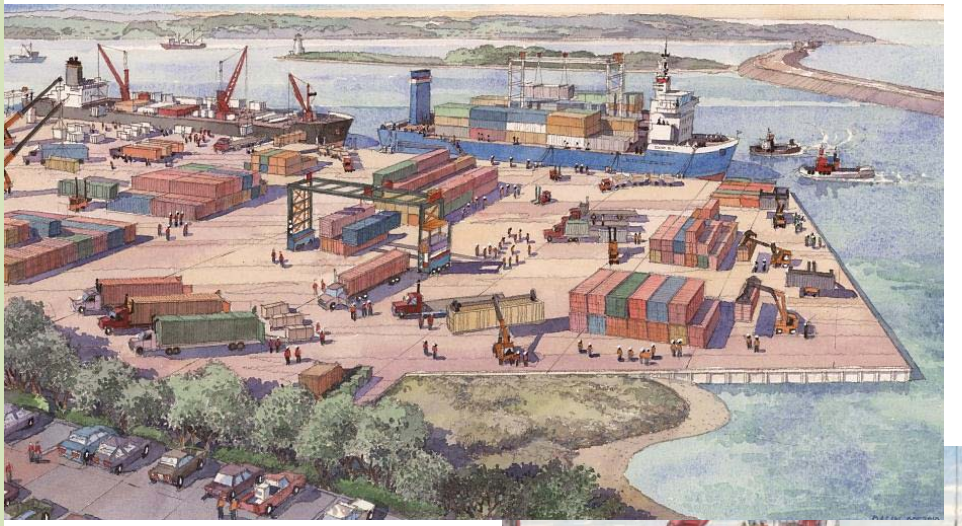
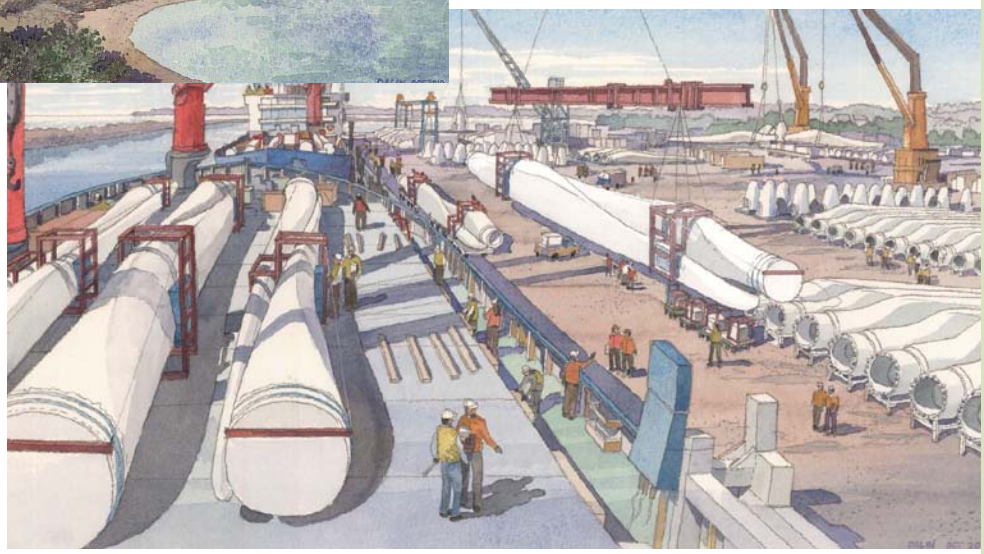
RETURN TO SER AR INDEX

FINAL MITIGATION PLAN

New Bedford Marine Commerce Terminal (NBMCT)
New Bedford, Massachusetts





STATE ENHANCED REMEDY IN NEW BEDFORD, SOUTH TERMINAL

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

OCTOBER, 2012

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Table of Contents

1.0 PROJECT SUMMARY **4**

2.0 OBJECTIVES **5**

3.0 SITE SELECTION **9**

3.1 Impact Site: New Bedford Marine Commerce Terminal **9**
3.2 Mitigation Sites **10**
3.2.1 Description of All Possibilities – Reference Information 10
3.2.2 Description of Top 20 Mitigation Projects 10
3.2.3 Initial Screening 14
3.2.4 Ranking Matrix 16
3.2.5 River's End Park Salt Marsh Restoration 19
3.2.6 Winter Flounder Mitigation Area 21
3.2.7 Capping of OU-3 Hot Spot 22
3.2.8 Shellfish Mitigation (Seeding) 24
3.2.9 Tern Monitoring Program 26

4.0 SITE PROTECTION INSTRUMENT **26**

4.1 Legal Arrangement **27**
4.2 Legal Instrument **27**

5.0 BASELINE INFORMATION **28**

5.1 Impact Assessment of Proposed Project **28**
5.1.1 Resource Identification and Direct Impact Assessment 28
5.1.2 Wetland Identification (Cowardin, et. AI.) – Area of Impact 29
5.1.3 Wetland Identification (Hydrogeomorphic Classification) – Area of Impact 30
5.1.4 Functions and Values Assessment 30
5.1.5 Groundwater Recharge/Discharge 30
5.1.6 Floodflow Alteration (Storage & Desynchronization) 30
5.1.7 Sediment/Shoreline Stabilization 31
5.1.8 Fish and Shellfish Habitat 31
5.1.9 Wildlife Habitat 31
5.1.10 Sediment / Toxicant Retention 32
5.1.11 Nutrient Removal/Retention/Transformation and Production Export 32
5.1.12 Recreation (Consumptive & Non-Consumptive), Educational/ Scientific Value, Uniqueness/ Heritage, Visual Quality/ Aesthetics 32
5.1.13 Endangered Species 32
5.1.14 Evaluation of Principal Functions and Values 33
5.2 Assessment of Mitigation Measures **33**
5.2.1 Resource Identification for Mitigation Measures 33
5.2.2 Wetland Identification (Cowardin, et. A1) – Post-Construction Mitigation Sites 34
5.2.3 Wetland Identification (Hydrogeomorphic Classification) – Post-Construction Mitigation Sites 34
5.2.4 Functions and Values Assessment 34

6.0 DETERMINATION OF MITIGATION CREDIT **37**

7.0 MITIGATION WORK PLAN **41**

7.1 Overall Sequence of Construction Activity **41**
7.2 Mitigation Site Locations **43**
7.2.1 Winter Flounder Spawning Habitat 43
7.2.2 OU-3 Capping and Enhancement Areas 43
7.2.3 Rivers End Park Salt Marsh Restoration 44
7.3 Construction Techniques **44**
7.3.1 OU-3 Capping and Enhancement Areas 44
7.3.2 Winter Flounder Mitigation Area 45
7.3.3 Salt Marsh Restoration at Rivers End Park 45
7.3.4 Timing 45
7.3.5 Winter Flounder Spawning Habitat 45
7.3.6 OU-3 Hot Spot Capping Area 46
7.3.7 Salt Marsh Restoration at Rivers End Park 46
7.4 Oversight **46**
7.4.1Winter Flounder Mitigation Area and OU-3 Hot Spot Capping Area 46
7.4.2 Salt Marsh Restoration at Rivers End Park 47

8.0 MAINTENANCE PLAN **47**

8.1 Maintenance Plan Overview **47**
8.2 Winter Flounder Mitigation Area and OU-3 Hot Spot Capping Area **47**
8.3 Rivers End Park Mitigation Area **48**
8.4 After Action Reports **48**

9.0 PERFORMANCE STANDARDS **48**

10.0 MONITORING REQUIREMENTS **53**

10.1 River's End Park Mitigation Area **53**
10.2 OU-3 Hot Spot Area **53**
10.3 Tern Survey **53**
10.4 Shellfish Survey **53**
10.5 Winter Flounder Mitigation Area **54**
10.6 Monitoring Reports **54**

11.0 LONG TERM MANAGEMENT PLAN (LTMP) **56**

11.1 LTMP Overview **56**
11.2 Winter Flounder Mitigation Area and OU-3 Hot Spot Capping Area **56**
11.3 Rivers End Park Mitigation Area **58**
11.4 Shellfish Mitigation **58**
11.5 Management Reports **59**

12.0 ADAPTIVE MANAGEMENT PLAN **59**

12.1 Events Covered By the Plan **60**
12.2 Methods for Inspection and Assessment **60**
12.3 Corrective Action **61**

13.0 FINANCIAL ASSURANCES **61**

13.1 River's End Park Salt Marsh Restoration **61**
13.2 Winter Flounder Mitigation Area **62**
13.3 Capping of OU-3 Hot Spot **63**
13.4 Shellfish Mitigation (Seeding) **63**
13.5 Tern Monitoring Program **64**

13.6 Construction Security **64**
13.7 Performance Security **64**
13.8 Endowment Fund **65**

Figures

Figure 1: Site Location Map
Figure 2: New Bedford Marine Commerce Terminal General Site Plan
Figure 3: Shellfish Seeding Area Plan
Figure 4: Tern Survey Transect Plan
Figure 5: Environmental Resource Area Delineation Plans – NBMCT
Figure 6: Mitigation Area Locus Plan/Rivers End Park Resource Area Delineation Plan

Appendices

Appendix 1: Design Drawings and Cross-Sections For Winter Flounder Mitigation Area and OU-3 Hot Spot Capping Area
Appendix 2: Design Drawings For River's End Park Mitigation Area
Appendix 3: Estimate of Number of Shellfish Per Impact Location
Appendix 4: Response to National Oceanic and Atmospheric Administration – National Marine Fisheries Service, Northeast Region Comments on the Draft Determination for the Proposed South Terminal Project, New Bedford, Massachusetts, 10/4/12
Appendix 5: Release Abatement Measure Completion Report, Former Reliable Truss Site, March 2012.
Appendix 6: Summary of Existing Soil Data, River's End Park, New Bedford, MA, TRC, March 2012.
Appendix 7: Proposed Winter Flounder Mitigation Site Screening Data
Appendix 8: Literature Regarding PCB Impacts to Winter Flounder
Appendix 9: Site Protection Instrument Template
Appendix 10: Wetland Delineation Survey Summary
Appendix 11: Winter Flounder Mitigation Egg Monitoring Plan
Appendix 12: Invasive Species Monitoring Plan
Appendix 13: Draft Declaration of Restriction
Appendix 14: Compensatory Mitigation Plan Checklist
Appendix 15: MassDMF Shellfish Planting Guidelines
Appendix 16: Massachusetts Marine Artificial Reef Plan

1.0 Project Summary

The New Bedford Marine Commerce Terminal (see **Figure 1** for a site location plan) located at the South Terminal in New Bedford has been promulgated in order to develop a multi-purpose marine terminal, a primary purpose of which will be to provide critical infrastructure to serve offshore renewable energy facilities and accommodate international shipping at the new facility. The proposed facility will also be capable of supporting other industries within New Bedford, and will beneficially re-use sand from navigational dredging or the construction of confined aquatic disposal facilities to the extent approved by US EPA.

An assessment of the potential locations for supporting offshore renewable energy facilities and international shipping completed within the document entitled "State Enhanced Remedy in New Bedford, South Terminal", promulgated by the Commonwealth on January 18, 2012 has resulted in the conclusion that South Terminal in New Bedford, Massachusetts is the only practicable location due to a number of constraints, including: horizontal clearance, jack-up barge access, overhead clearance, total wharf and yard upland area, berthing space, site control/availability, and proximity. Due to the lack of other practicable alternatives, and the avoidance and minimization of impacts to resource areas to the maximum extent practicable, the South Terminal CDF is the Least Environmentally Damaging Practicable Alternative that will meet the primary Project Purpose.

The January 18, 2012 "State Enhanced Remedy in New Bedford, South Terminal" also included a conceptual mitigation plan. Since the date of that submission, the following documents have updated the available project information:

- The Commonwealth's June 18, 2012 responses to questions posed by EPA.
- The Commonwealth's June 26, 2012 responses to questions posed by EPA.
- The July 16, 2012 Draft Determination issued by EPA.

In addition to the submission or promulgation of the above-mentioned documents, a site inspection to confirm the field delineation of federal jurisdictional resource areas that had previously been described in the January 18, 2012 submission to EPA was conducted on September 13, 2012. As a result of the field inspection conducted by EPA, the final direct and indirect impacts to resource areas from the full project (see **Figure 2**) are anticipated from the construction of the New Bedford Marine commerce terminal are as follows:

Permanent Impacts

- **Areas of Proposed Filling:**
    - 2.07 acres of intertidal area.
    - 4.06 acres of shallow, near-shore sub-tidal area;
    - 0.11 acres of salt marsh will be filled during the construction of the facility;
    - 0.106 acres of freshwater wetlands will be filled during the construction of the facility; and

- 0.67 acres of area that will be dredged, partially filled with a concrete blanket along the bottom as well as piles needed to support the pile-supported section of the quay, and shaded by the concrete platform.

- **Areas of Dredging (Existing Depth Between -1 and -6 MLLW):**
  - 7.02 acres of near-shore, subtidal area will be dredged from between -1 and -6 MLLW to between -30 and -32 MLLW (Deep-Draft Boat Basin Area and Channel).
  - 8.46 acres of near-shore, subtidal area will be dredged from -1 MLLW to -6 MLLW to -14 MLLW (Shallow-Draft Boat Basin Area and Tug Channel).

- **Shellfish Impacts**
  - Based upon the revised area of impact as described above, the number of shellfish anticipated to be impacted has been revised. The total shellfish anticipated to be impacted by the project is: 9,817,121.

Temporary Impacts

- **Areas of Dredging (Existing Depth Between -1 and -6 MLLW):**
  - 8.76 acres of near-shore, subtidal area will be dredged to -45 MLLW, filled and capped (CAD Cell #3).
  - 6.17 acres of near-shore, subtidal area will be dredged from -4 to -6 MLLW to between -6 and -7 MLLW (Mooring Mitigation and Gifford Channel Relocation).
- **Areas of Dredging (Existing Depth between -20 and -30 MLLW):**
  - 8.29 acres of subtidal area will be dredged from -20 to -29 MLLW to -30 MLLW (Dredging within Existing South Terminal Area).
  - 13.26 acres of subtidal area will be dredged to -30 MLLW (Federal Channel).

2.0 Objectives

The objectives of this Mitigation Plan are to provide functions and values to compensate for the impacts associated with the New Bedford Marine Commerce Terminal project. The scope of the project was described within the January 18, 2012 submittal by the Commonwealth to USEPA, as well as several supplemental submittals and the Draft Determination issued by EPA on July 18, 2012. The mitigation proposed by the Commonwealth to compensate for the resource area impacts associated with the project are as follows:

To compensate for environmental impacts associated with the above-listed changes, the Commonwealth proposes complete the following mitigation for the project as follows:

- Construction of a 22.73 acre Winter Flounder Mitigation Area (see **Appendix 1** for construction plans)**.**
- Capping of an area within the OU-3 Hot-Spot (see **Appendix 1** for construction plans), located outside of the New Bedford Hurricane Barrier, such that:

    - A 4.47 acre intertidal area will be enhanced created immediately adjacent to the outside of the New Bedford Hurricane Barrier via capping of PCB impacted sediment; and
    - A 14.91 acre sub-tidal area will be enhanced via capping of PCB impacted sediment.
- Restoration of 0.88 acres of salt marsh along the Acushnet River, north of the Wood Street Bridge at a location called "River's End Park" (see **Appendix 2**).
- Completion of a Tern Monitoring Program.
- Shellfish mitigation consisting of seeding approximately 24 million shellfish seed (however, the actual number will be proportionate to the final impact as determined via the final dredging area) within waters of the City of New Bedford.
- Institution of a Fish Deterrent Plan and monitoring of project areas in order to minimize temporary impacts to Winter Flounder spawning, as well as temporary impact to other marine resources.

This mitigation is anticipated to compensate for the lost or compromised functions and values of the impacted resources as follows:

Intertidal Area Impacts

Functions and values associated with the intertidal area that will be lost when 2.07 acres of intertidal area are filled in association with the project will be compensated by creation of approximately 4.47 acres of intertidal area immediately outside of the New Bedford Hurricane Barrier in association with the OU-3 Hot-Spot Capping. The new intertidal area is assumed to have the same functions and values as the existing intertidal area at the project location, such that the creation of the mitigation area is anticipated to be suitable to compensate for the functions and values lost at the impact area; however, the ratio for this work will be approximately 2.16, which is intended to compensate for any loss of function in the relocation of this resource area to outside of the New Bedford Hurricane Barrier. This area will also cap PCB impacted sediment, which is intended to partially compensate (in coordination capping of PCB impacted sediment associated with the remainder of the OU-3 Hot Spot capping and the Winter Flounder Mitigation Area capping) for the temporary resource area impacts (see below) that will be incurred in association with this project. The capping will also result in the enhancement of tern foraging habitat (in this case, periodically shallow locations subject to plunge-diving) by capping PCB impacted sediment that is the habitat of one of the primary prey creatures of terns, the sand lance.

Sub-tidal Area Impacts That Are Anticipated to Permanently Impact Winter Flounder Spawning Habitat

Permanent sub-tidal impacts are divided between impacts that are anticipated to permanently impact Winter Flounder spawning and impacts that are not anticipated to permanently impact winter flounder habitat (temporary impacts to Winter Flounder spawning are independent, and are minimized to the extent practicable via the Fish Deterrent Plan, silt curtain use and turbidity monitoring). Approximately 4.06 acres of near-shore sub-tidal area is anticipated to be filled, 0.67 acres of area will be dredged, partially filled with a concrete blanket along the bottom as well as piles needed to support the pile-supported section of the quay, and shaded by the concrete

platform, and 7.02 acres of near-shore, sub-tidal area will be dredged from between -1 and -6 MLLW to between -30 and -32 MLLW. These impacts will permanently impact Winter Flounder spawning habitat. A total of 11.75 acres of area that presently serve as Winter Flounder spawning habitat will be impacted via either filling or dredging to a depth deeper than the commonly understood depth at which Winter Flounder are known to spawn.

To compensate for the impacts to Winter Flounders spawning habitat, approximately 22.73 acres of sub-tidal area impacted by PCBs will be enhanced via capping and will also be increased in elevation from deeper than -16.5 MLLW (deeper than Winter Flounder are known to spawn) to an elevation of -16 MLLW or shallower (an elevation at which Winter Flounder are known to spawn). The 22.73 acres of mitigation area is intended to replace the functions and values lost from the areas of impact (which will lose Winter Flounder spawning as a function and value). The mitigation ratio for this work will be approximately 1.93 acres enhanced for each 1 acre impacted.

The Winter Flounder mitigation area will also cap PCB impacted sediment. The capping of PCB impacted sediment is also intended to partially compensate (in coordination with the capping of PCB impacted sediment associated with the OU-3 Hot Spot mitigation area) for the temporary resource area impacts (see below) that will be incurred in association with this project.

Subtidal Area Impacts That Are Not Anticipated to Permanantly Impact Winter Flounder Spawning Habitat

Permanent subtidal impacts are divided between impacts that are anticipated to permanently impact Winter Flounder spawning and impacts that are not anticipated to permanently impact winter flounder spawning habitat (temporary impacts to Winter Flounder spawning are independent, and are minimized to the extent practicable via the Fish Deterrent Plan, silt curtain use and turbidity monitoring).. Approximately 8.46 acres will be dredged from -1 MLLW to -6 MLLW to -14 MLLW, which is not anticipated to permanently impact Winter Flounder spawning. To compensate for the temporary impacts to the subtidal areas being dredged, approximately 14.91 acres of subtidal area impacted by PCBs will be enhanced via capping. It is anticipated that the functions and values of the 8.46 acres within the impact area will have some permanent impact, but will retain much of their existing functions and values. The 14.91 acres of enhancement mitigation areas is similar in nature to the 8.46 area of impact, such that enhancement of the mitigation area is anticipated to be suitable to compensate for the losses at the impact area. The capping will also result in the enhancement of tern foraging habitat (shallow locations subject to plunge-diving) by capping PCB impacted sediment that is the habitat of one of the primary prey creatures of terns, the sand lance. The ratio for this mitigation work will be approximately 1.76 acres of enhancement for each acre of impacted flounder habitat; however, this work is also intended to partially compensate (in coordination capping of PCB impacted sediment associated with the remainder of the OU-3 Hot Spot capping and the Winter Flounder Mitigation Area capping) for the temporary resource area impacts (see below) that will be incurred in association with this project.

Temporary Dredging Impacts

Permanent subtidal impacts are divided between impacts that are anticipated to permanently impact Winter Flounder spawning and impacts that are not anticipated to permanently impact Winter Flounder spawning habitat. These impacts will typically result in a short-term disturbance that will create temporary impacts (such as temporary benthic disturbances), but will not substantially change the benthic elevation, and whose benthic environments are anticipated to recover relatively quickly through re-colonization. The temporary impacts will involve removal of at least one foot of surficial material from a dredge area; as this material within New Bedford Harbor is universally impacted with PCBs, it is anticipated that the temporary impacts will be substantially offset by the ecological benefits of removal of PCB impacted sediment from these areas.

The temporary impacts include dredging of 8.76 acres of near-shore, subtidal area to -45 MLLW, filling the area with contaminated sediment and then capping with clean sediment, the dredging of 6.17 acres of near-shore, subtidal area from -4 to -6 MLLW to between -6 and -7 MLLW, dredging of 8.29 acres of subtidal area from between -20 and -29 MLLW to -30 MLLW, and the dredging of 13.26 acres of subtidal area from between -26 and -29 MLLW to -30 MLLW. It is currently anticipated that the impacts associated with this dredging will generally be temporary, and will have a positive benefit in that the PCB contaminated sediment that currently impacts these areas will be removed. Nevertheless, as outlined within the previous sections, portions of the mitigation associated with (the capping of PCB impacted sediment associated with the OU-3 Hot Spot capping and the Winter Flounder Mitigation Area capping) are intended to also mitigate for the temporary dredging impacts.

Salt Marsh and Freshwater Wetland Area Impacts

Functions and values associated with the 0.11 acres of salt marsh and 0.106 acres of freshwater wetlands that will be lost when they are filled in association with the project will be compensated by creation of approximately 0.88 acres of salt marsh to be created at the Rivers End Park Mitigation Site, located on the Acushnet River, to the north of the Wood Street Bridge in New Bedford, Massachusetts (to the north of the impact area). The new salt marsh is hoped to have equal functions and values as the existing salt marsh area. As the existing freshwater wetland is significantly degraded due to the immediate presence of demolition debris below it, and the presence of impacts to soils from PCBs, metals, and PAHs either within the wetland or immediately surrounding it, it is also hoped that the created salt marsh at the Rivers End Park Mitigation Site will have equal or better functions and values than the existing freshwater wetland onsite. The creation of the mitigation area is anticipated to be suitable to compensate for the functions and values lost at the impact area; however, the ratio for this work will be between 4.07, which is intended to compensate for any difference from potential indirect impacts to remaining salt marsh located adjacent to the facility.

Shellfish Mitigation

Functions and values associated with the shellfish that will be impacted in association with the filling and dredging associated with the project (anticipated to impact approximately 9,817,121

shellfish, assuming that the full project is completed) will be mitigated for with the seeding of approximately 24,542,802 million shellfish seed, which is proposed assuming a 40% survival rate due to predation. A portion of the shellfish will be seeded as oyster seed (up to 20%) within a proposed "oyster reef" that will be designed under the guidance of EPA, NMFS and MassDMF. The actual number of shellfish to be seeded will depend strongly on the extent of the area that is ultimately impacted. Should the area of impact be reduced, the number of shellfish to be seeded will be reduced in proportion to the estimated number of shellfish within the area that is subsequently not impacted (see **Appendix 3** for the estimated number of shellfish within each proposed area of impact). The number of shellfish, the apportionment of species, and the design of the "oyster reef" will be in accordance with the Commonwealth's October 4, 2012 letter to EPA titled "Response to National Oceanic and Atmospheric Administration – National Marine Fisheries Service, Northeast Region Comments on the Draft Determination for the Proposed South Terminal Project, New Bedford, Massachusetts" (see **Appendix 4**). It is anticipated that the functions and values lost through the impacts incurred by this project will be compensated through the proposed seeding program.

Tern Monitoring Program.
Although it is currently anticipated that impacts to Common Tern and Roseate Tern foraging or habitat will be extremely minor if they exist at all, elements of the proposed project mitigation related to creation of intertidal and shallow water subtidal habitat, in conjunction with the capping of PCB impacted sediment within the OU-3 Hot Spot mitigation area, are intended to compensate for the anticipated minor impacts to tern foraging habitat that may occur. As a result, the proposed Tern Monitoring Program is mitigation that is above and beyond what would normally be required. It is currently anticipated that the Tern Monitoring Program, by providing additional information to federal and state-wide programs to protect both the Common and Roseate Tern, will assist in the protection of the two species.

Fish Deterrent Plan
As a part of minimizing the temporary impacts to finfish resources, during potential resource sensitive periods, a Fish Deterrent Plan (submitted under separate cover to EPA on October 17, 2012) will be implemented to discourage fish species from entering the work zone. The Fish Deterrent Plan details means and methods for; physical site controls to minimize access to the work area, monitoring of the physical controls and their efficacy, and active resource clearing techniques for safe removal of resources from the work area. There is no accepted mitigation ratio with which to assess the credit due for the Fish Deterrent Plan.

A Compensatory Mitigation Plan checklist is attached to this document as Appendix 14.

3.0 Site Selection

3.1 Impact Site: New Bedford Marine Commerce Terminal

South Terminal in New Bedford has been determined to be the only practicable location for siting of an offshore renewable energy support facility. This information was presented to USEPA within the January 18, 2012 submittal by the Commonwealth. Please reference this

document for the alternatives analysis prepared to support the siting of the terminal at this location.

3.2 Mitigation Sites

A number of potential mitigation alternatives were evaluated for compensation of lost resources and/or functions and values associated with the New Bedford Marine Commerce Terminal. 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, EPA, National Marine Fisheries Services, the Massachusetts Division of Marine Fisheries, the Massachusetts Natural Heritage and Endangered Species Program, and/or the City of New Bedford, or had been separately conceptualized were also considered. A list of 20 potential mitigation projects were selected from the greater number of potential projects. Those 20 potential mitigation projects were screened to eliminate those projects which were impracticable for a number of potential reasons. The remaining sites were evaluated and a set of particular mitigation measures was developed into a full mitigation proposal.

3.2.1 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. 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.

3.2.2 Description of Top 20 Mitigation Projects

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:

- <u>Alternative 1 – Intertidal and/or salt marsh habitat construction between the Coggeshall Street and the Route 1-95 Bridges.</u> 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/0.7 acres of salt marsh. 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/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 a portion of the OU-3 Hot Spot
  At a request from USEPA, the New Bedford Harbor Development Commission capped a portion of the OU-3 Hot Spot 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 (please note that this area does not contain PCBs greater than 50 mg/kg, but capping such sediments would still constitute an enhancement of the existing resource areas). EPA has monitored the area that was capped in 2004, and has noted that the benthic environment has been robustly re-colonized, indicating that such capping presents only a short-term impact, while has much greater longer-term benefits to the benthos, and the surrounding sub-tidal areas. The proposed alternative would utilize clean sand from the CAD Cell to cap a portion of the OU-3 Hot Spot nearest to the Hurricane Barrier as well as to create intertidal area. The project would create an intertidal area that could serve as Essential Fish Habitat, shellfish habitat, avian wildlife foraging area, and Horseshoe Crab Habitat which would integrate into the existing capped area. The area would be relatively isolated from human contact as it would be immediately adjacent to the Hurricane Barrier.

- 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/2 acres of intertidal area 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/0.5 acres of intertidal area within the inner harbor.

- Alternative 6 – Beach, Salt Marsh, or Freshwater Wetland Construction at Crow Island
  The alternative would purchase Crow Island in New Bedford Harbor to construct a beach on a small sand bar/jetty on the south west side of Crow Island, or salt marsh or freshwater wetland areas on the main portion of the island. Crow Island is located immediately south of Pope's Island, and is privately owned.

- 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 Stormwater Drainage 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 or enhance approximately 2 acres of successional 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.

- Alternative 11 – Rivers End Park Marsh Restoration
  The alternative would create an area of salt marsh at the River's End Park, located on the Acushnet River, north of the Wood Street Bridge in New Bedford, MA. It is unclear if the area was historic wetland, but the likelihood (with its proximity to the Acushnet River) is that it was. The project would remove fill to create an area of salt marsh. The restoration would establish wetland grade, soils, hydrology and vegetation to provide full tidal flushing to the restored salt marsh.

- Alternative 12 – Winter Flounder Mitigation Area
  This alternative was proposed by EPA and NMFS. The concept is to locate an area that is deeper than the known depth of Winter Flounder Spawning (typically understood to be areas shallower than -16 MLLW). The proposal would identify an area deeper than -16 MLLW, and shallow it to a depth of approximately -16.5 MLLW, to create Winter Flounder spawning habitat in the area.

- Alternative 13 – Buttonwood Park Wetland Restoration A
  Buttonwood Park Zoo in New Bedford has prepared a master plan (Buttonwood Zoo Master Plan) that encompasses a revision in the orientation of the park. One of the major components of this rehabilitation includes the addition of multiple wetland areas. The creation of freshwater wetlands at Buttonwood park has three potential orientations (due to the size of the facility, three different areas were considered for wetland creation/restoration). Orientation A anticipates that the existing pond at the northern limits of the zoo has land to the east and west that could be converted to wetlands mitigation area.

- Alternative 14 – Buttonwood Park Wetland Restoration B
  Buttonwood Park Zoo in New Bedford has prepared a master plan (Buttonwood Zoo Master Plan) that encompasses a revision in the orientation of the park. One of the major components of this rehabilitation includes the addition of multiple wetland areas. The creation of freshwater wetlands at Buttonwood park has three potential orientations (due to the size of the facility, three different areas were considered for wetland creation/restoration). Orientation B anticipates that the existing stream running through the zoo could be reconfigured to incorporate wetlands mitigation embankments.

- Alternative 15 – Buttonwood Park Wetland Restoration C
  Buttonwood Park Zoo in New Bedford has prepared a master plan (Buttonwood Zoo Master Plan) that encompasses a revision in the orientation of the park. One of the major components of this rehabilitation includes the addition of multiple wetland areas. The creation of freshwater wetlands at Buttonwood park has three potential orientations (due to the size of the facility, three different areas were considered for wetland creation/restoration). At the southwestern portion of the Buttonwood Zoo the existing stream is culvertized. This pipe could re-emerge and be reconfigured to incorporate an

extension of the stream into a new wetlands area. This location would coincide with some of the proposed wetlands in the (Buttonwood Zoo Master Plan).

- Alternative 16 – Wetland Restoration South of the New Bedford Airport
  The Massachusetts Department of Public Infrastructure (MA DPI) and the City of New Bedford manage and operate parcels of land that encompass New Bedford Regional Airport. A location immediately to the south of the existing New Bedford Airport currently serves as upland area immediately adjacent to existing freshwater wetlands in the area. The upland could be converted to freshwater wetland. Shallow groundwater at this site as well as the public ownership of the land make this option advantageous.

- Alternative 17 – Riverside Landing Restoration Area
  This alternative would create either freshwater or saltwater wetland mitigation at the "Riverside Landing" area, which is north of the Coggeshall Street Bridge, but south of Sawyer Street. This area is immediately adjacent to the Acushnet River to the east, with a new roadway to the west. Either the runoff from the roadway or tidal flows from the Acushnet River could be utilized to create hydraulic conditions in this location that could support freshwater or saltwater wetlands.

- Alternative 18 – Onsite Salt Marsh or Freshwater Marsh Mitigation
  This alternative would reserve land on the footprint of the New Bedford Marine Commerce Terminal to create wetland resources that would be impacted in association with the creation of the new facility.

- Alternative 19 – Shellfish Mitigation (Seeding or Relaying)
  Shellfish mitigation was conceptualized by the Massachusetts Division of Marine Fisheries. The mitigation could either include the relaying of shellfish out of the proposed potential area of impact, or could include seeding of shellfish to replace the shellfish that will be impacted as part of this project.

- Alternative 20 – Tern Monitoring Program
  Representatives from the Natural Heritage and Endangered Species program suggested the inclusion of a Tern Monitoring Program to evaluate the presence or absence of terns within New Bedford Harbor. Although existing evidence indicates that terns are not currently present within New Bedford Harbor, a more thorough monitoring program will help gather information regarding their patterns and habits in the area.

3.2.3 Initial Screening

An initial screening of the original 20 alternatives was completed based on a number of criteria that indicated whether the mitigation sites would be suitable. The initial screening eliminated the following alternatives:

- Alternative 18 – Onsite Salt Marsh or Freshwater Marsh Mitigation - As outlined within the alternatives analysis within the Commonwealth's January 18, 2012 submittal to EPA, the minimum area required for the new facility is approximately 28 acres. In order to

create mitigation onsite, some area that has previously been acquired and anticipated for inclusion within the new facility would need to be repurposed, and additional area would need to be acquired, or the resource areas created would need to be on the periphery of the newly created space, resulting in their likely being receptors for stormwater runoff from the active areas. Onsite salt marsh creation would not be possible due to the demands of harbor access required of the new facility (otherwise the impact to the existing salt marsh could be avoided). It is unlikely that upland freshwater wetlands would be suitable for mitigating for impacts to salt marsh; therefore, this option was not considered an ideal alternative, and was dropped from consideration.

- Alternative 4 – Beach Construction in Clarks Cove along Hurricane Barrier – This alternative was considered to be further away from the area of impact than other potential intertidal area construction projects. It was also anticipated that, since Clark's Cove is not as significantly impacted with PCBs in sediment as areas within New Bedford Harbor and within the OU-3 Hot Spot, that this alternative would likely not generate as much ecological benefit from capping, and therefore may be a more controversial alternative. As a result, it was dropped from consideration.

- Alternative 7 – Marsh Island Saltwater Marsh Restoration – It is the Commonwealth's understanding that the Marsh Island Saltwater Marsh Restoration area is currently being completed by a joint team including NOAA and several other agencies. As a result, this mitigation alternative is not available as an option, and was dropped from consideration.

- Alternative 9 – Silver Beach Drive Salt Marsh Restoration – This alternative was considered unsuitable because the restoration would be outside of the City of New Bedford, where the impacts will be created. It was assumed that residents of the City of New Bedford would request that the maximum possible mitigation be performed within the City limits and therefore be against this proposal, and it was dropped from further consideration.

- Alternative 10 – Round Hill Beach Highland Marsh Restoration - This alternative was considered unsuitable because the restoration would be outside of the City of New Bedford, where the impacts will be created. It was assumed that residents of the City of New Bedford would request that the maximum possible mitigation be performed within the City limits and therefore be against this proposal, and it was dropped from further consideration.

- Alternative 13 – Buttonwood Park Wetland Restoration A, Alternative 14 – Buttonwood Park Wetland Restoration B, Alternative 15 – Buttonwood Park Wetland Restoration C, and Alternative 16 – Wetland Restoration South of the New Bedford Airport - These alternatives proposed only freshwater wetland mitigation. As the project is anticipated to generate both salt marsh and freshwater impacts, sole freshwater mitigation projects do not appear to be appropriate to mitigate for the lost functions and values (whereas a larger salt marsh project may be sufficient to compensate for lost functions and values of both salt marsh and freshwater wetland areas). Additionally, EPA expressed strong opposition to Alternative 16.

- Alternative 17 – Riverside Landing Restoration Area – This area is located immediately adjacent to the section of the Acushnet River currently subject to the USEPA led Superfund cleanup. EPA has indicated that they would likely oppose work in the intertidal areas that had not yet been remediated. As a result, it would be difficult, if not impossible to create a viable salt marsh area at this location. Therefore, only a freshwater wetland would be available for creation, and, as the project is anticipated to generate both salt marsh and freshwater impacts, sole freshwater mitigation projects do not appear to be appropriate to mitigate for the lost functions and values.

- Alternative 19 – Shellfish Mitigation (Relaying) - Shellfish relaying was severely limited by EPA due to restrictions on relaying shellfish from Area 1 (areas north of the New Bedford Hurricane Barrier) to areas outside of Area 1. As a result, the Commonwealth had decided to focus on Shellfish Seeding for mitigation, and has dropped relaying from future consideration. The project area is in an area restricted to shellfish harvest due to bacterial contamination and is impacted with PCB contamination associated with the New Bedford Harbor Superfund site. Due to the PCB contamination, the EPA has determined that any relay must be conducted in the harbor, north of the hurricane barrier, to prevent spread of PCBs and prevent PCB-contaminated shellfish from entering the food supply (see the letter from EPA attached to Appendix 52 of the Commonwealth's January 18, 2012 submittal). The harbor area available for relaying (Area I) is in an area prohibited for shellfishing due to bacterial contamination. NSSP guidelines do not encourage planting in prohibited areas. Additionally, harvesting of shellfish for any reason from inside Area I (e.g. north of the hurricane barrier) would require a variance from MassDPH because their regulation, 105 CMR 260, prohibits any taking of shellfish in that area. Furthermore, due to a long period of prohibition of shellfish harvest and large areas of the harbor in actively managed dredged channels, the available suitable habitat area for shellfish is limited and likely already populated with adult shellfish.

- Relaying from Butler's Flat was determined to be cost-prohibitive due to the low density of quahogs there. Relaying from OU-3 was determined to be cost-prohibitive due to the size of the impact area and difficulty of accessing the area with efficient gear. Therefore, the preferred course of action for an efficient and effective mitigation strategy is to conduct mitigation solely by planting new shellfish and relay of shellfish was eliminated from consideration.

3.2.4 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. Several matrix tables were created to rank the alternatives. Each matrix table was created such that the mitigation measures that compensated for specific resources (salt marsh, for example) were ranked together. The following matrix tables show 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 (Salt Marsh)

Alternative	**E**	**T**	**B**	**O**	**N**	**I**	**S**	**P**	**C**	**Total**
Acushnet River Between 1-95 Bridge and Coggeshall Street Bridge	8	1	5	5	1	1	5	6	4	**36**
River Side Park Riparian Restoration	8	1	8	10	1	5	6	5	3	**47**
Beach, Salt Marsh, or Freshwater Wetland Construction at Crow Island	5	1	5	1	1	3	3	5	1	**45**
Hurricane Barrier Stormwater Drainage Swale Rehabilitation and Restoration	6	10	6	6	1	5	6	10	4	**54**
Rivers End Park Marsh Restoration	8	10	10	10	10	6	10	6	5	**75**

Alternative Matrix Table (Inter-tidal/Subtidal)

Alternative	E	T	B	O	N	I	S	P	C	Total
Capping of OU-3 Hot Spot	8	10	8	10	10	10	10	8	10	**84**
Construction of Beach North of Pease Park, Fairhaven	8	9	6	5	10	6	5	8	6	**63**
Beach, Salt Marsh, or Freshwater Wetland Construction at Crow Island	5	1	5	1	1	10	3	5	1	**32**
Winter Flounder Mitigation Area	6	8	8	10	10	8	8	8	8	**74**
Shellfish Mitigation (Seeding)	8	6	10	10	10	10	10	10	5	**79**
Tern Monitoring Plan	5	8	8	10	8	10	8	10	8	**75**

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

List of Selected Sites

Based upon the evaluation, the following proposed mitigation alternatives appear to be the most promising for inclusion within a mitigation strategy for long-term impacts:

Salt Marsh:

- Alternative 11 – Rivers End Park Marsh Restoration – This alternative is in a location that, although some distance from the impact area, is still within the Acushnet River watershed, and will therefore serve to facilitate the functions and values being impacted by the work. Salt marsh is already present at this location, indicating good conditions for expansion of the salt marsh. The site is owned by the City of New Bedford, can be completed in a relatively short period of time and is not unduly expensive. The benefits from this site appear to be such that the resultant wetland is anticipated to have a higher degree of functioning than the existing freshwater wetland onsite (which is severely degraded) and should be capable of suitably compensating for the salt marsh being impacted. This area should be sufficient to mitigate for both the salt marsh and freshwater wetland impacts onsite.

Intertidal/Subtidal:

The intertidal and subtidal impacts from the project are more significant than can be compensated by one project only. Therefore, the following four alternatives have been selected as the most favorable for mitigating for intertidal and subtidal impacts:

- Alternative 3 – Capping of OU-3 Hot Spot - Alternative 3 is in a location proximate to the intertidal and subtidal impacts. Alternative 3 would create intertidal area in a location where it was once present (along the New Bedford Harbor shoreline prior to creation of the Hurricane Barrier. The location is controlled by the Commonwealth, can be completed in a relatively short period of time and is not unduly expensive. The benefits from this site appear to be that it will be isolated from human contact, which should allow more extensive use of the area by wildlife and will cap an area that is impacted by PCB contamination in sediment. Additionally, the pilot cap installed by EPA in this location has shown that the temporary impacts from capping will be quickly re-colonized by the surrounding benthic community.

- Alternative 12 – Winter Flounder Mitigation Area - Alternative 12 was the only Alternative that addressed mitigation for impacts to Winter Flounder spawning habitat, and was thus selected.

- Alternative 19 – Shellfish Mitigation (Seeding) - Alternative 19 was the only remaining Alternative to mitigate for impacts to shellfish, and was thus selected. Shellfish seeding is a commonly accepted practice for mitigating impacts to shellfish.

- Alternative 20 – Tern Monitoring Program - Alternative 20 was the only Alternative to provide mitigation for potential impacts to terns, and was thus selected.

Detailed Description of Mitigation Sites

3.2.5 River's End Park Salt Marsh Restoration

The River's End Park Salt Marsh Restoration project proposes restoration of 0.88 acres of salt marsh in the Rivers End Park situated just south of Main St, and East of River Road along the Acushnet River in New Bedford, Massachusetts. Currently, the site contains approximately 0.402 acres of salt marsh immediately adjacent to the Acushnet River. The mitigation work involves removal of fill from immediately behind the existing salt marsh, to expand the salt marsh to the east of the Acushnet River. USACE and EPA requested that the design of the mitigation measure maximize the flux of water into and out of the new marsh; therefore, some impacts to existing salt marsh were necessary in order to improve connections. The improved connections will result in 0.04 acres of salt marsh that will be temporarily impacted (but will be restored in place). The overall work area is 0.92 acres (0.04 acres of which will be existing salts marsh that will be then restored in place). Therefore, the project will result in a net increase in 0.88 acres of salt marsh. The figures within **Appendix 2** show the pre- and post- plans for the work, as well as cross-sections. The existing resource areas are included within Figure 6.

The work involves restoring salt marsh to the west of existing salt marsh along the river. Fill material would be removed, the area would be re-graded, and wetland species would be planted. The soil currently located at Rivers End Park is contaminated with heavy metals (primarily lead, but also by cadmium, zinc, chromium, and nickel) and Benzo(a)pyrene (a PAH constituent) above Massachusetts Contingency Plan Reportable Concentrations (MCP RCs). A number of

environmental investigations have been completed in association with site investigations conducted by the City of New Bedford, the most recent of which is a Release Abatement Completion Report issued in March of 2012 (see **Appendix 5)**. An additional summary of existing soil data prepared by Beals and Thomas is attached as **Appendix 6**. Please refer to the plans within **Appendix 5** for sample locations relevant to **Appendix 6**.

The eastern side of the property is currently waterfront and has an existing salt marsh of 0.62 acres. By removing lead and heavy metal contaminated soil located to the west of the existing salt marsh and grading the embankment into the upland area, the Commonwealth will create between 0.88 acres of salt marsh. This area is owned by the City of New Bedford, which supports the project. The New Bedford Conservation commission requested the preliminary design of the area as mitigation for a separate project, under the assumption that the City of New Bedford would be able to finance the work in association with the construction of the River's End Park; however, the funding for the work is unavailable. The Commonwealth has adopted this project, and has redesigned it to increase the quantity of low and high marsh to be created. Additionally, an existing embankment, which currently isolates proposed wetland areas from the Acushnet River will be removed to increase the tidal flushing into the wetland area. Finally, the Chapter 91 walkway, which previously ran along the eastern side of the proposed wetland has been moved to the western side. By funding this project, the Commonwealth will allow this work to move forward. The work will not only revitalize waterfront area, but will also extend a Chapter 91 compliant scenic walkway along this western side of the area, a walkway which has been planned by the City for some time.

The project will enhance the waterfront of the Upper New Bedford Harbor and create habitat for wetland flora and fauna. Although the location is a significant distance from the impact site, it is within the same watershed, and will have a positive impact on the waters of the Acushnet River, but upstream of the impact site. The restored area and the new salt marsh habitat will replicate the functions and values of salt marsh that will be lost during construction of the New Bedford Marine Commerce Terminal. **Figure 6** shows the existing resource areas within the Rivers End Park, including the High Tide Line and the existing wetland flagging. **Appendix 2** shows the current conceptual plan for mitigation within the Rivers End Park. Cross-sections and details of the proposed work are attached within **Appendix 2**.

Currently, the section of the Acushnet River adjacent to Rivers End Park is tidally influenced; however, the existing area (upland of the existing salt marsh) is degraded. Historic fill has eliminated resource areas upland of the existing salt marsh. The area of the proposed mitigation is currently characterized by the growth of upland invasive species, has poor hydrology, and has a large amount of trash evident. Hot-spot remediation has occurred onsite, in which some soils with high concentrations of heavy metals were excavated and disposed offsite (see **Appendices 5 and 6** for reports on the delineation of impacts to soil and sediment).

Please note that elevated levels of contaminants onsite (heavy metals, PAHs, etc) have been found primarily within the surficial 1-3 feet of soil onsite. The mitigation project will require removal of between 7-8 feet of soil to grade the contours such that the elevations will be suitable for tidal flushing to support the proposed salt marsh, which will remove contamination from the area. The results of analytical collected to date indicate that the contaminated surficial layer

will be removed during construction of the salt marsh, and that construction of the salt marsh will not result in expose of contamination.

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

- Re-grading of the embankment profile to allow for the creation of an area of salt marsh vegetation. Excavation and off-site disposal of soil generated during re-grading at a suitable facility;
- Elimination and either reuse of the fill at another portion of the New Bedford Marine Commerce Terminal or offsite disposal of fill;
- Planting of low and high marsh species within the re-graded embankment and marsh area; and
- Installation of an adjacent public access Chapter 91 compliant scenic walkway.

The proposed marsh restoration/creation includes the following characteristics:

- Installation of a layer of parent material across the bottom of embankment, while shallowing some areas in order to create a suitable environment for low-marsh plants;
- Excavation of fill on the western side of the embankment and grading of the area 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*);
- Planting of Low Marsh/High Marsh vegetation (such as sp. s*partina patens, sp. Distichlis spicata*;
- Planting of High Marsh/Transition Zone vegetation (such as sp. *juncus gerardii,* sp. *iva frutescens* and a New England specific Coastal Salt Tolerant Grass mix;
- Planting of upland vegetation (such as sp. *solidago sempervirens*, sp. *eurybia spectabilis*, sp. *coreopsis verticillata*, sp. *prunus maritima*, sp. *myrica pensylvanica*, and a New England Specific Coastal Salt Tolerant Grass Mix); and
- Installation of an adjacent public access Chapter 91 compliant scenic walkway.

3.2.6 Winter Flounder Mitigation Area

Three locations located outside of the New Bedford Hurricane Barrier, adjacent to the Federal Channel, were proposed by USEPA as potential pilot Winter Flounder spawning mitigation locations, this proposal was based on the assumption that the locations met specific criteria associated with depth, PCB concentration in sediment, and strength of current. The three areas were screened for suitability for Winter Flounder spawning habitat creation via collection of bathymetric data, PCB concentration in sediment, and current data (for the location of data points, and a presentation of data collected in the three screening areas, please see **Appendix 7**).

Literature indicates the winter flounder spawn at a water depth of approximately -16.4 feet MLLW and shallower, and that currents less than 0.6 knots will prevent Winter Flounder eggs from being swept out to sea. Based upon the results of the screening investigation, it was

determined that the chosen location had existing bathymetry that is deeper than what is conventionally considered Winter Flounder spawning habitat, and had currents below 0.6 knots.

Samples of sediment collected from the proposed area Winter Flounder mitigation area were collected and analyzed for the presence of PCBs. The results of the testing indicated PCB concentrations in sediment between 1.3 mg/kg and 8.2 mg/kg within the proposed mitigation area, indicating PCB concentrations, although generally below EPA Superfund cleanup levels for the upper and lower Harbor, could have impacts such that capping the areas would result an environmental benefit by isolating the contaminants from the environment. (Please note that PCB concentrations in sediment are calculated by summing the 18 NOAA Congeners and multiplying by a factor of 2.0, which is a non-location specific factor used by NOAA to calculate total PCBs since 1988).

Based upon the results of the suitability analysis, it was determined that an area located immediately north of the Butler Flat's Lighthouse would be suitable for a pilot test, intended to create Winter Flounder spawning habitat. The area targeted for mitigation is at least approximately 22.73 acres in area, and is located outside of the New Bedford Hurricane Barrier. The area is approximately 1 mile south of the proposed facility in an area with a water depth of between approximately -22 feet MLLW to -18 feet MLLW. The proposed mitigation would change the elevation of the targeted area to a depth of approximately -16 MLLW or shallower, in order to create conditions suitable for Winter Flounder spawning. A figure showing the proposed mitigation area, as well as a conceptual cross-section are included as **Appendix 1**.

The mitigation would have a dual purpose. The work will not only create an area that is within the elevation range for preferred Winter Flounder spawning, the work will also cap PCB contaminated sediment, and enhance the area as habitat for fish and shellfish. The mitigation will be achieved via placement of dredged parent material within the target area. The parent material will be generated from either the construction of the South Terminal Expansion (i.e. parent material from the dredge footprint of the proposed facility) or from the construction of a CAD Cell, or both. The target final elevation after fill placement will be a depth of approximately -16 feet MLLW or deeper.

3.2.7 Capping of OU-3 Hot Spot

This proposed alternative would utilize parent material from the construction of South Terminal or from a CAD Cell to cap 14.91 acres of near-shore, shallow, sub-tidal environment, and create an adjacent new 4.47 acre intertidal area, in order to compensate for permanent loss of intertidal area and temporary and permanent impacts to sub-tidal areas via construction of the South Terminal CDF. The location of the proposed intertidal creation and sub-tidal enhancement is located immediately outside of the New Bedford Hurricane Barrier, east and slightly south of the end of Gifford Street.

The proposed intertidal creation and sub-tidal enhancement areas would be created outside the Hurricane Barrier on the New Bedford side of the Bay (see **Appendix 1** for the location of the proposed intertidal creation area). The location of the intertidal creation was selected because it was previously an intertidal area (prior to the construction of the New Bedford Hurricane Barrier) that was formerly affected by an anthropogenic structure (the Hurricane Barrier), and

would significantly benefit from new intertidal habitat. A cross-sectional diagram of an example beach profile for the proposed created intertidal area is included in **Appendix 1**. The profile created will include a large proportion of intertidal sandy (silt/sand/gravel mixture) area, representing creation of preferential habitat.

The proposed mitigation location is not accessible from the shore and is rarely travelled by recreational vessels. As a result, the critical area would be relatively isolated from human impacts, and would provide a prime location to enhance spawning and foraging areas for winter flounder, scup, black sea bass and windowpane flounder, and enhance foraging area for avian wildlife identified within the resource delineation, including the Common Tern and the Roseate Tern, and create horseshoe crab spawning habitat.

Both the inter-tidal creation area and the sub-tidal enhancement areas were also chosen due to the presence of PCB impacted sediment in the area. The placement of the parent material will also cap PCB contaminated sediment associated with a portion of the New Bedford Harbor superfund project called "OU-3". The mitigation is located within a near-shore, shallow, sub-tidal area located in the outer harbor, immediately southwest of the Hurricane Barrier, where a PCB-contaminated area has been partially (approximately 20 acres) capped (OU-3 pilot cap), OU-3 is a 17,000 acre area outside of the Hurricane Barrier. A hotspot area was located in the vicinity of the proposed mitigation that was partially capped in 2005 (OU-3 pilot cap). The OU-3 pilot cap area was identified for remediation under the New Bedford Harbor Superfund project; however, the OU-3 pilot cap area is not within the area slated for intertidal creation. The OU-3 pilot cap project was a "pilot study"; a remedy decision has not been issued for OU-3. The mitigation project would have the dual purpose of creating intertidal area while simultaneously capping and isolating from the environment sediments with a high level (but likely lower than 10 mg/kg) of PCB contamination within them.

Through bioaccumulation and uptake, PCBs impact a variety of types of marine life, and also have subsequent effects on avian wildlife. The effects of PCBs on Common and Roseate terns via their ingestion of sand lance were discussed in the previous section; it is anticipated that the isolation of PCB contaminated sediment in the location of the proposed intertidal creation area will also benefit both terns and other avian wildlife. A summary of available literature presenting some evidence of the impact of PCBs on the reproductive cycle of Winter Flounder is attached as **Appendix 8**. The literature search consists of one study noting the link between PCB contamination and a reduction in Winter Flounder larval length and body weight. The other study notes that reduced larval length and body weight results in significant decreased survival potential. The two studies taken together indicate that PCBs in sediment have a significant impact on the ability for Winter Flounder to produce viable offspring that ultimately contribute to propagation of the species. As a result, it is likely that eliminating direct contact from PCB impacted sediment would result in a positive impact to the Winter Flounder population. Therefore, isolation of PCB sediments would be beneficial to Winter Flounder.

It is suspected that PCB impacted sediment affects many species, in addition to Winter Flounder, and that capping PCB impacted sediment will create an area that will be relatively more productive as a shallow near-shore subtidal environment for spawning and foraging areas for many species, including Winter Flounder, Scup, Black Sea Bass and Windowpane Flounder.

The areas will also therefore be more productive as foraging areas for avian wildlife, including the Common Tern and the Roseate Tern.

3.2.8 Shellfish Mitigation (Seeding)

Seeding within Area I was not considered due to the restrictions outlined above when considering relaying. Areas that have been considered for seeding are within areas that EPA considers conditionally acceptable for shellfishing (Areas II), due to restrictions on shellfish consumption recommended by EPA, in relation to the concentrations of PCBs found within shellfish harvested within this area and Area III, the only unrestricted area present within the City of New Bedford. Area III is located further from shore, and, although accessible by commercial shellfishermen, would not be easily accessible to local shellfisherman within the City of New Bedford, who would be most impacted by the reduction in shellfish seed stock associated with the completion of this project. Therefore, it is generally considered that the bulk of seeding will take place within Area II.

The Commonwealth proposes the purchase and planting of two and one half (2.5) quahog seed for every one (1) quahog impacted by the project, for a total of 24,542,802 seed quahogs, assuming all portions of the project as proposed are completed. Because the seed will be planted in a phased approach, the Commonwealth plans to assess the total number of shellfish impacted based on the project "as completed", and if portions of the project are not completed, the number of shellfish seed will be reduced proportionately. The seed will be primarily quahog (as outlined above), with the exception of some portion of the seed to be oyster stock (which will be seeded in association with the "oyster reef" requested by NMFS, and as described below). The exact number of oyster seed will be dependent on the size and layout of the proposed "oyster reef", and will be finalized in consultations with NMFS and MassDMF.

MassDMF considers seed appropriate for planting to range from approximately 20-25 mm in size; out-planting at this size minimizes the mortality rate without the need for predator exclusion netting. The planting activities would target shallow subtidal areas in City of New Bedford waters. MassDMF has stated that seeded areas are ideally shut down for shellfishing for a minimum of one year up to approximately three years, in order to allow the seed to grow to a sufficient size to spawn and reach legal harvest size. Rather than plant at one time (which would result in large areas to be shut down for 1-3 years), it is recommended that the planting be distributed using a rotational planting and closure plan developed by MassDMF and the City over a relatively long time period (approximately 10-15 years). Planting will not take place within Area I, north of the hurricane barrier. Figure 1 (see below) illustrates the potential areas for seeding in the City of New Bedford (attached). Planting will occur in approved (green hatched) and conditionally approved (orange hatched) areas only. Red cross-hatched areas are prohibited for shellfishing and would not be seeded. Blue striped areas are restricted and would not be seeded.

There are approximately 1,500 acres of potential seeding area located within shallow, subtidal areas that are conditionally approved for shellfishing in City of New Bedford waters (see **Figure 3**). The area has been broken down into 10 separate sub-areas, of approximately 150 acres each. Each year of seeding will take place in a portion of one of the 10 separate sub-areas. That area

will then be shut down for shellfishing for a maximum of 3 years. For the purposes of this plan, the intent is to rotate from sub-area to sub-area from lowest to highest number (Area 1 first, Area 2 second, etc). Additional guidelines on standard shellfish seeding protocols utilized by MassDMF are included within the MassDMF Shellfish Planting Guidelines (**Appendix 15**). Please note that specific conditions will drive the process by which the rotational seeding and closure process will proceed; however, the plan may be altered as the seeding progresses over what is anticipated to be a lengthy seeding period (10 years or more).

The Commonwealth anticipates that the area selected for seeding should be more than large enough to accommodate the new seed. Shallow, subtidal areas associated with the New Bedford Marine Commerce Terminal were documented within the Commonwealth's shellfish survey to support between 50,000 and 800,000 shellfish per acre (an average of 425,000 shellfish per acre). Therefore, it is anticipated that, if 2,000,000 seed were produced in any one year, an average of 4.7 acres shallow sub-tidal shellfish habitat would be needed to support those seed. Thus, in no case would an entire 150 acre area need to be shut down. If the areas are shut for three years only, then an average of 28.2 acres of the total 1500 acres will be shut at any one time to allow maturation for the seeded areas, which is a very small fraction of the overall available shellfishing area.

A reseeding project for impacts to shellfish at South Terminal (and associated areas) would have the following characteristics:

The planting program would be run by MassDMF for the Commonwealth. Quahogs would be planted at a size of 20-25 mm to optimize survival. MassDMF would purchase seed quahogs (5-8 mm) and oversee the grow out (to 20-25 mm). The grow out would occur at the John Hughes Hatchery on Martha's Vineyard and the shellfish would be outplanted in New Bedford waters. The areas for outplanting would be identified in concert with the city, and rotational closure management would be used to ensure sufficient area is open for recreational and commercial shellfishing that occurs in the area. To compensate for some other species that were detected during field investigations, an "oyster reef" will be created outside of the New Bedford Hurricane Barrier. The exact location and configuration of this reef will be worked out between EPA, NMFS and MassDMF, but may be constructed with rock removed in association with the New Bedford Marine Commerce Terminal. A relatively small percentage (up to 20%) of the overall 24.4 million shellfish will be seeded as oysters in association with construction of the reef; however, the exact number will be dependent on the size and configuration of the reef. Only quahogs will be planted in the other areas conditionally approved for shellfishing. Interagency coordination meetings between MassDMF, NMFS, and EPA will take place to determine the design of the "oyster reef" requested by NMFS; this meeting has not yet taken place. The number of shellfish, the apportionment of species, and the design of the "oyster reef" will be in accordance with the final decisions reached during the interagency coordination meetings and the written agreement that results from those meetings. Further direction regarding methods and location of the "oyster reef" will be generated from the MassDMF Shellfish Planting Guidelines (**Appendix 15**) and the MassDMF Artificial Reef Policy (**Appendix 16**).

At present, the productivity of the proposed hatchery depends upon a number of operational factors; it is anticipated that up to 2,000,000 seed could be purchased and grown out per year.

The program is currently anticipated to last between 10 and 15 years, dependent upon the productivity factors mentioned above, or until the 24,542,802 seed (or the proportional equivalent, based on the number of shellfish impacted) have been planted.

3.2.9 Tern Monitoring Program

Although it is not currently anticipated that Common Tern and Roseate Tern habitat will be substantially impacted by completion of the South Terminal CDF project, elements of the proposed project mitigation related to creation of intertidal and shallow water subtidal habitat, in conjunction with the removal of PCB-contaminated sediment, is intended to compensate for the impacts to tern foraging habitat that may occur. In addition, a tern survey plan will be implemented in Spring/Summer 2012 to determine the extent of the foraging habitat for the Terns as well as Tern use of the area. Based on consultation with the Massachusetts Natural Heritage and Endangered Species Program (NHESP) (Mostello, pers. comm.), the survey will entail weekly surveys from May through mid-July, peak tern nesting season, to acquire data on the density and abundance of terns using the area on both an east/west and north/south gradient to determine tern abundance and density as a function of proximity to shoreline and distance up the estuary. Outside the hurricane barrier, transects would be roughly east/west (shoreline to shoreline); inside the hurricane barrier one north/south transect would extend from the hurricane barrier as far north as navigability allows. At the recommendation of the NHESP, the surveys will be conducted using methodology consistent with guidance provided in the document titled Towards standardized seabirds at sea census techniques in connection with environmental impact assessments for offshore wind farms in the U.K. (http://www.offshorewindfarms.co.uk/Assets/1352_bird_survey_phase1_final_04_05_06.pdf), and in consultation with the NHESP and the U.S. Fish and Wildlife Service.

The Monitoring Program involve weekly surveys for terns both within and without New Bedford Harbor from mid- to late- April to mid- to late- August in one year. Surveys will be conducted by utilizing a wildlife expert, with tern spotting knowledge on a marine vessel that will follow the same transects on each inspection. The transects will run north to south in New Bedford Harbor; one transect on the east of the harbor, one on the west, and one down the center of the harbor, for areas north of the Hurricane Barrier and one transact on the west and one down the Federal Channel for areas south of the Hurricane Barrier. The northernmost location will be bounded by the Route 195 bridge, while the southernmost location will be the Butler Flats area. This data will be collected and summarized in a report, which will be presented to the Massachusetts Natural Heritage and Endangered Species Program, which will synthesize the data with existing and future date to be able better know the extent to which terns are utilizing New Bedford Harbor, if at all. A drawing showing the proposed transect lines is included as **Figure 4**.

4.0 Site Protection Instrument

In order to ensure the completion and long term viability of the proposed “Compensatory Mitigation”, the Commonwealth proposes to implement a “Site Protection Instrument”(SPI). This instrument serves to assure the relevant agencies that the compensatory mitigation will be performed and will enjoy permanent protection. The wetland mitigation site known as “River’s End Park Salt Marsh Restoration”(Site) is a city owned parcel of upland real estate and as a

result, the only mitigation project not under regular direct control of the Commonwealth, and/or the interested agencies. In this context this Site is unique, and additional attention afforded by the SPI is a prudent protection for this mitigation site. The Site Protection Instrument also serves as a basis for establishing the roles and responsibilities and identities for maintenance of this mitigation project, which will be discussed in Section 11 "Financial Assurances". The commonwealth has selected a SPI template, **Appendix 9**, as the basis of discussions with the EPA. A final SPI format will require acceptance of both the Commonwealth and the EPA, but will contain the major elements of the attached template although the form may vary. A summary of the protections offered by the SPI are discussed below.

4.1 Legal Arrangement

The attached SPI commits to the establishment of the permittee responsible mitigation wetland which will be created by the project proponent, in this case the Commonwealth of Massachusetts, and will remain in the care of the City of New Bedford as the Property Owner. The Site once constructed will have compensatory mitigation equal to that which is required by the USEPA and the Corps of Engineers for the loss of saltmarsh and bordering vegetated wetland resource at the NBMCT.

The Site once constructed will have compensatory mitigation "Credit" equal to that which is required by the USEPA and the Corps of Engineers for the loss of saltmarsh resource at the NBMCT. The SPI also names the USEPA and the State Enhanced Remedy Committee as the Interagency Review Team (IRT). The IRT is given oversight and review powers to ensure; that the existing resources are adequately delineated, and the constructed mitigation meets the requirements of the approved mitigation design.

4.2 Legal Instrument

As real estate the subject parcel that the Site is a located on can be transferred to alternate owners as real property. To protect the Site and the associated resources, the SPI provides for an encumbrance on the property through a Conservation Restriction in accordance with Massachusetts law. The Conservation Restriction is a perpetual easement prohibiting development of the property which is not consistent with the protected "conservation value". For the Site, the conservation value to be cited in the Conservation Restriction is to be the compensatory saltmarsh as approved by EPA. This encumbrance will ensure that regardless of the possible future property transfers or owner, the saltmarsh will remain a protected resource.

A Draft Declaration of Restriction template is attached as Appendix 13. The Conservation Restriction is a protective document that amends the deed to restrict future use of the property and avoid actions on the property that are detrimental to success of the mitigation work. The Commonwealth believes that this is the best methodology for implementing a restriction for this Property. The proposed conservation restriction is sufficiently protective for the following reasons:

1. The City of New Bedford will retain ownership of the property, while the Commonwealth maintains the mitigation area, the final boundaries of which will be monumented in the field and noted on the restriction.
2. The document notes approved actions (such as activities associated with construction, operation, and maintenance of the proposed mitigation measures) and forbidden actions (such as filling, clearing, or other disturbances, including vehicular access).
3. The document gives the Agency (EPA) and the Commonwealth the right to enforce the document.
4. The document gives the Agency (EPA) and the Commonwealth the right to conduct periodic inspections to determine to its satisfaction that the work has been completed and maintained to the satisfaction of the Agency and the Commonwealth.
5. Once put in place, the document restricts future alterations or releases of the declaration unless they have been approved in writing by EPA and the Commonwealth.

The River's End compensatory mitigation site to be set aside for conservation will be protected in perpetuity from future development via the Restriction noted above. Within 90 days of the date of EPA's final determination and prior to initiation of work in aquatic resources, the Commonwealth will submit to EPA a draft of the preservation document. Within 30 days of the date EPA approves this draft document in writing, the Commonwealth will execute and record it with the Registry of Deeds for the City of New Bedford. A copy of the executed and recorded document will be sent to EPA within 120 days of the date EPA approves it. As noted above:

- The preservation document will enable the site to be protected in perpetuity from any future development.
- The document will expressly allow for the creation, restoration, remediation and monitoring activities required by EPA's final determination.
- It will prohibit all other filling, clearing and other disturbances (including vehicle access) except for activities explicitly authorized by EPA.

5.0 Baseline Information

5.1 Impact Assessment of Proposed Project

The following section outlines the baseline information for the Commonwealth's assessment of primary and secondary impacts associated with the project, resource area delineation, and impact assessment of the proposed project.

5.1.1 Resource Identification and Direct Impact Assessment

The project site is located adjacent to New Bedford Harbor in New Bedford, Massachusetts, immediately to the south of the existing South Terminal facility, adjacent to the Acushnet River. A Site Locus Map is included with this document as **Figure 1**. The latitude of this site is 41.622936. The longitude of this site is 70.915271. The site is located within the Cape Cod Watershed. The Hydrologic Unit Code for this site is 01090002.

A wetland resource investigation was conducted on April of 2010 and again in June of 2012 and September of 2012. Elevations of the property were recorded during the land survey and referenced to New Bedford Harbor Mean Lower Low Water datum, and were used to determine the limits of the High Tide Line. Scaled plans showing the existing resources with wetland flag locations for the project site, and areas of direct impact shaded, as well as the High Tide Line, Mean Low Water, and Mean High Water and Mean High High Water marked are shown on **Figure 5**. The investigations revealed a relatively small area of freshwater wetland in the upland area (approximately 0.109 acres). During the course of this investigation, 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 during the wetland delineation. The fill on the site consists of angular stone, soil, brick, gravel, asphalt, tar, concrete, steel, automobile and truck tires and inner-tubes, automobile and truck parts, plastic, and glass. 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. A written description of the wetland survey investigations conducted in June of 2012 are included as **Appendix 10** to this document.

A resource area location map is included as **Figure 5**. Historically, the majority of the land that will be incorporated into the proposed Facility is former heavy industrial property, the site of an extensive former mill complex. Historical maps, sketches, and photographs indicate that a large textile mill complex known as the *Potomska Mills* occupied approximately 19 acres, or much of the land within the footprint of the proposed facility. Based on a best-fit overlay of the historical maps onto current conditions noted from recent (2009) aerial photography, the mill complex land appears to have extended inland from the current shoreline to beyond the western-most extents of the proposed Facility, and extended eastward into some portion of what is now intertidal land. A 1911 "Atlas of the City of New Bedford, Massachusetts" depicts the former mill site covering more than half of the proposed South Terminal Extension Facility main site. Historical information indicates that the Mill began erecting structures on the site around 1871, and that the complex was demolished between 1935 and 1936. Presently, the land area that covers the former mill complex exhibits areas of hummocky terrain typically indicative of remnant rubble or debris in the subsurface, and portions of the site (particularly the central, northern, and western portions) contain broken pieces of brick and mortar at or just below the ground surface.

The primary resource areas noted during the field investigation are: salt marsh, freshwater wetland, intertidal area, shallow, near-shore subtidal area (existing elevation of between -1 and -6 MLLW), and deeper subtidal area (existing elevation between -20 and -25 MLLW).

5.1.2 Wetland Identification (Cowardin, et. AI.) – Area of Impact

The following is an assessment of wetland classes at the site that will be effected by the proposed work, in accordance with the system presented by Cowardin, et.al. (1979) "Classification of wetlands and deepwater habitats of the United States," Office of Biological Services, FWS/OBS-79/31, December 1979:

For areas submerged at low tide:

System: Estuarine, Subsystem: Subtidal, Class: Unconsolidated Bottom, Subclass: Mud
For areas between low tide and high tide:
System: Estuarine, Subsystem: Intertidal, Class: Unconsolidated Shore, Subclass: Sand
For salt marsh areas:
System: Estuarine, Subsystem: Intertidal, Class: Emergent Wetland

For freshwater wetlands on the upland portion of the site:

System: Palustrine, Class: Emergent Wetland

5.1.3 Wetland Identification (Hydrogeomorphic Classification) – Area of Impact

The following is an assessment of wetland classes at the site that will be effected by the proposed work, in accordance with the system presented by Brinson, M.M. (1993). "A hydrogeomorphic classification for wetlands", Technical Report WRP-DE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A270 053.

For intertidal areas, subtidal areas, and salt marsh at the site:
Geomorphic Setting: Coastal – Fringe Wetlands - Sea Level Location
Water Source: Lateral Surface Flows (tides)
Hydrodynamic Properties: Bi-directional Flows – Astronomical Tides (Regular Flooding)

For freshwater wetlands at the site:
Geomorphic Setting: Depressional Wetlands – No apparent inlet or outlet.
Water Source: Groundwater discharge to wetland.
Hydrodynamic Properties: Vertical fluctuation of water table – Drawdowns of WT Interspersed between frequent rain events that fully saturate sediments.

5.1.4 Functions and Values Assessment

The following is an evaluation of functions and values for the area of impact. A subsequent section summarizes the principal functions/values of the proposed South Terminal CDF area, and discusses the potential impacts that the proposed work will have on the principal functions/values of the proposed South Terminal CDF area:

5.1.5 Groundwater Recharge/Discharge

Groundwater Discharge is one of the principal functions/values of the wetland. The area is a primary intersection of a freshwater groundwater table and a saltwater estuary. Groundwater generated via precipitation and runoff typically intersects with saltwater intrusion and discharges/mixes at this location; therefore, Groundwater Discharge is one of the Primary Functions. Groundwater recharge does not occur at this location.

5.1.6 Floodflow Alteration (Storage & Desynchronization)

The wetland area provides 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. Therefore, although flood flow alteration is one of the functions/values of the wetland, it is not a Principal Function.

5.1.7 Sediment/Shoreline Stabilization

The wetland areas provide a buffer to reduce the energy of the high-velocity waves within New Bedford Harbor. The filling of the wetland areas will reduce the ability of the area to reduce the energy of these waves, which would result in slightly higher energy waves within the Harbor impacting upon other structures, vessels, and natural features. Therefore, sediment/shoreline stabilization is one of the Principal Functions of the wetland areas.

5.1.8 Fish and Shellfish Habitat

Shallow, near-shore subtidal areas serve as fish habitat as well as spawning grounds. An Essential Fish Habitat Assessment has been conducted (see January 18, 2012 submission to EPA). The Essential Fish Habitat Assessment provides a more thorough assessment of the existing fisheries habitat that will be altered by completion of this project.

Visual evidence as well as the results of a shellfish survey have indicated that the coastal beach and aquatic areas of the site serve as shellfish habitat. The results of the shellfish survey are included within previous sections of this document. The Shellfish Survey provides a more thorough assessment of the existing shellfish resources that will be altered by completion of this project. Fish and shellfish habitat is one of the Principal Functions of the wetland areas.

5.1.9 Wildlife Habitat

The site is isolated on all sides by industrial properties, which minimizes the accessibility of the site for large mammals. However, the shallow water habitat, and the intertidal areas provide nesting and feeding locations for shore birds. Avian wildlife has been observed onsite as well as within New Bedford Harbor and Bristol County. A more thorough assessment of the avian wildlife that may frequent the site, due to the presence of such wildlife within the greater region, and also based upon local bird-watching information is included within previous sections of this document.

It should be noted that the quality of the avian habitat is questionable due to the PCB impacts to shoreline sediments as well as the impacts to shellfish that serve as a food source for avian wildlife at the site. Nevertheless, wildlife habitat is one of the Principal Functions of the wetland areas.

5.1.10 Sediment / Toxicant Retention

Although wetland areas are typically associated with sediment/toxicant reduction, the presence of PCBs within sediment in New Bedford Harbor complicates the assessment of these areas. Fine grained material or sediment are present below the low tide line and are also interspersed within the sand-dominated intertidal area, which results in the elevated concentrations of PCBs in both locations. Shellfish located within the resource areas typically have relatively high concentrations of PCBs in their flesh. Therefore, sediment/toxicant retention is not listed as a principal function and value for the area of impact.

5.1.11 Nutrient Removal/Retention/Transformation and Production Export

The salt marsh and upland freshwater wetland serve to act as a sink for nutrients; nevertheless, the flow regime, low detention time, absence of slowly draining fine-grained material or deep organic/sediment deposits limit the capabilities of the wetland areas to act as a sink for nutrients in a significant fashion. Some level of production of food or usable products are associated with the salt marsh and freshwater wetland areas (particularly for wildlife), and Winter Flounder are known to feed off of shellfish. However, the presence of PCB impacts within sediment complicate the assessment of the impact area, particularly due to the potential for the export of nutrients to also be impacted with PCB contamination (of organic matter exported). Therefore, the functions/values of Nutrient Removal/Retention/ Transformation and Production Export (Nutrient) are not considered a principal function and value.

5.1.12 Recreation (Consumptive & Non-Consumptive), Educational/ Scientific Value, Uniqueness/ Heritage, Visual Quality/ Aesthetics

The site is an open area, and has a length of coastline that can be viewed from multiple locations. However, the site is strewn with trash, and debris, and is not a popular location for the locals to view. The site is located within New Bedford Harbor, which is an active industrial and commercial Harbor, and the site is located within an area designated by the Commonwealth of Massachusetts as a Designated Port Area; an area that is set aside specifically for industrial development. The site does not have any cultural or heritage significance. The site is not part of a recreation area, is private property, is fenced off, and the public is discouraged from entering. The wetland areas are adjacent to navigation areas, but are not accessible for recreational boaters; a recreational boat ramp and mooring fields are adjacent to the site, and accessible through City of New Bedford-owned facilities. Impacts to the wetland areas will not impact accessibility to New Bedford Harbor. Therefore, the functions/values of Recreation, Educational/Scientific Value, Uniqueness/Heritage, and Visual Quality/Aesthetics are not principal functions and values.

5.1.13 Endangered Species

The site is not located within an area identified as critical habitat or priority habitat for rare or endangered species.

5.1.14 Evaluation of Principal Functions and Values

As identified above, the principal functions and values identified for the site are:

- Groundwater Discharge;
- Sediment/Shoreline Stabilization;
- Wildlife Habitat; and
- Fish and Shellfish Habitat.

The primary impact to the existing resource areas are the diminished wildlife, fish, and shellfish habitat. The mitigation measures are primarily designed to address those functions and values.

5.2 Assessment of Mitigation Measures

The following section outlines the baseline information for the Commonwealth's assessment of the mitigation measures proposed for compensation in association with the project, resource area delineation, and impact assessment of the proposed project.

5.2.1 Resource Identification for Mitigation Measures

There are three primary mitigation sites (River's End Park Mitigation Site, OU-3 Hot Spot Capping Area and Winter Flounder Mitigation Area). All three locations are located either within New Bedford Harbor (outside of the Hurricane Barrier) or adjacent to the Acushnet River; however, all three locations are located within the city limits of the City of New Bedford. A Site Locus Map showing all three mitigation areas is included as **Figure 6**. The latitude and longitude of the three sites is:

- River's End Park Mitigation Site: Latitude – 41.679936, Longitude – 70.917399
- OU-3 Hot Spot Capping Area: Latitude – 41.618165, Longitude – 70.912254
- Winter Flounder Mitigation Area: Latitude – 41.606053, Longitude – 70.896362

All three sites are located within the Cape Cod Watershed. The Hydrologic Unit Code for all three mitigation sites is: 01090002.

The OU-3 Hot Spot Capping area and the Winter Flounder Mitigation Area are completely sub-tidal as of a hydrographic survey conducted in the spring of 2011. A wetland resource investigation for the River's End Park Mitigation Site was conducted in October of 2012. Elevations of the property were recorded during the land survey and referenced to New Bedford Harbor Mean Lower Low Water datum, and were used to determine the limits of the High Tide Line. Scaled plans showing the existing resources with wetland flag locations for the project site, and areas of direct impact shaded, as well as the High Tide Line, Mean Low Water, and Mean High Water and Mean High High Water marked are included as **Figure 6**. The investigations revealed an existing are of salt marsh on the fringe of the border of the property with the Acushnet River; *however, the mitigation is designed to prevent impact to that existing wetland area.*

5.2.2 Wetland Identification (Cowardin, et. A1) – Post-Construction Mitigation Sites

The following is an assessment of the wetland classes at the three mitigation sites proposed for mitigation work, in accordance with the system presented by Cowardin, et.al. (1979) "Classification of wetlands and deepwater habitats of the United States," Office of Biological Services, FWS/OBS-79/31, December 1979:

For the Winter Flounder Mitigation area:
The current and the enhanced classification for the Winter Flounder Mitigation Area is:
System: Estuarine, Subsystem: Subtidal, Class: Unconsolidated Bottom, Subclass: Mud

For the OU-3 Capping Area:

The current classification prior to mitigation, as well as the enhanced condition post mitigation for the sub-tidal enhancement areas is: System: Estuarine, Subsystem: Subtidal, Class: Unconsolidated Bottom, Subclass: Mud
No intertidal currently exists in this location. Post construction, the following classification will apply to the intertidal areas: System: Estuarine, Subsystem: Intertidal, Class: Unconsolidated Shore, Subclass: Sand

For the River's End Park Mitigation Area:
No salt marsh currently exists within the area planned for mitigation. Post mitigation, the following will be the classification - System: Estuarine, Subsystem: Intertidal, Class: Emergent Wetland

5.2.3 Wetland Identification (Hydrogeomorphic Classification) – Post-Construction Mitigation Sites

The following is an assessment of wetland classes at the three mitigation locations proposed for mitigation work, in accordance with the system presented by Brinson, M.M. (1993). "A hydrogeomorphic classification for wetlands", Technical Report WRP-DE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A270 053.

The existing and post-construction condition of the OU-3 Capping Area and the Winter Flounder Mitigation area, as well as the post-construction condition of the River's End Park Mitigation Area are:
Geomorphic Setting: Coastal – Fringe Wetlands - Sea Level Location
Water Source: Lateral Surface Flows (tides)
Hydrodynamic Properties: Bi-directional Flows – Astronomical Tides (Regular Flooding)

5.2.4 Functions and Values Assessment

The following is an evaluation of functions and values for the mitigation areas. A subsequent section summarizes the principal functions/values of the proposed South Terminal CDF area, and discusses the potential impacts that the proposed work will have on the principal functions/values of the proposed South Terminal CDF area:

5.2.5 Groundwater Recharge/ Discharge

Groundwater Discharge will be one of the principal functions/values of the River's End Park Mitigation Area. The area will be a primary intersection of a freshwater groundwater table and a saltwater estuary. Groundwater generated via precipitation and runoff typically intersects with saltwater intrusion and discharges/mixes at this location; therefore, Groundwater Discharge is one of the Primary Functions. Groundwater recharge will not occur at this location.

No Groundwater Discharge or Recharge does or will occur at the OU-3 Capping Area and/or the Winter Flounder Mitigation Area.

5.2.6 Floodflow Alteration (Storage & Desynchronization)

The River's End Mitigation Area will provide floodflow alteration, including storage, post construction, which does not currently occur due to the presence of fill in the area. Flood storage on this end of the Acushnet River can be very beneficial to overall flood storage for the Acushnet River. Flood storage will be a primary function and value of the mitigation area once it is completed.

The OU-3 Capping Area and the Winter Flounder Mitigation Area do not currently and are not anticipated to, post-construction, provide this function and/or value. Therefore, although flood flow alteration is one of the functions/values of the wetland, it is not a Principal Function.

5.2.7 Sediment/ Shoreline Stabilization

The post-construction mitigation at the River's End Park is anticipated to provide additional sediment/shoreline stabilization than its existing condition. It is anticipated that sediment/shoreline stabilization will become a post-construction primary function and value of the new salt marsh area.

The OU-3 Capping Area does not currently have sediment/shoreline stabilization as one of its primary functions and values, but the intertidal portion of the capping area have sediment/shoreline stabilization as a primary function and value, due to its ability to buffer the storm waves that would otherwise reflect off of the Hurricane Barrier and redirect to other shoreline locations.

The Winter Flounder Mitigation Area both pre- and post-construction will not have sediment/shoreline stabilization as one of its primary functions or values.

5.2.8 Fish and Shellfish Habitat

The River's End Park Mitigation Area does not currently (pre-construction) sever as fish and shellfish habitat, but will likely serve some nursery functions post construction for some species of fish.

The OU-3 Capping Area and the Winter Flounder Mitigation Area both serve as shellfish and fish habitat, but are currently impacted by concentrations of PCBs in sediment which degrade the quality of the existing habitat. Capping these areas will isolate the PCBs from the existing marine populations, serving to enhance the habitats. Additionally, the Winter Flounder Mitigation Area will not serve as Winter Flounder spawning habitat pre-construction, but is anticipated to serve as Winter Flounder spawning habitat post-construction, which will be a significant improvement in this wetland's functions and values.

5.2.9 Wildlife Habitat

The Winter Flounder Mitigation Area and the OU-3 Capping Area serve as locations within which shorebirds may forage for food. As a result, capping these areas will likely assist in increasing the quality of these habitats. As the fish are less exposed to PCBs, the shorebirds that eat the fish will then have their exposure to PCBs similarly reduced. The creation of intertidal area at the OU-3 Capping area will allow foraging shorebirds to rest periodically on the beach and forage within the area in shallow water or on periodically dry land. Plunge diving birds will be able to forage within this shallow habitat more easily.

The River's End Park Mitigation Area will create a new habitat for wildlife to utilize. This will be a principal function and value for the area.

5.2.10 Sediment/ Toxicant Retention

It is anticipated that the River's End Park Mitigation area will have sediment/toxicant retention as one of its principal functions and values (once it is constructed).

5.2.11 Nutrient Removal/ Retention/ Transformation and Production Export (Nutrient)

It is anticipated that the River's End Park Mitigation area will have nutrient removal/retention/transformation as one of its principal functions and values (once it is constructed).

5.2.12 Recreation (Consumptive & Non-Consumptive), Educational/ Scientific Value, Uniqueness/ Heritage, Visual Quality / Aesthetics

None of the three mitigation locations have any cultural or heritage significance. The River's End Park Mitigation Area is part of a City park that has been planned by the City of New Bedford. The park will have recreational value, as well as visual quality/aesthetics that are currently not available in the park's current state. The site is owned by the City, and the City anticipates having the public able to view the location and be able to appreciate its functions and values. The OU-3 Capping Area and the Winter Flounder Mitigation Areas are areas that may be navigable, but are not federally authorized. Although this function and value is relevant to all three sites, the functions/values of Recreation, Educational/Scientific Value, Uniqueness/Heritage, and Visual Quality/Aesthetics are not principal functions and values, except for the proposed River's End Park Mitigation Area.

5.2.13 Endangered Species

None of these locations is located within an area identified as critical habitat or priority habitat for rare or endangered species.

5.2.14 Evaluation of Principal Functions and Values

Pre-construction, the principal functions and values identified for the three sites pre-mitigation are:

- Wildlife Habitat - OU-3 Capping Area, Winter Flounder Mitigation.
- Fish and Shellfish Habitat –OU-3 Capping Area, Winter Flounder Mitigation.

Post-Construction, the principal functions and values identified for the three sites are:

- Groundwater Discharge – River's End Park;
- Floodflow Alteration (Storage & Desynchronization) – River's End Park;
- Sediment/Shoreline Stabilization – River's End Park;
- Wildlife Habitat - River's End Park, OU-3 Capping Area, Winter Flounder Mitigation.
- Fish and Shellfish Habitat – River's End Park, OU-3 Capping Area, Winter Flounder Mitigation.
- Sediment Toxicant Reduction - River's End Park;
- Nutrient Removal/Retention/Transformation and Production Export - River's End Park;
- Recreation (Consumptive & Non-Consumptive), Educational/Scientific Value, Uniqueness/Heritage, Visual Quality/Aesthetics - River's End Park.

6.0 Determination of Mitigation Credit

The USACE New England District Compensatory Mitigation Guidance document (dated 7/20/2010) page 15 Table 1 contains guidelines regarding the recommended compensatory mitigation ratios for direct permanent impacts (see below). The New Bedford Marine Commerce Terminal proposed mitigation includes restoration/creation of salt marsh, creation of intertidal areas, and enhancement to sub-tidal areas (plus shellfish seeding and the proposed Tern Monitoring Plan). The table provides the following guidance regarding mitigation requirements associated with impacts related to those anticipated associated with the New Bedford Marine Commerce Terminal:

- For impacts to emergent wetlands, where creation is involved, a mitigation ratio of between 2:1 to 3:1 (mitigation to impact) is recommended.
- For impacts to emergent wetlands, where restoration is involved, a mitigation ratio of 2:1 (mitigation to impact) is recommended.
- For open water impacts, the recommended ratio of mitigation is "project specific" for enhancement as mitigation, indicating that there is some latitude in determining the appropriate mitigation for such impacts.

TABLE 1 - RECOMMENDED COMPENSATORY MITIGATION RATIOS FOR DIRECT PERMANENT IMPACTS

Mitigation / Impacts	Restoration[1] (re-establishment)	Creation (establishment)	Enhancement (rehabilitation)	Preservation (protection/ management)
Emergent Wetlands (ac)	2:1	2:1 to 3:1	3:1 to 10:1[2]	15:1
Scrub-shrub Wetlands (ac)	2:1	2:1 to 3:1	3:1 to 10:1[2]	15:1
Forested Wetlands (ac)	2:1 to 3:1	3:1 to 4:1	5:1 to 10:1[2]	15:1
Open Water (ac)	1:1	1:1	project specific[3]	project specific
Submerged Aquatic Vegetation (ac)	5:1	project specific[4]	project specific[5]	N/A
Streams[6] (lf)	2:1[7]	N/A	3:1 to 5:1[8]	10:1 to 15:1[9]
Mudflat (ac)	2:1 to 3:1	2:1 to 3:1	project specific	project specific
***Upland*[10] (ac)**	≥10:1[11]	N/A	project specific	15:1[12]

[1] Assumes no irreversible change has occurred to the hydrology. If there has been such a change, then the corresponding creation ratio should be used.
[2] Based on types of functions enhanced and/or degree of functional enhancement.
[3] Might include planting submerged and/or floating aquatics and/or removal of invasive species.
[4] Rare cases, e.g., removal of uplands, old fill, etc.
[5] E.g., remove pollutant source such as an outfall, remove moorings.
[6] Note that this assumes both banks will be restored/enhanced/protected. If only one bank will be restored/ enhanced/protected, use half the linear foot credit.
[7] E.g., daylighting stream, elimination of concrete channel.
[8] Enhancement of denuded banks and channelized streams = 3:1.
Enhancement of denuded banks when there is a natural channel = 4:1.
Enhancement when there are vegetated banks but the stream has been channelized = 5:1.
[9] Preserving buffer within the 100-foot minimum from channel = 10:1.
Preserving additional buffer 100 to 250 feet from channel = 15:1.
[10] This is when upland is used for wetland mitigation, NOT mitigation for upland impacts, which are not regulated.
[11] Only applies if existing condition is pavement or structure AND should complement aquatic functions.
[12] 100' upland buffer recommended for restoration, creation, and enhancement sites would be credited here.

Intertidal Area Impacts

The proposed intertidal area creation is being provided at a ratio of approximately 2.16 (4.47 acres of mitigation in compensation for 2.07 acres of impact). The new intertidal area is assumed to have the same functions and values as the existing intertidal area at the project location, such that the creation of the mitigation area is anticipated to be suitable to compensate for the functions and values lost at the impact area.

This area will also cap PCB impacted sediment, an enhancement of open water area that would not otherwise be completed. The enhancement is also intended to partially compensate (in coordination capping of PCB impacted sediment associated with the remainder of the OU-3 Hot Spot capping and the Winter Flounder Mitigation Area capping) for the temporary resource area impacts (see below) that will be incurred in association with this project.

Sub-tidal Area Impacts That Are Anticipated to Permanantly Impact Winter Flounder Spawning Habitat

Permanent sub-tidal (i.e. open water) impacts are divided between impacts that are anticipated to impact Winter Flounder spawning and impacts that are not anticipated to impact winter flounder spawning (temporary impacts to Winter Flounder spawning are independent, and are minimized to the extent practicable via the Fish Deterrent Plan, silt curtain use and turbidity monitoring). The proposed creation of Winter Flounder Spawning habitat is being provided at a ratio of approximately 1.93 (22.73 acres of Winter Flounder Spawning habitat creation in compensation for 11.75 acres of Winter Flounder Spawning habitat impact).

The Winter Flounder mitigation area will also cap 22.73 acres of PCB impacted sediment (an enhancement to existing open water habitat). The capping of PCB impacted sediment is also intended to partially compensate (in coordination with the capping of PCB impacted sediment associated with the OU-3 Hot Spot mitigation area) for the temporary resource area impacts (see below) that will be incurred in association with this project.

Subtidal Area Impacts That Are Not Anticipated to Permanantly Impact Winter Flounder Spawning Habitat

Permanent subtidal (i.e. open water) impacts are divided between impacts that are anticipated to impact Winter Flounder spawning and impacts that are not anticipated to impact winter flounder spawning (temporary impacts to Winter Flounder spawning are independent, and are minimized to the extent practicable via the Fish Deterrent Plan, silt curtain use and turbidity monitoring). The proposed enhancement of open water habitat includes the capping of PCBs that would not otherwise be addressed. The proposed enhancement of open water area at the OU-3 Hot Spot capping location is being provided at a ratio of approximately 1.76 (14.91 acres of open water habitat enhancement in compensation for 8.46 acres of open water habitat impact).

The capping of PCB impacted sediment at this location is also intended to partially compensate (in coordination capping of PCB impacted sediment associated with the remainder of the OU-3

Hot Spot capping and the Winter Flounder Mitigation Area capping) for the temporary resource area impacts (see below) that will be incurred in association with this project.

Temporary Dredging Impacts (Not Anticipated to Impact Winter Flounder Spawning Habitat)

Temporary impacts (that are not anticipated to impact Winter Flounder spawning habitat) to existing resource areas are also associated with this project. These impacts will typically result in a short-term disturbance that will create temporary impacts (such as temporary benthic disturbances), but will not substantially change the benthic elevation, and whose benthic environments are anticipated to recover relatively quickly through re-colonization. The temporary impacts will involve removal of at least one foot of surficial material from a dredge area; as this material within New Bedford Harbor is universally impacted with PCBs, it is anticipated that the temporary impacts will be substantially offset by the ecological benefits of removal of PCB impacted sediment from these areas.

The temporary impacts include dredging of 8.76 acres of near-shore, subtidal area to -45 MLLW, filling the area with contaminated sediment and then capping with clean sediment, the dredging of 6.17 acres of near-shore, subtidal area from -4 to -6 MLLW to between -6 and -7 MLLW, dredging of 8.29 acres of subtidal area from between -20 and -29 MLLW to -30 MLLW, and the dredging of 13.26 acres of subtidal area from between -26 and -29 MLLW to -30 MLLW.

However, as additional compensation, portions of the mitigation associated with the capping of PCB impacted sediment associated with the OU-3 Hot Spot capping and the Winter Flounder Mitigation Area capping are intended to also mitigate for the temporary dredging impacts.

Salt Marsh and Freshwater Wetland Area Impacts

Functions and values associated with the 0.11 acres of salt marsh and 0.106 acres of freshwater wetlands that will be lost when they are filled in association with the project will be compensated by creation of approximately 0.88 acres of salt marsh to be created at the Rivers End Park Mitigation Site, located on the Acushnet River, to the north of the Wood Street Bridge in New Bedford, Massachusetts (to the north of the impact area). The ratio for this work will be between 4.07 (ratio of mitigation to impact, which is intended to compensate for any difficulty associated with potential indirect impacts to additional salt marsh which will be located adjacent to the facility.

Shellfish Mitigation

Functions and values associated with the shellfish that will be impacted in association with the filling and dredging associated with the project (anticipated to impact approximately 9,817,121 shellfish, assuming that the full project is completed) will be mitigated for with the seeding of approximately 24,542,802 million shellfish seed, which is proposed assuming a 40% survival rate due to predation (a 2.5 ratio of mitigation to impact). Although not listed in the USACE guidance manual, the 2.5 ratio of mitigation to impact is a generally accepted ratio for seeding to replace impacted shellfish, typically recommended by MassDMF. The actual number of shellfish to be seeded will depend strongly on the extent of the area that is ultimately impacted.

Should the area of impact be reduced, the number of shellfish to be seeded will be reduced in proportion to the estimated number of shellfish within the area that is subsequently not impacted (see **Appendix 3** for the estimated number of shellfish within each proposed area of impact). Interagency coordination meetings between MassDMF, NMFS, and EPA will take place to determine the design of the "oyster reef" requested by NMFS; this meeting has not yet taken place. The number of shellfish, the apportionment of species, and the design of the "oyster reef" will be in accordance with the final decisions reached during the interagency coordination meetings and the written agreement that results from those meetings. Further direction regarding methods and location of the "oyster reef" will be generated from the MassDMF Shellfish Planting Guidelines (**Appendix 15**) and the MassDMF Artificial Reef Policy (**Appendix 16**).

Tern Monitoring Program

Although it is not currently anticipated that Common Tern and Roseate Tern habitat will be substantially impacted by completion of the South Terminal CDF project, elements of the proposed project mitigation related to creation of intertidal and shallow water subtidal habitat, in conjunction with the capping of PCB impacted sediment within the OU-3 Hot Spot mitigation area, is intended to compensate for the anticipated minor impacts to tern foraging habitat that are anticipated to be extremely minor, if they exist at all. Therefore, there is no accepted mitigation ratio with which to assess the credit due for the Tern Monitoring Program, but the Massachusetts Natural Heritage and Endangered Species program has expressed confidence that this program will assist in tern monitoring in the Commonwealth, which will help to assist in caring for the species. Additionally, it is the Commonwealth's understanding that the US Fish and Wildlife Service has similarly accepted that impacts to tern foraging would be extremely minimal (if they exist at all), and therefore, the Tern Monitoring Program would represent suitable compensation.

Fish Deterrent Plan

As a part of minimizing the temporary impacts to finfish resources, during potential resource sensitive periods, a Fish Deterrent Plan (submitted under separate cover to EPA on October 17, 2012) will be implemented to discourage fish species from entering the work zone. The Fish Deterrent Plan details means and methods for; physical site controls to minimize access to the work area, monitoring of the physical controls and their efficacy, and active resource clearing techniques for safe removal of resources from the work area. There is no accepted mitigation ratio with which to assess the credit due for the Fish Deterrent Plan.

7.0 Mitigation Work Plan

7.1 Overall Sequence of Construction Activity

The implementation of construction of the proposed mitigation measures will involve multiple steps, and will be dependent upon the methodology utilized by the Contractor; in some cases, the construction methodology will be integrated with the construction of the New Bedford Marine Commerce Terminal (for the Winter Flounder Mitigation Area and for the OU-3 Capping Area), whereas in other locations (the River's End Park Mitigation Area, Shellfish Mitigation, and Tern

Monitoring Plan), the sequence of completion will not be related. The following is an estimate of the approximate sequence of construction for the development of the site:

For the OU-3 Capping Area and the Winter Flounder Mitigation Area, the following is an overview of the sequencing for the full construction project, that indicates the time and location at which these two mitigation projects would be completed:

- Mobilize to the site;
- Install perimeter and interior erosion and sedimentation controls.
- Grub and clear site vegetation;
- Construct dredge material handling and dewatering areas using earth berms sized to contain all stormwater inside without any uncontrolled runoff, if necessary.
- Install additional sedimentation basins and traps for treatment of stormwater from dredge material handling and dewatering areas, if necessary.
- Install additional temporary stormwater basins for sediment control for the remainder of the project areas, as necessary.
- Construct CAD Cell. Utilize a portion of the suitable Bottom of CAD Cell material to construct some of the Winter Flounder Mitigation Area (the remainder will be disposed offshore). See **Appendix 1** for the plans and cross-sections for the Winter Flounder Mitigation Area construction. This will be completed by utilizing bottom dump scows to position material in the area, and deposit it in the area. Bottom dump scows will allow the material to settle into an undulating final surface, which will provide refuge areas for fish utilizing the area.
- Complete navigational dredging of contaminated material (the "Top of Dredge") for the marine terminal. Dredging will be accomplished using water tight buckets, tight bottom barges, sediment curtains, floating booms and other BMPs, as necessary, to control introduction of turbidity into the harbor's waters. Construct OU-3 cap. Material so dredged will be placed into CAD Cell #3.
- Dredge "Intermediate Dredge" material, which is considered not appropriate geotechnically for use with the facility. Parts of this material will be used to cap the Borrow Pit CAD Cell and CAD Cell #1. The remainder will be utilized to construct more of the Winter Flounder Mitigation Area.
- Install sheet pile bulkhead. Bulkheads will be terminated with a tight connection at the shoreline.
- Complete navigational dredging by removing the "Bottom of Dredge" material. This material is more granular than the "Intermediate Dredge" material. This material will be used within the New Bedford Marine Commerce Terminal as fill, and will also be used for the OU-3 Hot Spot Capping and to complete the Winter Flounder Mitigation Area. See **Appendix 1** for the plans and cross-sections for the OU-3 Hot Spot Capping area construction.
- The remainder of the construction of the New Bedford Marine Commerce Terminal would take place independent of mitigation measures being conducted, once the OU-3 Hot Spot Capping Area and the Winter Flounder Mitigation Area were completed.

The following outlines the procedure anticipated to take place in construction of the River's End

Park Mitigation Area:

- Mobilize to the site;
- Install perimeter and interior erosion and sedimentation controls. In particular, ensure that existing resource areas that are not to be impacted by construction are suitably protected by erosion and sedimentation controls;
- Demarcate existing wetland areas onsite (if applicable) to ensure that the construction equipment does not impact existing resource areas;
- Grub and clear site vegetation;
- Excavate material from the work area to grade the area as shown on the plans (see **Appendix 2**). Excavated material will be disposed of offsite at a suitable disposal location.
- Install erosion control measures to stabilize the newly-graded slopes.
- Plant vegetation as shown in plans within **Appendix 2**.

7.2 Mitigation Site Locations

7.2.1 Winter Flounder Spawning Habitat

The winter flounder spawning habitat is located immediately to the north of the Butler Flats Light House. The winter flounder spawning area has been defined by the points depicted on the design plans for the construction project (attached as **Appendix 1**). The georeferenced points outline the perimeter of the mitigation area, which are set out in the table below:

Table 7.1

NORTHING	EASTING	ELEVATION
X=820578.6	Y=2682280.3	Z=-16.0
X=820613.5	Y=2682650.8	Z=-16.0
X=821187.8	Y=2682842.9	Z=-16.0
X=821187.8	Y=2682842.9	Z=-16.0
X=821639.8	Y=2681891.8	Z=-16.0
X=821639.8	Y=2681891.8	Z=-16.0
X=821416.4	Y=2681555.0	Z=-16.0
X=821416.4	Y=2681555.0	Z=-16.0
X=821416.4	Y=2681555.0	Z=-16.0
X=821176.1	Y=2681537.4	Z=-16.0
X=821176.1	Y=2681537.4	Z=-16.0
X=820864.1	Y=2681610.0	Z=-16.0

7.2.2 OU-3 Capping and Enhancement Areas

The OU-3 Capping/ Intertidal/sub-tidal restoration area is located east of Rodney French Blvd and the New Bedford Hurricane Barrier. The area has been defined by the points depicted on

the design plans for the construction project (attached as **Appendix 1**), and the points in the table below:

Table 7.2

NORTHING	EASTING
X=817508.3	Y=2685514.4
X=817651.2	Y=2685651.0
X=817679.8	Y=2685834.0
X=817533.3	Y=2685960.6
X=817371.5	Y=2686138.4
X=817288.5	Y=2686300.3
X=817216.9	Y=2686379.8
X=817247.2	Y=2686547.2
X=817192.2	Y=2686656.5
X=817125.4	Y=2686758.6
X=816710.1	Y=2686932.4
X=816676.7	Y=2686928.7
X=816587.6	Y=2686898.8

7.2.3 Rivers End Park Salt Marsh Restoration

The Salt Marsh Restoration site at Rivers End Park is located North of the Wood Street Bridge and to the east of River Rd and west of the Acushnet and New Bedford border. The restoration area is depicted on the plan prepared by Beals and Thomas and attached as **Appendix 2.**

7.3 Construction Techniques

7.3.1 OU-3 Capping and Enhancement Areas

Construction techniques will vary based upon the type of mitigation being constructed. To complete the OU-3 Hot Spot Capping Area, it is expected that the contractor will place material hydraulically. Material will be generated from construction of the "Bottom of Dredge" area, which is associated with the navigational dredging for the New Bedford Marine Commerce Terminal. The material will either be dredged hydraulically and transported to the mitigation area to be placed hydraulically, or could also be dredging mechanically, and then hydraulically offloaded and placed as shown on the drawings. Where water depths allow, material may be dumped from a shallow draft dump scow. Hydraulic placement of the material would result in a relatively uniform thickness of material to be placed. Particular care will be utilized to ensure that the final grades are met by the contractor, as small variations in elevation could result in significant variations in the size of the OU-3 Hot Spot Capping Area. Short-term settlement of hydraulically placed material will be addressed during the post-construction survey period (contract documents stipulate fill elevation and expectable tolerances associated with filling); long-term settlement (depending upon the severity), which will be observed via yearly surveys of the capped areas, may or may not be addressed, depending on the speed of the resultant re-colonization of the capped area, and the potential impact associated with such action.

7.3.2 Winter Flounder Mitigation Area

Creation of the Winter Flounder Mitigation Area will likely be achieved by a combination of placement of parent material from the construction of CAD Cell #3 and one or more phases of navigational dredging associated with the New Bedford Marine Commerce Terminal. Materials will be most likely be placed via bottom-dump scow. The bottom-dump scow placement would result in fluctuations of the final benthic surface, which will allow for a more complex benthic habitat. The variations will consist of small rises and falls within the finished surface. It is anticipated that these variations would further reduce bottom currents and to act as sheltered areas for fish to hide from predators.

7.3.3 Salt Marsh Restoration at Rivers End Park

The creation of salt marsh as mitigation at Rivers End Park will require regrading the upland area adjacent to the existing salt marsh at the site. This work will require the utilization of standard construction equipment, such as backhoes and excavators. Great care will be taken to protect the existing resources during construction activities. Erosion and sedimentation controls at the site will be placed to minimize the effect on the adjacent resources. The controls will most likely incorporate an erosion control mat (of a biodegradable material, such as coir or jute) and the re-graded slope may utilize one or more erosion control rolls (also made of coir or jute) to help to stabilize the slope temporarily while vegetation establishes itself. Coir or jute netting and erosion control materials typically biodegrade over the course of approximately 3 years. Planting of wetlands plants will foster the permanent stabilization of the area. Invasive species removal will also be completed while re-grading and re-planting occurs. Grading spoils that are impacted will be hauled to the New Bedford Marine Commerce Terminal for reuse or manifested and disposed of at a suitably licensed facility. The completed channel will be planted with high marsh and low marsh plants as shown on the attached **Appendix 2**. Plantings will likely be completed in either the late fall or the early spring in keeping with typical wetland restoration practices.

7.3.4 Timing

Implementation of the Winter Flounder Mitigation Area and the OU-3 Hot Spot Capping Area will take place during the dredging of the main channel to the New Bedford Marine Commerce Terminal or the Construction of CAD Cell#3. The construction of the River's End Park Mitigation Area will likely take place in the early spring or late winter of the season after the EPA Final Determination is issued; it is anticipated that the work can be completed in a relatively short period of time, perhaps 1-2 months. The Shellfish Mitigation will begin within one year of the issuance of the EPA Final Determination and will take place over 12 years. The Tern Monitoring Program will take place over one season, beginning in late April and stretching to late August; the work will take place the first season after the EPA Final Determination is issued.

7.3.5 Winter Flounder Spawning Habitat

Creation of the Winter Flounder spawning area will begin after parent material is either generated first from the construction of CAD Cell #3, and subsequently from "Intermediate

Dredge" and "Bottom of Dredge" materials from the New Bedford Marine Commerce Terminal navigational dredge areas. Dredge material will be loaded into dump scows or split hull barges and positioned at the site. Parent material will be placed in accordance with the plans established for the site. Parent material can be safely transported to the site and placed 24 hours a day, except in extreme marine conditions. Silt curtains will be required at all times around any filling area that is not completely enclosed. Silt curtains will be required around any capping, dredging, or other construction activity of the Contractor within the water between January 15 and June 15 of any year.

7.3.6 OU-3 Hot Spot Capping Area

Capping of the OU-3 Hot Spot Capping Area will begin after parent material is generated from the "Bottom of Dredge" portion of the construction of the New Bedford Marine Commerce Terminal navigational dredge area. Capping of the inter-tidal and subtidal areas immediately outside of the Hurricane Barrier may take up to approximately 3 to 4 months. This time period may vary due to the potential inter-relationships of other portions of construction of the New Bedford Marine Commerce Terminal. Silt curtains will be required at all times around any filling area that is not completely enclosed. Silt curtains will be required around any capping, dredging, or other construction activity of the Contractor within the water between January 15 and June 15 of any year.

7.3.7 Salt Marsh Restoration at Rivers End Park

The construction of the salt marsh at Rivers End Park is independent of the larger New Bedford Marine Commerce Terminal Construction schedule. Construction could begin immediately after the issuance of the EPA Final Determination; however plantings will be restricted to the spring or fall 2013. Therefore, the most likely time for construction is the winter or early spring of the season immediately following the issuance of the EPA Final Determination. It is currently anticipated that, if the EPA Final Determination is issued in the fall of 2012, that the salt marsh restoration will be in place prior to construction of the New Bedford Marine Commerce Terminal is completed.

7.4 Oversight

7.4.1 Winter Flounder Mitigation Area and OU-3 Hot Spot Capping Area

Creation of the Winter Flounder Mitigation Area as well as the OU-3 Hot Spot Capping Area will be closely observed by field personnel. Bathymetric and land surveys (for intertidal locations) will be conducted as necessary both before and after placement of material to confirm that the material has been placed appropriately. Clean-up areas will be designated around the mitigation areas; if material is inadvertently placed outside of the designated areas, it will be removed and replaced in the appropriate area. Vertical tolerances will also be set; should material exceed those vertical tolerances, the material exceeding the vertical tolerance will be removed and re-positioned.

7.4.2 Salt Marsh Restoration at Rivers End Park

Oversight of all construction activities will be conducted under the direction of a Professional Wetland Scientist (PWS) or Professional Engineer. At the time of planting the PWS will evaluated the planting density and suggest plant changes as availability of some species may not be available.

To reduce the immediate threat and minimize the long-term potential of degradation, the species included on the "Invasive and Other Unacceptable Plant Species" list in Table 4 of the US Army Corps of Engineers New England District Mitigation Plan Guidance will not be included as planting stock in the overall project. Only plant materials native and indigenous to the region will be used.

8.0 Maintenance Plan

8.1 Maintenance Plan Overview

Maintenance will be implemented as needed based upon the results of implementation of the monitoring plan outlined in subsequent sections as compared to the Performance Standards as outlined within the following sections. The outcome of the monitoring will indicate whether maintenance is needed at each of the mitigation areas. A "Site Protection Instrument" and "Financial Assurances" to secure the future management, and maintenance of the mitigation areas can be located in Sections 4 and 13, respectively, of this Mitigation Plan. The following sections provide guidance regarding maintenance activities that will be conducted when inspections note that the Performance Standards are not being met, as noted during implementation of the monitoring program:

8.2 Winter Flounder Mitigation Area and OU-3 Hot Spot Capping Area

The monitoring plan describes the requirements of the physical and biological monitoring activities to take place at the site(s). The results of the monitoring will be compared to the Performance Standards to note if any deficiencies exist. The inspections will primarily be driven by bathymetric or land surveys to monitor the final conditions of the mitigation measures. The studies will determine if winnowing or deposition of sediments have adversely affected the created or enhanced resource area.

Following inspections that indicate that winnowing or deposition is taking place, an assessment of the data will be undertaken to determine if conditions warrant action by the Commonwealth, or if either the existing conditions are within reasonably acceptable parameters, or if action by the Commonwealth would benefit or harm the mitigation area.

If the inspections and a final assessment determine activities are required to restore the resource or make alterations of any kind, the Commonwealth, through its financial assurances, will mobilize to the site and make the appropriate alterations to the resource by either placing

additional material or removing accumulated sediment from the sites. After action reports for any activities will be created to detail actions taken and any additional study requirements.

8.3 Rivers End Park Mitigation Area

The monitoring plan describes the requirements of the physical and biological monitoring activities to take place at the site(s). The results of the monitoring will be compared to the Performance Standards to note if any deficiencies exist. Potential deficiencies could include: plant mortality, the presence of invasive species, erosion, or changes in elevations from those in the post-construction surveys.

Following inspections that indicate that any of the above-listed deficiencies is taking place, an assessment of the data will be undertaken to determine if conditions warrant action by the Commonwealth, or if either the existing conditions are within reasonably acceptable parameters, or if action by the Commonwealth would benefit or harm the mitigation area. This assessment will be undertaken in consultation with EPA. If a Performance Standard is not being met, it is very likely that corrective actions will be required.

If the Commonwealth elects to take action to remedy the noted deficiency, a solution will be implemented. At a minimum invasive species found within the areas will be removed. The entire area will also be inspected for excessive erosion or siltation. If plants are found to be dead or stressed, they will be replaced. If the erosion control blankets (which may be used with discretion to stabilize planting areas within the marsh restoration area) are found to have been torn or show evidence of tears, such that the stability of the mitigation area could be compromised, the erosion control blankets may be replaced. If jute or coir rolls are utilized to stabilize slopes at the mitigation location, and are noted to be out of place or other slope stabilization measures become dislodged, additional tie-downs will be added to secure the slope stabilization measures. If excessive erosion or siltation is noted, and the erosion is compromising the integrity of the mitigation measure, grades within the area will be restored to match the final elevations. The coir rolls or other slope stabilization measures will be replaced or repaired if plant growth has not been well established before the coir roll has decayed.

8.4 After Action Reports

The results of the maintenance activities will be documented in annual reports that will be submitted to USEPA by December 15th of each year following the completion of the first maintenance activity.

9.0 Performance Standards

The intent of the mitigation activities being performed for the Project are to offset unavoidable permanent impacts to the resources of the area caused by the construction of the Facility. Accordingly, the Performance Standards provide measureable standards by which to judge the success of the mitigation measures employed. The Performance Standards presented in the sections below describe the criteria to be used as goals for successful mitigation: Salt Marsh and

Jurisdictional Wetland Mitigation; Winter Flounder Mitigation; Intertidal and Sub-tidal Mitigation; Shellfish Mitigation; and Shorebird Monitoring.

Salt Marsh and Jurisdictional Wetland Mitigation – Rivers End Park Salt Marsh Creation

The mitigation activities to be undertaken to offset impacts to salt marsh and jurisdictional upland wetlands include the creation of new salt marsh and wetland habitat at the Rivers End Park located on the Acushnet River near the north end of New Bedford. The following criteria will be utilized to measure the success of the prescribed mitigation:

Performance Category	Performance Component	Performance Standard (PS)	Performance Period	Monitoring Frequency	Remedial Action if PS Failure
Physical Parameters	Size of Area – (Erosion Minimization)	Mitigation Area retains 90% of its land area over time.	5 - years	Monthly April through October for 1st 3-years, thereafter May and September for each successive year.	Evaluate ecological benefit vs. impact of replacing eroded material. If beneficial, conduct remedial action by replacing eroded material and replanting.
	Elevation of Planted Area – (Subsidence and Accretion Minimization)	Mitigation Area retains design elevation within tolerance of 1 foot	5 - years	Monthly April through October for 1st 3-years, thereafter May and September for each successive year.	Evaluate ecological benefit vs. impact of filling or cutting. If beneficial, conduct remedial action by re-establishing grade within the stated tolerance.
	Channeling (Erosion Minimization)	No channeling (No erosion channels)	5 - years	Monthly April through October for 1st 3-years, thereafter May and September for each successive year.	Evaluate ecological benefit vs. impact of filling in channels. If beneficial, conduct remedial action by filling channels and re-seeding and fertilizing.
Ecological Parameters	Salt Marsh and Wetland planting survival	Maintain $\geq$ 80% Survival within the planted plots.	5 - years		Re-seed and/or fertilize as appropriate areas of thinned plantings.
	Invasive Species Control	No invasive species.	5 - years	Monthly April through October for 1st	Remove invasive species.

				3-years, thereafter May and September for each successive year.	

Winter Flounder Mitigation – Winter Flounder Mitigation Area

The activities associated with creating the Winter Flounder Mitigation Area involve the placement of sediment in a portion of outer New Bedford Harbor to decrease the water depth to within the ideal spawning depth range for Winter Flounder (less than -16.4 feet MLLW). The following criteria will be utilized to measure the success of the prescribed mitigation:

Performance Category	Performance Component	Performance Standard (PS)	Performance Period	Monitoring Frequency	Remedial Action if PS Failure
Physical Parameters	Size of Area – (Erosion Minimization)	Mitigation Area retains 90% of its area over time.	5- years	Annually (Bathymetric Surveys)	Evaluate ecological benefit vs. impact of replacing eroded material. If beneficial, conduct remedial action by replacing eroded material around edges of area.
	Elevation of Habitat Replication Area – (Subsidence, Erosion and Accretion Minimization)	Mitigation Area retains elevation range of -14.76 to -18.04 MLLW over 90% of its total area.	5 - years	Annually (Bathymetric Surveys)	Evaluate ecological benefit vs. impact of filling or cutting. If beneficial, conduct remedial action by re-establishing grade within the tolerance.
Ecological Parameters	Flounder Egg Survey (Pilot Study)	Mitigation Area is acceptable or advantageous habitat for Winter Flounder spawning.	3 - years	Weekly during early spawning season (January 15 – March 30) and then twice per month through May (Egg Survey).	Report findings to IRT for possible additional study or adaptive management.
	Research	Submit Monitoring Report to EPA and resource	Within 3 months of completion of surveys.	N/A	Complete report.

		agencies annually.			

Intertidal and Sub-tidal Mitigation – OU-3 Capping Area

The mitigation activities to be undertaken to offset Intertidal and (non-flounder) Sub-tidal impacts include the creation of new intertidal and sub-tidal habitat area adjacent to the OU-3 Pilot Capping Area in New Bedford's outer harbor. The measures to be implemented include the placement of dredge materials in the shallow water between the hurricane barrier and the existing OU-3 Pilot Cap. Because the monitoring that EPA has conducted at the previously constructed OU-3 Pilot Cap area has shown that native species are successfully repopulating the capped area, it is expected that the OU-3 cap expansion proposed under the mitigation plan for this project will repopulate with similar success. Accordingly, the performance standards for this mitigation activity are focused on ensuring that the physical requirements of the mitigation are met. The following criteria will be utilized to measure the success of the prescribed mitigation:

Performance Category	Performance Component	Performance Standard (PS)	Performance Period	Monitoring Frequency	Remedial Action if PS Failure
Physical Parameters	Size of Area – (Erosion Minimization)	Mitigation Area retains 90% of its area over time.	5- years	Annually (Bathymetric/ Topographic Surveys)	Evaluate ecological benefit vs. impact of replacing eroded material. If beneficial, conduct remedial action by replacing eroded material around edges of area.
	Elevation of Habitat Replication Area – (Subsidence, Erosion and Accretion Minimization)	Mitigation Area retains as-built elevation range within tolerance of +/-1 feet over 90% of its total area.	5 - years	Annually (Bathymetric/ Topographic Surveys)	Evaluate ecological benefit vs. impact of filling or cutting. If beneficial, conduct remedial action by re-establishing grade within the tolerance.

Shellfish Mitigation (Seeding)

The activities associated with mitigating impacts to shellfish involve the placement of quohog (no less than 80% of stock) and oyster (up to 20% of stock) seed in areas outside the New Bedford Harbor hurricane dike. A survivability ratio of seed stock from seedling to maturity is anticipated to be approximately 40%. The intent of the mitigation is to replace shellfish stock through seeding. The following criteria will be utilized to measure the success of the prescribed mitigation:

Performance Category	Performance Component	Performance Standard (PS)	Performance Period	Monitoring Frequency	Remedial Action if PS Failure
Ecological Parameters	Survival (Quohogs)	Maturity rate of > 40%	10- years (or duration of seeding program)	N/A	Review seed stock and evaluate methods for increasing survival rates (grow out to larger size, seed over larger area, etc).
	Survival (Oysters)	Maturity rate of > 40%	10 – years (or duration of seeding program)	N/A	Review seed stock and evaluate methods for increasing survival rates (grow out to larger size, seed over larger area, increase density of seed in reef, etc).
	Survival (both species)	Closure of seed areas to shell-fishing for a period of 3 years after seeding.	10 – years (or duration of seeding program)	Regular monitoring of shell-fishing in seed areas by State and City Environmental law Enforcement for poaching in closed areas.	Enforcement action (fines and ejection of poachers) during closure period.

Tern Monitoring

The activities associated with Tern Monitoring involve weekly ornithological surveys to inform resource agencies as to the presence or absence of terns in the project area. Presently, there is no information to indicate that terns are present north of the New Bedford Hurricane Barrier, within close proximity to the project site; however, terns have been observed outside of the New Bedford Hurricane Barrier. Tern monitoring will be conducted in order to validate that thesis. The following criteria will be utilized to measure the success of the prescribed mitigation:

Performance Category	Performance Component	Performance Standard (PS)	Performance Period	Monitoring Frequency	Remedial Action if PS Failure
Ecological Parameters	Tern Presence	Observe presence or absence of terns.	One year – 1 May through July 15	Weekly (observation surveys)	N/A
	Research	Submit Monitoring Report to	Within 3 months of completion	N/A	Complete report.

		resource agencies.	of surveys.		

10.0 Monitoring Requirements

Monitoring will be implemented in order to assess whether the Performance Standards listed in the previous section are being met. Inspections will be performed as outlined below and at the frequencies outlined below. The following monitoring activities will be performed in their respective areas:

10.1 River's End Park Mitigation Area

River's End Park will be monitored for the first five years of its existence by the Permittee. During the first three years, seven monthly inspections will occur from April to October. During years four and five of monitoring inspections will occur twice per year in May and September. Monitoring will include determination as to whether any major physical issues are present, which include erosion, failure of slopes, or failure of erosion protection materials. Monitoring will also include inspections for invasive species (see **Appendix 12**) and inspections of the species diversity and health of the plantings. Each year an annual report as specified in the above sections will be completed.

10.2 OU-3 Hot Spot Area

Operable Unit #3 will be monitored by completing annual bathymetric and land surveys of the area using United States Army Corps of Engineers: Engineering and Design Hydrographic Surveying Manual, EM 1110-2-1003.

10.3 Tern Survey

Other than completion of the one-season Tern Monitoring Program, monitoring associated with the Tern Monitoring Program is not anticipated in association with this project.

10.4 Shellfish Survey

Monitoring will be conducted in coordination with MassDMF's typical monitoring activities to assess the health of the shellfish population, and within its role to manage the shellfish population of the Commonwealth sustainably.

As deemed to be necessary, periodic quadrat counting for shellfish density may be completed, in order to determine more accurate levels of shellfish predation, in order to determine if the 40% survival assumption is correct, and to assess the sustainability of the resource of the long term. At a minimum, this survey will be completed once (within the first seeding area) to confirm that the shellfish mitigation is proceeding as planned. If this program is implemented, the monitoring will be conducted as follows:

- Areas to be seeded will first be cleared of existing shellfish, which will be relayed to another location.
- The location of the area to be measured will be recorded utilizing GPS, and may also be marked in the field with visible benthic markers.
- The area will be seeded at a rate similar to surrounding areas.
- Subsequent to the time within which the area is restricted from shellfishing (anticipated to be between three and six years), the area will be revisited.
- A quadrat survey will be conducted. The area will be raked clean of shellfish, and the number of shellfish will be counted and categorized.
- The number of shellfish will be compared with the number of seed placed within the area at the start of the shellfish restriction period.
- If the number of shellfish found within a particular location is above or below the anticipated level (indicating an increase or decrease in anticipated predation), the seeding level may be adjusted accordingly.

10.5 Winter Flounder Mitigation Area

The Winter Flounder Mitigation Area will be monitored both physically and biologically. It will be monitored by completing annual bathymetric surveys of the area using United States Army Corps of Engineers: Engineering and Design Hydrographic Surveying Manual, EM 1110-2-1003. Additionally, a winter flounder egg survey will be completed to determine success of the mitigation. A hybrid plan has been developed and is included within **Appendix 11**.

10.6 Monitoring Reports

Annual monitoring reports should generally follow a 8-page maximum report format per site. Submission of electronic formats (e.g., pdf) is strongly encouraged. The information required should be framed within the following format.

- Project Overview (maximum 1 page) - Highlighted summary of problems which need immediate attention (e.g., severe invasive species problem, serious erosion, major losses from herbivory, etc.).
- Summary Data (maximum of 2 pages) - Summary data must be provided to substantiate the success and/or potential challenges associated with the compensatory mitigation project. Photo documentation should be provided to support the findings and recommendations, and placed in the Appendix.
  - Address performance standards achievement and/or measures to attain the standards.
  - Describe the monitoring inspections, and provide their dates, that occurred since the last report.
  - Concisely describe adaptive actions done during the monitoring year to meet the performance or success standards – actions such as removing debris, replanting, controlling invasive plant species (with biological, herbicidal, or mechanical methods), re-grading the site, applying additional topsoil or soil amendments, etc. Also describe any other adaptive actions done at each site.

- Report the status of all erosion control measures on the compensation site(s). Are they in place and functioning? If temporary measures are no longer needed, have they been removed?
- Give visual estimates of:
  (1) percent vegetative cover for each mitigation site, and
  (2) percent cover of the invasive species in each mitigation site.
- What fish and wildlife use the site(s) and what do they use it for (nesting, feeding, shelter, etc.)?
- By species planted, describe the general health and vigor of the surviving plants, the prognosis for their future survival, and a diagnosis of the cause(s) of morbidity or mortality.

- Maps/Plans (maximum of 3 pages)
  - Maps must be provided to show the location of the compensatory mitigation site relative to other landscape features, habitat types, locations of photographic reference points, transects, sampling data points, and/or other features pertinent to the mitigation plan.
  - In addition, the submitted maps/plans must clearly delineate the mitigation site boundaries to assist in proper locations for subsequent site visits.
  - Each map or diagram must fit on a standard 8 ½ x 11" piece of paper and include a legend, bar scale, and the location of any photos submitted for review.
- Conclusions (1 page)
  - A general statement must be included describing the conditions of the compensatory mitigation project. If performance or success standards are not being met, a brief discussion of the difficulties and potential remedial actions proposed by the permittee, including a timetable, must be provided.
- Monitoring Report Appendices
  - Appendix A -- An as-built plan showing any inlet/outlet structures and the location and extent of the designed plant community types (e.g., shrub swamp). Within each community type the plan shall show the species planted—but it is not necessary to illustrate the precise location of each individual plant. There should also be a soil profile description and the actual measured organic content of the topsoil in the first monitoring report unless there is grading or soil modifications or additional plantings of different species in subsequent years.
  - Appendix B – A vegetative species list of volunteers in each plant community type. The volunteer species list should, at a minimum, include those that cover at least5% of their vegetative layer.
  - Appendix C -- Representative photos of each mitigation site taken from the same locations for each monitoring event. Photos should be dated and clearly labeled with the direction from which the photo was taken. The photo sites must also be identified on the appropriate maps.

11.0 Long Term Management Plan (LTMP)

11.1 LTMP Overview

A long term management program will be implemented in order to inspect, assess, and manage the condition and effectiveness of the proposed mitigation. The Commonwealth will be responsible for long term management for each mitigation project. The management plan will consist of monitoring (as outlined in the previous section), assessment of the results of monitoring, and management (if necessary) to ensure the long-term performance of the proposed mitigation. A "Site Protection Instrument" and "Financial Assurances" to secure the future management of the mitigation areas can be located in Sections 4 and 13, respectively, of this Mitigation Plan. The following sections provide guidance regarding management activities that will be conducted to confirm success of planned mitigation efforts:

11.2 Winter Flounder Mitigation Area and OU-3 Hot Spot Capping Area

Mechanical Monitoring (Winter Flounder Spawning Habitat and Intertidal and Sub-Tidal Areas Outside Hurricane Barrier)
In order to monitor that capping material has remained in place, a detailed bathymetric survey of the Winter Flounder Mitigation Area and OU-3 Hot Spot Capping area outside of the Hurricane Barrier will be conducted annually for the first five years after construction to confirm that material placed within these areas has not inadvertently moved to another area, and that excessive erosion is not taking place. Yearly bathymetric data will be compared to the post cap placement survey to assess migration of capping material away from the designated area.

Biological Monitoring (Winter Flounder Spawning Habitat Only)
In order to judge the effectiveness associated with Winter Flounder Spawning Habitat creation area, we have consulted with academic researchers Professor Steve Cadrin and Professor Kevin Stokesbury of the University of Massachusetts Dartmouth's School for Marine Science and Technology (SMAST). The two professors have formed a joint academic team with relevant professionals drawn from both SMAST and the Woods Hole Oceanographic Institute (WHOI), to create a team with broad-based experience that will effectively investigate the potential impact of the proposed mitigation measure. As needed, individual members of this team will be utilized to both collect and analyze relevant data over the period of this study.

The initial proposal, which currently focuses on the resources available to SMAST, involves collecting data prior to mitigation being completed, in order to establish background or "baseline" conditions prior to mitigation. The proposal includes a plan to quickly initiate baseline sampling and to develop a conceptual design for long-term monitoring, with the goal of evaluating the effectiveness of the mitigation plan for winter flounder spawning habitat.

The analytical design involves before-after/control-impact sampling and statistical comparisons. Egg sampling will be conducted by using an epibenthic sled to test for the presence of winter flounder eggs in both the mitigation site and adjacent control sites. The sled will be dragged behind a marine vessel, and is intended to capture demersal Winter Flounder eggs along the bottom of the harbor (if present). A control site was defined that is adjacent to the habitat

mitigation site north of Butler Flats, with the same area and similar bathymetry as the habitat mitigation site. An additional control site is located in shallower habitat (more likely to be Winter Flounder habitat) across the Federal Channel from the mitigation site. Baseline sampling (before the mitigation plan begins) of the mitigation and control sites is critical for evaluating effectiveness of the plan.

A hybrid bi-weekly/weekly baseline sampling protocol will be utilized (with weekly sampling being conducted early in the spawning season, and bi-weekly later in the season). Both baseline sampling and long-term sampling will involve surveys of winter flounder eggs in the mitigation and control sites.

For sampling methodology, SMAST plans to follow the protocols that Scultz et al. (2007) used to sample winter flounder eggs in New Haven and Milford Harbors. The epibenthic sled will be towed in a straight line, into the direction of the prevailing current. The sled will be towed on the bottom at a speed of approximately 2 knots, for 4-5 minutes. Towing the net in a straight line will ensure that it maintains solid contact with the bottom throughout the tow. During each tow, approximately 800'-1000' of the area will be sampled by the sled. The tow duration is limited, due to the small size of the study area. SMAST plans to conduct 4 standard tows each in the mitigation site and the control sites during each sampling event. Following each tow, the contents of the net will be rinsed into the collection jar at the end of the net, and preserved in a labeled 500mL bottle with 10% formalin for subsequent analysis.

Long-term monitoring will be similar in scope to the baseline sampling, and that statistical analysis of baseline and long-term monitoring data will test for increased presence of winter flounder eggs in the mitigation area. The long-term monitoring is currently anticipated to take place for three Winter Flounder spawning seasons, to begin at the beginning of the first Winter Flounder spawning season after construction of the Winter Flounder Mitigation Area is complete.

The relevant personnel associated with the project (some of which may be very actively involved in the project and others of which may or may not):

- Professor Kevin Stokesbury, Associate Professor, Chair of the Department of Fisheries Oceanography, University of Massachusetts Dartmouth, School for Marine Science and Technology.
- Professor Steve Cadrin – Associate Professor, Department of Fisheries Oceanography, University of Massachusetts Dartmouth, School for Marine Science and Technology and.
- Professor John Stegeman – Senior Scientist at the Woods Hole Oceanographic Institute; and
- Professor Mark Hahn – Senior Scientist at the Woods Hole Oceanographic Institute.

A copy of the SMAST Baseline Proposal is attached as **Appendix 11**. Please note that biological monitoring program is being completed for the Winter Flounder Mitigation Area only.

11.3 Rivers End Park Mitigation Area

The Rivers End Park mitigation area will be inspected on a monthly basis during the period from April through October for the first 3 years after construction. Subsequent to the first 3 years, the mitigation areas will be inspected in May and September of each year for an additional 2 years.

Inspections will be completed by a wetland scientist. The wetland scientist will monitor and document the presence and species diversity of plants that have been installed at the site, and will monitor for the presence of invasive species. The wetland scientist will hand pull invasive species as necessary and will evaluate other control methods, if necessary. A more thorough invasive species monitoring plan is attached as **Appendix 12**.

All impacts to the mitigation measure will first be evaluated prior to any remedial action is completed. The primary goal will be the success of the mitigation measure, and if remedial action is more likely to compromise the success of the mitigation measure (rather than to assist in the success of the mitigation measure) then the mitigation measure may not be completed. However, it the mitigation measure is crucial to achieve success, the remedial measure will be completed. In all cases, multiple potential solutions to the problem will be evaluated, and the solution that impacts the success of the mitigation measure the least will be selected.

The general health of the plants within the marsh area shall be determined during each inspection. Invasive species found within the areas will be removed. The entire area will also be inspected for excessive erosion or siltation. If plants are found to be dead or stressed, they will be replaced. If the erosion control blankets (which may be used with discretion to stabilize planting areas within the marsh restoration area) are found to have been torn or show evidence of tears, such that the stability of the mitigation area could be compromised, the erosion control blankets may be replaced. If jute or coir rolls are utilized to stabilize slopes at the mitigation location, and are noted to be out of place or other slope stabilization measures become dislodged, additional tie-downs will be added to secure the slope stabilization measures. If excessive erosion or siltation is noted, and the erosion is compromising the integrity of the mitigation measure, grades within the area will be restored to match the final elevations. The coir rolls or other slope stabilization measures will be replaced or repaired if plant growth has not been well established before the coir roll has decayed.

11.4 Shellfish Mitigation

The shellfish seeding aspect of this project is forecast the longest date into the future, at an end projected 10 -15 years from the start of the NBMCT project. The project proposes seeding up to approximately 24,542,803 shellfish, based on a 40% survivability assumption, and dependent upon the total number of shellfish impacted, over a ten to fifteen year period. Portions of the 1,500 acre area within New Bedford waters listed in **Figure 3** as “Conditionally Approved for Shellfishing” will be seeded annually in succession from seeding within a portion of Area 1 the first year to successive areas in each following year (seeding a portion of Area 2 in year 2 and so on). Each year, up to 2,000,000 shellfish (depending on the productivity of the MassDMF nursery), will be seeded. This 24.5 million shellfish over the ten year period accounts for

estimated predation and longevity values, to reach mitigation requirements, therefore monitoring of survival rates will not be necessary.

Periodic quadrat counting for shellfish density may be completed, in order to determine more accurate levels of shellfish predation, in order to determine if the 40% survival assumption is correct, and to assess the sustainability of the resource of the long term. At a minimum, this survey will be completed once (within the first seeding area) to confirm that the shellfish mitigation is proceeding as planned. When this program is implemented, the monitoring will be conducted as follows:

- Areas to be seeded will first be cleared of existing shellfish, which will be relayed to another location.
- The location of the area to be measured will be recorded utilizing GPS, and may also be marked in the field with visible benthic markers.
- The area will be seeded at a rate similar to surrounding areas.
- Subsequent to the time within which the area is restricted from shellfishing (anticipated to be between a maximum of three), the area will be revisited.
- A quadrat survey will be conducted. The area will be raked clean of shellfish, and the number of shellfish will be counted and categorized.
- The number of shellfish will be compared with the number of seed placed within the area at the start of the shellfish restriction period.
- If the number of shellfish found within a particular location is above or below the anticipated level (indicating an increase or decrease in anticipated predation), the seeding level may be adjusted accordingly.

11.5 Management Reports

The results of the monitoring, assessment and management activities will be documented in annual reports that will be submitted to USEPA by December 15th of each year following the completion of the first growing season subsequent to planting. Monitoring reports will be consistent with the "New England Compensatory Mitigation Guidance" document dated July 20, 2010 as well as 40 CFR Part 230, Compensatory Mitigation for Losses of Aquatic Resources: Final Rule dated April, 10, 2008, which is attached at **Appendix 4**.

12.0 Adaptive Management Plan

There are a multitude of potential events that are difficult to plan for, and whose implications are wholly unknown at this time, which may result in deleterious impacts to the proposed mitigation measures. Although the full implication of these events cannot be known at this time, the following section presents a set of procedures that may be implemented such that the implications may be inspected and assessed, such that the feasibility of action may be contemplated, and, if action is determined to be the best course of action, it will be taken. In the event of unforeseeable events that could take place in association with the proposed mitigation areas, there are a multitude of steps to take to resume control of the site and move forward with the project as a whole. This adaptive management plan will cover three main phases:

- Events covered by the plan
- Methods for Inspection and Assessment
- Corrective Action.

12.1 Events Covered By the Plan

This plan is intended to cover unforeseen events. Such unforeseen events could include catastrophic events, such as sabotage or vandalism, earthquake, fire, plant community failure of unknown origin, insect damage, hurricanes, tornados, flooding, or similar natural disasters. There is a possibility as well that the mitigation plan, as designed, fails. Actions in accordance with the next section review the methods for inspection and assessment that are authorized to determine if corrective action is necessary and/or warranted. However, full correction to original conditions may not be necessary in order to continue the success of the mitigation project. Instead, minor corrective actions may allow for continued success of the project.

12.2 Methods for Inspection and Assessment

Although by definition unlikely, unforeseen events contain the potential for continued or perhaps increased success of a mitigation project. Preparation for such events is paramount to success. Although the exact details of any particular impact or failure may be extremely difficult to predict, a measured and regimented plan may be put into place to be able to respond to any unforeseen event. The following list indicates the procedure for responding to the mitigation measure subsequent to an unforeseeable event:

- Determine (as best as possible) the safety of the surroundings. Do not enter an unsafe area. Some initial assessment items may include, fallen power lines, fallen trees, slope instability, or rising water levels that could trap an inspector;
- Inspect the site for damages. Document the results of the event. Determine the methodology for failure (i.e. excessive erosion, plant death, slope failure);
- Remove debris and/or foreign matter from the area where possible;
- Determine if temporary or permanent bench marks utilized during construction of the mitigation measure are intact and are currently correct or if new benchmarks need to be set. Set as necessary;
- Complete appropriate land or marine based elevation surveys to confirm new site elevations and conditions. Conduct a comparison of existing elevations to post-construction elevations;
- Conduct an assessment of the existing conditions. Have conditions changed dramatically? Are the current conditions suitable to meet the original goals of the mitigation measure?
- Produce a list of potential remedies. Assess the potential impact and benefit of each remedy to determine if the net benefit will outweigh the potential impact.
- Select the correct remedy that will have the greatest benefit. Keep in mind that the remedy that has the greatest benefit may be the “do nothing” option if the remedy will provide a higher impact to existing resources than a benefit to future resources.
- Consult with EPA and all appropriate regulatory agencies to determine any other safety, or construction practices that will be necessary moving forward for the selected remedy.

12.3 Corrective Action

Corrective action will be completed in accordance with any plan that is formulated in accordance with the list of methods for inspection and assessment listed in the previous section. A corrective action plan will be prepared to cover the proposed alteration to the mitigation area, if warranted. The corrective action plan will outline the unforeseen condition, the inspection actions that were completed, and the assessment that led to the selected corrective action. In addition, this corrective action plan will include existing conditions plans and proposed conditions plans to outline the corrective action that is necessary. The corrective action plan will be submitted to EPA for review and approval prior to implementation.

13.0 Financial Assurances

The broad scope and extended term (up to 15 years for shellfish mitigation and in perpetuity for saltmarsh restoration) of this mitigation plan require a significant financial and resource commitment. The Commonwealth proposes to make available financial instruments to ensure that funding is available to properly implement the mitigation efforts making them successful and permanent. The following section describes the anticipated level of effort and costs associated with the implementation, monitoring, maintenance, and restoration of the various mitigation projects discussed within this plan. The costs included in this section form the basis for the values to be included in the financial instruments proposed as assurance that the mitigation plan will be completed as approved.

13.1 River's End Park Salt Marsh Restoration

The River's End Park Salt Marsh Restoration requires both short and long term commitments from the Commonwealth and the City of New Bedford. The Project provides mitigation for the loss of protected wetland resources which are to be unavoidably impacted by the construction of the NBMCT, and enhances an existing city park. The Commonwealth is committing to recreating the resources lost at the NBMCT site, and ensuring that the proposed mitigation is successfully implemented during the performance period, while the City will be providing long term care and protection of the property and the resource values.

To ensure the completion of this mitigation project The Commonwealth is proposing to provide a Construction and Performance Security as detailed below. Furthermore, in order to provide for the long term protection of the created resources, the Commonwealth proposes to provide an endowment to provide a continuous funding source to the City ensuring that future maintenance costs for the inspection and removal of invasive species is available for the created resource. The anticipated costs for construction and maintenance during the performance period, as well as the annual costs anticipated to be expended by the City are shown below.
Securities:

Event	Annual Cost	No. Years	Total Security Amount
Construction	$250,000	1	$250,000
Performance Period Maintenance	$7,500	5	$37,500

Endowment:

Event	Annual Cost*	Expected Annual Yield %	Total Endowment
Long Term Maintenance	$3000	5%	$100,000

*The proposed endowment is anticipated to yield a 5% return on investment, 3% of which will be available for the long term maintenance of the mitigation site, and 2% will be returned to the principal to maintain its value against inflation.

13.2 Winter Flounder Mitigation Area

The Winter Flounder Mitigation Area is integral to the successful completion of the New Bedford Marine Terminal Project from both a resource protection and mitigation stand point as well as constructability stand point. The beneficial reuse of dredged material at the mitigation area means in practical use that the project can be completed at significantly lower cost when performed in conjunction with the construction of the NBMCT. Similarly, the short transit times afforded by the mitigation site for placement of the dredged material offer an expected cost savings for the NBMCT. Because of this mutual benefit, the Commonwealth is incentivized to complete this mitigation project without the need for a secondary financial instrument. Additionally, the value of the security required to cover the cost of constructing the mitigation would need to be in considerable excess to the actual cost of construction if coordinated with the NBMCT. For these reasons, the cost of constructing the Winter Flounder Mitigation Area has been omitted from the proposed financial instruments.

Monitoring of the placed material at the mitigation site, for the five years following the completion of the project, and Annual Surveys for Winter Flounder Eggs for three years following the project, are expected to entail the following estimated costs:

Monitoring Event	Annual Cost	No. Years	Total
Annual Bathymetric Surveys (1 day)	$4,340	5	$21,700
Annual Winter Flounder Egg Surveys	$43,140	3	$129,420
Total Cost			**$151,120**

The Commonwealth proposes to include the costs for these surveys in a Performance Security as discussed in the performance security section below.

13.3 Capping of OU-3 Hot Spot

The OU-3 Hot Spot provides similar benefits to the NBMCT project as the Winter Flounder Mitigation Area. The dredged material generated during dredging of the navigational areas of NBMCT require a placement area, and the material has not been permitted for upland disposal (which is prohibitively expensive) nor for offshore disposal, which would require the authority of both the EPA and the USACE. As a result the permitting of the OU-3 Capping Mitigation Area is required for the construction of the NBMCT, and any alternative would need the regulatory approval of the EPA and USACE. As discussed in the Winter Flounder Mitigation Area above, an estimate to construct the OU-3 Capping Mitigation Area without a coincident local dredging project to provide material to be beneficially reused would be unrealistically inflated. As a result of these existing construction and permitting constraints, the cost of construction of the OU-3 cap has been omitted from the proposed financial assurances.

Monitoring of the proposed cap at the mitigation site for the five years following completion is expected to entail the following costs:

Monitoring Event	Annual Cost	No. Years	Total
Annual Bathymetric Surveys (2 days)	$8,680	5	$43,400
Total Cost			**$43,400**

The Commonwealth is proposing to include these costs in a Performance Security as described in the performance security section below:

13.4 Shellfish Mitigation (Seeding)

The Shellfish Mitigation plan discussed in Section 3 details a proposed methodology for the generation and placement of seed stock within the City of New Bedford's conditionally approved shell fish beds. Discussions with the Massachusetts Division of Marine Fisheries (DMF) and the City of New Bedford have provided guidance as to the locations, availability and costs of staff and resources for the successful implementation of the proposed plan. The DMF has estimated the cost of raising and delivery of 2,000,000 seed quahogs at $75,000. The City has committed to providing the labor and equipment at its own cost to disperse the seed stock received from the DMF. With these commitments in place, the Commonwealth is proposing to provide an endowment, as detailed below, to cover the costs of seed generation, as estimated by the DMF, over the course of the expected 12 year seeding project time span.

Event	Annual Cost	No. Years	Total
Annual Quahog and Shellfish Seed Production	$75,000	12	$900,000
Total Cost			**$900,000**

13.5 Tern Monitoring Program

The planned Tern Monitoring Program to be conducted in the Spring and Summer of 2013. The monitoring is a series of events which will take place concurrent with the project and tern nesting season. The survey will cover the Tern nesting season, as discussed in Section 3 above, and will provide weekly surveys of the area around New Bedford Harbor. The cost of conducting the weekly surveys and report generation has been estimated at $60,000, which the Commonwealth proposes to include in the Performance Security as detailed below.

Monitoring Event	Annual Cost	No. Years	Total
Tern Surveys	$60,000	1	$60,000
Total Cost			**$60,000**

13.6 Construction Security

To ensure the mitigation projects are completed as proposed in this plan the Commonwealth proposes to provide a Construction Security in the amount of 100% of the estimate to construct the proposed mitigation at River's End Park in accordance with the Mitigation Plan. The Construction Security shall be in the form of an irrevocable standby letter of credit. The letter of credit shall ensure that the full amount of the Construction Security shall remain in effect throughout the performance of construction and planting to create the Habitat on the Property in accordance with the Mitigation Plan. *Provided, however*, that if all such construction and planting is completed in accordance with the Mitigation Plan prior to the date on which the letter of credit would otherwise be required to furnish the Construction Security then no Construction Security shall be required.

13.7 Performance Security

Concurrent with the Transfer of the first Credit, the Commonwealth shall furnish to the SER Committee, a Performance Security in the amount equal to the value stated in the table in this section. The Performance Security shall be in the form of an irrevocable standby letter of credit. The Commonwealth shall ensure that the full amount of the Performance Security shall remain in effect until the SER Committee determines that all of the Performance Standards have been met and all the remaining obligations of the Mitigation Plan have been concluded.
Performance Security Table:

Performance Event	Total
Tern Surveys	$60,000
River's End Park	$37,500
OU-3 Hot Spot Capping	$43,400
Winter Flounder	$151,120
Total Cost	**$292,020**

13.8 Endowment Fund

To ensure the longer term mitigation projects are maintained as proposed in this plan the Commonwealth proposes to provide two separate Endowment Funds. One fund will be created to benefit the City of New Bedford for the long term maintenance and care of the River's End Park Saltmarsh Restoration site. The Second fund will be instituted to benefit the Massachusetts Division of Marine Fisheries ensuring the continued funding of the anticipated 12 year seeding program. The form of the endowment will be as determined by the Commonwealth and the respective beneficiary, but will not provide less than the figures stated in this plan.

Until the Endowment is fully funded, the amount of the Endowment Principal shall be adjusted by the Bank Sponsor annually, on January 2 of each year following the Bank Establishment Date (each such date is referred to as an "Adjustment Date"), by a percentage equal to the percentage increase, if any, in the Consumer Price Index, Boston-Brockton-Nashua, MA-NH-ME-CT (1982-1984 = 100), for All Urban Consumers for Massachusetts (the "CPI"), published by the United States Department of Labor, Bureau of Labor Statistics. Adjustment of the Endowment Principal is the percentage increase of the CPI published most immediately preceding the Adjustment Date, as compared to the CPI published most immediately preceding the date of this SPI. The adjustment shall be applied to the amount of the initial Endowment Principal. The Commonwealth shall notify each member of the SER Committee of each Endowment Deposit made, within 30 days of such deposit.