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PROPOSED RESOURCE COMPENSATORY MITIGATION FOR PROPOSED SOUTH TERMINAL EXTENSION CDF NEW BEDFORD HARBOR

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Prepared for

NEW BEDFORD HARBOR DEVELOPMENT COMMISSION
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ABBREVIATIONS AND ACRONYMS

APEX	Apex Companies, LLC
CAD	Confined Aqueous Disposal
CI	Channel Inner
CZM	The Office of Coastal Zone Management
DMF	Division of Marine Fisheries
DMMP	Dredge Material Management Plan
DO	Dissolved Oxygen
EENF	Expanded Environmental Notification Form
EFH	Essential Fish Habitat
EFHA	Essential Fish Habitat Assessment
EIR	Environmental Impact Review
FFMP	Federal Fisheries Management Plan
HAPC	Habitat Areas of Particular Concern
iscy	in situ cubic yards
MACZM	Massachusetts Costal Zone Management
MADEP	Massachusetts Department of Environmental Protection
MADMF	Massachusetts Division of Marine Fisheries
MA EOEA	Massachusetts Executive Office of Environmental Affairs
MLW	mean low water
NBHDC	New Bedford Harbor Development Commission
NBRA	New Bedford Re-Development Authority
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
PIN	Popes Island North
SER	State-Enhanced Remedy
UDM	Unsuitable Dredge Material

1.0 INTRODUCTION

This report was prepared in order to evaluate the potential for mitigation to address presumed impacts to resource areas due to implementation of a Confined Disposal Facility (CDF) via an extension of South Terminal in New Bedford, Massachusetts.

The purpose of the Proposed South Terminal Extension CDF Project is to develop a marine terminal that will provide essential infrastructure to serve offshore renewable energy facilities, facilitate the remediation of the New Bedford Harbor and manage the dredge sediment generated from the maintenance of navigational channels within the Harbor.

CAD Cells have been chosen as the preferred methodology for disposal of PCB contaminated sediment within New Bedford Harbor associated with the State Enhanced Remedy to the Record of Decision of the New Bedford Superfund Site. The USEPA is also considering the use of CAD Cells in implementing the Remedy for the Superfund Site. It is currently anticipated that approximately 1.8 million cubic yards of clean sand will be generated during construction of the future CAD Cells. MassDEP has stated that it is preferable to find alternatives to Open Ocean Disposal due to the large volume of material, specifically, alternatives that can be implemented at the site. One of those potential alternatives is to utilize Confined Disposal Facilities (CDFs) within New Bedford Harbor to dispose of the clean sand while constructing a marine terminal, which can subsequently help to store additional clean sand in the future, helping to implement other potential disposal or re-use alternatives. Analysis of the best location in New Bedford Harbor for the first proposed CDF (the preferred Alternative) indicates that the Proposed South Terminal Extension CDF is the best candidate for fulfilling the Project Purpose as the Least Environmentally Damaging Alternative, when consideration is given to all factors.

The Site is located immediately to the south of South Terminal in New Bedford, Massachusetts. A Site Locus Map is included with this document as **Figure 1**. The extension involves the installation of approximately 800 linear feet of sheet piling to the south, aligned with the existing bulkhead. The proposed extension is shown on **Figure 2**. The area behind the bulkhead would be filled with clean sand generated during CAD Cell construction. The surface of the CDF, after

filling, is currently anticipated to be crushed stone, to accommodate anticipated uses at the facility. The full facility:

- Encompasses approximately 20 acres of area;
- Would cover and cap subaqueous PCB and metals contaminated sediments that exist to the east of the current shoreline, and cover contaminated urban fill areas upland, and paved and filled areas upland;
- Reflects ideal future potential industrial use as an Alternative Energy Industrial Marine Park, potential direct rail access, and nearby highway access;
- Is currently industrial and industrially impacted property;
- Is located south of the Route 6 swing bridge, and has no restriction on vessel size nor timing;
- Land is currently owned by the HDC, but leased to non-water-dependant users;
- Does not require the relocation of any users; and
- Would allow for future storage of a large amount of clean sand from CAD cells as a transient storage holding area until other uses can be found for the material.

While CDFs will impact some resource areas, this impact will be mitigated by the fact that contaminated lands will be incorporated into the footprint of the CDFs, effectively capping these environmentally impaired potential future contaminant source areas. The impact to resource areas by building the CDFs will be further mitigated by the environmental benefit to the overall Harbor that will be realized by expediting the cleanup of contaminated sediments that CDFs will facilitate.

2.0 ASSESSMENT OF AREA TO BE IMPACTED

The following sections review the information promulgated within the Essential Fish Habitat Assessment, Shellfish Survey, as well as the Functions and Values Assessments prepared by Apex Companies, LLC (Apex) all completed in 2010, for the Proposed South Terminal Extension CDF.

2.1 List of Impacted Resources from EFH / FVA / Shellfish Survey

The anticipated impacts from the construction of the Proposed South Terminal Extension CDF are both short-term and long-term. The short-term impacts primarily are due to construction related impacts, associated with potential generation of dust, noise, turbidity within the water column, and excessive erosion.

Long-term impacts are related to impacts associated with the loss of resource areas. A resource delineation completed by Apex Companies, LLC (Apex), and presented within the Functions and Values Assessment for the Proposed South Terminal Extension CDF indicated that the resource areas anticipated to be impacted by completion of this project are as follows:

- 2.99 acres of Land Under the Ocean/Land Containing Shellfish.
- 1.27 acres of Coastal Beach/Land Containing Shellfish/Horseshoe Crab Habitat.
- 0.34 acres of Coastal Beach/Land Subject to Flooding.
- 0.26 acres of Coastal Bank/Land Subject to Flooding.
- 1.03 acres of Land Subject to Flooding.
- 0.71 acres of Isolated Wetlands.

Which is a total of approximately 6.6 acres of resource area at this facility that will be lost due to completion of this project. A resource area location map is included as **Figure 4**.

An Essential Fish Habitat Assessment was prepared by Apex Companies, LLC (Apex) which stated that, although construction impacts for the Proposed South Terminal Extension CDF are

anticipated to be minimal, 2.99 acres of Land Under the Ocean will be lost as Essential Fish Habitat due to the installation of a bulkhead and the filling behind the bulkhead to create the facility.

A shellfish survey conducted by Apex Companies, LLC estimated that 132,164 shellfish will be impacted by capping and filling the Proposed South Terminal Extension CDF area.

2.2 Proposed Calculation of Compensation

The wetland impacts associated with the Proposed South Terminal Extension CDF have been assessed and the following mitigation is proposed for the anticipated impacts:

Short–Term Construction Related Impacts and Proposed Mitigation

Stormwater Best Management Practices – Upland Construction

The upland construction associated with this project presents multiple opportunities to avoid and minimize potential short-term environmental impacts. One of the most significant areas in which short-term impacts to the environment can be reduced relates to stormwater discharges. While earthwork is being conducted on-site and soils and/or fill material are exposed, appropriate measures will be employed to limit the offsite transport of sediment/soil. Suitable erosion and sedimentation controls will be implemented as described below to minimize additional potential sources of sedimentation and pollution.

Silt fencing, composed of geotextile fabric and/or haybales, will be installed around the perimeter of the project site while native soils or underlying fill material is exposed on-site. Additionally, silt fencing will be installed around material stockpiles on-site, to minimize erosion and run-off potential.

When clean sand from the CAD Cell and/or contaminated sediment is placed within the CDF, secure, passive dewatering areas will be established within the work area. Berms will be established around the dewatering areas, to prevent the discharge of sediments back into the

harbor. Dewatering fluids will be run through a filtration unit (such as a sand filter) to remove suspended sediment prior to discharge into New Bedford Harbor.

Physical Barriers

The first step of the preferred construction alternative will involve the installation of sheeting. Dredging and backfilling operations will occur only after the sheeting has been installed. Once installed, the sheeting will act as a physical barrier to the transport of suspended sediments entrained in the water column that may result from filling operations behind the CDF. Additionally, the use of floating semi-permeable turbidity barriers, or "silt curtains", during construction will be utilized, if they are determined necessary and feasible (typically in shallow, tidally influenced water, the silt curtains may impact the water column with fine-grained sediment more than protect the water column). The silt curtains (should they be employed) will further minimize the distribution of any fine-grained sediment that is unintentionally suspended during construction operations and will minimize potential turbidity exceedances. As an added benefit, the proposed silt curtains will act as a physical barrier to keep finfish and mobile invertebrates out of the work areas. The silt curtains, if they are used during project activities, and the steel sheeting, will both act as physical barriers to reduce siltation at spawning locations.

Water Quality Monitoring

Turbidity will be monitored during the Proposed South Terminal Extension CDF construction and related dredging projects, the potential impact to water quality will be measured and evaluated against threshold standards previously defined for dredging and construction activities under the State Enhanced Remedy (SER). Avoidance and minimization measures will be taken if threshold exceedences are identified during the water quality monitoring.

Monitoring of the water column turbidity will measure the potential impact to water quality using an Optical Backscatter Sensor and will follow the parameters and standards established previously for the dredging and construction activities under the SER.

If an exceedance of the project turbidity standard is triggered (activities when the average turbidity at the monitoring site exceeds the average reference site turbidity plus the permissible turbidity increase) construction, dredging and/or disposal activities will cease, and additional water quality samples will be collected. Water quality samples will be composited over three depths from the water column, and will be taken from both the up-current and down-current monitoring sites. Water quality samples will be taken at the same approximate locations and depths as where the turbidity measurements were taken and submitted to a certified laboratory under proper chain of custody. Water quality samples will be analyzed for the following parameters: Total Suspended Solids (TSS), total PCBs (Summation of Congeners), and total metals (arsenic, cadmium, copper, chromium, lead, mercury, nickel and zinc).

If compliance with the turbidity standards cannot be reestablished within 48 hours, dredging and/or construction will cease. If dredging is stopped due to a water quality exceedance, the Massachusetts Department of Environmental Protection (MassDEP) and any other interested local, state or federal agency staff, subcontractors, and/or consultants, shall review the operational actions undertaken, all analytical results and data evaluations. A determination would be made regarding the requirement for any additional mitigation (if necessary).

Additional Construction Related Impacts

Additional short-term environmental and other impacts may be expected during the phases of construction. These impacts include the potential for increased amounts of airborne dust on-site, increased noise and/or odors as related to construction activities, potential for chemical spills related to the on-site heavy machinery.

The New Bedford Building, Codes and Planning departments will be consulted during the construction phases to ensure that increased construction-related noises and odors on-site do not violate local ordinances. Appropriate measures will be employed if it is determined that noise or odor violations of these ordinances occur.

During the bidding process, construction contractors will be required to address mitigation measures for potential spills related to the diesel engines and other heavy machinery to be used on-site. Spill clean-up kits will be available on-site during construction activities and the proper regulatory agencies will be notified and appropriate clean-up measures will be undertaken, should a spill occur on-site.

Long-Term Impacts and Proposed Mitigation

Long-term impacts include impacts anticipated to be generated via construction of the facility. Construction of the Proposed South Terminal Extension CDF is anticipated to have a long-term impact on the following resource areas:

- 2.99 acres of Land Under the Ocean/Land Containing Shellfish.
- 1.27 acres of Coastal Beach/Land Containing Shellfish/Horseshoe Crab Habitat.
- 0.34 acres of Coastal Beach/Land Subject to Flooding.
- 0.26 acres of Coastal Bank/Land Subject to Flooding.
- 1.03 acres of Land Subject to Flooding.
- 0.71 acres of Isolated Wetlands; and
- Destruction of 132,164 shellfish.

Land Subject to Flooding

1.03 acres of land within the project footprint has been identified as Land Subject to Flooding under the Commonwealth of Massachusetts' Wetland Protection Act (310 CMR 10.0000). The resource areas at the site provide storage for flood flows present within the Acushnet River; however, flood storage is not as crucial at the base of the Acushnet River, where New Bedford Harbor intersects with Buzzard's Bay. Reduction of flood storage at this end of the Acushnet River provides less benefit due to the ease at which flood waters drain out through the Hurricane Barrier at the mouth of New Bedford Harbor. Flood flows during storm surges are many orders of magnitude higher than what can be accommodated at properties within New Bedford Harbor; and the New Bedford Hurricane Barrier protects New Bedford Harbor from significant storm surges. It does not appear to be critical to mitigate for this lost resource, due to its relatively low

importance at this location within the watershed; therefore, no mitigation is proposed for the loss of this resource.

Isolated Wetlands

0.71 acres of land within the project footprint is designated Isolated Wetlands under the Commonwealth of Massachusetts' Wetland Protection Act (310 CMR 10.0000). Prior to conducting a resource identification at the site in question, historical records of land use were reviewed. A map prepared by the Massachusetts Office of Coastal Zone Management indicates that the historic high water line at the facility is significantly inland of the current coast line. This map is presented as **Figure 3**. The resource area location map (**Figure 4**) notes the location of the historic high water line as a blue stripe running approximately 200 feet inland and parallel to the existing coastline; the area between the historic high water line and the existing high water line consists of filled tidelands.

During the course of its wetland resource investigation on April 20, 2010, Apex Companies, LLC, the presence of historic fill was confirmed in all but one of up to nine separate test pit locations dug to investigate the presence of hydric soils. In all but one location, man-made materials (brick, asphalt, trash, etc.) were identified within 15 inches of the surface. This was found to be the case even for areas in which hydric soils were noted within the top 10-15 inches of soil and where wetland indicator species (primarily the invasive species *phragmites australis*) were detected. Due to the highly degraded nature of these wetlands, and the fact that they are not natural, but are instead man-made and are choked with invasive species, the functions and values of these wetland areas are questionable.

The main value that these wetlands provide is in stormwater retention onsite. Fortunately, the facility is currently not planned to be paved, so it is unlikely that significant stormwater retention capacity will be lost; however, to ensure that the significant stormwater retention function is not lost by construction of the facility, a Stormwater Runoff/Infiltration Study will be performed during the design of the facility to analyze the capacity of the facility to retain runoff and infiltration capacities at the facility.

It is known that environmental stakeholders in the Harbor are concerned about general stormwater infiltration, non-point source pollution and runoff issues, including non-point source pollution that enters the Harbor from major roadways such as I-195 where it crosses the Acushnet River. Therefore, a pilot Rain Garden program will be undertaken in an area within New Bedford that can benefit from additional stormwater retention and/or treatment. At present, one possibility under consideration is a location nearby one of the major highways within New Bedford (such as Route 18 or Route 195). Such a pilot rain garden is anticipated to be approximately 0.25 acres in size, but will depend heavily upon the final location chosen for the site.

Land Under the Ocean

2.99 acres of land within the project footprint has been identified as Land Under the Ocean under the Commonwealth of Massachusetts' Wetland Protection Act (310 CMR 10.0000). The resource area consists of Essential Fish Habitat as well as shellfish habitat. All sediments in New Bedford Harbor are severely degraded with contamination and contain PCBs and heavy metals. All areas under the high water mark within New Bedford Harbor are part of the New Bedford Superfund Site; so designated due to historic releases of PCBs into the marine environment that have universally impacted sediment within the Harbor with PCBs (typically fine-grained organic sediments of varying thicknesses). Although the concentration of PCBs in this fine-grained sediment varies depending upon the location within the Harbor, historic sampling results indicate that the concentration of PCBs within the sediment at the subject site is higher than the upper limit allowed within landfills within the Commonwealth of Massachusetts. USEPA has banned fishing and shellfishing within New Bedford Harbor indefinitely due to the presence of PCBs within fish and shellfish (see **Figure 5** for a copy of the notice issued by USEPA indicating the bans). Although it may be possible to depurate the shellfish of PCB impacts, the PCBs are not anticipated to degrade on their own and depuration of the shellfish within a clean area will only transport the PCBs to the clean location at which depuration occurs, thereby transporting Superfund material outside of a Superfund site. Areas at the site (and within New Bedford Harbor as a whole) below the high water mark act as a source of contaminants for the surrounding communities (beginning at Buzzard's Bay), rather than retaining sediment or toxics, as non-impacted wetland areas would be expected to do.

Traditional production from within a wetland is provides the opposite effect than what is normally anticipated at wetland sites: the production of food or usable products for humans or other living organisms by the wetland areas are harmful, instead of beneficial to humans, wildlife, fish or the environment.

The New Bedford Harbor Development Commission has diligently worked to remove PCB contaminated sediment from New Bedford Harbor while conducting Navigational Dredging and has removed it from contact with Essential Fish Habitat and benthic organisms. The Navigational Dredging Projects have been completed in three Phases.

Phase I of Navigational Dredging involved dredging on the south side of the New Bedford State Pier in New Bedford Harbor, and the fairway and a portion of the Federal Channel leading up to the Pier. Work on Phase I began in 2001, and dredging of the project area was completed by the end of 2002. For this project, approximately 75,000 yards of contaminated sediment was dredged from the area to the south of the State Pier and the fairways leading there-to.

Phase II included the maintenance dredging of portions of Maritime Terminal, Norpel Terminal, Whites Terminal, South-of-Route 6 Bridge, and Niemiec Marine, as well as removing and disposing of the top of an 85,000 cubic yard CAD Cell (CAD Cell #1), in New Bedford Massachusetts, and the Warren Alexander Property, D.N. Kelley & Son, Linberg Marine, and Pease Park properties, in Fairhaven, Massachusetts. The New Bedford Harbor Phase II Dredge Project began in January 2005 and was completed Phase II harbor maintenance dredging in January 2006, removing more than 156,000 cubic yards (cy) of material from sites in New Bedford and Fairhaven.

Phase III included the maintenance dredging of portions of the New Bedford Rowing Facility boat basin, Packer Marine, Tonnesson Park, South Terminal, Gifford Street Boat Ramp, Niemiec Marine as well as removing and disposing of the top of an 92,000 cubic yard CAD Cell (CAD Cell #2), in New Bedford, Massachusetts and Linberg Marine, Olde North Wharf Fisheries, Fairhaven Shipyard, Union Wharf, Warren Alexander (South) in Fairhaven, Massachusetts.

Phase III began in September 2006 and was completed in September 2009, removing more than 189,000 cubic yards (cy) of material from sites in New Bedford and Fairhaven.

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The New Bedford Harbor Navigational Dredging projects have removed approximately 49.5 acres of PCB contaminated sediment from the bottom of New Bedford Harbor. This work has not been utilized as mitigation for any construction project to date, and has resulted in the removal of PCB and heavy metals impacted sediment, thereby enhancing the quality of 49.5 acres of Land Under the Ocean. The effects of this mitigation work has resulted in the enhancement of 49.5 acres of Land Under the Ocean and Shellfish Habiat, as well as improvement to Essential Fish Habitat within New Bedford Harbor, and a much improved benthic substrate. This 49.5 acres of Land Under the Ocean enhancement is proposed as mitigation for the 2.99 acres of Land Under the Ocean that will be impacted on a long-term basis by construction of the Proposed South Terminal Extension CDF.

Loss of Shellfish

The following is a calculation of the quantity of shellfish that will be re-seeded for this project, in accordance with DMF guidelines. The results of a shellfish survey completed by Apex indicates that approximately 132,164 of varying sizes and species will be impacted by the completion of the Proposed South Terminal Extension CDF project. DMF has indicated in the past that the dollar value recommended for seed purchases to mitigate for shellfish loss during construction projects is often five times the value of the shellfish. Therefore, mitigation proposed for shellfish loss due to the construction of the Proposed South Terminal Extension CDF is five times (660,820 [rounded to 661,000] shellfish seed) the estimated number of shellfish being impacted (132,164 shellfish).

Coastal Beach/Coastal Bank

1.27 acres of land within the project footprint has been identified as Coastal Beach/Land Containing Shellfish/Horseshoe Crab Habitat, 0.34 acres of land within the project footprint has been identified as Coastal Beach/Land Subject to Flooding, and 0.26 acres of land within the project footprint has been identified as Coastal Bank/Land Subject to Flooding under the Commonwealth of Massachusetts' Wetland Protection Act (310 CMR 10.0000). A total of 1.87

acres of Coastal Beach/Coastal Bank is proposed to be created as mitigation for the long-term impact to these resource areas. Ideally, the mitigation for this lost resource area should serve as both shellfish habitat and/or horseshoe crab habitat, if possible.

3.0 RANKING OF POSSIBLE COMPENSATORY MITIGATION SITES

A number of potential mitigation alternatives were evaluated for compensation of lost resources identified within the previous section. A number of pre-screened mitigation projects were reviewed and evaluated. Additional projects that had either been suggested by representatives of the New Bedford Conservation Commission, or had been separately conceptualized were also considered. A list of 10 potential mitigation projects were selected from the greater number of potential projects. Those 10 potential mitigation projects were evaluated and a particular mitigation proposal was developed.

3.1 Description of All Possibilities – Reference Information

Approximately 52 pre-screened potential mitigation alternatives were researched within the New Bedford Harbor Wetlands Restoration Plan, dated August 2002, prepared by the Massachusetts Wetlands Restoration Program (cover, index and relevant cut sheets attached as **Appendix A**). Review of the document did indicate several projects which restore similar resources to those in the proposed project area. Additionally, alternatives identified by project stakeholders and local officials were gathered. Other potential alternatives were prepared based upon the results of historic meetings conducted with the New Bedford Conservation Commission Agent as well as observations made at various time periods within New Bedford Harbor and the surrounding community. Many of the potential options were not selected since they were known to have been already undertaken since 2002, or were known to be on hold until the completion of the USEPA Superfund Remedy within Upper New Bedford Harbor. Still others were not selected due to the fact that they presented insurmountable logistical difficulties involved in complicated ownership arrangements and/or did not present opportunities to provide the functions and values that are needed for mitigation for the impacts anticipated from the Proposed South Terminal Extension CDF project. Finally, some options were not selected due to their distance from the source of impact.

3.2 Description of Top 10 Locations

As stated within the last section, the many potential mitigation alternatives were not found to be viable for many potential reasons, including ownership issues, proximity to the location of impact, and a poor match of newly created functions and values with functions and values that are anticipated to be lost. The following ten alternatives were chosen for a more detailed evaluation:

Alternative 1 – Beach construction between the Coggeshall Street and the Route 1-95 Bridges.
This alternative would remove PCB contaminated sediment between the two bridges. The removal of the PCB impacted sediment would allow for the construction of 250 linear feet of beach and .7 acres of habitat. The area is well sheltered, although the two bridges act as a tidal restriction to the upper reaches of the harbor water movement in the area would allow for continued tidal flushing. The location of the site is ideal as there is no access to the site from the land side as the on ramp and off ramp to Route 1-95 limits access.

Alternative 2 – Riverside Park Riparian Restoration.
The Riverside Park is located on Bellville Ave adjacent to the upper harbor. The site has very interesting and distinct characteristics. The cove acts as a still water area for all types of biota. The shore line at the site meanders back and forth creating several peninsulas. The project could restore up to 2,400 linear feet of bank and approximately 1.4 acres of marsh. There have been proposals to add a bike path/walking trail with educational interpretive signs at the site as well. Before work could begin at the site location, the USEPA remedy would need to be complete in this area.

Alternative 3 – Capping of OU3 between the Hurricane Barrier and Existing OU3 Cap
At a request from USEPA, the New Bedford Harbor Development Commission capped an area of OU-3 as part of Phase II of Navigational Dredging. The action helped to further the Superfund Remedy by capping PCB contaminated sediments which were distributed in the surficial soft sediments in the area surrounding a Hurricane Barrier stormwater discharge. The capping began in 2004; the material was placed over approximately 75% of the designated area for capping. Much of the area closest to the Hurricane Barrier remained uncapped due to

limitations at the time of the placement method. The proposed alternative would utilize clean sand from the CAD Cell to cap a portion of OU-3 nearest to the Hurricane Barrier as well as to to create beach and dune habitat in this area. The project would create coastal beach and a coastal bank structure which would integrate into the existing capped area. The proposed alternative would create approximately 2 acres of Coastal Beach extending approximately 800 linear feet in an area which is environmentally distressed. The project would beneficially reuse approximately 65,000 cubic yards of clean sand generated during CAD Cell construction.

Alternative 4 – Beach Construction in Clarks Cove along Hurricane Barrier

The alternative would construct a beach along the Hurricane Barrier in Clark's Cove. The proposal would be to create up to 800 linear feet of beach and 2 acres of coastal structure on the east side of Clarks Cove. This project is outside of the Superfund Site, and therefore would require conventional permits. The project would construct Coastal Beach where presently a riprap slope exists.

Alternative 5 – Construction of Beach North of Pease Park, Fairhaven

The alternative would remove PCB contaminated sediments from along a rip-rap slope and sheet pile wall north of Pease Park in Fairhaven. The material would be disposed of within a CAD Cell or CDF. Clean sand generated during CAD Cell construction would be placed along the sheet pile wall and rip-rap slope creating approximately 400 linear feet of beach and .5 acres of Coastal Beach habitat within the inner harbor.

Alternative 6 – Beach Construction at Crow Island

The alternative would construct a beach on a small sand bar/jetty on the south west side of Crow Island. Crow Island is located immediately south of Pope's Island, and is privately owned. It is currently unclear if this project would interfere with existing or future navigational requirements of either recreational boating or commercial or industrial navigational activity within New Bedford Harbor. The project could create approximately 145 linear feet of beach and .11 acres of habitat.

Alternative 7 – Marsh Island Saltwater Marsh Restoration

Marsh Island is located in Fairhaven, north of Route 6, but south of Route 195, adjacent to the Riverside Cemetery. The site presently has a radio tower which broadcasts the signal for WBSM. The project would remove approximately 2 to 6 feet of fill from the north side of the island within the marsh at the site. The removal of the fill would eliminate tidal restrictions to approximately 5 acres of salt marsh area, restoring flow to the site. It is unclear; however, whether this project may either be underway or may be completed in the near future by other parties.

Alternative 8 – Hurricane Barrier Vegetated Swale Rehabilitation and Restoration.

The alternative would remove PCB contaminated sediment from an existing stormwater swale on the inland side of the Hurricane Barrier between Gifford Street and Cove Street. The restoration would include the removal of PCB contaminated sediment currently within the drainage swale, and addition of clean sand from the CAD Cell, raising the elevation of the submerged area to between 6 inches and 1 foot below high tide. A central drainage channel and branched drainage channels would run through the new material, allowing for stormwater drainage through the area to continue. The low areas would be planted with low marsh plants. Rip-rap running along the western side of the channel would be removed and the low area would be graded gradually up to the existing grade, to allow a salt marsh succession ending at the top of slope. The project would create approximately 2 acres of marsh habitat.

Alternative 9 – Silver Beach Drive Salt Marsh Restoration

The alternative would restore tidal flow to an approximately 50 acre area of Sconticut Neck in Fairhaven. The project would remove sand and gravel which build up with in the outlet structure to the marsh. The tidal restriction at the site impounds fresh water within the marsh system creating a mosquito control issue as well as causes a degradation of the saline environment. The project would explore a more permanent solution keeping the outlet structure free of foreign debris as well as sand and gravel which is deposited by tidal flushing. It is unclear; however, whether this project may either be underway or may be completed in the near future by other parties

Alternative 10 – Round Hill Beach Highland Marsh Restoration

The alternative would restore tidal flow to approximately 10 acres of highland marsh behind the Round Hill Barrier Beach in Dartmouth, MA. The project would remove 1 to 3 feet of fill from within a historic saltwater marsh. The restoration would establish wetland grad, soils, hydrology and vegetation, as well as placement of an appropriate culvert or bridge under Ray Peck Rd. to provide full tidal flushing to the restored salt marsh.

3.3 Ranking Matrix

Each of the potential mitigation options that passed the initial screening was evaluated using standardized criteria, selected in order to help prioritize logistical, engineering, cost, and environmental qualities of the alternatives. The criteria are grouped into the following categories: Effectiveness, Timeliness, Benefits, Ownership, Environmental Issues, Difficulty in Implementation, Size, Proximity to Area of Impact, and Cost. Each of the categories has been given equal weighting in order to compare the desirability of each alternative. The resulting formula assigns a score for each construction alternative based on the following formula where an alternative with a higher score is a more desirable option and an alternative with a lower score is a less desirable option:

$$[\#] = E + T + B + O + N + I + S + P + C$$

Where:

E is Effectiveness	I is Difficulty in Implementation
T is Timeliness	S is Size
B is Benefits	P is Proximity to Area of Impact
O is Ownership	C is Cost
N is Environmental Issues	

Within each of the criteria, the alternatives were assigned a relative ranking for comparative purposes. The relative ranking was given a range of [1 to 10] for each category, with [10] being

the most desirable and [1] being the least desirable rank for each category. The following matrix table shows the alternatives, the evaluation criteria, each alternative's ranking for its respective criteria, and the total score for each alternative. Alternatives are ranked by total score (highest score indicates the most preferred alternative).

Alternative Matrix Table

Alternative	**E**	**T**	**B**	**O**	**N**	**I**	**S**	**P**	**C**	**Total**
Acushnet River Between 1-95 Bridge and Coggeshall Street Bridge	8	1	5	10	1	1	5	6	4	**41**
River Side Park Riparian Restoration	10	1	8	10	1	5	8	5	3	**51**
Capping of OU3 Between Hurricane Barrier and Existing Cap	8	10	8	10	10	10	10	8	10	**84**
Construction of Beach at Clarks Cove along Hurricane Barrier	8	3	8	5	4	7	8	4	6	**53**
Removal of contaminated sediments at existing beach and construction of replacement beach and new beach in Fairhaven.	10	9	10	5	10	6	5	8	6	**69**
Beach construction at Crow Island	5	1	5	1	1	10	3	5	6	**57**
Marsh Island salt water marsh restoration	6	4	5	1	5	6	3	5	4	**39**
Hurricane Barrier saltwater marsh restoration	8	10	8	10	10	10	6	10	8	**80**
Silver Beach Drive (Fairhaven) saltwater marsh restoration	8	10	7	3	10	6	10	4	10	**68**
Round Hill Beach marsh restoration	8	1	8	10	10	1	8	1	1	**48**

Where:

E is Effectiveness
B is Benefits of Habitat
N is Environmental Issues
S is Size
C is Cost of Implementation
T is Timeliness
O is Ownership
I is Difficulty in Implementation
P is Proximity to Area of Impact

3.4 List of Selected Sites

The alternatives evaluated are listed below in descending order of preference as determined by the Alternative Matrix Table:

Ranking (Total Score)	Alternative	Reasoning
#1 (84 points)	Capping of OU3	Unlike many other alternatives, this alternative will create beach and coastal dune structures where they do not presently exist. In addition, the alternative will permanently isolate PCB impacted sediment from storm water outfalls. The project could be completed as a part of the construction of the next CAD Cell, thereby enhancing the remedy. The area of capping is owned by the Commonwealth of Massachusetts and has been partially capped in 2004. As stated previously the project would isolate PCB impacted sediment present in the surficial sediment in the area. Coarse-grained material could be placed hydraulically or mechanically placed on the surface of the soft sediment. The proposed area is 2 acres and would create approximately 800 linear feet of beach. The alternative is directly south of the hurricane barrier and would proved habitat for displaced biota. The cost of placement will be marginal as the capping of the remaining areas of OU3 is required and the project can be done in conjunction.
#2 (80 points)	Hurricane Barrier Marsh Restoration	This alternative will remove contaminated sediment from the existing drainage swale which runs along the back side of the hurricane barrier. The swale will be then graded so that no more than a half a foot to a foot of water exists in the swale at high tide. The swale will be designed so that low marsh plants and high marsh plants can be planted on the west side (land side) of the structure. The interior of the swale will be seeded with the appropriate salt resistant plants and wetland species.
#3 (69 points)	Beach Restoration and Construction	This alternative will remove PCB contaminated sediment from the beach between Pees Park and the Seaport Inn and Conference Center on the Fairhaven side of the Harbor. The dredged sediment would be placed within a CAD Cell or CDF. Sand dredged as a part of future CAD Cell construction will be placed within the footprint of where contaminated sediment was removed. In addition a beach will be created along the rip-rap slope and be integrated into the beach restored to the north. The project would create approximately 0.5 acres of beach area and would create 400 linear feet of beach with in the inner Harbor. This project is a good alternative as it restores beach habitat within the inner harbor.

Ranking (Total Score)	Alternative	Reasoning
#4 (68 points)	Silver Beach Drive Marsh Restoration	This alternative was selected from the New Bedford Harbor Environment Wetland Restoration Plan. The alternative would restore tidal flow to an approximately 50 acre area of Sconticut Neck in Fairhaven. The project would remove sand and gravel which build up with in the outlet structure to the marsh. Additionally the project would explore a more permanent solution keeping the outlet structure free of foreign debris. The project sheet from the Wetlands Restoration Plan is included in Appendix A. This project is a good alternative and scores well on the effectiveness, timeliness and lack of other environmental issues however the project is not in proximity to the proposed project and restores resources similar to those taken in the proposed project.
#5 (53 points)	Construction of Beach in Clarks Cove	Construction of a Beach with in Clarks Cove along the Army Corp of Engineers Hurricane barrier similar to that of the previously described alternative. The beach would tie into existing beaches within the Cove and create new habitat and salt marsh. The project is not a good alternative as it would take a great deal of time to implement the project.
#6 (51 points)	Construction of Beach at Crow Island	This alternative would create beach on the south west side of Crow Island. There is currently a small sand bar which could be enlarged to create a new beach in the inner Harbor. However the alternative could have a significant impact on navigation with in the Harbor.
#7 (45 points)	Riverside Park Riparian Restoration	This alternative was selected from the Wetlands Restoration Plan. Before the project could be completed the US Environmental Protection Agency would need to complete the removal of superfund waste from the adjacent cove and wetland. The time line for the completion of this is unknown at this time. A project description is included in Appendix A.
#8 (48 points)	Round Hill Beach Marsh Restoration	This alternative was selected from the New Bedford Harbor Environment Wetland Restoration Plan. This alternative will likely be the most expensive of any of the considered alternatives. The project includes the removal of 1 to 3 feet of fill across a 10 acres site. The site would be reseeded and restored to its natural state. A detail description of the project is included in Appendix A.
#9 (41 points)	Acushnet River between the 1-95 and Coggeshall Bridge	This alternative would require the US EPA to remove PCB contaminated sediment from the area before the alternative could be realized. The site does offer a protected location with effective tidal flushing.
#10 (39 points)	Marsh Island Marsh Restoration	This alternative was selected from the New Bedford Harbor Environment Wetland Restoration Plan. This alternative would remove tidal restrictions on the North side of the Island by removing 2 to 6 feet of fill from the site. The site is owned by several entities. The project would be difficult to implement and would restore a minimal amount of salt marsh. A detailed description is included in Appendix A.

4.0 PROPOSED COMPENSATORY MITIGATION FOR LONG-TERM IMPACTS

In order to compensate for Long-Term impacts to 1.87 acres of Coastal Beach and Coastal Bank resource areas due to construction of the Proposed South Terminal Extension CDF, a number of potential mitigation options have been evaluated. The results of this evaluation were that the following mitigation package is proposed:

- Creation/Enhancement of 2.5 acres of Coastal Beach/Coastal Bank via a combination of sites either within or immediately outside of New Bedford Harbor.
- Creation/Enhancement of 2 acres of a combination of successional marsh areas (mudflat, low marsh, high marsh, and transitional area).

4.1 Strategy

The proposed mitigation strategy for long-term impacts is to implement the following three proposed mitigation alternatives:

- Alternative 3 – Capping of OU3 between the Hurricane Barrier and Existing OU3 Cap;
- Alternative 5 – Construction of Beach North of Pease Park, Fairhaven; and
- Alternative 8 – Hurricane Barrier Vegetated Swale Rehabilitation and Restoration.

The three locations are shown on **Figure 6**.

Alternative 3, Capping of OU-3 Between the Hurricane Barrier and Existing OU-3 Cap is anticipated to create or enhance approximately 2.0 acres of coastal beach and coastal bank. The mitigation project would have the dual purpose of creating Coastal Beach habitat while simultaneously capping and isolating from the environment sediments with a high level of PCB contamination within them while also utilizing clean sand from CAD Cell construction. The Coastal Beach would be approximately 800 feet in length, the exact length of Coastal Beach that will be impacted by implementation of the Proposed South Terminal Extension CDF. The majority of the new beach will be below the high tide line; however, a portion may be left above the high tide line nearer to the Hurricane Barrier to act as Coastal Bank. It is anticipated that this

project will also help to prevent scouring at the toe of the Hurricane Barrier and will likely also help allow waves to break slightly before they reach the Hurricane Barrier, which should help to improve the operation and functioning of the Hurricane Barrier as well. This location is not accessible from the shore and is rarely travelled by recreational vessels. As a result, the area that would be created would be relatively isolated from human impacts, and would provide a prime location for Horseshoe Crab habitat. A generic cross-section of the beach work is attached as **Figure 7**.

Alternative 5, Construction of Beach North of Pease Park, Fairhaven is anticipated to create or enhance approximately 0.5 acres of coastal beach and coastal bank. The mitigation project will create Coastal Beach habitat in front of an existing rip-rap wall, while utilizing clean sand from CAD Cell construction. The Coastal Beach would be approximately 400 feet in length. The majority of the new beach will be below the high tide line; however, some sand may be placed above the high tide line in order to provide material for construction of a Coastal Bank. A specific cross-section is not provided for this site; however, the work would be similar to that shown within **Figure 7**.

Alternative 8 – Hurricane Barrier Vegetated Swale Rehabilitation and Restoration is anticipated to create or enhance an approximately 2 acre area. The area currently serves as a stormwater runoff channel that runs behind the Hurricane Barrier. The benthic substrate is currently filled with PCB impacted sediment. The western side of the channel is currently a rip-rap slope that has little ecological value. By removing the PCB contaminated sediment and capping the residual impacted sediment, creating drainage channels, removing the rip-rap slope, and grading into the upland behind the rip-rap slope, approximately 2 acres of mudflat, low marsh, high marsh, and transitional salt marsh area can be created or enhanced. This area is owned by the City of New Bedford. The project will enhance the hydraulic capacity of the drainage ditch to transport stormwater from behind the Hurricane Barrier, and will create significant breeding ground for Essential Fish as well as bird habitat and habitat for other salt-marsh dwelling species. A cross section of the swale is attached as **Figure 8**.

4.2 Conceptual Designs

Shellfish Seeding

In order to provide compensatory mitigation for impact to shellfish organisms in the footprint of the proposed South Terminal expansion, a shellfish seeding program is proposed. A Shellfish Survey (completed by Apex in May 2010) identified an approximate shellfish organism count in the to-be-affected area of 132,164 shellfish organisms. Mitigation seeding is proposed at a ratio of 5:1 (seed provided to organisms effected), in keeping with generally accepted practice. The following provides a summary of the proposed program:

- A total of 661,000 seed stock is proposed, with relative percentage of animal type provided at a ratio that is consistent with the current projected ratio found to be existing in the potential footprint of the proposed Terminal expansion (based upon the 2010 crop survey of the currently proposed affected area):
    - 72 % of the seed = Quahogs;
    - 22% of the seed = Common Oyster;
    - 6 % of the seed = Soft Shell Clam;

- The seed stock will be provided over a period of time (over a five year period):
    - 200,000 seed stock (at the organism percentage noted above) will be provided the first year of significant construction at the Site (expected to be 2011);
    - 115,250 seed stock (at the organism percentage noted above) will be provided each successive year for a period of 4 years;

- Seed stock will be provided to the New Bedford Shellfish Constable for distribution in accordance with the City shellfish program.

- As a condition of providing seed stock, the project will review the Shellfish Office seeding plan to encourage use of the seed stock in appropriate locations (i.e., not in contaminated areas), and at the appropriate time(s) of the year.

Coastal Beach Habitat Creation

In order to provide compensatory mitigation for impact to Beach/Land Containing Shellfish/Horseshoe Crab Habitat, 2.5 acres of Coastal Beach Creation is proposed. A Resource Assessment Study was conducted (by Apex in 2010) of the proposed affected area, indicating that approximately 1.87 acres of Coastal Beach area will be affected by the proposed South Terminal Extension Project. The following provides a summary of the proposed program:

- Coastal Beach would be created in two areas: inside the Hurricane Barrier on the Fairhaven side of the Harbor, and outside the Hurricane Barrier on the New Bedford side of the Bay (see Figure 6 for the location of the proposed Coastal Beach creation areas). These areas were selected because they were previously coastal beach areas that were formerly affected by anthropogenic structures (the Hurricane Barrier and parking lots), and would significantly benefit from created Coastal Beach;
    - 2 acres of Coastal Beach creation at the OU3 Pilot Cap location in the outer Harbor in New Bedford;
    - 0.5 acres of Coastal Beach creation north of Pease Park in Fairhaven, MA;
    - See Figure 6 for a Locus Map of the proposed Coastal Beach creation sites;

- The form of the Coastal Beach created would be designed to emphasize re-creation of a specific ecological system – namely that of shore bird foraging and Horseshoe Crab habitat. The Beach profile created will include a large proportion of intertidal sandy (silt/sand/gravel mixture) beach, representing creation of preferential habitat for Horseshoe Crab and foraging shore birds. A cross-sectional diagram of an example beach profile for the proposed created Coastal Beach is included in Figure 7.

<u>Salt Marsh Creation</u>

It is recognized that, by creating Coastal Beach area, as is proposed above, the project will affect a certain acreage of Land Under the Ocean. As noted above, Land Under the Ocean that is affected in the Inner New Bedford Harbor (inside the Hurricane Barrier) is effectively compensated for through 49.5 acres of Navigational/SER Dredging, that simultaneously improves the Harbor bottom resource through removal of PCB and metals contaminated sediments while providing for navigational maintenance dredging. As such, the approximately

0.5 acres of Land Under the Ocean that would be affected by the proposed Coastal Beach creation in Fairhaven is effectively mitigated for by the Navigational dredging.

The 2 acres of Land Under the Ocean that would be affected in the OU3 area (outside the Hurricane Barrier) by the creation of the proposed Coastal Beach at that location requires another mitigation strategy. The strategy proposed includes the creation of a 2 acre Salt Marsh and successionary sequence in the drainage swale that exists to the west of the Hurricane Barrier, just to the south of the Gifford Street Boat-ramp parking area. Currently, the drainage swale in this location is tidally influenced (it is subtidal), however the quality of the resource is degraded mudflat/drainage ditch. The area of the proposed mitigation is currently characterized by the growth of invasive species and has a large amount of trash evident. The sediments in the drainage swale are contaminated (with PCBs).

The goal of the restoration project at this location would be to create a functioning marsh area in a publically visible area, so as to have both an ecological benefit and an educational benefit. The mitigation project at this location would include four primary elements:

- Removal of PCB and metals contaminated sediments;
- Re-grading of the swale profile to allow for the creation of a successionary sequence of marsh vegetation;
- Planting of high, low, and transitional marsh species within the regarded swale; and
- Installation of a public access walkway/bike path adjacent to the created marsh area with appropriate signage identifying the type and importance of the biota in the restored/created resource area.

The proposed marsh restoration/creation includes the following characteristics:

- Sampling to determine the extent and depth of PCB and metals contaminated sediments;
- Excavation and removal of those sediments and placement of those sediments in the CAD Cell;
- Installation of a layer of clean material across the bottom of swale graded into a topographic succession that will include a deeper flow channel meandering through the middle of the swale and benched sides that will promote high and low marsh vegetation growth as well as transitional vegetation growth.

- Planting of Low Marsh vegetation (such as sp. *spartina alternaflora*) on the lower created benched steps;
- Planting of High Marsh vegetation (such as sp. s*partina patens* and sp. *distichlis spicata*, and possibly some sp. *spartina alternaflora* mixed in to the High Marsh sequence; and
- Planting of Transition Zone vegetation (such as sp. *panicum virgatum*, sp. *iva frutescens*, and some sp. *distichlis spicata and* s*partina patens*, as well as sp. *myrica pensylvanica*, sp. *rosa virginiana*, and sp. *arctostophylos uva-ursi* shrubs);
- Installation of an adjacent public access walkway/bike path and bordering ornamental fence with appropriate signage to inform the public of the restoration/creation project conducted as well as pointing out both the types and importance of the marsh sequences installed.
- A conceptual diagram of the proposed successionary marsh creation/restoration project is attached as Figure 8.

Other Proposed Activities

As noted in the Resource Functions and Values assessment conducted (completed by Apex in 2010), there exists in the proposed footprint of the South Terminal Extension CDF some amount of degraded upland wetland. As noted in the referenced studies, these wetlands have developed on top of urban fill (which includes piles of asphalt, brick, block, and stone debris, cement and other demolition rubble). An Environmental Site Assessment Report (21E Report) for a large proportion of the property indicates that the filled land that the wetlands have developed upon also contains soils contaminated with common industrial contaminants. Non-invasive wetlands plants are noticeably absent from the site, and invasive species (particularly sp. *phragmites austalis*) are dominant. As such, these upland wetlands at the site are in poor condition and do not represent functioning wetland resources. However, it is recognized that as topographic features on the site, these areas play a role in storm-water retention and filtration. In recognition of that, the project proposes to conduct certain activities related to storm-water management and retention, including:

- Conducting a thorough review of storm-water flow and infiltration for the proposed CDF Facility as part of the design activities that will be undertaken. Should the study results indicate that significant storm-water retention and/or discharge issues may be anticipated,

the project will incorporate into the Facility design best management practice solutions to the storm-water issues;

- The project will conduct a natural Pilot Storm-water Filtration project within New Bedford in order to assess and demonstrate the effectiveness and importance of designed natural storm-water filtration systems. Such a system (sometimes referred to as a "rain garden") would be constructed on City property or on easement property in an area where storm-water runoff issues are either present or suspected. While the ideal location for such a feature is currently unknown, a study would be undertaken as part of the project that would identify a useful location for such feature (likely to be adjacent to one of the major roadways that cross the Harbor or parts of the Harbor – such as the I-195 crossing of the Acushnet at Washburn Street). It is anticipated the size of the Pilot system that may be installed would be on the order of approximately 0.1 to 0.2 acres. Detailed design of this system would be conducted in concert with appropriate agency and non-governmental organization input.

Monitoring and Maintenance of Installed and Created Features

All of the features noted above will require periodic monitoring and maintenance. The project will conduct regular inspections of the installed features (on an appropriate frequency – but no longer than once per year) in order to assess their stability and effectiveness for their intended purpose. Inspection frequency for specific features will be dependent upon accepted protocols for the particular feature, and timetables that are appropriate for each feature will be created as part of the project. Maintenance and monitoring activities will be conducted by the project for a period of five years. At the end of the five-year assessment period, decisions as to the long-term monitoring and maintenance needs for each feature will be determined.

Figures

FIGURE 1

SITE LOCUS MAP

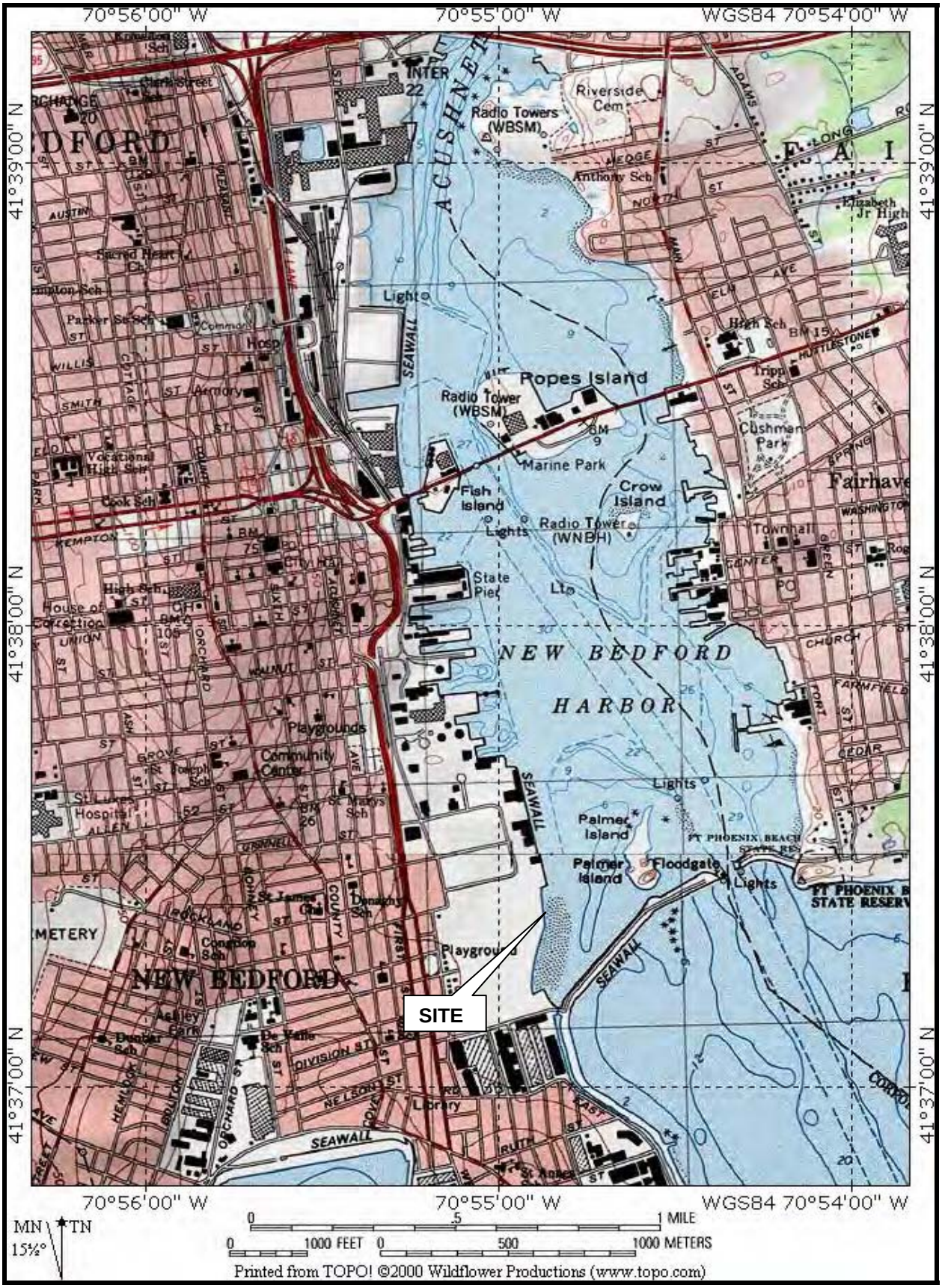


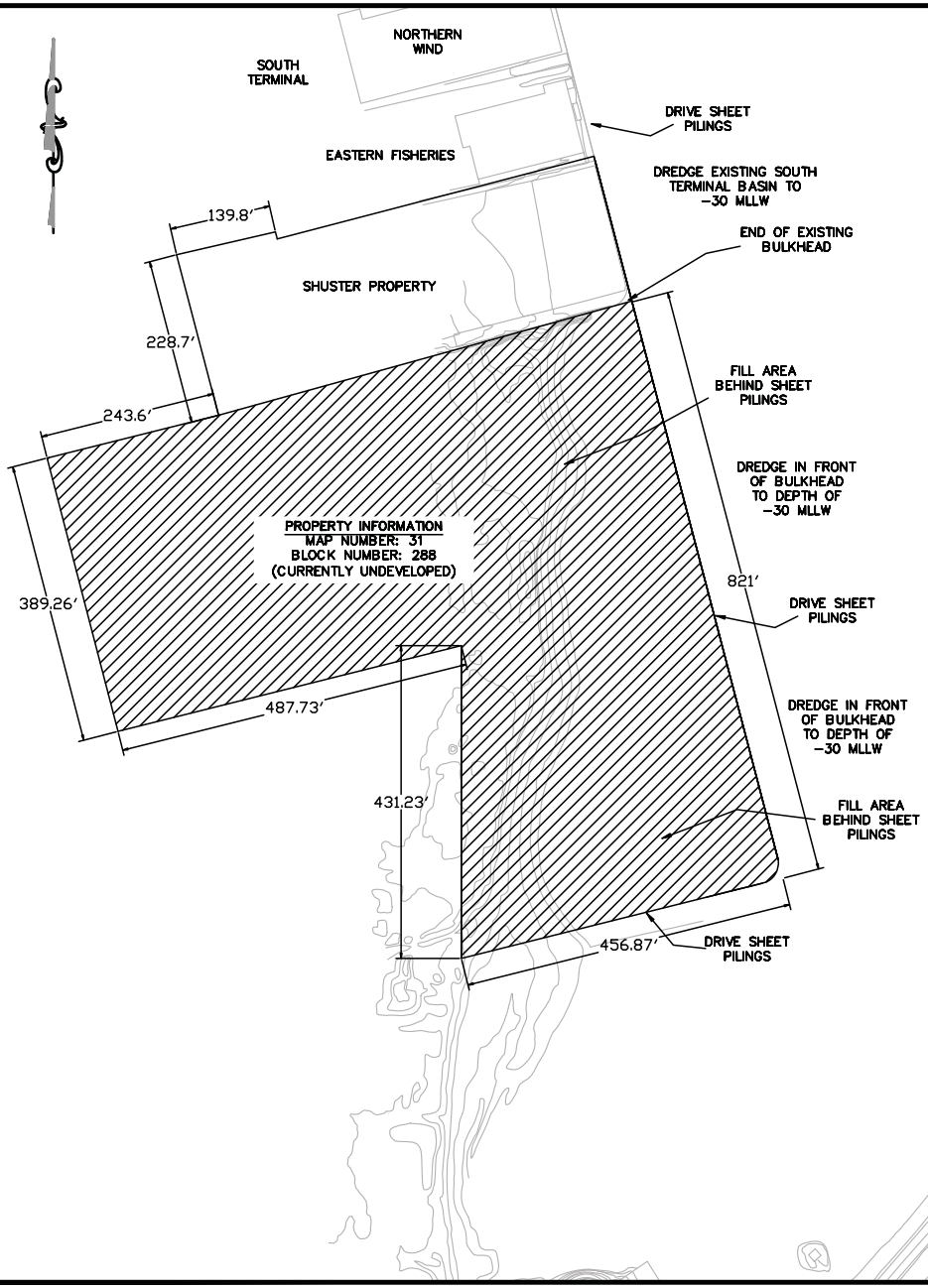
Figure 1: Site Location Map

South Terminal CDF Proposed Location

City of New Bedford, New Bedford, Massachusetts

FIGURE 2

PROPOSED PROJECT FOOTPRINT



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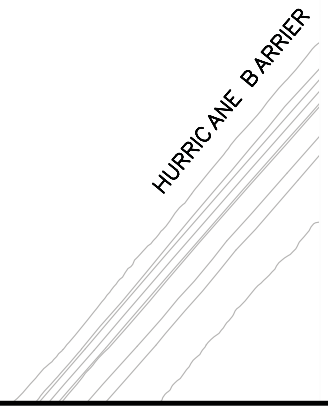
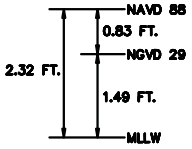


GRAPHIC DEPICTION OF DATUM SEPARATIONS FOR NEW BEDFORD HARBOR



Apex Companies, LLC.
184 HIGH STREET
SUITE 500
BOSTON MA 02110
(617) 722-0979

REVISIONS

NO.	DATE	DESCRIPTION

THESE DRAWINGS PREPARED BY APEX FOR THIS PROJECT ARE INSTRUMENTS OF APEX'S SERVICE FOR USE SOLELY WITH RESPECT TO THIS PROJECT, AND APEX SHALL BE DEEMED THE AUTHOR OF THE DRAWING AND SHALL RETAIN ALL COMMON LAW, STATUTORY AND OTHER RESERVED RIGHTS WITH RESPECT THERETO, INCLUDING COPYRIGHT. THE DOCUMENTS SHALL NOT BE USED ON OTHER PROJECTS, FOR ADDITIONS TO THIS PROJECT OR FOR COMPLETION OF THIS PROJECT BY OTHERS, EXCEPT BY AGREEMENT IN WRITING AND WITH APPROPRIATE COMPENSATION TO APEX.

PROJECT TITLE:

RENEWABLE ENERGY MARINE PARK

PREPARED FOR:

THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION

DRAWING TITLE:

CONCEPTUAL DESIGN A OF RENEWABLE ENERGY MARINE PARK

NOT FOR CONSTRUCTION

Scale: 1"=60'

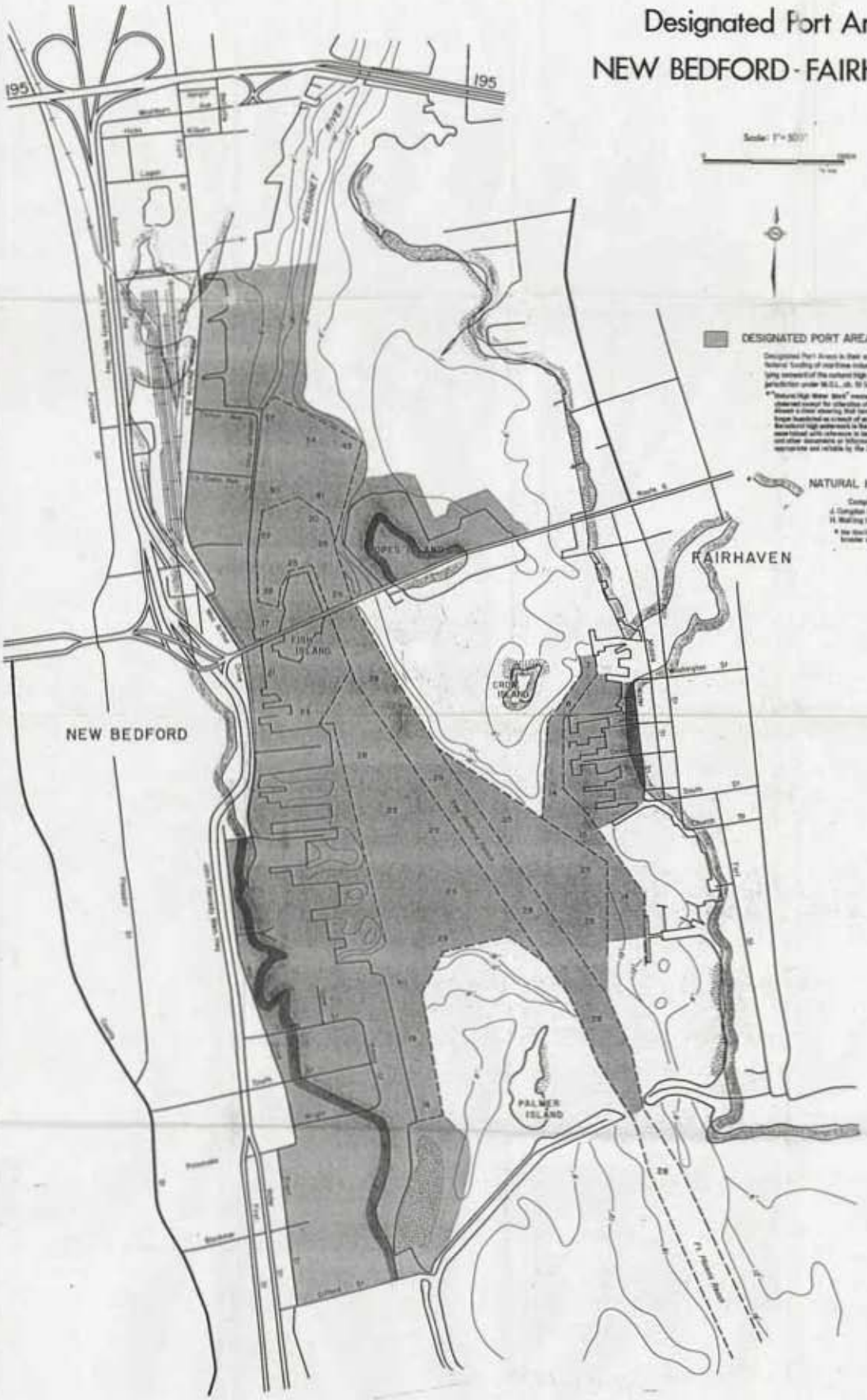
0 40 80 160 240 FEET

Date	5/16/09	Drawing No.
Proj. Mgr.	JKB	
Design	CM	1
Check	JKB	
Drawn	CM	
Job. No.	6815	
Last Rev.	11/23/09	

FIGURE 3

HISTORIC HIGH WATER LINE MAP

Designated Port Area:
NEW BEDFORD - FAIRHAVEN

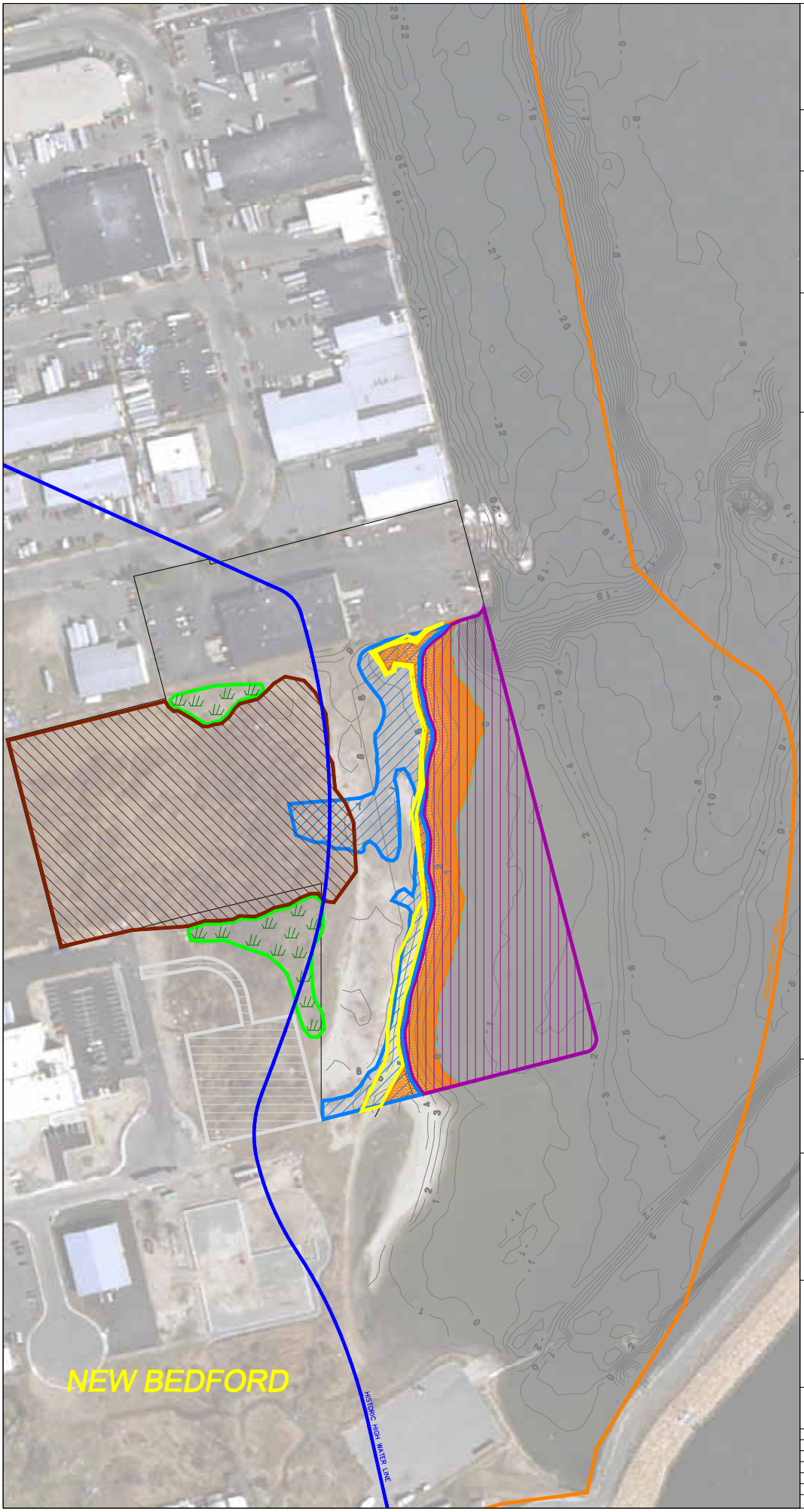


Dept. of Environmental Quality Engineering
Division of Wetlands and Waterways Regulation

Coastal Zone Management

FIGURE 4

RESOURCE AREA LOCATION MAP



Apex Companies, LLC.

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SUITE 502
BOSTON MA 02110
(617) 728-0070

REVISIONS

NO.	DATE	DESCRIPTION
1.	2/11/10	PRELIMINARY LAYOUT
2.	4/09/10	PRELIMINARY ASSESSMENT
3.	4/15/10	FIELD LOCATION

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SUITABLE SHELLFISH GROWING AREA

LAND SUBJECT TO FLOODING

COASTAL BEACH

COASTAL BANK

WETLAND

PAVED AREA

URBAN FILL

PREPARED FOR:

THE NEW BEDFORD HARBOR DEVELOPMENT COMMISSION AND THE TOWN OF FAIRHAVEN, MASSACHUSETTS

DRAWING TITLE:

SOUTH TERMINAL MARINE INFRASTRUCTURE PARK 2010 RESOURCE AREA ASSESSMENT

Scale: 1"=80'

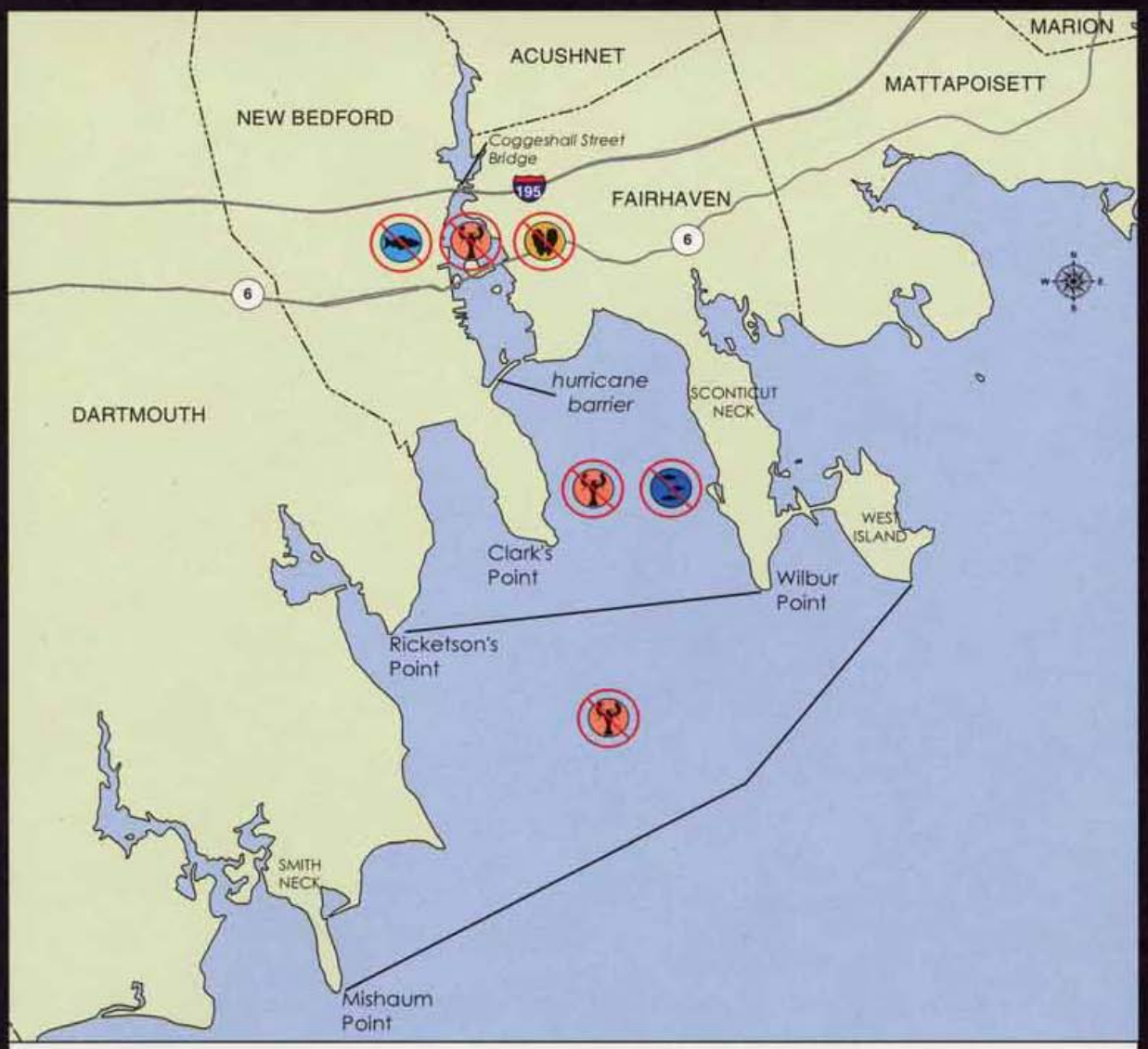
0 40 80 160 240 FEET

Date 3/24/10	Drawing No.
Proj. Mgr.	
Design	
Check CM	P-1
Drawn GCD	
Job. No. 6615	
Last Rev. 4/15/10	

FIGURE 5

USEPA FISHING/SHELLFISHING/LOBSTERING BAN NOTICE

Fish Smart—Use this Chart



Fish Smart-Use this Chart
¡Pesque con cabeza! Utilice esta gráfica
Pesque esperto-Use este mapa

Don't eat any fish
No coma pescado
Não coma peixe

Don't eat any lobster
No coma langosta
Não coma lagosta

Don't eat any shellfish
No coma mariscos
Não coma mariscos

Don't eat any bottom fish:
No coma pescado de fondo:
Não coma peixe de fundo:

- flounder
- lenguado
- solha
- tautog
- tautoga
- bodião da ostra
- scup
- sargo
- sargo
- eel
- anguila
- anguila

Map Produced By The US EPA New England GIS Center
30 May 2003

FIGURE 6

MITIGATION PROJECT LOCUS MAP

Mitigation Project Locus Map

184 HIGH STREET
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BOSTON MA 02110
(617) 728-0070

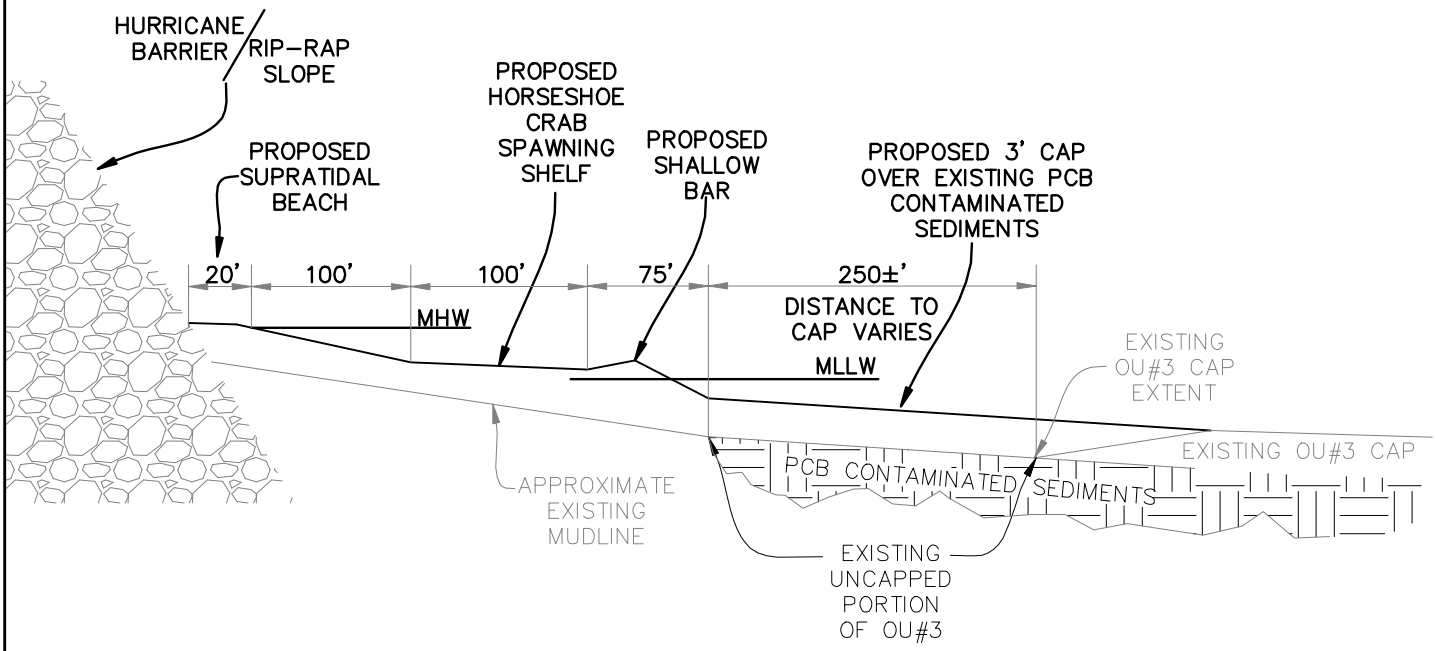
SOUTH TERMINAL MARINE INFRASTRUCTURE PARK
NEW BEDFORD, MA

Scale: 1"=1300'

0 650 1300 2600

FIGURE 7

COASTAL BEACH MITIGATION CROSS-SECTION



Scale: 1"=30'

0 15 30 60

EXAMPLE COASTAL BEACH CREATION AREA OU#3 CAP LOCATION

SOUTH TERMINAL CDF NEW BEDFORD, MA

Apex Companies, LLC
1 WAMSUTTA STREET, SUITE 8
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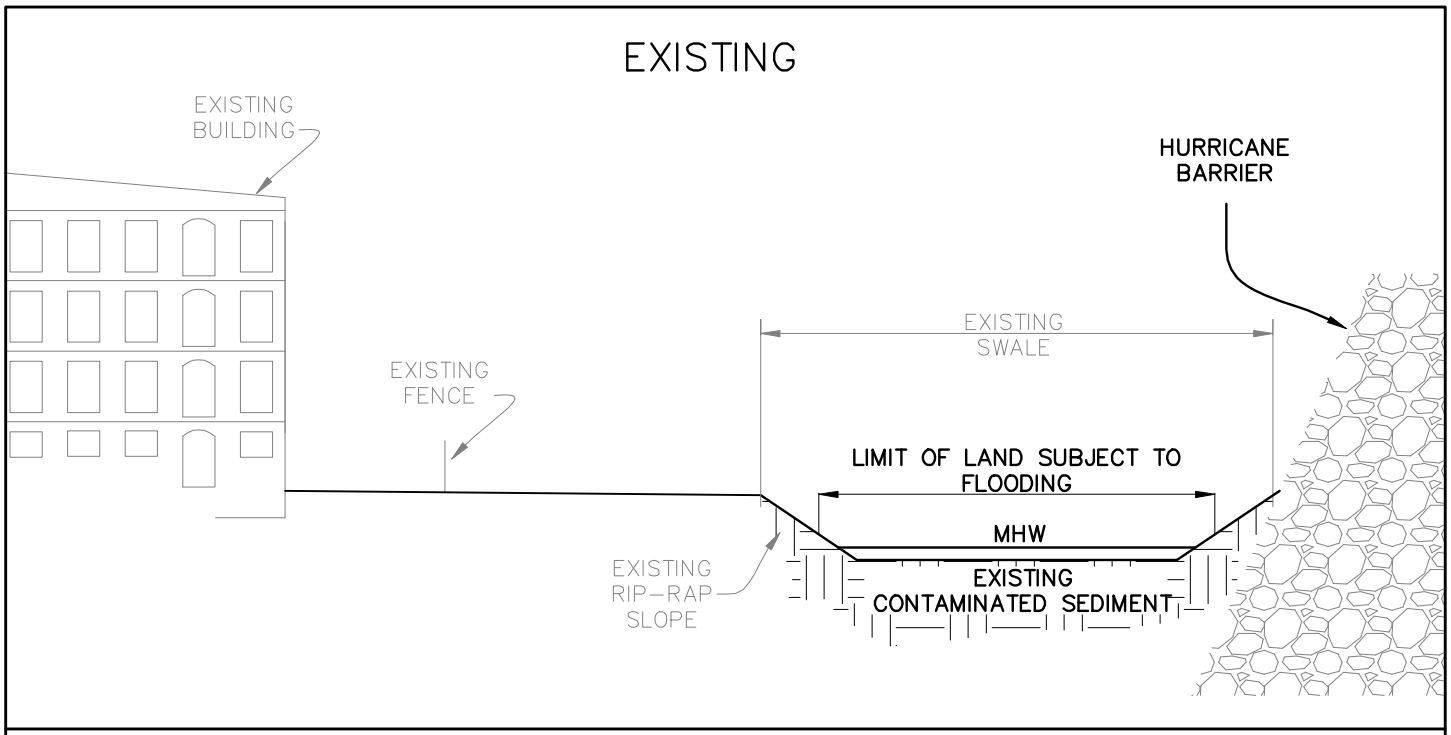
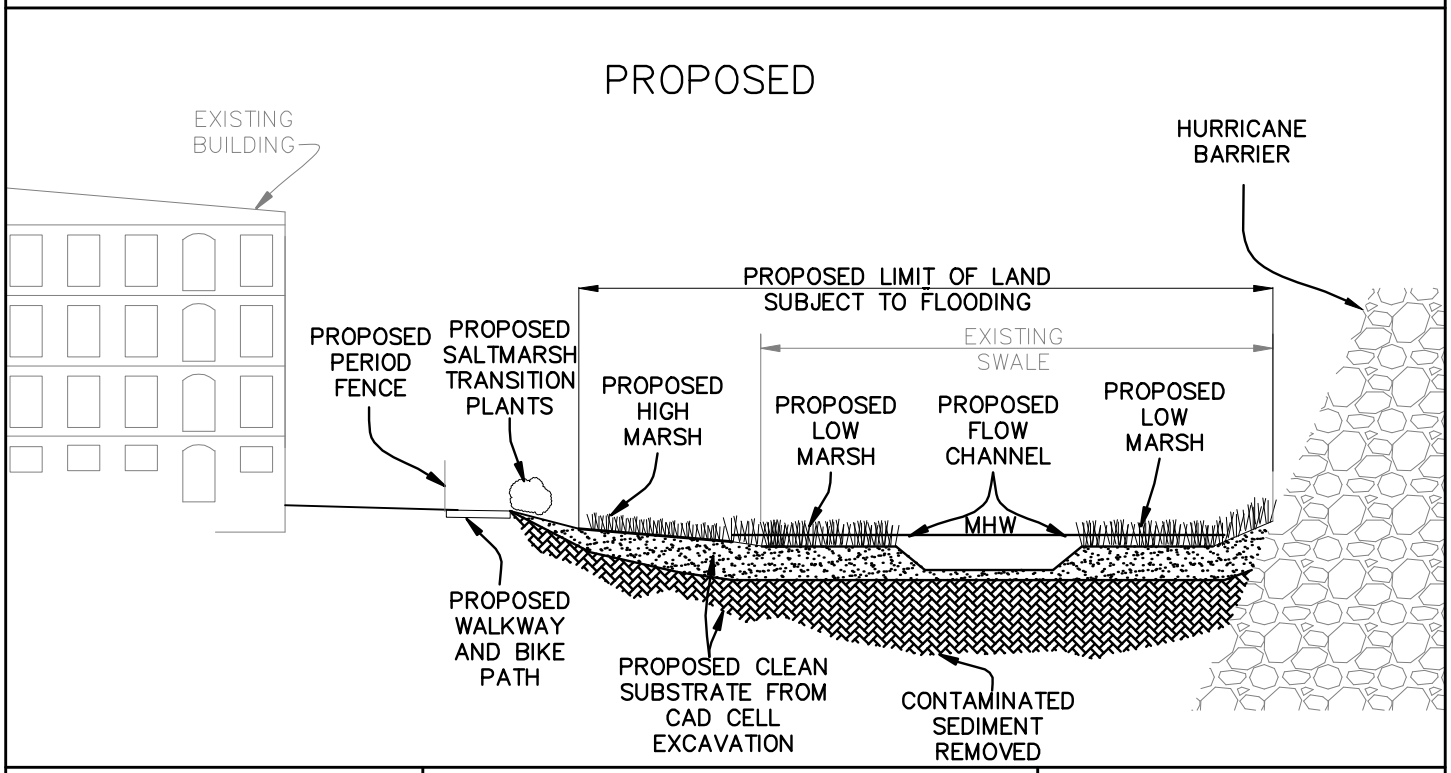
(617) 728-0070
184 HIGH STREET, SUITE 502
BOSTON MA 02110
(617) 728-0070

NEW BEDFORD HARBOR DEVELOPMENT COMMISSION
106 CO-OP WHARF
NEW BEDFORD, MASSACHUSETTS 02740
(508) 961-3000

FIGURE 8

MARSH RESTORATION AREA CROSS-SECTION





Scale: 1"=30'

0 15 30 60

HURRICANE BARRIER RESOURCE AREA ENHANCEMENT

SOUTH TERMINAL CDF NEW BEDFORD, MA

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BOSTON MA 02110
(617) 728-0070

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(508) 961-3000

APPENDICES

APPENDIX A

COVER, INDEX, AND RELEVANT CUT SHEETS FROM NEW BEDFORD HARBOR WETLANDS RESTORATION PLAN

Draft New Bedford Harbor Environment WETLANDS RESTORATION PLAN

Massachusetts Wetlands Restoration Program

Executive Office of Environmental Affairs

August 2002

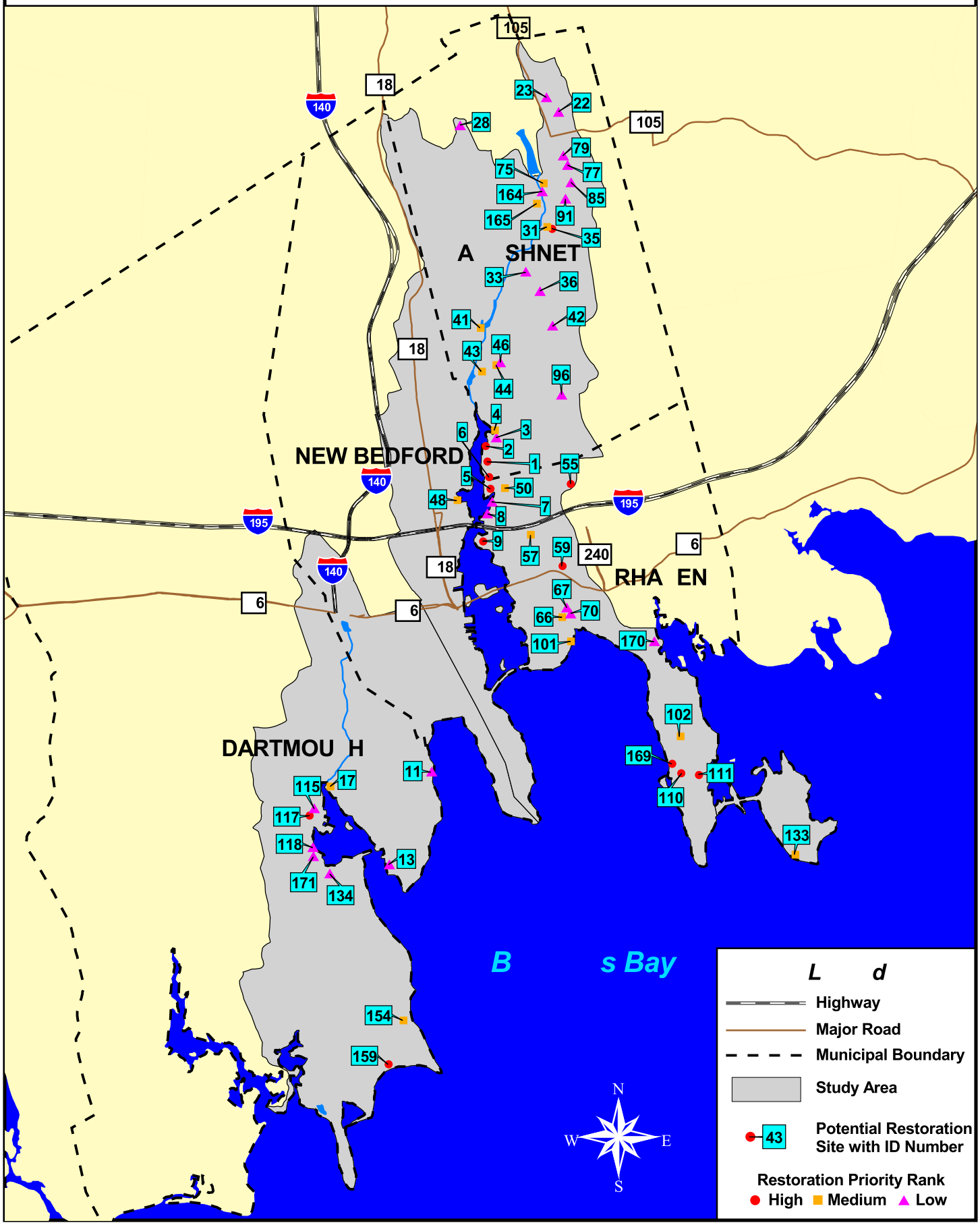
JANE SWIFT
Governor

BOB DURAND
Secretary

SHARON MCGREGOR
Assistant Secretary

CHRISTY FOOTE-SMITH
Director

New Bedford Harbor Environment
Potential Wetland Restoration Sites



Site	Priority Rank:	Town	Ownership:	Acres:	Wetland Type:
9	High	Fairhaven	Mixed	5+	Tidal

Impact Type

- [x] Filled
- [ ] Drained
- [ ] Impounded
- [x] Tidally Restricted
- [ ] Active Agriculture
- [ ] Channelized
- [ ] No Riparian Buffer
- [ ] Unknown

Site Attributes

- [ ] In NHESP Habitat
- [ ] In NHESP Biomap
- [x] In Flood Zone
- [x] In Open Space

This is an extremely degraded site located west of the Riverside Cemetery and directly abutting New Bedford Harbor. Research to date indicates that a majority of the site is privately owned and leased for the operation of two radio towers located on the southern portion. The town of Fairhaven also owns part of the site. GIS analysis and site observation indicate that the majority of this site is historically filled salt marsh. The fill ranges 2-6 feet above marsh grade. A small (0.5 ac.) area of marsh that remains along the northern perimeter appears to be severely tidally restricted and is dominated by Phragmites. Restoration actions may include removal of fill material and re-establishment of wetland grade, soils, hydrology, and vegetation. Restoration of proper tidal flow to the existing northern marsh should also be considered. The New Bedford Harbor Trustees and the Fairhaven / Acushnet Land Trust are exploring the purchase of this site for restoration purposes.

USGS Site Location Map

N

Aerial Photo Site Image

Site	Priority Rank:	Town	Ownership:	Acres:	Wetland Type:
48	Medium	New Bedford	Public	2?	Tidal

Impact Type

- [x] Filled
- [ ] Drained
- [ ] Impounded
- [ ] Tidally Restricted
- [ ] Active Agriculture
- [ ] Channelized
- [ ] No Riparian Buffer
- [ ] Unknown

Site Attributes

- [ ] In NHESP Habitat
- [ ] In NHESP Biomap
- [x] In Flood Zone
- [ ] In Open Space

This city-owned site directly abuts New Bedford Harbor and is known as Riverside Park. It appears to be an old industrial site that contains a recently demolished brick building. GIS analysis and site observation indicate that a portion of the site is historically filled salt marsh. The eastern shoreline of the site is fenced off with contamination warning signs. Research indicates that the EPA is planning to dredge and replace existing contaminated wetlands along the shoreline where a narrow fringe of salt marsh remains. Restoration actions may include removal of fill material and re-establishment of wetland grade, soils, hydrology, and vegetation. Salt marsh restoration should be considered during preparation of redevelopment plans. The Trustee Council has allocated $2M to assist the city with upland park improvements and will work with city planners to explore wetland restoration options.

USGS Site Location Map

N

Aerial Photo Site Image

Site	Priority Rank:	Town	Ownership:	Acres:	Wetland Type:
159	High	Dartmouth	Public	10+	Tidal

Impact Type

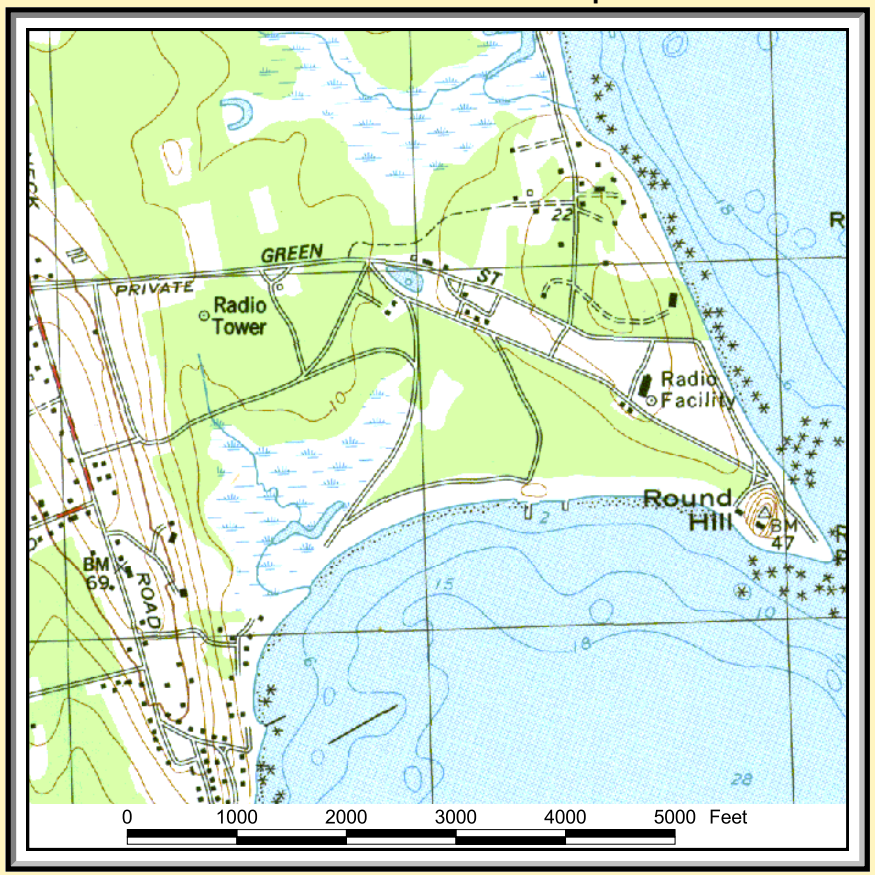
- [x] Filled
- [ ] Drained
- [ ] Impounded
- [x] Tidally Restricted
- [ ] Active Agriculture
- [ ] Channelized
- [ ] No Riparian Buffer
- [ ] Unknown

Site Attributes

- [ ] In NHESP Habitat
- [ ] In NHESP Biomap
- [x] In Flood Zone
- [x] In Open Space

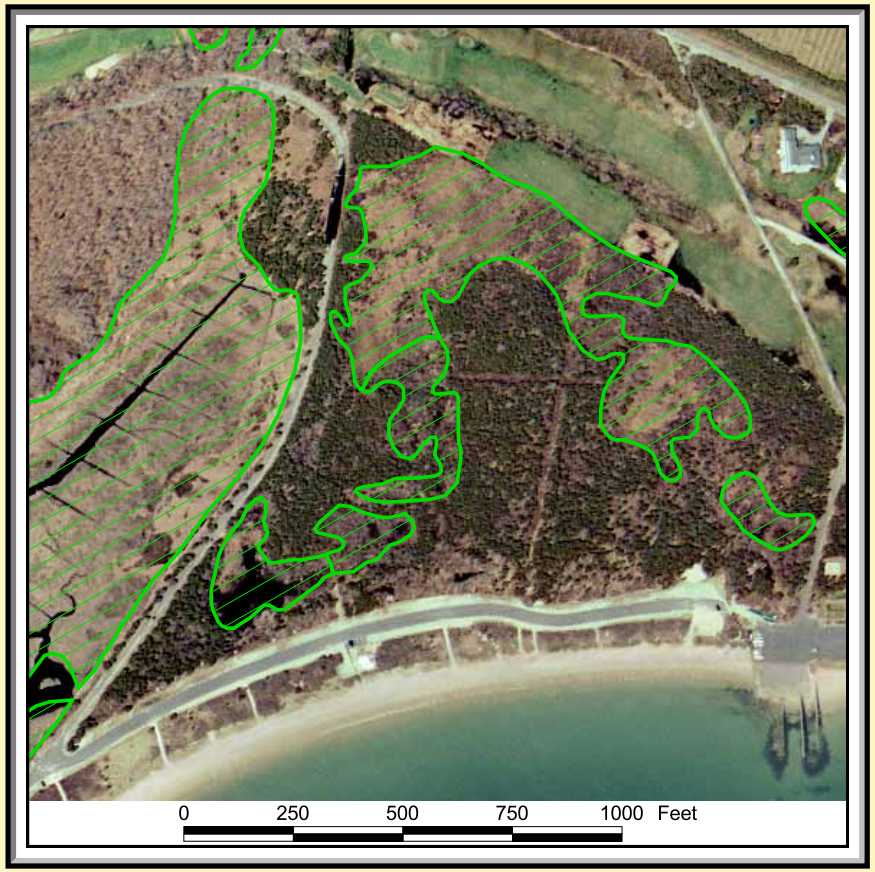
Site consists of a large, highly disturbed area that is part of the town-owned Round Hill Beach property. GIS analysis and site observation indicate that this area was historically a typical barrier beach-protected salt marsh system. Research to date suggests that back in the 1800s, the entire Round Hill peninsula was privately owned and extensively altered. It appears that the eastern half of the historic barrier beach and salt marsh system was filled in and cut off from tidal flow by construction of Ray Peck Drive (the public access road to the beach). An old wooden beam culvert is located beneath this road just before it intersects the beach parking lot, but it is unclear whether the culvert conveys any tidal flow to upgradient wetlands. Small areas of fragmented and degraded fresh marsh exist east of the road. Another potential salt marsh restoration area exists south of the sharp curve in the road, adjacent to the existing healthy salt marsh system. The majority of fill observed is 1-3 feet above wetland grade. Restoration actions may include removal of fill material and re-establishment of wetland grade, soils, hydrology, and vegetation, as well as placement of an appropriate culvert or bridge under Ray Peck Rd. to provide full tidal flushing to the restored salt marsh to the east. See Site Evaluation for further details.

USGS Site Location Map



N

Aerial Photo Site Image



Site	Priority Rank:	Town	Ownership:	Acres:	Wetland Type:
169	High	Fairhaven	Private	~50	Tidal

Impact Type

- [ ] Filled
- [ ] Drained
- [ ] Impounded
- [x] Tidally Restricted
- [ ] Active Agriculture
- [ ] Channelized
- [ ] No Riparian Buffer
- [ ] Unknown

Site Attributes

- [ ] In NHESP Habitat
- [x] In NHESP Biomap
- [x] In Flood Zone
- [ ] In Open Space

Site consists of a tidally influenced wetland system on the western shore of Sconticut Neck. GIS analysis and site observation indicate that this system may be tidally restricted by the natural dynamics of its outlet to the ocean (located just south of the end of Silver Shell Beach Drive). During the site visit, a long-time resident stated that mosquito control officials sometimes maintain the tidal opening, but it is often clogged with sand and gravel, thus restricting tidal flow and impounding freshwater within the wetland. The wetland observed is dominated by Phragmites and had a large standing pool of water upstream of the outlet opening. It appeared that only the highest portion of the tide would flow into the wetland. This site should be further evaluated for restoration options which may include more frequent maintenance of the outlet, application of Open Marsh Water Management, and/or the installation of an outlet structure to ensure full and consistent tidal flushing.

USGS Site Location Map

Aerial Photo Site Image

ROUND HILL BEACH / MEADOWS SHORE, DARTMOUTH, MASSACHUSETTS POTENTIAL WETLAND RESTORATION SITE #159

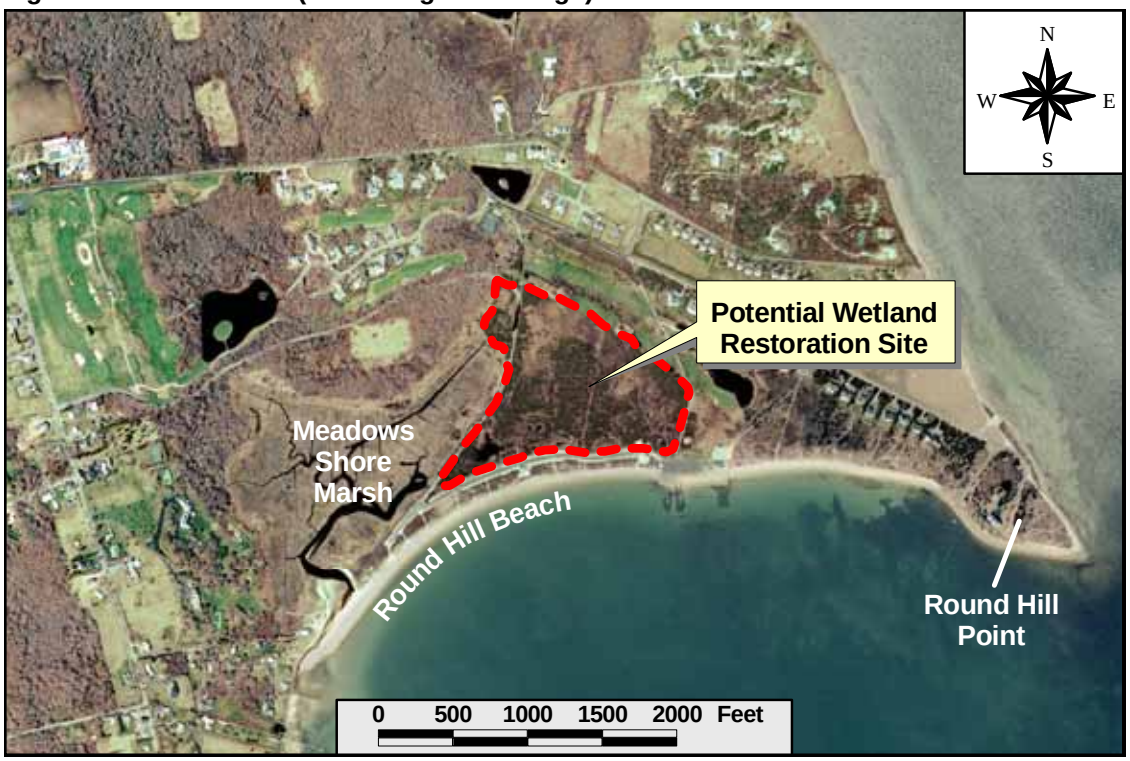
Overview

The Round Hill Beach / Meadows Shore potential wetland restoration site consists of a highly disturbed (former) coastal wetland system protected by a barrier beach along the southern shore of the town of Dartmouth, just west of Round Hill Point (Figure 1). The site is situated within a larger town-owned beach and park property and contains up to (or possibly more than) 24 acres of historically filled salt marsh. Historic documents, including an 1893 USGS map, confirm that the areas of forested upland and degraded freshwater wetlands east of Ray Peck Drive and north of Round Hill Beach were once coastal salt marsh associated with the barrier beach and dune system that is still present today. Research to date indicates that this entire wetland area was filled in during the early 1900s to create a private airport and runway system with associated buildings and infrastructure.

Table 1: General Site Information	
Town:	Dartmouth
Location:	North of Round Hill Beach, south of Round Hill Condominiums, and east of the Meadows Shore salt marsh
Ownership:	Town of Dartmouth
Contacts:	**Property:** Dartmouth Park Department **Restoration Activities:** Dartmouth Park Department and Conservation Commission **Local Environmental Groups:** Dartmouth Natural Resources Trust, Lloyd Center for Environmental Studies **Site History:** Round Hill Associates, Bristol County Mosquito Control

This site presents a superb - and quite rare – opportunity to restore a large area of contiguous, historically filled salt marsh and barrier beach coastal ecosystem that is publicly owned and remains vacant of permanent structures. Through the removal of fill material, re-creation of salt marsh plain, and excavation of historic tidal channels, this project could significantly enlarge this valuable tidal system and greatly enhance the many natural functions and values that it provides within the greater New Bedford Harbor environment. These functions and values include flood protection, pollutant attenuation, and coastal ecosystem fish and wildlife habitat. A restoration project at this site would also provide valuable stewardship and educational opportunities due to its highly visible public location.

Figure 1: Site Location (click image to enlarge)



Site Description

The landscape surrounding this site is occupied by the Round Hill Condominiums and Round Hill Golf Course to the north and east, Round Hill Beach to the south, and Ray Peck Drive and Meadows Shore marsh to the west (Figure 1). Just west of the site, the existing Meadows Shore marsh appears to have been left largely untouched by historic human alterations (except for a filled area in the northeast corner) and is dominated by native salt marsh vegetation. The potential wetland restoration site includes all areas of historically filled salt marsh. It presently contains a mix of secondary successional upland vegetation surrounding areas of degraded seasonal freshwater wetlands. Sections below provide more information on the site's soils, hydrology, and vegetation.

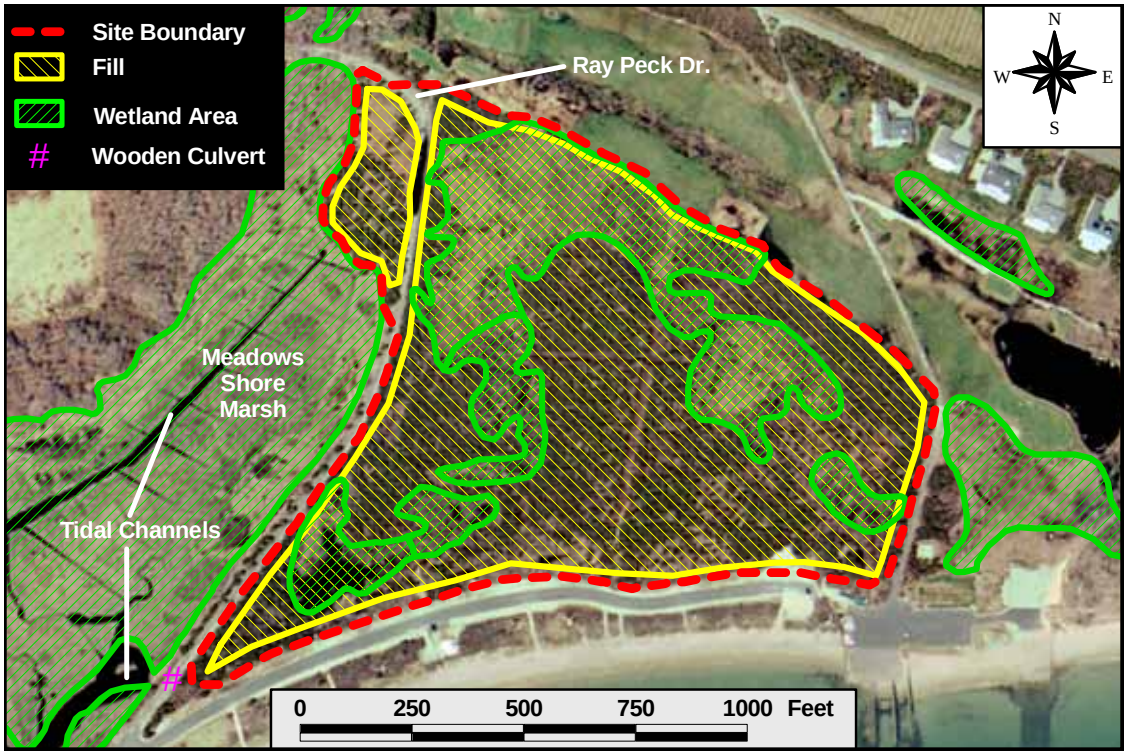
Vegetation: The site's wooded upland areas consist of mid-successional species such as Eastern Red Cedar (*Juniperus virginiana)* that are quite uniform across the upland areas of the site. The freshwater wetlands located within the site are dominated by Purple Loosestrife (*Lythrum salicaria*, an invasive species), which is an indicator of degraded wetland conditions (Photograph 1).

Photograph 1: View of degraded wetland area within site (foreground) - upland area shown in background

Soils: Soil samples (20 cm deep) taken from within the wetlands of this site revealed minimal development of organics with less than 1 cm of humus underlain by a sandy, mineral soil. Soil mottling indicated hydric conditions. Soils in the surrounding upland areas were extremely sandy and well drained.

Hydrology: The main tidal channel within the marsh west of the site terminates at an old wooden culvert (4 ft. by 8 ft.) beneath Ray Peck Drive. The culvert does not appear to convey tidal flow to the site (Figure 2, Photograph 2). Salinities within the tidal channel at Meadows Shore marsh were between 24 and 22 ppt. There was no standing water present in the wetland areas east of Ray Peck Drive during July 2002.

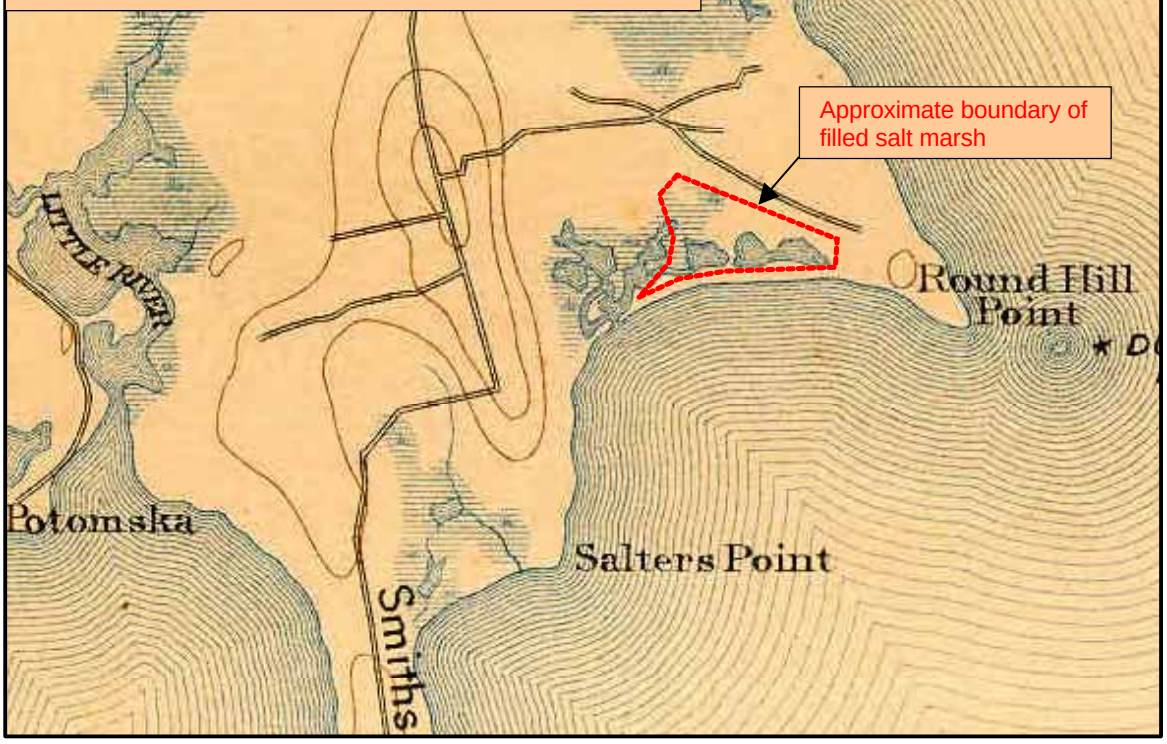
Figure 2: Site Details (click image to enlarge)



Sources of Degradation

Past human activity has significantly altered this historic coastal wetland site. Historic maps, including an 1893 USGS Topographic map (Figure 3) and a tracing of an 1856 Town of Dartmouth map, confirm that this site was coastal wetland prior to at least the late 1800's. A 1928 aerial photograph of this site, provided by the Lloyd Center for Environmental Studies (Dartmouth, MA), depicts this site "shortly after filling of the northern third of the marsh and dredging of the inlet". Under private ownership, farm facilities, dwellings, airplane and blimp hangers, an aviation school, runways, M.I.T research facilities, and a series of pumping stations and catch basins were constructed on this filled site between 1928 and 1937. Information obtained from the Bristol County Mosquito Control indicates mosquito control activities, including ditching, took place on this site as far back as 1959. Today, only remnants such as concrete foundations, catch basin structures, and the non-functioning wooden culvert beneath Ray Peck Drive remain, with approximately 4 to 8 ft. of fill material throughout the site.

Figure 3: 1893 USGS Map of Round Hill Beach Area



Photograph 2: View of wooden culvert at end of tidal creek in Meadows Shore marsh

Photograph 3: Remnant structure on upland fill.

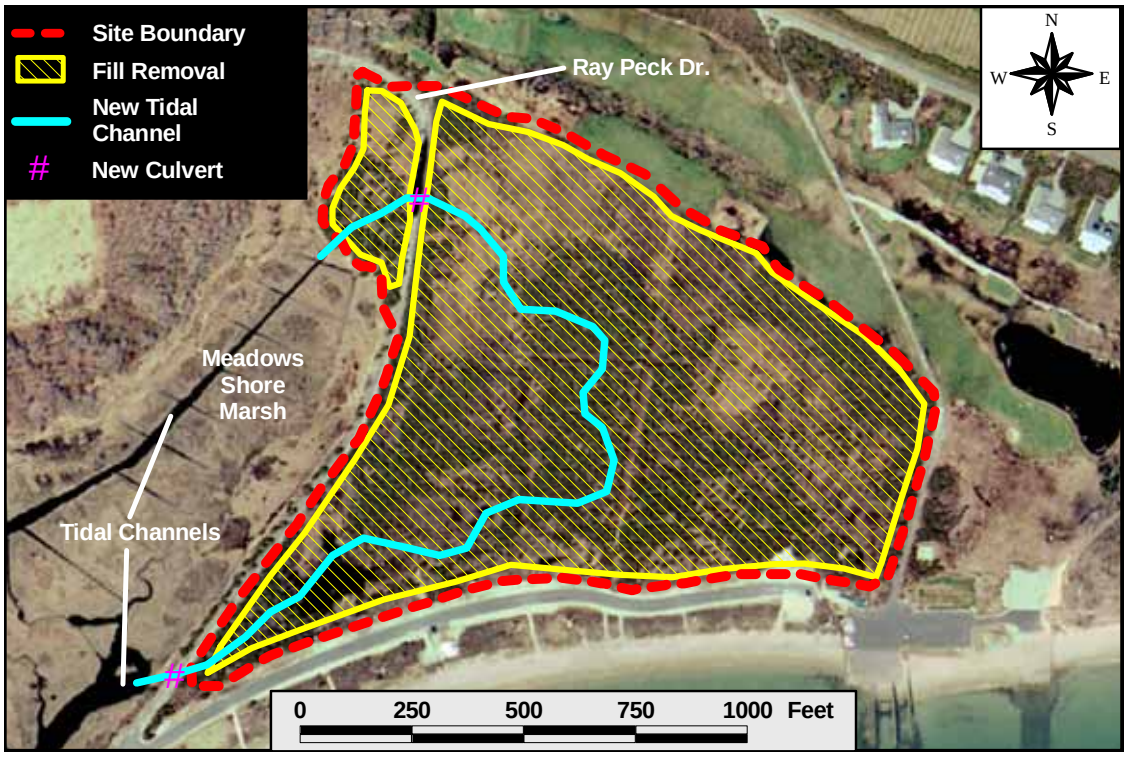
Restoration Recommendations

The main focus of this project will be the removal of significant amounts of fill material to restore coastal salt marsh. The access road (Ray Peck Drive) which separates the existing Meadows Shore marsh from this site must remain intact as it provides public access to the Round Hill Beach area. Therefore, a tidal connection at either the non-functioning wooden culvert or other location will need to be constructed to provide tidal flushing to restored wetland areas east of the road (Figure 4). Under current conditions, restoration of tidal flow alone would not restore salt marsh habitat because the elevation of fill and degraded wetlands east of Ray Peck Drive is much higher than the Meadows Shore marsh. Removal of fill material and re-grading to proper marsh elevations will be required. Possible restoration actions may include:

- Removal of all fill from historic wetlands east of Ray Peck Drive as well as the smaller filled wetland in the northeast corner of Meadows Shore marsh; and re-grading to proper salt marsh elevation
- Re-location and piling of a portion of the fill within the site to create a habitat island (an option that would reduce the costs of off-site hauling and disposal)
- Replacement of the old wooden culvert beneath Ray Peck Drive to restore full tidal flushing to newly restored salt marsh
- Installation of a second culvert further north beneath Ray Peck Drive to improve flushing of newly restored salt marsh and northern reaches of the Meadows Shore salt marsh
- Excavation of tidal channels to aid in tidal flushing and create coastal open-water habitat associated with the newly restored salt marsh
- Re-planting of newly created marsh plain to aid in marsh establishment

The image below depicts the location and extent of features discussed in the various restoration alternatives. MWRP would be happy to discuss these alternatives in greater detail with those who are interested in this potential restoration site.

Figure 4: Restoration Options (click image to enlarge)



Anticipated Permits / Regulatory Issues

A number of permits and regulatory reviews are anticipated for this project (Table 3). Additional permits and review may be required depending on the source of funding and final scope of work. This site is not under a Wetlands Restriction Order, Conservation Restriction Order, and is not located within an Area of Critical Environmental Concern. Therefore, this project would not require the associated additional regulatory review.

Table 3: Description Of Anticipated Permits and Regulatory Review

REGULATION:	POTENTIAL THRESHOLD:	ACTION:	PERMIT:
Wetlands Protection Act, MGL c.131, s.40 and 310 CMR 10.00 & local by-laws	Any project that will dredge, fill, alter, or remove any wetland resource area	File a Notice of Intent (NOI) with Cons. Commission and DEP	Order of Conditions
Federal Clean Water Act, Section 404	All projects involving discharge of fill or dredged materials to the Waters of the US, including wetlands	File for a federal permit from the US Army Corps of Engineers	Programmatic General Permit for Massachusetts
Massachusetts 401 Water Quality Certification Program, MGL c. 21, ss 26-53, and 314 CMR 9.00	Discharge of dredged or fill material, dredging and dredged material disposal activities in waters of the US within the Commonwealth which require federal licenses or permits.	File for 401 Water Quality Certification with the MA DEP	MA DEP 401 Water Quality Certificate
Massachusetts Environmental Policy Act, MGL Ch. 30, ss. 61-61H and 310 CMR 11.00	Alteration of 5,000 sq. ft. or more of bordering or isolated vegetated wetlands	File an Environmental Notification Form (ENF), an EIR may be required for wetland conversion	Massachusetts Environmental Policy Act Certificate
Chapter 91, Waterfront Protection Act, MGL c. 91	The placement of fill or structures (such as culverts), or the alteration of existing licensed structures in flowed or filled tidelands	File for a license to place a structure, in this case a culvert, in the tidal channel	DEP Waterways Program Chapter 91 Liscense
Coastal Zone Consistency Review	Any coastal project that requires a federal license, is implemented by a federal agency, or gets federal funding	File an application with the Massachusetts Coastal Zone Management Office	CZM Consistency Statement

Cost Estimates

Project costs will vary depending on the restoration options chosen. Removal of one-half of the fill, wetland plantings, installation of one culvert, and creation of a tidal channel is estimated to cost approximately **$3,063,000**. Removal of all fill areas, wetland plantings, installation of two culverts, and creation of a tidal channel is estimated to cost approximately **$6,086,000**. Note that these estimates assume that hazardous materials will not be encountered. *Costs estimated using RS Means, *Site Work & Landscape Cost Data*, 2002.

Planning & Permitting:
Topographic Survey w/ major features and vegetation zones @ $2,675.00* / acre x 24 acres = $64,200.00
Permitting, including permit applications and permit plans is estimated @ $40,000.00
Total: $104,200.00

Construction:
Excavation @ $4.44*/cu yd, Hauling @ $9.90*/cu. yd., and Dewatering @ $9.65 /cu. yd. = $23.99 / cu. yd.

24 ac. fill @ 232,318 cu. yds = $5,573,308.82
Plantings + labor @ $0.75/pot (18in. grid) x 24 ac. = 459,976 plants = $344,982.00

Excavation of Tidal Channel @ 2000 cu. yds. = $47,980.00
Pre-cast 4 ft. by 8 ft. Concrete Culvert @ $200.00 / linear ft. x 40 ft. x 2 culverts = $16,000.00

Other Information

- An historic map depicting 1937 engineering plans for Edward H. R. Green's estate is available through the M. I. T. archives
- Additional historic information may be available through Bristol County Mosquito Control and the Round Hill Associates
- This site is near listed Priority / Estimated Habitat for the Piping Plover (*Charadrius melodus*), a threatened species listed by the MA Natural Heritage and Endangered Species Program; it is also listed as a threatened species under the Federal Endangered Species Act.