from the Piscataqua River include the direct burial of benthic organisms at the disposal site, as well as the burial or direct contact of any fish species that may be foraging along the bottom with the material as it descends through the water column. Therefore any shortnose sturgeon in the immediate path of the descending dredge plume could be directly affected by the material as it descends from the scow. Also if these sites were used for foraging, then food items could be buried.

Studies conducted on sub-adult white sturgeon (*Acipenser transmontanus*) in the lower Columbia River in Washington at dredged material disposal areas have shown that "the rates of movement, depths used, and diel movement patterns of the white sturgeon showed little change over all periods" (i.e. of disposal activities) "suggesting that natural behaviors were not altered during and immediately after hopper dredge disposal operations" (Parsley et al. 2011). It is assumed that shortnose sturgeon would similarly be unaffected, being a similar species. In addition, most of the migratory activity of shortnose sturgeon appears to be during the spring and fall, and since most of the dredging activity is planned to occur during mid-October through mid-April, the likelihood of sturgeon being in these areas at the time of dredging is reduced.

Rock removed from the site is planned to be disposed at the Isle of Shoals disposal area. As noted in the letter from Peter Colosi referenced above, although acoustic receivers (GoMOOS buoy E01) in the vicinity of the Isle of Shoals have detected tagged Atlantic salmon and Atlantic sturgeon, no shortnose sturgeon were detected in the receiver closest to the Isle of Shoals-N site (GoMOOS Buoy B01). Although the letter mentions that migrating shortnose sturgeon could be in the area of the proposed disposal site, the closest buoy to that site has not detected any shortnose sturgeon or Atlantic salmon. In addition, since shortnose sturgeon have been detected migrating between river systems in the spring and fall, it is not likely that they will be in the vicinities of the disposal areas during the bulk of the construction period between mid-October through mid-April. Therefore, based upon the time of year of the shortnose sturgeon migrations reducing the likelihood of their being in any of the disposal areas during the time of disposal, and the fact that shortnose sturgeon were not detected at the Isles of Shoals buoy, as well as the information that shows other sturgeon species to be unaffected by disposal material, it would appear that the disposal of the Piscataqua River dredged material at the proposed nearshore and Isles of Shoals-N disposal sites would not be likely to adversely affect shortnose sturgeon.

Effects of Blasting on Shortnose Sturgeon in the Piscataqua River - Approximately 25,200 cy of rock could be blasted to remove it from the expanded turning basin to achieve required depths. Potential aquatic impacts associated with blasting include noise, thermal energy release, increased turbidity, damage to structures, and effects on aquatic life, all of which are expected to be minor and temporary in nature due to the precautions to minimize the shock wave. These impacts would be generated as a result of vibrations, explosion-induced surface water waves, or air overpressure. Measures to minimize impacts to resources during blasting operations will be employed and are noted below.

In your letter from November 15, 2013, you note that the use of explosives has the potential to result in injury or mortality of fish. Shortnose and Atlantic sturgeon within 500 feet of a detonation resulting in peak pressures of 120 psi and average pressure of 70 psi, would be exposed to noise and pressure levels that could cause adverse effects (see Moser 1999; Teleki and Chamberlain 1978; and Wiley *et al.* 1981). Based on studies completed by Moser (1999), peak pressure levels at, or below, 75.6 psi, and peak impulse levels at or below 18.4 psi-msec, will cause no injury or mortality to species of sturgeon, including Atlantic and shortnose sturgeon. You recommended that we design the blasting project to observe the above mentioned thresholds and also suggested the following mitigation techniques be used to facilitate the reduction of sound pressure:

1. Stemming and decking of individual charges;
2. Staggered detonation of charges in a sequential blasting circuit; and
3. Blasting during periods of slack tide and within a confined bubble curtain.

We concur with recommendations #1 and #2 above; due to the swift currents in the Piscataqua River, the use of a bubble curtain would not be practicable. We propose to further avoid and minimize potential blasting impacts to marine mammals and fish (i.e. shortnose sturgeon) by employing the methods discussed below:

a. Use of a fish detecting and startle system to avoid blasting when fish are present or transiting through the area, including placing the fish startle system on a separate boat;
b. Require the use of sonar and the presence of a fisheries and marine mammal observer;
c. Prohibiting blasting during the passage of schools of fish, or in the presence of marine mammals, unless human safety was a concern;
d. Using inserted delays of a fraction of a second per blast drill hole, and;
e. Placing material on top of the borehole (stemming) to deaden the shock wave reaching the water column.

In addition, blasting safety radii for marine mammals, sea turtles and Atlantic sturgeon were calculated for the Boston Harber Deep Draft Dredging project. These calculations were based upon peak pressure levels of less than 23 psi, which would avoid level B harassment of turtles and marine mammals, and would be more than protective of Atlantic and shortnose sturgeon (which as noted above is 75.6 psi). Using Coles equation (1948) modified for confined blasting (Hempen et al, 2007) safety radii were calculated based upon the total weight of the charges for blast. These same equations will be used to calculate safety radii for the Piscataqua River blasting. Since they are based upon the lower peak pressure of 23 psi which protects sea turtles and marine mammals, it is expected that they would be more than protective of shortnose sturgeon (see letter to John Bullard, NOAA Fisheries from ACOE, November 7, 2012 for further discussion).

Based on these calculations and analysis of effects on listed species. and the low probability of whales, sea turtles and Atlantic and sturgeon occurring in the project area during the time of active blasting, we believe that the blasting in the Piscataqua River would not likely adversely affect listed species, particularly sturgeon.

Atlantic sturgeon

In your letter of November 15, 2013 you note that several listed DPSs of Atlantic sturgeon may occur in the proposed dredging and disposal areas. These include the possibility of four Distinct Population Segments (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) which are listed as endangered (New York Bight, Chesapeake Bay, Carolina, and South Atlantic) and one DPS of Atlantic sturgeon listed as threatened (Gulf of Maine). The marine range for all five DPSs includes all marine waters, plus coastal bays and estuaries, from Labrador Inlet, Labrador, Canada, to Cape Canaveral, FL. The action area is within the range of all five DPSs; however, individuals in this area are most likely to originate from the GOM or NYB DPS.

Like shortnose sturgeon, the available information on the presence of Atlantic sturgeon in the Piscataqua River is extremely limited and is based only on the detection of Atlantic sturgeon by acoustic receivers in Great Bay. An Atlantic sturgeon tagged and released in the Merrimack River was detected by telemetry receivers in the Great Bay as recently as June 2012. The best available information indicates that suitable habitat for Atlantic sturgeon spawning and rearing does not occur in the lower Piscataqua River because of relatively high salinities. If suitable forage was present, it would be expected that occasional subadult Atlantic sturgeon could be present in the River while foraging between the spring and fall. Because of the lack of spawning and rearing habitat, the action area should only be considered a migratory corridor for both sturgeon species; but, since Atlantic sturgeon do not overwinter in their natal streams they may occur in the action area regardless of season or time of year.

General Description of Atlantic Sturgeon/Life History - Generally, the life history pattern of Atlantic sturgeon is that of a long lived, (approximately 60 years; Mangin, 1964; Stevenson and Secor, 1999), late maturing, estuarine dependent, anadromous species (in ASSRT, 2007). It can reach lengths of up to 14 feet (4.26 m) and weigh over 800 pounds (364 kg) (FR, 10/6/2010). Atlantic sturgeon are omnivorous benthic feeders and filter quantities of mud along with their food. The diets of adult sturgeon include mollusks, gastropods, amphipods, isopods and fish. Juvenile sturgeon feed on aquatic insects and other invertebrates (ASSRT, 2007).

Spawning - Atlantic sturgeon spawn in freshwater, but spend most of their adult life in the marine environment. Generally, spawning adults migrate upriver in the spring/early summer; February- March in southern systems, April-May in mid-Atlantic systems, and May-July in Canadian systems (Murawski and Pacheco 1977, Smith 1985, Bain 1997, Smith and Clugston 1997, Caron et al. 2002, in ASSRT, 2007). In addition, a fall spawning migration may occur in some southern rivers (Rogers and

Weber 1995, Weber and Jennings 1996, Moser et al. 1998). Atlantic sturgeon likely do not spawn every year, and multiple studies have indicated spawning intervals ranging from 1-5 years for males (Smith, 1985; Collins et al., 2000; Caron et al., 2002) and 2-5 years for females (Vladykov and Greeley, 1963; Van Eenennaam et al., 1996; Stevenson and Secor, 1999, in FR, 2010). Spawning is believed to occur between the salt front of estuaries and the fall line of large rivers, in flowing waters, with optimal flows ranging from 46-76 cm/s and depths from 11-27 m (Borodin, 1925; Leland, 1968; Scott and Crossman, 1973; Crance, 1987; Bain et al., 2000, in FR, 2010). Their highly adhesive eggs are deposited on the bottom substrate usually on hard surfaces such as cobble (Gilbert, 1989; Smith and Clugston, 1997, in FR, 2010). Eggs hatch in approximately 94 and 104 hours after deposition at temperatures of 20°–18° C respectively and the larvae are demersal after hatching (Smith et al., 1980 in FR).

Larval Development and Migration - After hatching, Atlantic sturgeon larvae move downstream to their rearing grounds during the yolk sac larval stage, which is completed in about 8-12 days (Kynard and Horgan, 2002 in ASSRT, 2007). Downstream movement occurs only during the night in the first half of their migration (Kynard and Horgan, 2002), and in the latter half of their migration during both day and night. During the first half of their downstream migration, the larvae use benthic structure such as gravel matrix for refuge during the day. The larvae continue downstream movement toward the estuary, transitioning to juveniles in the process and developing a tolerance for increased salinity. They may reside in the estuary as juveniles for months or years before migrating to the open ocean as sub-adults (Holland and Yelverton, 1973; Doevel and Berggen, 1983; Waldman et al., 1996a; Dadswell, 2006; in ASSRT, 2007).

Subadult and Adult Migration - The subadults move to coastal waters once they reach a size of approximately 76-92 cm (Murawski and Pacheco 1977, Smith 1985 in ASSRT, 1997) where populations undertake long range migrations (Dovel and Berggren 1983, Bain 1997, T. King supplemental data 2006 in ASSTR, 2007). When at sea, the adults mix with populations from other rivers, but return to their natal rivers to spawn as indicated from tagging records (Collins et al. 2000a, K. Hattala, NYSDEC, pers. comm. 1998 in ASSTR, 2007) and population genetic studies showing relatively low rates of gene flow (King et al. 2001, Waldman et al. 2002 in ASSTR, 2007). In addition, migratory and sub-adult Atlantic sturgeon as well as adult sturgeon are normally captured in shallow (10-50 m) nearshore areas dominated by gravel and sand substrate (Stein et al. 2004; from ASSRT 2007). Feeding Atlantic sturgeon are benthic feeders and typically forage on "benthic" invertebrates (e.g. crustaceans, worms, mollusks). (http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm)

The following information concerning habitat and depths at sea has been excerpted from Greene et al. (2009), Atlantic States Marine Fisheries Commission Atlantic Coast Diadromous Fish Habitat: A Review of Utilization, Threats, Recommendations for Conservation, and Research Needs concerning migration during non spawning season and depths at sea:

"Little is known about the habitat use of adult Atlantic sturgeon during the non-spawning season, particularly when the sturgeon return to marine waters (Bain 1997; Collins et al. 2000b). While at sea, adult Atlantic sturgeon have been documented using relatively shallow nearshore habitats (10 m to 50 m) (Laney et al. 2007; Stein et al. 2004). It is possible that individual fish select habitats in the same areas, or even possibly school to some extent (Bain et al. 2000; Stein et al. 2004; Laney et al. 2007)."

"Down-river/down-estuary migrations peak at the end of October in the Hudson (River) system. At this time, many juveniles overwinter in deep holes, while others leave the Hudson River and move south along the Atlantic coast (Dovel and Berggren 1983). In contrast, Moser and Ross (1995) found that juvenile sturgeon in the Cape Fear River, North Carolina, kept the same center of distribution near the saltwater freshwater interface year round. However, these fish were unable to move upriver because of the location of the Cape Fear Lock and Dam No. 1, just above the estuary (0.5 ppt interface) (P. Brownell, NOAA Fisheries, Southeast Regional Office, personal communication).

Depths at Sea - The greatest depth in the ocean at which Atlantic sturgeon have been reported caught was 75 m (Colette and Klein-MacPhee 2002). Collins and Smith (1997) report that Atlantic sturgeon were captured at depths of 40 m in marine waters off South Carolina. Stein et al. (2004) investigated data collected by on-board fishery observers from 1989-2000 to determine habitat preferences of Atlantic sturgeon. They found that Atlantic sturgeon were caught in shallow (<60 m) inshore areas of the Continental Shelf. Sturgeon were captured in depths less than 25 m along the Mid-Atlantic Bight, and in deeper waters in the Gulf of Maine (Stein et al. 2004). The Northeast Fisheries Science Center bottom trawl survey caught 139 Atlantic sturgeon from 1972-1996 in waters from Canada to South Carolina. They found the fish in depths of 7 m to 75 m, with a mean depth of 17.3 m. Of the fish caught, 40% were collected at 15 m, 13% at 13 m, and less than 5% at all the depth strata (NEFC, unpublished data, reviewed in Savoy and Pacileo 2003)." More recent information indicates that Atlantic sturgeon have been reported at depths of up to 300 m (Dave Bean, NMFS, personal communication).

Overwintering areas - As also reported in Greene et al (2009), "overwintering areas for adult and late juvenile Atlantic sturgeon include the nearshore areas off the Atlantic coast from the Gulf of Maine south to at least Cape Lookout, North Carolina (Stein et al. 2004; Laney et al. 2007). These areas provide Atlantic sturgeon with foraging grounds and habitat for most of the year (Johnson et al. 1997). Winter habitat occurs in coastal nearshore waters, which is expected to not be as limited as spawning habitats and inlets." In the Hudson River, some juvenile Atlantic sturgeon moving down estuary during late October will overwinter in deep holes, while others while others leave the Hudson River and move south along the Atlantic coast (Dovel and Berggren 1983 in Greene, 2009). In addition, as reported in Gilbert (1989) "Adult sturgeon are generally found in areas of little or no current throughout much of their lives, specifically during times when they are living in the lower parts of rivers, in estuaries, or in the ocean. This is particularly true for Atlantic sturgeon, which tend to occupy more saline environments than those inhabited by the shortnose sturgeon".

Feeding/Foraging - Juvenile Atlantic sturgeon in the Chesapeake Bay were found to prey on annelid worms, isopod, amphipods, chironomid larvae and mysids (Secor et al, 2000b in Greene, 2009). Connectict and Merrimack River Atlantic sturgeon showed a mix of amphipods and polychaetes (Kynard et al. 2000 in Greene, 2009). Juvenile Atlantic sturgeon in freshwater ate plant and animal matter, sludgeworms, chironomid larvae, mayfly larvae, isopods, amphipods and small bivalve mollusks. It was also stated that in marine waters, Atlantic sturgeon fed on mollusks, polychaete worms, gastropods, shrimps, amphipods, isopods, and small fish (particularly sand lances) (Scott and Crossman, 1973 in Greene, 2009). In addition, foraging often occurs at or near areas with submerged aquatic vegetation (SAV) or shellfish resources (NMFS, 2012, Letter from Daniel Morris).

Atlantic Sturgeon in the Dredging Area - As noted in your November 15, 2013 letter, Atlantic sturgeon are not believed to spawn in the Piscataqua River, and due to the lack of spawning and rearing habitat, the action area should only be considered a migratory corridor for both sturgeon species. However the letter also notes that due to the fact that Atlantic sturgeon do not overwinter in their natal streams, they may occur in the action area regardless of season or time of year. As noted in the information presented above, Atlantic sturgeon overwintering areas include nearshore areas off the Atlantic coast from the Gulf of Maine south to Cape Lookout North Carolina. Also in the Hudson River, overwintering areas include deep holes. In addition, Adult sturgeon are generally found in areas of little or no current throughout much of their lives, specifically when they are living in the lower parts of rivers, in estuaries or in the ocean.

Since the dredging area of the Piscataqua River is located in an area of high velocity currents, it would not likely be an overwintering area for Atlantic sturgeon. In addition, based upon the above information, it would appear that most of the overwintering areas for adults and late juvenile Atlantic sturgeon would be in nearshore areas off the coast. Since the dredging will occur from mid-October through mid-April, during the times that Atlantic sturgeon would already be at these overwintering areas, it is not likely that an overwintering Atlantic sturgeon would be in the area of active dredging. However, since Atlantic sturgeon migrations occur during the spring and fall, it is possible that during the late fall or early spring that Atlantic sturgeon moving through the area to or from the Great Bay Estuary could be affected by the dredging activities. However, no or minimal impact would be expected as the material is mostly coarse grained and any suspended sediment would be expected to settle quickly.

The above referenced letter also notes that if suitable forage was present in the dredging area of the Piscataqua River, then occasional sub-adult Atlantic sturgeon could be present in the area while foraging between the spring and fall. Since Atlantic sturgeon juveniles are known to feed on a variety of freshwater, estuarine and marine organisms, it is likely that these food items would be present in either Great Bay, or the tidal flats in the vicinity of the proposed dredging area. However, as noted in your letter, this would be likely between the spring and the fall. In addition, the most recent Atlantic sturgeon detection from Great Bay occurred during June of 2012. Since most of the dredging will occur in the late fall through the early spring, then the chances of an Atlantic sturgeon being in the area and being affected by the dredging operations would be assumed to be minimal. However, it is also possible that a late fall or early spring migrant through the river could come in contact with the dredging activities.

Effects of Dredging on Atlantic Sturgeon - The effects of dredging on Atlantic sturgeon would be similar to the effects of dredging on shortnose sturgeon discussed above, and include injury or mortality resulting from direct contact with the dredge, effects to all life stages of Atlantic sturgeon that could be in the vicinity from elevated levels of suspended sediment from re-suspension, as well as indirect effects to habitat and food supply resulting from the dredging and elevated suspended sediments. However, since Atlantic sturgeon are not believed to spawn in the Piscataqua River or areas upstream, there would not be any effects to spawning fish, eggs or larval forms, only on juveniles or adults that may be migrating through the area.

A mechanical dredge will be used for the dredging, which as noted above is less likely to take sturgeon than other types of dredges, particularly if these fish not expected to be present during the time of active dredging. The discussion of water quality effects on shortnose sturgeon resulting from dredging presented above would also address those same effects on Atlantic sturgeon. Generally, the levels of suspended sediments resulting from mechanical dredging of coarse grained sand and gravel would be expected to rapidly settle within short distance from the dredge and scow, therefore having minimal downstream effects. In addition, they would be unlikely to significantly raise the turbidities in the Piscataqua River and therefore not be expected to create a barrier to any up-migrating Atlantic sturgeon that could be in the area. Therefore, the proposed dredging activities would appear to not adversely affect any Atlantic sturgeon that may be migrating through the area. Furthermore, since most migratory activity occurs during the fall and spring, Atlantic sturgeon would not be expected to be in the area during period when most of the dredging will be done (i.e. winter).

Nearshore Disposal Areas - As noted above for shortnose sturgeon, the four nearshore disposal areas are located between river systems where known Atlantic sturgeon populations are known to exist (i.e. the Kennebec River, Maine, and the Merrimack River, MA, as well as the Hudson River in New York). Since Atlantic sturgeon are known to make long range coastal migrations, then it is possible that during some time of the year, migrating Atlantic sturgeon would be passing through the near shore areas in the vicinities of the disposal areas. In addition, they have been documented as using relatively shallow nearshore habitats, which would also suggest that the disposal areas could be used by them. Also, as noted above, overwintering areas include "areas off the Atlantic coast from the Gulf of Maine south to at least Cape Lookout North Carolina". Therefore it is possible that overwintering Atlantic sturgeon could be in the vicinities of the near shore disposal areas during the time of disposal operations, and be affected by them.

The effects of disposal operations on Atlantic sturgeon would be similar to those noted above for shortnose sturgeon. As noted above, studies of white sturgeon on the Columbia River in Washington have shown that dredge disposal operations did not alter the behaviors of the sturgeon in the area during and immediately after hopper dredge disposal operations. It would be assumed that this would also be true for Atlantic sturgeon, being a similar species. Also, since the material is consists mostly of coarse sand and gravel, levels of suspended sediments in the vicinity of the nearshore placement areas and the ocean placement site would be expected to return to background levels within a short time period.

A letter from your agency to the USACE concerning Atlantic sturgeon in the vicinity of Wells Harbor, Maine (NMFS, 2012), states that "studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). Fish eggs and larvae can be buried or smothered as suspended solids settle out of the water column". It continues "As Atlantic sturgeon are highly mobile they are likely to be able to avoid any sediment plume and any effect on their movements or behavior is likely to be insignificant. Additionally, the TSS levels expected (40.0-475.0 mg/L depending on the type of dredge used and site specific conditions during dredging and up to 500.0 mg/L for disposal) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical; see summary of scientific literature in Burton 1993) and benthic communities (590.0 mg/L (EPA 1986)); therefore, effects to benthic resources that sturgeon may eat are extremely unlikely. Based on this information, it is likely that both the effect of the suspension of sediment resulting from dredging operations and the effects of the discharge of sediments at the disposal site will be insignificant." (NMFS Wells letter, 2012).

It is estimated that there will be approximately two trips per day between the dredging area and the nearshore disposal sites, for a total of about 30 days for the entire dredging period. If any sturgeon were occupying these areas they could be in the direct path of the sand as it descends from the scow at which point they could be buried or injured. However, as noted above from the studies with tagged white sturgeon occupying these disposal areas, most of these species were unaffected by disposal operations. In addition due to the mobility of these fish, they would likely move to avoid the descending material. More likely if these fish are in the disposal areas, they would likely be in general areas (and not in the direct path of the descending material), and where they would be subjected to temporary increases in turbidity which would not be expected to significantly affect them (based on information presented above).

Isles of Shoals-N Disposal Area – In a letter from Peter Colosi referenced above (September 2, 2011) you note that Atlantic sturgeon were detected at GoMOOS Buoy B01 which is located in the vicinity of the proposed Isles of Shoals-N disposal area. However since 2005, there have been only nine Atlantic sturgeon detected, with most of them detected in March and one detected in June. It would appear from this information, that these would be detecting fish moving through the area, rather than occupying these areas for any length of time. The GoMOOS Buoy B01 is located in a water depth of approximately 62 meters (203 feet) (NERACOOS website http://gyre.umeoce.maine.edu/data/gomoos/buoy/php/buoy_realtime.php?mooring_id=B0101, accessed 11/26/2013). The nearby Isle of Shoals disposal area (IOS-N) proposed for the disposal of the rock is located in water depths ranging from 250 to 310 feet deep. As discussed above, Atlantic sturgeon have recently been reported at depths of 300 feet. Earlier information notes that the deepest record as 75 meters (246 feet) with the mean depth of 17.3 meters (approximately 57 feet), and only 5% of the sturgeon collected were from depth strata other than 15 and 13 meters (this could also be due to sampling bias from the higher frequency of shallower depths sampled). However, based upon the relatively few detections of Atlantic sturgeon from the GoMOOS Buoy B01, it appears that most Atlantic sturgeon are more likely to be found in shallower areas along coast than in the deeper areas near the proposed Isles of Shoals-N ocean placement site.

The disposal of rock at the IOS-N disposal area could affect any sturgeon that may be directly below the scow by either direct burial, or injury from direct contact with the rock as it descends through the water column. However, as noted above, Atlantic sturgeon are highly mobile and would be expected to avoid any material as it descends. In addition, detections of this fish from the vicinity of the disposal area are infrequent (nine since 2005), and most have been during March which would be near the end of the dredging period. The estimated disposal rate for this site would be approximately one trip per day for 11 days. Therefore, given the depths at the disposal area, the low frequency of Atlantic sturgeon detections in the area, the time of year of the detections, the relatively few disposal trips, and the ability of these fish to move from the area of disturbance, it would appear that it would be unlikely for these fish to be in the area at the time of active disposal and/or be adversely affected by the disposal operations.

Effects of Blasting on Atlantic Sturgeon - The effects of blasting on Shortnose sturgeon discussed above are also applicable to Atlantic sturgeon. As noted, methods will be employed to reduce the impacts to this species in the action area. It is expected that given the time of year that the blasting is planned to occur (late winter), the unlikelihood of Atlantic sturgeon using the area for overwintering or foraging, the low frequency of their occurrence in the Piscataqua River (being considered as mainly a migratory corridor for this species) as well as the methods proposed to reduce the blasting effects, that the proposed blasting operations would not likely adversely affect any Atlantic sturgeon.

Atlantic Salmon

As noted in the letter of September 2, 2011 from Peter Colosi, Atlantic salmon have been detected in the vicinity of GoMOOS Buoy E01, however they have not been detected in the Buoy closest to the disposal area, B01 since its deployment in 2005 (which is located approximately 10 miles south from E01). Therefore it is unlikely that this species would be in the vicinity of the IOS-N ocean placement site during the time of disposal operations. In addition, once out-migrating Atlantic salmon smolts have transitioned to saltwater, growth is rapid, and the postsmolts have been reported to move close to the surface in small schools and loose aggregations (Dutil and Coutu, 1988). Therefore given the fact that this species has not been detected in the area of the disposal area, as well its migratory behavior being close to the surface where it could avoid any vessel in the area, it is unlikely that the placement of rock or dredged material at the IOS-N will adversely affect the Gulf of Maine DPS of Atlantic salmon.

Sea Turtles

In your letter of November 15, 2013, you also note that there is a potential for four listed species of sea turtles to be in either the haul routes or placement sites during the warmer months, generally from June through the first week in November. These include the threatened Northwest Atlantic (NWA Distinct Population Segment (DPS) of loggerhead sea turtles (*Caretta caretta*), endangered Kemp's ridley (*Lepidochelys kempi*) green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) sea turtles. Since the bulk of the dredging and disposal activities are planned occur during the late fall and winter months (mid-October through mid-April) it is unlikely for these species to be in the area during the construction activities. Therefore, the proposed dredging and disposal operations are not expected to adversely affect listed species of sea turtles.

Whales

The letter of November 15, 2013 referenced above states "While listed whales occur in the offshore waters of New Hampshire and Maine, due to the riverine nature of the dredging and demolition sites, the inshore location of the fill sites, and the water depth of the likely transit routes in between, no listed whales are expected to occur in the action area". Therefore it is not expected that dredging and blasting in the Piscataqua River, and disposal activities at the near shore disposal sites would adversely affect listed Whales. A letter from Peter Colosi dated September 2, 2011 (referenced above) concerning the IOS-N disposal area states "Listed Whales also occur in the waters off the coast of Maine. In the disposal area, North Atlantic right whales (*Eubalaena glacialis*) as well as occasional humpback whales (*Megaptera novaeangliae*) and fin whales (*Balaenoptera physalus*) could be present." Therefore it is possible that listed whales could be in the area of the IOS-N ocean placement site, or along the transit routes between the dredging area and the placement sites and potentially be affected by the disposal of the rock or transit of the scows.

In order to minimize the effects to listed whales, the following measures will be implemented.

- The Right Whale sightings Advisory system will be monitored as well as other communication media (i.e. NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, Notice to Mariner, and U.S. Coast Pilots) for general information regarding North Atlantic Right Whale sighting locations. In addition, the Contractor will be required to monitor the Right Whale Listening Network for information on Right Whales detected near the shipping lane.
- All project vessels will comply with voluntary speed restrictions (10 knots or less) to minimize the risk of ship strikes, as implemented in Dynamic Management Area (DMAs) that may be established by NOAA Fisheries Service. NOAA Fisheries Service will announce DMAs to mariners through its customary maritime communication.
- One or more NMFS-approved endangered species observers will be present on the vessel traveling to and from the disposal area to monitor for listed whales.

Therefore it is expected that the disposal operations at the IOS-N ocean placement site will not adversely affect any listed whale species that may occur in the along the disposal route or in the disposal area.

In conclusion, based upon the information discussed above for shortnose sturgeon, five DPSs of Atlantic sturgeon, the GOM DPS of Atlantic salmon, four listed sea turtles, and three listed whales, we believe that the dredging, nearshore or ocean placement, and blasting activities associated with the proposed navigation improvement project consisting of widening the upper turning basin at the Portsmouth Harbor and Piscataqua River Federal Navigation Project in New Hampshire and Maine, may affect but is not likely to adversely affect these listed species.

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2. (FR, 2010). Federal Register /Vol. 75. No 193/ Wednesday, October 6, 2010/ Proposed Rules. Department of Commerce, National Oceanic and Atmospheric Administration, 50 CFR Parts 223 and Part 224 RIN 0648-XJ00 [Docket No. 100903414-0414-02], Endangered and Threatened Wildlife and Plants; Proposed Listing Determinations for Three Distinct Population Segments of Atlantic Sturgeon in the Northeast Region. Agency National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.