

**SAMPLING AND ANALYSIS PLAN  
FOR  
NEW BEDFORD HARBOR DREDGE – PHASE III**

**SAP**

**TOWN OF FAIRHAVEN AND CITY OF NEW  
BEDFORD DREDGING  
UNDER THE  
STATE ENHANCED REMEDY**

**New Bedford, Massachusetts  
and Fairhaven, Massachusetts  
October, 2006**

**Prepared for the:  
New Bedford Harbor Development Commission (HDC)  
New Bedford, Massachusetts  
And  
the Town of Fairhaven, Massachusetts**

**Prepared by:  
Apex Companies, LLC  
New Bedford, Massachusetts  
Boston, Massachusetts**



## 1.0 INTRODUCTION AND PURPOSE

This sampling and analysis plan has been prepared by Apex Companies, LLC (Apex) on behalf of the New Bedford Harbor Development Commission (HDC) and the City of Fairhaven for the purpose of obtaining sediment characterization data in the proposed dredge area for the New Bedford Harbor Dredge – Phase III in New Bedford Harbor, for sites located within the cities of New Bedford and Fairhaven, Massachusetts.

This document is intended to provide a sampling work plan, which describes proposed sampling activities, sampling methods, laboratory (chemical and geotechnical) parameters and field/laboratory quality assurance/quality control (QA/QC) procedures, as well as proposes sampling frequencies, and provides a sampling schedule. This Sampling Plan is required by the MADEP, and is intended to be used in the field to coordinate sampling activities aimed at characterizing the sediment to be dredged for the project.

The project site is located within the inner portion of New Bedford Harbor in New Bedford, Massachusetts, as shown on *Figure 1*. As indicated by the Town of Fairhaven and the City of New Bedford, the proposed dredge areas for the Phase III dredging include:

- the AGM Marine Facility (located at the South End of Fish Island, in New Bedford, Massachusetts);
- Hathaway Braeley Wharf (currently housing the Steamship Authority in Fairhaven, Massachusetts);
- Portions of D.N. Kelley & Son, Inc. piers, docks, and boat slips (in Fairhaven, Massachusetts);
- Portions of the Warren Alexander's properties (in Fairhaven, Massachusetts);
- The Town of Fairhaven's Union Wharf (in Fairhaven, Massachusetts);
- The Sal Ingrande area (in Fairhaven, Massachusetts);
- An area north of Linberg Marine (in Fairhaven, Massachusetts); and
- The Acushnet River Boat Club (Coast Guard Auxiliary) piers (in Fairhaven, Massachusetts).

The New Bedford Harbor Dredge - Phase III will be conducted in harbor areas within and adjacent to New Bedford's and Fairhaven's existing marine facilities.

The New Bedford/Fairhaven Harbor Plan, approved by the Secretary of the Massachusetts Executive Office of Environmental Affairs (EOEA) on September 24, 2002, represents the City of New Bedford's and Town of Fairhaven's joint harbor maintenance and future development plans. The New Bedford Harbor Dredge – Phase III work scope for this project represents a number of the high-priority areas requiring dredging under the Harbor Plan. Please note that the dredging for AGM Marine Facility is not in the New Bedford/Fairhaven Harbor Plan, and is thus not included in the SER. Permitting for this maintenance dredging shall be completed outside the SER; however

this area will be included in this Work Plan, as tasks for this facility shall be performed concurrently as for the other areas included in the New Bedford Harbor Dredge – Phase III and the AGM facility dredge material will be disposed of in the New Bedford Harbor CAD cell under the SER.

The following is a brief description of the anticipated size and depth of proposed dredge areas, as well as the resulting anticipated volumes of material to be dredged, based upon initial surveys:

<b>Dredge Area</b>	<b>Approx. Size</b>	<b>Dredge Depths (Including 1 Foot Overdredge)</b>	<b>Approx. Volume (Including side- slopes)</b>
Acushnet River Boat Club	4.98 Acres	3-3.5 Feet	29,800 Cubic Yards
AGM Marine	1.03 Acres	2-4 Feet	4,600 Cubic Yards
Hathaway Braeley	0.67 Acres	1.5-14 Feet	8,800 Cubic Yards
D.N. Kelley & Son	0.10 Acres	2-6 Feet	4,000 Cubic Yards
Warren Alexander (1)	0.03 Acres	2-4 Feet	500 Cubic Yards
Warren Alexander (2)	0.10 Acres	1-11 Feet	2,300 Cubic Yards
Linberg Marine	0.70 Acres	1-5 Feet	4,100 Cubic Yards
Sal Ingrande	0.40 Acres	1.5-11 Feet	5,000 Cubic Yards
Union Wharf	0.64 Acres	2-6 Feet	4,000 Cubic Yards

At present, the total anticipated dredge volume for the New Bedford Harbor Dredge – Phase III is approximately 63,100 cubic yards.

## **2.0 EXISTING SEDIMENT DATA**

Existing sediment sampling and analysis data has been collected and reviewed from multiple areas within New Bedford Harbor in order to provide an indication of sediment characteristics in the proposed dredge area. The New Bedford Harbor Development Commission collected multiple sediment samples during the New Bedford State Pier Dredge, completed in 2002. Sampling and chemical analyses were also conducted from multiple areas during the New Bedford Harbor Dredge – Phase II, completed in 2005. The existing sediment characterization data indicates that the surficial sediment may contain elevated amounts of TPH, metals, PAH and PCBs.

A preliminary evaluation of the sediment characterization data has been performed to identify potential treatment/reuse/disposal options. The elevated PCB levels (2 to 35 ppm at existing sampling locations) and accelerated dredging schedule restrict the disposal options. The preliminary evaluation of disposal options has resulted in elimination of offshore disposal as well as reuse under the MCP process for this project or upland reuse and/or disposal at a regulated landfill(s), leaving disposal into a new Confined Aquatic Disposal (CAD) cell within New Bedford Harbor as the most viable option.

The existing sediment characterization data should be sufficient to characterize the proposed dredge areas of D.N.Kelley & Son and Warren Alexander (1), since these two areas were dredged during the New Bedford Harbor Dredge – Phase II; however, additional geotechnical data will be collected at up to two locations. Work in these two areas primarily involves removing material that may have been missed during the last phase of dredging.

The existing sediment characterization data is inadequate for the purposes of the remaining dredge areas, and new data must be collected from within the proposed dredge area in order to adequately characterize the sediment to be dredged and disposed. The following sections discuss the sample collection and analysis protocols that will be performed in order to obtain the additional data required.

## **3.0 SAMPLE COLLECTION**

The proposed sample locations have been selected based on existing data in order to provide sufficient characterization information prior to dredging and disposal in the proposed CAD cell.

### **3.1 Sample Locations**

The existing characterization data exists primarily within former dredge areas, and the proposed sampling locations are designed to provide overall areal coverage. The following is a list of sampling frequency proposed within each of the dredge areas:

<b>Dredge Area</b>	<b>Number of Sampling Locations</b>	<b>Total Number of Samples</b>
Acushnet River Boat Club	30 Locations	10 Samples
AGM Marine	4 Locations	4 Samples
Hathaway Braeley	8 Locations	4 Samples
D.N. Kelley & Son	2 Locations	Geotechnical Only
Warren Alexander (1)	2 Locations	Geotechnical Only
Warren Alexander (2)	2 Locations	2 Samples
Linberg Marine	2 Locations	4 Samples
Sal Ingrande	3 Locations	5 Samples
Union Wharf	11 Locations	4 Samples

Sampling frequency was determined based upon volume, with an average of 1 sample per 2000 cubic yards dredged. At the Acushnet River Boat Club and at the Hathaway Braeley Wharf, samples will be composited at a frequency of one sample per three locations (Acushnet River Boat Club) and one sample per two locations (Hathaway Braeley Wharf). A total of sixty-four sampling locations (stations) are proposed within the dredging footprint. The sampling stations may have from one to three separate samples taken at different depths depending upon dredging requirements. A total of thirty-three samples will be submitted for laboratory analysis. Proposed sampling stations are noted on *Figures 2 and 3*.

### **3.2 Sample Collection Method**

Samples will be collected at each sampling station over the full proposed dredge depth, based on the bathymetry at each station. Based on the variable total sample depths required and our experience with sample collection within New Bedford Harbor, two methods of sample collection will be utilized. Sampling equipment will include a 3” diameter hydraulic vibracore unit, as well as a free-fall Ponar or Eckman, clamshell-style dredge sampler. The use of the sampling device is dictated by the anticipated sediment characteristics (density, grain size) at each individual sample station, as well as the required sampling depth for the location. The sampling will be lead in the field by an experienced sediment sampler. This Field Operations Lead (FOL) will have discretion (within the parameters of this sampling plan) to make decisions in the field concerning the sampling program. Sampling will be conducted from a research vessel equipped with an “A-frame” and appropriate sampling and positioning equipment. As-built sample locations will be documented using a Global Positioning System (GPS).

Once the sampling vessel is in position, the as-built coordinates and water depth will be logged. A vibracore unit will be deployed where noted on *Figures 2 and 3*. Where necessary to provide sufficient delineation of the chemical composition of dredge material, the clamshell-type sampling unit will be used to collect a composite sample of

the surficial sediments (0-1'). Soils will be logged in the field in accordance with ASTM 2488-93 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)." Each vibracore will be composited from 1 to 3 feet, 3 to 5 feet and from 5 to 10 feet, unless visual observation of the core indicates that the sediment classification changes within the proposed composited depths (in which case, like materials will be composited within a depth range).

### **3.3 Sample Handling**

Sampling equipment will be cleaned following standard decontamination procedures prior to individual sample collection. Sediment samples will be logged and visually characterized prior to collection in laboratory-supplied pre-cleaned and pre-preserved jars. Samples will be stored at 4 degrees Celsius in sample coolers on the vessel prior to shipment to the laboratory. Chain-of-custody forms will be filled out and will accompany each sample shipment to the laboratory. Standard quality control and quality assurance (QA/QC) samples (including trip and rinseate blanks) will be collected as part of the sampling protocol. The sampling protocol includes the collection of duplicate, blank, and split samples at a rate sufficient to meet EPA guidelines.

### **3.4 Sampling Schedule**

The proposed sampling fieldwork is anticipated to be conducted over a three-week period beginning on October 9, 2006. Chemical analysis will begin within the first week of sampling and is expected to be complete by approximately November 10, 2006. A Draft Sampling Results report will be submitted approximately two weeks after all analytical results have been reported.

## **4.0 SAMPLE ANALYSIS**

The analytical testing program will address both chemical and physical characterization of the sediment to dredged. Samples will be sent to an EPA approved offsite chemical analysis laboratory. Samples will be hand-delivered or couriered to the laboratory in sample coolers in order to maintain appropriate sample conditions. Samples requiring physical characterization will be sent to a qualified geotechnical laboratory.

### **4.1 Geotechnical Analysis**

Geotechnical testing for characterization is anticipated to consist of a combination of grain size analyses (up to 18 sieve tests and 18 sieve/hydrometer tests), up to 18 Atterburg Limits and up to 18 moisture content analyses. Geotechnical samples will be collected by vibracore. Cores collected will be noted for changes in strata, to aid in the vertical delineation of maintenance material. Probes will be advanced between vibracore locations to aid in delineation. Proposed probe and vibracore locations are noted on *Figures 2 and 3*. Representative samples will be selected for testing based on strata descriptions indicated on the boring logs and visual logging of the soil samples.

## 4.2 Chemical Analysis

Samples will be collected for chemical analysis from vibracore samples where possible. Additional grab samples will be collected using either a Ponar or Eckman clamshell-style dredge sampler. Proposed grab sample stations are noted on *Figures 2 and 3*. Analytical parameters for the samples were selected based on guidelines established during previous sediment sampling within New Bedford Harbor for previous phases of dredging. The following is a list of proposed analytical testing parameters:

Parameter	Analytical Method EPA Method unless otherwise noted	Maximum Detection Limit Mg/kg unless otherwise noted
Arsenic	6020	0.5
Cadmium	6020	0.1
Chromium	6020	1
Copper	6020	1
Lead	6020	1
Mercury	7471A	0.02
Nickel	6020	1
Zinc	6020	1
PCBs by NOAA Summation of Congeners	8082	0.001
Petroleum Hydrocarbons as EPH	MADEP 1998	0.01
Total Organic Carbon	9060	0.1%
Reactive Sulfide		30

Of the 33 proposed samples, 7 samples will be analyzed for the full suite of analytical parameters. The remaining 26 samples will be analyzed for PCBs only. Contingency samples will be collected from up to 20 additional sampling stations. Samples from the contingency stations will be collected and preserved for possible additional analyses, depending on the results obtained from the initial testing. Contingency samples will be placed on “hold” and properly stored at the laboratory. Should elevated or unusual analytical results be obtained from the initial sample analytical round, indicating a substantial difference in the horizontal or vertical distribution of concentrations of contaminants in the New Bedford Harbor Dredge – Phase III areas from prior dredge areas, the selected contingency samples would be analyzed in order to fill in any data gaps.

Based on prior sampling experience in New Bedford Harbor, Apex anticipates that concentrations of contaminants will decrease with depth. Therefore, in areas where deeper samples (below three feet) will be recovered, the surficial samples (0 to 1 foot and 1 to 3 feet) will be analyzed initially. The deeper samples will be preserved and held in contingency. These deeper samples will be analyzed depending on the characterization data from the upper samples. The deeper contingency samples described above are proposed at 20 sampling stations.

Standard turnaround time for all analytical parameters with the exception of dioxins is 14 days. Standard turnaround time for dioxins is 20 business days (4 weeks). Samples collected will be analyzed by a laboratory for a standard analytical turnaround time. According to Alpha Analytical/Woods Hole Group Laboratories, most samples to be analyzed for the analytical parameters shown above will have a hold time of 14 days. Additionally, all sediment samples may be frozen to increase the holding time for up to one year. Since the hold times for most parameters equal the standard turnaround times for analytical results, some measure must be taken for the contingency samples to preserve them at least two weeks beyond the standard turnaround times discussed above. Apex proposes that all contingency samples be frozen and maintained in freezer storage under laboratory custody. If a contingency sample requires analyses, Apex will request the laboratory to thaw the contingency sample and analyze for the requested parameters.

## **4.2 Laboratory Methods**

Samples will be sent to a USEPA approved laboratory. Chemical analytical methods will be performed in accordance with USEPA protocol and Massachusetts MCP Guidelines. Grain size distribution and Atterberg Limits testing (on selected samples) will be performed in accordance with applicable ASTM specifications. Laboratory methods for the proposed analysis are shown above.

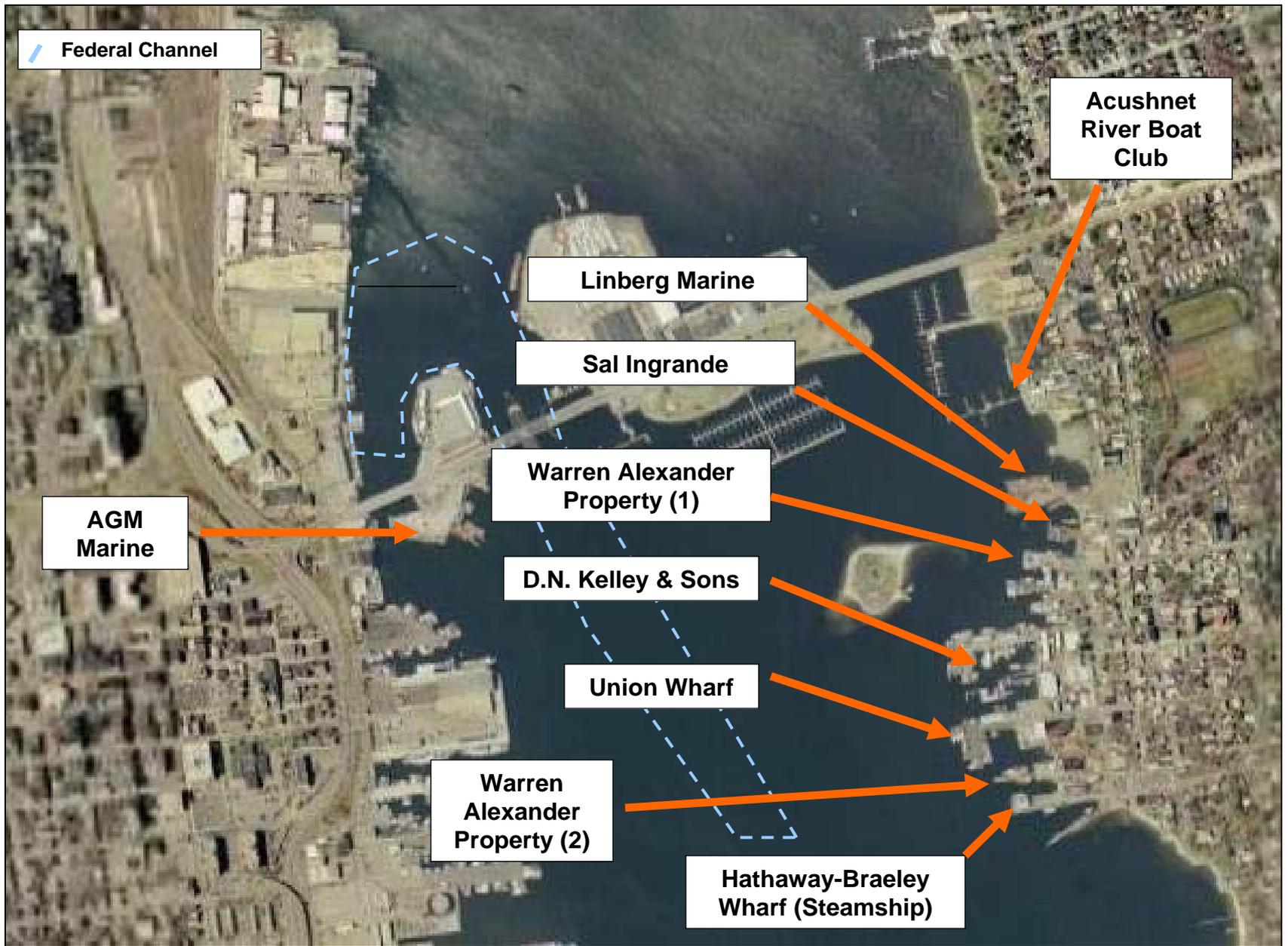
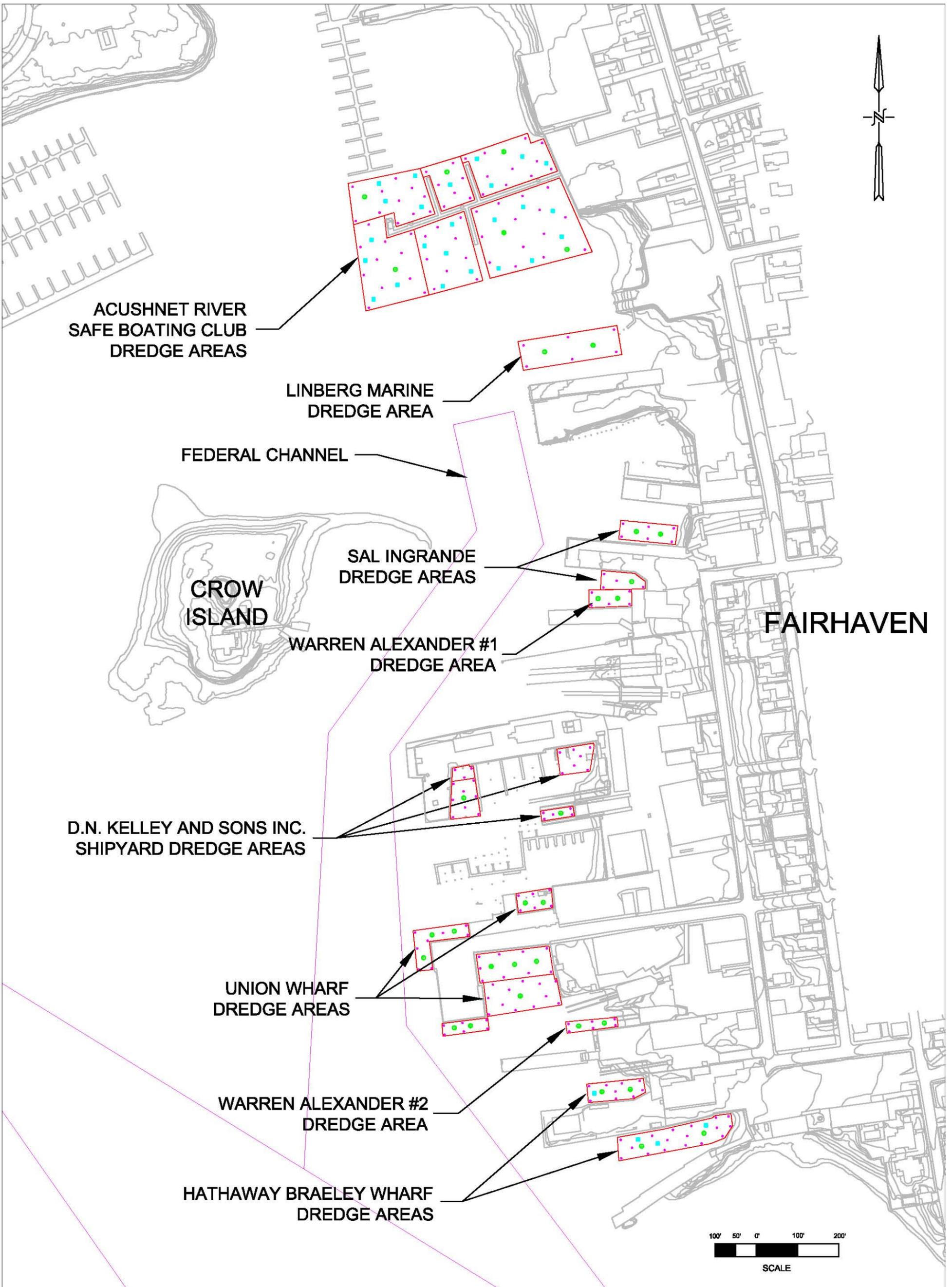


Figure 1: Site locus map for New Bedford Harbor Dredge – Phase III Areas.



**LEGEND**

- - PROPOSED VIBRACORE LOCATION
- - PROPOSED SEDIMENT PROBE LOCATION
- - PROPOSED GRAB SAMPLE LOCATION

<p>Figure 2</p>	<p>115 BROAD STREET SUITE 200 BOSTON MA 02110 (617) 728-0070</p>	<p>DATE OCT. 4, 2006</p>	<p><b>FAIRHAVEN DREDGE AREAS SAMPLING LOCATIONS</b></p>	<p>JOB NOS. 6593.002 6588.002</p>	<p><b>NEW BEDFORD HARBOR DREDGE - PHASE III</b></p>	
		<p>DESIGNED KH</p>	<p>NEW BEDFORD HARBOR, NEW BEDFORD AND FAIRHAVEN, MA</p>			
		<p>TECHNICIAN DB</p> <p>CHECKED CM</p>				

6550-10019593

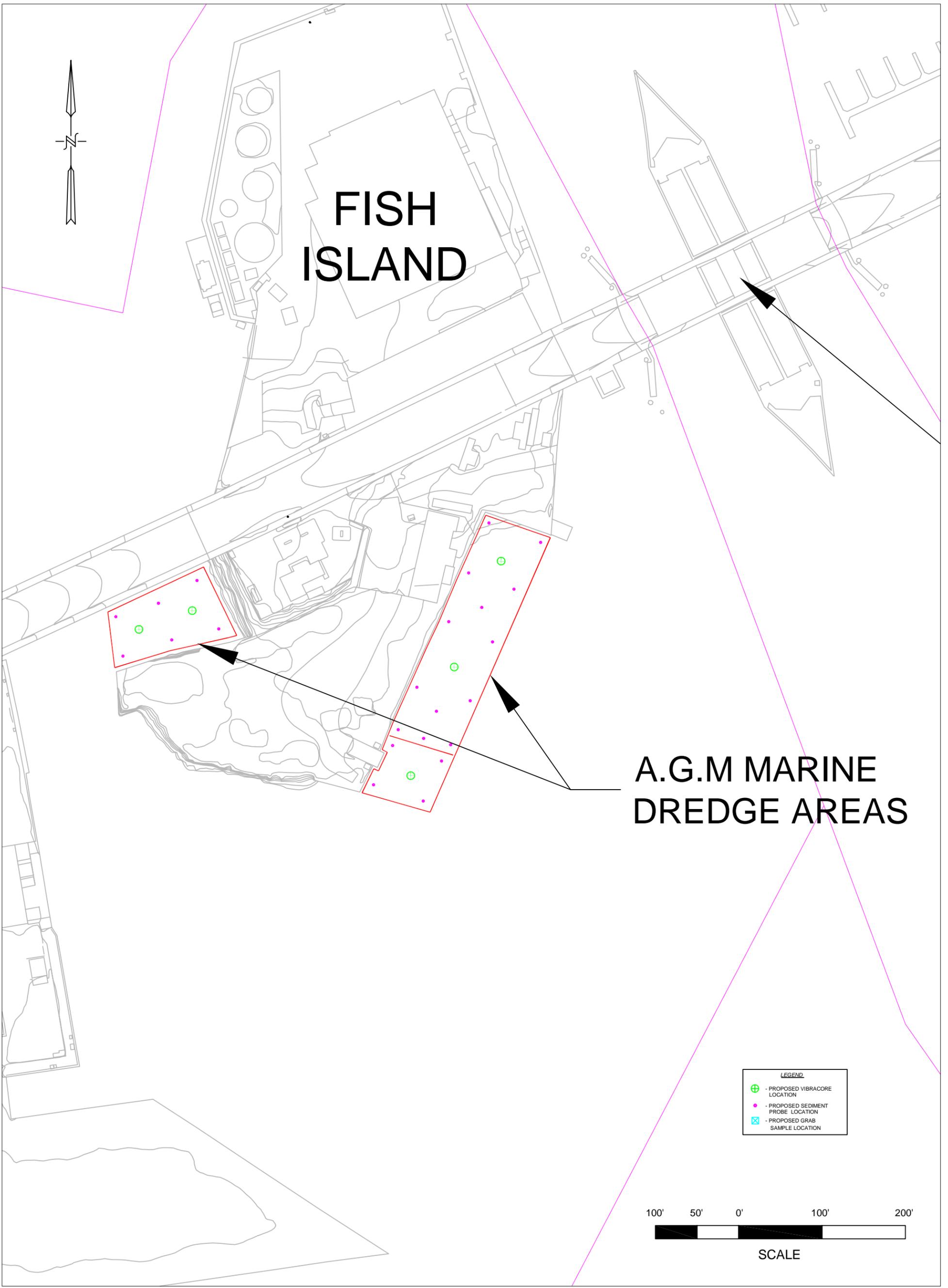


Figure 3

115 BROAD STREET  
SUITE 200  
BOSTON MA 02110  
(617) 728-0070



DATE  
OCT. 4, 2006

**A.G.M MARINE DREDGE AREA SAMPLING LOCATIONS**

DESIGNED KH  
TECHNICIAN DB  
CHECKED CM

NEW BEDFORD HARBOR,  
NEW BEDFORD AND FAIRHAVEN, MA

JOB NOS.  
6593.002  
6588.002

**NEW BEDFORD HARBOR DREDGE - PHASE III**

6556.001-DWG