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Dredged Material Management Plan Phase I

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VOLUME I

Prepared for:

Massachusetts Coastal Zone Management
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September 30, 1997

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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
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September 30, 1997

To the Maritime and Port Planning Interests in Massachusetts,

Periodic dredging of the Commonwealth's ports is necessary to maintain and enhance the competitive position of our maritime industries. Dredging is therefore a cornerstone of Governor Cellucci's program to revitalize the ports of Massachusetts.

However, while we discuss "dredging," the real issue is disposal of dredged material, as a significant proportion of the material removed from our urban ports contains contaminants potentially harmful to marine life. This material is therefore prohibited from unconfined disposal in the ocean. Unfortunately, alternative disposal methods have, until recently, proven to be either prohibitively expensive or technically infeasible. The result is a significant backlog of necessary dredging, a backlog that has lead to stagnating waterfronts, unexploited economic opportunities, and outright loss of maritime commerce.

The volumes of material we need to dredge indicate the magnitude of the challenge. Over the next 20 years, the urban ports of Massachusetts will generate a total of 8.0 million cubic yards (mcy) of material. Of this volume, up to 6.0 mcy may be unsuitable for traditional ocean disposal. Considering that recent projects as small as 16,000 cubic yards have been stalled by lack of disposal sites, it is clear that a comprehensive management solution is needed.

The Executive Office of Environmental Affairs (EOEA), through the Office of Coastal Zone Management (MCZM), is developing a state-wide Dredged Material Management Plan (DMMP) to meet this challenge. The purpose of the DMMP is to identify and permit disposal alternatives with sufficient capacity to accept dredged material unsuitable for unconfined ocean disposal from public and private dredging projects over the next 20 years. The DMMP focuses initially on the ports of Gloucester, Salem, New Bedford, and Fall River. MCZM has completed Phase 1, the inventory and analysis of existing conditions, this September. Phase 2 will begin immediately and will be structured as individual Environmental Impact Reports for each of the ports under the provisions of the Massachusetts Environmental Policy Act (MEPA).

There are several noteworthy aspects of the DMMP:

• Disposal site identification and designation is being integrated with the development of port development plans, another Seaport Bond initiative. As part of the port plans, each of the four port communities will identify specific landside development activities that will require dredging. The DMMP is working simultaneously to identify disposal sites for this material, so that potential sites can be reviewed by the community in the context of the port plan. By supporting the two programs in tandem, EOEA can most efficiently provide the technical information necessary for the ports to develop community consensus on the most appropriate development/dredging/disposal site scenario.

• The DMMP is being coordinated with the Corps of Engineers and other federal agencies with

oversight of dredging projects. In the past, disagreements between local and state planners and the federal agencies have significantly delayed or even sidetracked dredging projects. By coordinating with the federal agencies, we are ensuring that disposal sites identified by the DMMP will receive timely federal regulatory approval.

• A key purpose of the DMMP is to identify disposal sites with long-term (minimum 20 year) capacity, because the availability of such sites is a fundamental prerequisite for efficient port management. With pre-approved disposal sites, dredging can again become a routine maintenance activity, port managers and private interests can plan their business growth accordingly, and environmental interests will be assured a consistent standard of environmental protection.

• The DMMP is specifically designed to provide relief to private, as well as public, marine interests. While much attention is given to the large navigation projects in our public waters, private sector efficiency has been severely impacted by lack of disposal sites. In the four ports under current review, 79 private facilities will need to dredge 1.0 mcy over the next 20 years, in projects ranging from 250 to 25,000 cubic yards. These projects, which include marinas, fish processing plants, cargo facilities, boat yards, and others, do not typically attract attention, but they represent the basic components of a thriving port economy.

• Because an efficient dredging and disposal program will be counterproductive if it degrades the resources on which we all rely, the DMMP is assessing the entire spectrum of alternatives, including upland reuse/disposal, alternative treatment technologies, and confined aquatic alternatives. Under Phase 2, the DMMP will perform site-specific analyses of the resources present at the potential sites, and will assess the potential impacts associated with the use of the sites. The last step in the process will entail working with the port communities, maritime industry, environmental interests, and local citizens to identify those sites that best meet the goals of cost-efficiency and environmental protection.

• Finally, all of this work will be of little use to anyone if we must endlessly repeat the process. Therefore, one component of the DMMP is the development of new dredging and disposal regulations that will expand the range of cost-effective disposal alternatives available for consideration, protect the environment, and, perhaps most importantly, provide a consistent and predictable level of review for all subsequent projects.

In summary, the DMMP is a process that will provide the basis for more effective port management, and will meet the needs and respect the interests of all of us who are invested in meeting the challenge of responsibly and efficiently managing dredged material.

We look forward to working with you as we work to complete this important project.

Sincerely,

Peg Brady

Peg Brady
Director

TABLE OF CONTENTS

This Dredged Material Management (DMMP) is a conglomeration of 12 primary tasks presented in this two volume set. The individual task reports contain text and graphics and, for most of these reports, reference is made to full scale (24" x 36") maps. These are assembled in a separately bound Dredged Material Management Plan Phase I Map Atlas.

The task reports in this DMMP are as follows:

Volume I

1. **Summary Report**	**An encapsulation of the dredging volumes, sediment quality and potential disposal alternatives for each DPA.**
2. **Data Management Plan**	**A description of the means and methods by which data from the individual tasks is managed.**
3. **Dredging Inventory**	**A listing of the projected private, local, state and federal dredging projects planned over the next 20 years with associated volumes.**
4. **Bathymetric Surveys**	**Soundings from recent Corps of Engineers surveys of the federal navigation areas within the four DPAs. Maps appear in the Map Atlas.**
5. **Alternative Technologies**	**An inventory and assessment of available treatment technologies for contaminated dredged material.**
6. **Natural Resources Inventory**	**An inventory of all known fish, shellfish and wildlife resources within the DPAs.**
7. **Aquatic and Near-shore Disposal Site Analysis**	**A description of potential CDF, CAD and tidal habitat restoration sites capable of accepting contaminated dredged material in each of the DPAs.**
8. **Upland Disposal Site Inventory**	**An examination of upland/reuse options for contaminated sediments with an inventory of existing MA landfills.**

Volume II

9. Due Diligence	An inventory and data description of pollution sources and historic sediment quality information.
10. Preliminary Geotechnical Investigations	An inventory and assessment of existing geotechnical information within the four DPAs.
11. Sampling Plans	Sediment sampling and testing plans for state and federal dredging projects within each DPA.
12. Buzzards Bay Disposal Site Investigation	A summary of available information and recommendations for further study of the BBDS - a potential disposal site for material deemed suitable for unconfined open water disposal.

DREDGED MATERIAL MANAGEMENT PLAN
PHASE I
SUMMARY REPORT

Prepared for:

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Boston, Massachusetts

Submitted by:

Maguire Group Inc.

Maguire Group ● BSC Group ● GEI Consultants ● Aubrey Consulting ● SAIC ● HEIDEMIJ

September 30, 1997

TABLE OF CONTENTS

1.0 PURPOSE AND NEED 1
1.1 Purposes (Objectives) 1
1.2 Need 1

2.0 Intro/Background (DMMP Phase II) 1

3.0 Dredging Inventory (Task B) 2

4.0 Sediment Quality (Task E) 2

5.0 Disposal Alternatives (Tasks I & J) 3
5.1 No Disposal 3
5.2 Treatment and Reuse (Task D) 4
5.3 Upland Reuse/Disposal (Task J) 4
5.4 Confined Disposal Facility (CDF) 4
5.5 Confined Aquatic Disposal (CAD) 5
5.6 Capping (CAP) 5

6.0 Siting Alternatives 8
6.1 Upland Sites (Task J) 8
6.2 Aquatic Sites (Task I) 8

7.0 Costs 10

8.0 Gloucester DPA 11
8.1 Dredging Inventory 11
8.2 Sediment Quality 11
8.3 Alternatives 12
8.4 Costs 13
8.5 Schedule 13

9.0 Salem DPA 18
9.1 Dredging Inventory 18
9.2 Sediment Quality 18
9.3 Alternatives 19
9.4 Costs 21
9.5 Schedule 21

10.0 New Bedford/Fairhaven DPA 26
10.1 Dredging Inventory 26
10.2 Sediment Quality 26
10.3 Alternatives 27
10.4 Costs 29
10.5 Schedule 29

11.0 Fall River 34

TABLE OF CONTENTS

11.1 Dredging Inventory 34
11.2 Sediment Quality 34
11.3 Alternatives 35
11.4 Costs 36
11.5 Schedule 36

LIST OF TABLES

TABLE 1 Volume of Material to be Dredged (in cubic yards) 2
TABLE 2 Characteristics of Material to be Dredged 2
TABLE 3 Volume of Material to be Dredged from Gloucester DPA 11
TABLE 4 Characteristics of Material to be Dredged from Gloucester DPA 11
TABLE 5 Physical Charcteristics of Aquatice Disposal Sites - Gloucester 14
TABLE 6 Summary Comparison of Alternatives for Gloucester 17
TABLE 7 Volume of Material to be Dredged from Salem DPA 18
TALBE 8 Characteristics of Material to be Dredged from Salem DPA 18
TABLE 9 Physical Charcteristics of Aquatice Disposal Sites - Salem 22
TABLE 10 Summary Comparison of Alternatives for Salem 25
TABLE 11 Volume of Material to be Dredged from New Bedford DPA 26
TABLE 12 Characteristics of Material to be Dredged from New Bedford DPA 26
TABLE 13 Physical Charcteristics of Aquatice Disposal Sites - New Bedford 30
TABLE 14 Summary Comparison of Alternatives for New Bedford 33
TABLE 15 Volume of Material to be Dredged from Fall River DPA 34
TABLE 16 Characteristics of Material to be Dredged from Fall River DPA 34
TABLE 17 Physical Charcteristics of Aquatice Disposal Sites - Fall River 37
TABLE 18 Summary Comparison of Alternatives for Fall River 40

LIST OF FIGURES

Figure 1 - Sediment Suitability for Open Ocean Disposal by Year for All 4 DPAs 3
Figure 2 - Tidal Habitat and CDF Alternatives 6
Figure 3 - Overdredge and CAD Alternatives 7
Figure 4 - Landfills 9
Figure 5 - Sediment Suitability for Open Ocean Disposal by Year for Gloucester 12
Figure 6 - Candidate Aquatic Disposal Sites with Dredging Information for Gloucester 15
Figure 7 - Anticipated Dredging Schedule - Gloucester 16
Figure 8 - Sediment Suitability for Open Ocean Disposal by Year for Salem 19
Figure 9 - Candidate Aquatic Disposal Sites with Dredging Information for Salem 23
Figure 10 - Anticipated Dredging Schedule - Salem 24
Figure 11 - Sediment Suitability for Open Ocean Disposal by Year for New Bedford 27
Figure 12 - Candidate Aquatic Disposal Sites with Dredging Information - New Bedford . . . 31
Figure 13 - Anticipated Dredging Schedule - New Bedford 32
Figure 14 - Sediment Suitability for Open Ocean Disposal by Year for Fall River 35
Figure 15 - Candidate Aquatic Disposal Sites with Dredging Information - Fall River 38
Figure 16 - Anticipated Dredging Schedule - Fall River 39

MASSACHUSETTS COASTAL ZONE MANAGEMENT
DREDGED MATERIAL MANAGEMENT PLAN
SUMMARY DOCUMENT

1.0 PURPOSE AND NEED

1.1 Purposes (Objectives)

The purposes of this dredged material management plan are:

- to provide information on dredging needs, characteristics of sediment, and available alternatives for treatment, reuse, and disposal of dredged material from four Designated Port Areas (DPAs) to be used in subsequent port planning,

- to identify and characterize the range of reasonable alternatives for dredge reuse/disposal and establish a framework for comparison of the alternatives as guidance for compliance with the Massachusetts Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA).

1.2 Need

The lack of a practicable, cost-effective method for the disposal of contaminated dredged material in an environmentally sound manner has been a long standing obstacle to the successful completion of major dredging projects in the designated ports of the Commonwealth. These ports are in need of maintenance and/or improvement dredging in order to maintain and improve the competitive positions of their maritime industries. Presently, the ports of Fall River, Gloucester, and New Bedford compete aggressively with other eastern ports in the United States and Canada for shipping business. Fall River, Gloucester, New Bedford, and Salem are all planning improvements to existing facilities to upgrade the infrastructure of their ports and to generate additional business activity. Existing depth limitations restrict the ability of these ports to accept larger vessels and cause shipping to be diverted to other ports, resulting in a loss of revenues to the ports and to the economy of the Commonwealth.

2.0 Intro/Background (DMMP Phase II)

This Statewide dredged Material Management Plan identifies disposal alternatives with sufficient capacity to accept dredged material unsuitable for unconfined ocean disposal from public and private dredging projects over the next 20 years. The DMMP focuses initially on the ports of Gloucester, Salem, New Bedford and Fall River. A number of steps must be taken to enable dredging of the DPA's. Environmental documentation of potential sites is required under the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA). Identification of preferred sites will be undertaken under NEPA, MEPA, and in coordination with the port plans currently being developed in each of the four ports. The selected disposal facilities must then be designed, permitted and constructed.

This document summarizes the results of 13 task reports (Task A-O) which make up the Dredge Material Management Plan. Readers wishing more detailed information are referred to the individual task reports printed and distributed separately.

3.0 Dredging Inventory (Task B)

The first step in the DMMP process was to determine the volume of material to be dredged from all public and private facilities in each of the four ports over the next 20 years. Dredging inventories from the four DPA's were reviewed, interpreted and refined from the "Inventory of Dredging Needs in the Designated Port Areas (DPAs) of Massachusetts: 1996-2016." (ACE 1996). The update included contacting those facilities which did not respond to the original survey, checking and re-calculating the volume to be generated by each of the major contributors of dredge sediment, and providing an allowance for sediment accumulation. The following table provides the updated dredging volumes (in cubic yards) for the twenty year planning horizon for the four subject DPAs.

TABLE 1
Volume of Material to be Dredged (in cubic yards)

Gloucester	Salem	New Bedford/ Fairhaven	Fall River	Total
819,700	825,444	1,706,264	453,277	3,804,685

4.0 Sediment Quality (Task E)

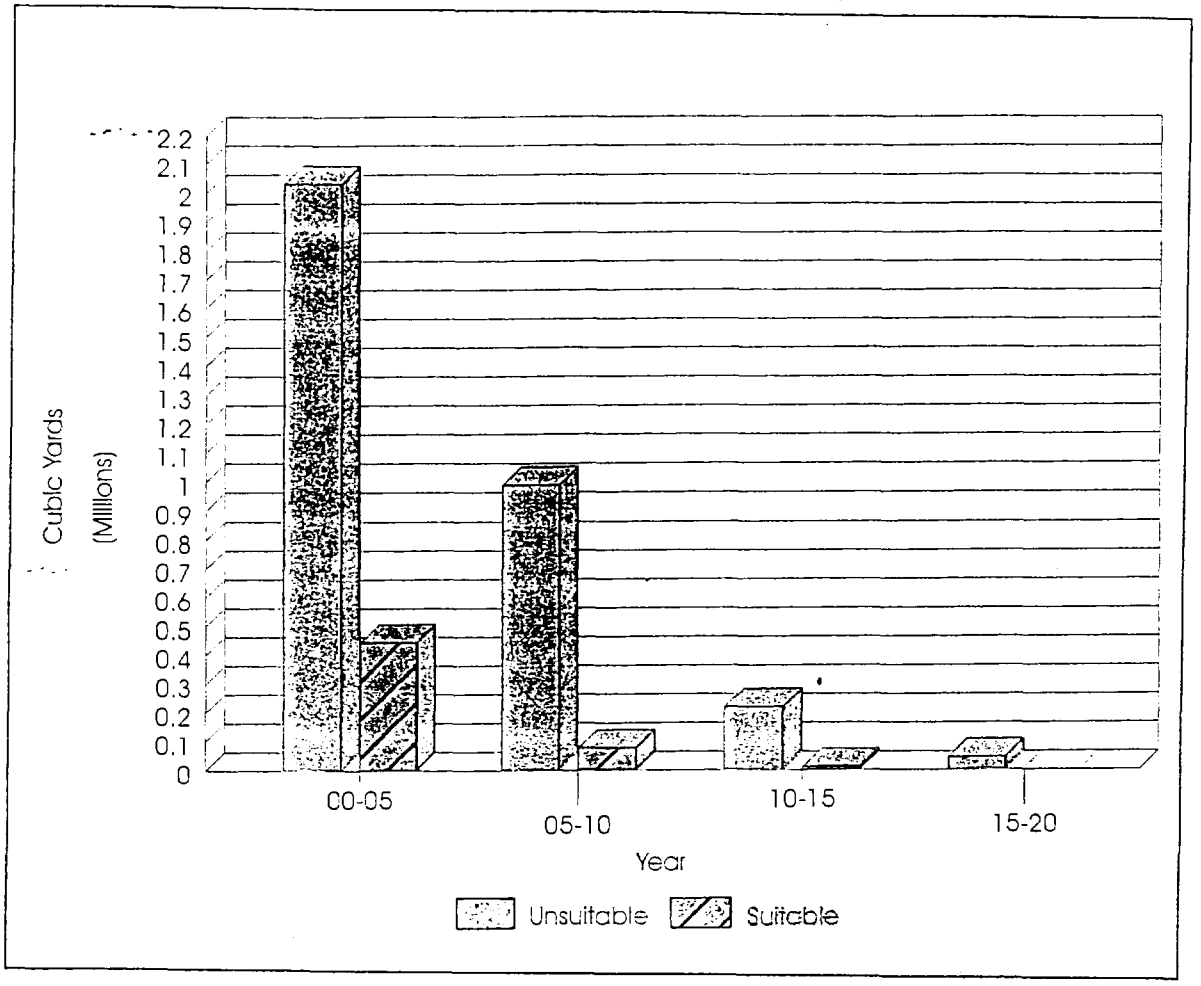
The next step in the DMMP process was to determine the quality (the chemical characteristics and physical properties) of the material to be dredged. An initial assessment of sediment quality was conducted by inventorying and assessing the potential sources of sediment contamination within the four DPAs. Based on a review of historical sediment data and pollution source data, the sediments were characterized as either suitable or unsuitable for unconfined disposal at existing open water disposal sites. The two currently active sites are the Massachusetts Bay Disposal Site (MBDS) and the Cape Cod Disposal Site (CCDS). (Note that a disposal site for suitable material from the Buzzards Bay region is currently being designated as a subsidiary product of the DMMP). Sediments that are unsuitable for disposal at these sites would have to be disposed of at authorized upland, confined nearshore, or confined aquatic sites within the four DPA municipalities. The following table provides an estimate of the sediment suitability for each of the DPAs. Figure 1 graphically represents this information by five year period over the twenty year planning horizon. Note that these estimates are based on currently available data regarding sediment quality. Phase II sediment testing will determine specific volumes of suitable and unsuitable material.

TABLE 2
Characteristics of Material to be Dredged

Port	Suitable	Unsuitable	Total	% Unsuitable
Gloucester	92,500	727,200	819,700	89%
Salem	373,444	452,000	825,444	55%
New Bedford	0	1,706,264	1,706,264	100%
Fall River	83,000	370,277	453,277	82%
Total	**548,944**	**3,255,741**	**3,804,685**	**86%**

QUANTITY & QUALITY

Figure 1 - Sediment Suitability for Open Ocean Disposal by Year for All 4 DPAs



5.0 Disposal Alternatives (Tasks I & J)

Next, the DMMP identified alternatives for disposal of dredged material. As shown above, a portion of the volume to be dredged from each DPA is likely to be suitable for unconfined ocean disposal at the MBDS or the CCDS. Seven general alternatives were considered for the disposal of the balance of the sediments from the four DPAs. The disposal alternatives include: no dredging or disposal, upland reuse/disposal at an approved existing landfill, upland disposal at a new landfill constructed specifically to receive dredged material, treatment by alternative treatment technologies and reuse or disposal, nearshore disposal at a Confined Disposal Facility (CDF), ocean disposal at a Confined Aquatic Disposal (CAD) site, and capping (CAP). Figures 2 and 3 illustrate conceptual cross sections of aquatic disposal alternatives.

5.1 No Disposal

The alternative of not disposing of dredge spoil is the "no action" alternative. Consideration of this alternative is mandated by the Massachusetts Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA). It will also be evaluated by the Port Plans in each

of the ports. This alternative provides the baseline to which the impacts of all other alternatives will be compared in the MEPA/NEPA process. This alternative involves undertaking no maintenance or improvement dredging in any of the four DPAs. With this alternative, sediment would continue to accumulate in each of the DPAs, gradually reducing the type and size of vessels which can navigate into and out of the DPA and reducing the supply of available berthing space in the DPAs. Non-structural measures, such as revisions to navigation routes and charts and repositioning of navigation aids could be used to temporarily postpone the need for future dredging.

5.2 Treatment and Reuse (Task D)

A technology assessment was conducted to inventory and assess existing treatment technologies for sediments which are unsuitable for conventional aquatic or upland disposal. The inventory includes 14 classes of treatment technologies including: chelation, chemical reduction/oxidation, dehalogenation, fungal remediation, incineration, in-situ bioremediation, pyrolysis, slurry bioreactor, solid-phase bioremediation, solidification/stabilization, solvent extraction, thermal desorption, and vitrification. A survey of vendors offering treatment technologies demonstrated that 77% of the respondents offered full scale/commercial scale technologies which were demonstrated at a reference site. The average throughput for all of the technologies was 754 cubic yards per day (838 tons per day). The average treatment costs for all of the technologies ranged from $70 to $167 per cubic yard ($64 to $152 per ton).

5.3 Upland Reuse/Disposal (Task J)

Upland reuse/disposal of sediments that are unsuitable for unconfined ocean disposal will require placement at a new or existing approved solid waste landfill. As there are presently no DEP regulations specific to disposal of dredged material, sediments which are unsuitable for unconfined aquatic disposal are handled and permitted as solid waste and disposal must comply with all applicable federal and state solid waste regulations. After dewatering, less contaminated sediments may potentially be utilized in a landfill as daily or intermediate cover, or as pre-capping contouring material. Upland disposal may take place either at an existing approved landfill, or at one or more new landfills constructed specifically to receive dredged material.

5.4 Confined Disposal Facility (CDF)

Dredged material which is unsuitable for unconfined open ocean disposal could also be disposed of in confined disposal facilities. Creation of a confined disposal facility requires construction of confinement walls (typically cofferdams of sheet pile and clean fill) or containment berms of earth or stone. Stone reinforcement (rip-rap) may be required on the seaward side of confinement walls and berms to protect them from wave action and tidal scouring. An impermeable liner and cap may also be required, depending on the chemical characteristics of the dredged material. The liner and cap may be made of impermeable soils (clay), synthetic materials such as High Density Polyethylene (HDPE) or some combination of these two. Leachate collection, treatment and disposal may be necessary for lined cells during the construction period to control rainwater infiltration until the cap can be placed over the cell. A CDF could also be used for the creation of tidal habitats such as mudflats and coastal wetlands. This method requires that at least part of the material be chemically and physically suitable to support biological activity. The method requires creation of an impoundment to retain the dredged material and protect the newly created habitat from scouring currents and wave action.

This is typically accomplished by building a berm (a breakwater) of stone or of soil armored with stone to an elevation above high water. The berm would be penetrated by one or more culverts, enabling sea water to flow through the berm and equalize tide elevations on both sides. The area inside the berm can then be filled with dredged material. To prevent bioaccumulation of contaminants, at least part of the material, the surface which will be exposed to biological activity, must be suitable material.

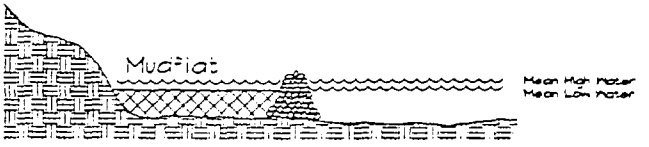
5.5 Confined Aquatic Disposal (CAD)

Confined aquatic disposal requires that dredged material which is unsuitable for unconfined disposal be deposited into the marine environment within a confined area and then covered over with suitable material. The method requires that sufficient suitable material be available to provide complete coverage of the unsuitable material. Containment capability and capacity of CAD sites may be enhanced prior to disposal by excavation of parent materials beneath the proposed disposal site. Project dredging areas in each of the DPAs could be used for disposal in the manner presently being employed in Boston. This method can be used where contaminants are present only in the surface sediments and where underlying materials are suitable for ocean disposal. In this method, the unsuitable sediments are removed from the bottom of the channel and/or from the bottom adjacent to the channel and stockpiled. Dredging in suitable sediments creates a sump below or beside the design channel. Unsuitable material from the stockpile is deposited into the sump and covered over with suitable material. The balance of the unsuitable material is disposed of at an approved offshore site.

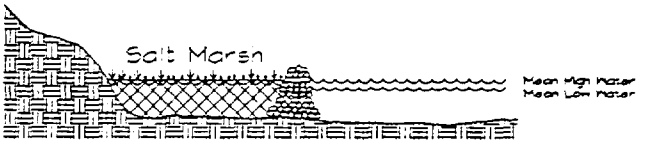
5.6 Capping (CAP)

Disposal by capping involves depositing the unsuitable material onto the seabed and then covering it over with clean material. This method requires that sufficient suitable material be available to provide complete coverage of the unsuitable material.

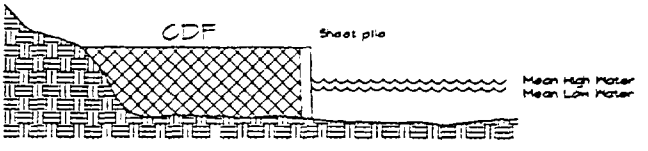
Tidal Habitat Creation
Coastal Mudflat



Tidal Habitat Creation
Coastal Wetland



Confined Disposal Facility (CDF) - Port Expansion



Confined Disposal Facility (CDF) - Land Creation

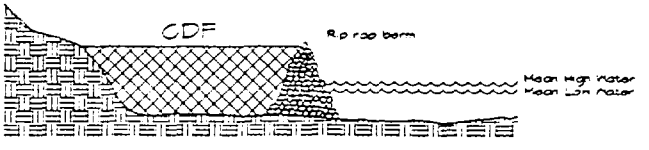


Figure 2 - Tidal Habitat Creation and CDF Alternatives

Not to Scale

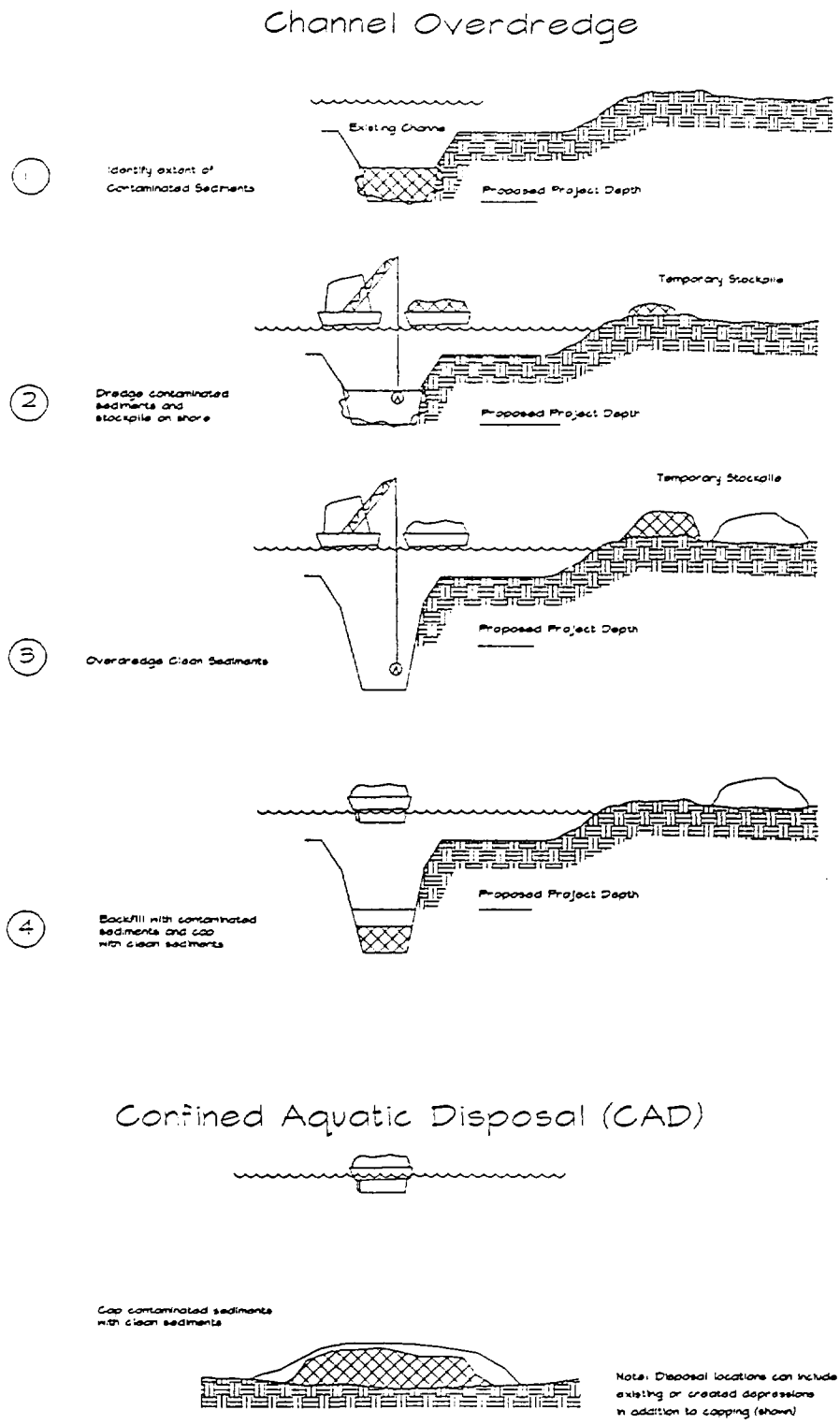


Figure 3 - Channel Overdredge and CAD Alternatives

Not to Scale

10.0 New Bedford/Fairhaven DPA

10.1 Dredging Inventory

A total of 1,706,264 cubic yards of material is projected to be dredged over the 20 year planning horizon in the New Bedford/Fairhaven DPA. The bulk of dredging, 92 percent of the total, is proposed for the near term -- 2000-2005. Approximately 79% of the proposed dredging is maintenance dredging of the New Bedford and Fairhaven Federal Channel, and is scheduled in the 2000-2005 time frame. Another 213,857 cubic yards of maintenance dredging has been proposed during the same time frame by various facilities throughout the New Bedford/Fairhaven DPA. The remainder of the proposed dredging is proposed for the period 2005-2010, including 135,407 c.y. of maintenance dredging and 2,000 c.y. of improvement dredging, and for the period 2010-2015 to include a much smaller 500 c.y of maintenance dredging.

The following table indicates the projected amount of maintenance and improvement dredging by year for the New Bedford/Fairhaven DPA. Figure 11 shows this information graphically.

Table 11
Volume of Material to be Dredged from New Bedford\Fairhaven DPA

	2000-2005	2005-2010	2010-2115	2115-2120	Total
Maintenance	1,568,357	135,407	500	0	1,704,264
Improvement	0	2,000	0	0	2,000
Total	**1,568,357**	**137,407**	**500**	**0**	**1,706,264**

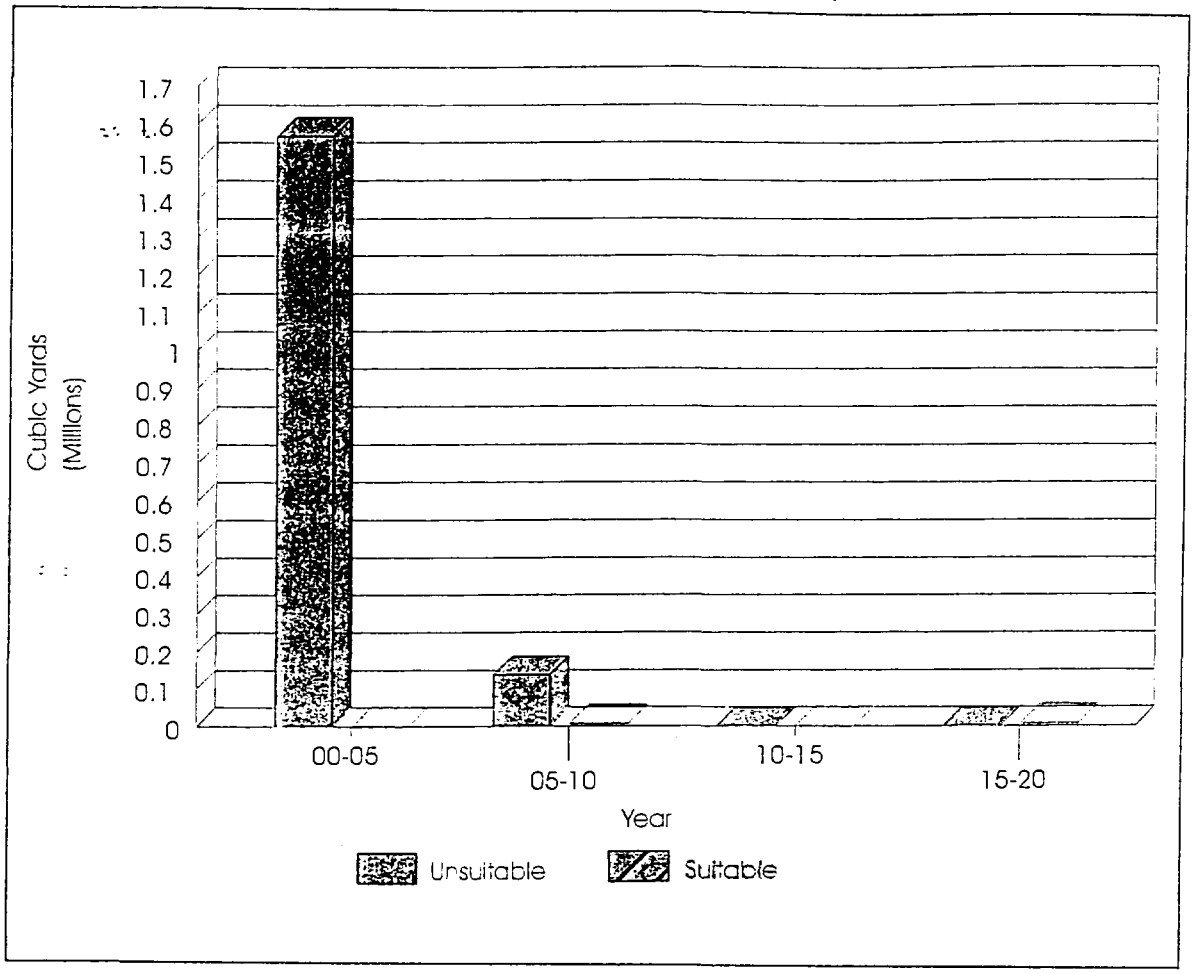
10.2 Sediment Quality

Initial estimates based on available data indicate that the sediments in New Bedford/Fairhaven are unsuitable for unconfined open water disposal, and will require disposal at an authorized upland, nearshore, or aquatic disposal site. The following table indicates sediment suitability by year.

TABLE 12
Characteristics of Material to be Dredged from New Bedford\Fairhaven DPA

	2000-2005	2005-2010	2010-2115	2115-2120	Total
Suitable	0	0	0	0	0
Unsuitable	1,568,357	137,407	500	0	1,706,264
Total	**1,568,357**	**137,407**	**500**	**0**	**1,706,264**

Figure 11 - Sediment Suitability for Open Ocean Disposal by Year for New Bedford



10.3 Alternatives

No Dredge - The no dredge alternative will lead to continued sedimentation and gradually decreasing depths within the New Bedford/Fairhaven DPA. Sediment accumulation in the harbor has been accelerated by construction of the hurricane barrier. The barrier, completed in 1966, reduced the opening of the harbor from 1,200 yards to 75 yards in width. A comparison of hydrographic surveys between 1967 and 1989 indicates an accumulation rate of about 63 cubic yards per acre per year. This rate, when applied over the 361 acres within the federal channel, equates to approximately 23,000 cubic yards of accumulation annually.

Upland Landfill - Upland disposal alternatives for New Bedford include those landfills discussed in Section 6.1 and the New Bedford landfill. The New Bedford Landfill is a 12 acre landfill which is partially capped and was scheduled for closure in 1996. Upland disposal of dredged material from the New Bedford/Fairhaven DPA would also require dewatering and transport by truck. Ten alternative sites were identified which could potentially be used for dewatering of dredged material. Each of these is an area of open space along the shoreline for processing and stockpiling of some quantity of dredged material for trucking to a disposal location. Additional project/site specific review would be required before a determination can be made relative to the actual potential use of any site. Approximately 41,300 truck trips would be required over the

NEW BEDFORD

dredging period to transport the material to an upland disposal location, with the largest number of trips, averaging about 22,000 trips per year, taking place between 2000 and 2005.

Aquatic disposal alternatives include CDF, CAD and CAP alternatives. Figure 12 shows the locations of alternative aquatic disposal locations for New Bedford.

CAD - Six potential Confined Aquatic Disposal (CAD) sites were identified in the New Bedford/ Fairhaven DPA; each capable of handling the full volume of material to be dredged. The six sites are identified as Bents Ledge, Great Ledge, Mosher Ledge, West Island Ledge, Deep Bay West, and Deep Bay East. The CAD sites are all located within the corporate boundaries of either New Bedford or Fairhaven. The CAD sites range from 3 to 9 miles from the area to be dredged. They are located in areas where the existing bottom contours indicate the likelihood that the dredged material will remain confined in the area where it is placed. The natural resources inventory indicates that the Bents Ledge, Mosher Ledge, and West Island Ledge sites all have identified shell fishing or finfishing areas on or nearby (within ½ mile) the proposed site. According to the Division of Marine Fisheries, these sites contain abundant tautog, scup, squid, butterfish, and summer flounder. Bent's Ledge contains commercial quantities of quahogs and is presently being reclassified from a "prohibited area" to a "Conditionally Approved Area" for commercial harvest of shellfish including quahogs and conch. Great ledge is an "Approved Shellfish Area" and is presently being fished by five commercial dredge boats. Shellfish are relayed from Silver Shell Beach to this location. Great Ledge is important for both recreational fishing and lobstering. Mosher's Ledge is also a commercial shellfish area, a recreational fin fishing and commercial lobster fishing area. West Island and Deep Bay West are both approved shellfish areas.

Disposal in New Bedford could also be accomplished by overdredging of bottom sediments in or near the channel with disposal of overdredge at the Buzzards Bay Disposal Site and disposal of unsuitable material in the resulting excavation. Capping could then be accomplished with clean material. This alternative may be feasible below the channel or adjacent to the channel immediately to the east or west. Detailed studies will be needed to determine if geotechnical and chemical characteristics of the bottom sediments are suitable for this type of disposal. The Division of Marine Fisheries has indicated that the channel and adjacent areas contain large numbers of quahogs, providing an annual average of 20,000 bushels for the last 10 years.

CDF - Eight potential Confined Disposal Facilities (CDF) were identified in the New Bedford/Fairhaven DPA. Of these alternatives, the West Seawall CDF is the only one which has sufficient capacity to accept the full volume of material to be dredged. The remaining 7 CDFs have substantially less capacity, such that a combination of three or more of these CDFs would be required to handle the full volume of dredged material. Two potential Tidal Habitat sites were identified in the New Bedford/Fairhaven DPA. These sites include the aforementioned West Seawall CDF site and the Silver Shell site. Since the creation of tidal habitat requires that the maximum elevation of site be at or near mean low water, the capacity of the West Seawall site as tidal habitat is substantially less than it would be as a CDF. In order to handle the full volume of dredged material, both sites would be necessary, or one of the sites in conjunction with two or more of the smaller CDF sites. The sites are relatively close to the area proposed to be dredged.

Of these sites, the only two which do not contain shellfish resources are the Fairhaven North and Fairhaven South sites. The Division of Marine Fisheries has indicated that the CDF at North 195 contains large quantities of soft shelled clams and quahog. The railyard, Pope's Island North and Pope's Island South, the State Pier, and West Seawall contain large quantities of quahogs. Pope's Island South and West Seawall are currently being used as relay areas by the Division of Marine Fisheries for the purpose of transplanting shellfish to south shore

NEW BEDFORD

'RN/ 'IEN'

TABLE 14
SUMMARY COMPARISON OF ALTERNATIVES FOR NEW BEDFORD/FAIRHAVEN DPA

ALTERNATIVE	CAPACITY (1,706,264 Needed)	IMPACTS	LOGISTICS	DISPOSAL COST	COMMENTS
No Dredge	Not Applicable.	Continued Siltation Eventual loss of navigation.	Non-structural measures may postpone need to dredge temporarily.	$0	Consideration required by MEPA/NEPA Does not fulfill project goals.
Upland - New Bedford Landfill	12 Acre Landfill	Trucking: traffic, noise, air quality. Landfill: uses capacity otherwise available for solid waste.	Dewatering required. 41,300 truck trips required to transport material to disposal site.	$126.3 million at $74 per cubic yard.	Landfill partially capped. Closure scheduled for 1996.
Upland - New Landfill	Theoretically unlimited.	Trucking: traffic, noise, air quality. Landfill: possible impacts on air, water, and land resources.	Dewatering required 41,300 truck trips required to transport material to disposal site.	$74 per cubic yard plus new landfill capital, operation and maintenance/monitoring costs.	Conflicts with State Solid Waste Plan & DEP Solid Waste Policy.
Soil Washing	32 tons per hour.	Potential landuse conflicts and impacts on noise and air quality at treatment site.	Maginally effective for clays and silts. Still requires transport and reuse/disposal.	Average $89 per cubic yard. $1.5 billion.	Requires other disposal or reuse alternative after treatment.
Solidification/Stabilization	Limited only by materials handling and disposal logistics.	Potential land use conflicts and impacts on noise and air quality at treatment site.	Fine particles and salts may interfere with binding process.	Average $99 per cubic yard. $1.68 billion.	Requires other disposal or reuse alternative after treatment.
Contained Disposal Facility (CDF) at West Seawall	1.97 million cubic yards.	Permanent displacement of subtidal and intertidal habitat. Impacts on soft shell clams, quahog and oyster.	427 barge trips and/or pumping required to transport material 0.5 miles to disposal site.	$85.3 million at $50 per cubic yard. 1,250' of berm for $1.4 million or sheetpile cofferdam for $4.0 million.	Capacity adequate for all unsuitable material. Active shellfish relay area.
CDF at North I-195	656,000 cubic yards	Permanent displacement of subtidal and intertidal habitat. Impacts on soft shell clams and quahog.	427 barge trips and/or pumping required to transport material 2.2 miles to disposal site.	$85.3 million at $50 per cubic yard. 1,500' of berm for $1.7 million or sheetpile cofferdam for $4.8 million.	Insufficient capacity for all unsuitable material. Multiple sites required.
CDF at Railyard	442,000 cubic yards	Permanent displacement of subtidal and intertidal habitat. Impacts on quahog.	427 barge trips and/or pumping required to transport material 1.4miles to disposal site.	$85.3 million at $50 per cubic yard. 2,000' of berm for $2.2 million or sheetpile cofferdam for $6.4 million.	Insufficient capacity for all unsuitable material. Multiple sites required.
CDF at Pope's Island North	673,000 cubic yards	Permanent displacement of subtidal and intertidal habitat. Impacts on quahog.	427 barge trips and/or pumping required to transport material 1.0 miles to disposal site.	$85.3 million at $50 per cubic yard. 3,000' of berm for $3.3 million or sheetpile cofferdam for $9.6 million.	Insufficient capacity for all unsuitable material. Multiple sites required.

TABLE 13 - PHYSICAL CHARACTERISTICS OF AQUATIC DISPOSAL SITES									
DPA	Site Name	Type	Coords (NAD83 M)		Water Depth (Feet)	Size (Acres)	Potential Volume (000 cu.yds.)	Distance To Project (Miles)	Adjacent Land Use
			North	East					
New Bedford	Channel	CAD/OD	820000	249000	28	344.5	11115	0.0	NA
	East of Channel	CAD/OD	820000	249100	25	350.0	12000	0.0	NA
	West of Channel	CAD/OD	820000	248900	25	350.0	12000	0.0	NA
	North 195	CDF	823600	248250	4	20.3	656	2.2	Ind. Play
	Railyard	CDF	822100	248150	4	13.7	442	1.4	Ind, Rail
	Popes Island North	CDF	821550	248800	4	20.9	673	1.0	Marina, Comm
	Popes Island South	CDF	821150	248900	6	18.6	599	0.6	Marina
	State Pier	CDF	820350	248450	12	21.7	700	0.3	Ind, Docks
	Fairhaven North	CDF	820300	249600	4	15	484	0.4	Res, Marina
	Fairhaven South	CDF	819850	249600	2	21.5	693	0.4	Res, Marina
	West Seawall	CDF/TH	819250	248800	2	61.2	1974	0.5	Park
	Bents ledge	CAD	814450	249450	24	237.1	7652	3.2	NA
	Great Ledge	CAD	812000	250900	30	919.1	29657	5.0	NA
	Mosher Ledge	CAD	813550	254250	35	260.2	8396	5.1	NA
	West Island Ledge	CAD	813000	256000	32	525.7	16964	6.0	NA
	Deep Bay West	CAD	809000	254500	53	570.5	18409	7.7	NA
	Silver Shell	CDF/TH	817500	253500	5	100	833	3.0	NA
	Deep Bay East	CAD	812500	260000	46	842.3	27179	8.9	NA

TABLE 14
SUMMARY COMPARISON OF ALTERNATIVES FOR NEW BEDFORD/FAIRHAVEN DPA

ALTERNATIVE	CAPACITY (1,706,264 Needed)	IMPACTS	LOGISTICS	DISPOSAL COST	COMMENTS
CAD at Great Ledge with capping.	29.7 million cubic yards	Permanent disturbance of subtidal habitat. Water quality impacts during disposal. Impacts on lobster quahog, and recreational finfishing.	427 barge trips required to transport material 5.0 miles to disposal site.	$41 million at $24 per cubic yard	Site specific research and testing required.
CAD at Mosher Ledge with capping.	8.4 million cubic yards	Permanent disturbance of subtidal habitat. Water quality impacts during disposal. Impacts on lobster, quahog, recreational & commercial finfishing.	427 barge trips required to transport material 5.1 miles to disposal site.	$41 million at $24 per cubic yard	Site specific research and testing required.
CAD at West Island Ledge with capping.	17.0 million cubic yards	Permanent disturbance of subtidal habitat. Water quality impacts during disposal. Impacts on lobster, quahog, recreational & commercial finfishing.	427 barge trips required to transport material 6.0 miles to disposal site.	$41 million at $24 per cubic yard	Site specific research and testing required.
CAD at Deep Bay West with capping.	18.4 million cubic yards	Permanent disturbance of subtidal habitat. Water quality impacts during disposal. Impacts on shellfish resources.	427 barge trips required to transport material 7.7 miles to disposal site.	$41 million at $24 per cubic yard	Site specific research and testing required.
CAD at Deep Bay East with capping.	27.2 million cubic yards	Permanent disturbance of subtidal habitat. Water quality impacts during disposal. Impacts on shellfish resources.	427 barge trips required to transport material 8.9 miles to disposal site.	$41 million at $24 per cubic yard	Site specific research and testing required.

NEW BEFORD/FAIRHAVEN FACILITIES	2000-2005	2005-2010	2010-2015	2015-2020
10 Pier 3 Fisherman's Wharf	3,333			
13 Marine Terminal Wharf	30,000			
14 Frionor USA Wharf	3,500			
18 Fish Terminal Wharf	10,000			
19 Gear Locker Marina	8,000 / 8,000			
23 Cozy Cove Marina	1,500			
29 Town of Fairhaven	3,524			
30 Norlantic Diesel Fuel	16,500			
31 Hathaway-Braley Wharf	1,000			
33 State Pier to Federal Channel	60,000			
34 Ferry Pier	35,000			
35 Fairhaven Boat Ramp	25,000			
36 Federal Channel	1,345,000			
17 Packer Marine	500 / 1,500		500	
25 Linberg Marine Berth	5,000	2,000		
28 DN Kelly & Son Wharf	11,000	50,000		
25 US Coast Guard		15,407		
27 Acushnet Fish Co Pier		11,000		
41 Nimiec Marine		26,000		
42 Whaling City Marine		23,000		
43 D.W. White Construction		10,000		

Improvement Dredging (1,500)

Maintenance Dredging (25,000)

Shading Indicates Sediments Suitable for Ocean Disposal (29,400)

Figure 13 - Anticipated Dredging Schedule - New Bedford