1.0 EXECUTIVE SUMMARY

1.1 Introduction and Coordinated Review

The Draft Environmental Impact Statement (DEIS) for the proposed Cape Wind Associates, LLC Cape Wind Energy Project has been prepared by the United States Army Corps of Engineers (USACE) in response to a permit application to fulfill the requirements of the National Environmental Policy Act (NEPA) and the USACE implementing regulations under Title 33, Code of Federal Regulations (CFR), Parts 320-330.

This document has also been prepared to address, the items identified by the Massachusetts Executive Office of Environmental Affairs (EOEA) in its Certificate on the Environmental Notification Form (ENF) filed by the Applicant under the Massachusetts Environmental Policy Act (MEPA). The document also includes items identified by the Cape Cod Commission (CCC) in its letter on the Development of Regional Impact (DRI) filed under the Cape Cod Commission Regional Policy Act. Sections 6.0, 8.0 and 9.0 of the document are specific to the MEPA and CCC requirements.

Therefore, the information presented in this document is being submitted to comply with three environmental impact review processes. Federal, state, and regional review agencies have assisted in consolidating and preparing one comprehensive document that will fulfill the project review requirements for NEPA, MEPA, and the Cape Cod Commission. Both NEPA and MEPA regulations allow for and encourage the preparation of joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) documents for projects that can achieve coordinated review for similar scopes of study. Furthermore, MEPA and the CCC have a formal process for coordinated EIR/DRI review pursuant to a Memorandum of Understanding (MOU) between the two agencies.

The combined NEPA/MEPA/CCC review process has allowed the development of joint scopes of study that have been coordinated to facilitate joint agency and public review of the proposed Project. Furthermore, the combined process has made it possible for joint hearings to be undertaken allowing the public to be fully informed on the multiple jurisdictional aspects. The coordination of the multiple jurisdictional reviews has further allowed for an inclusive process and for full open disclosure.

On January 30, 2002 the USACE published a Notice of Intent (NOI) in the Federal Register for the Preparation of an EIS for the Proposed Cape Wind Project. The NOI gave notice of the public hearings, explained the proposed project and requested comments concerning issues and concerns that should be included in the EIS.

Public scoping hearings to provide the general public with an opportunity to learn more about the project, and to comment on environmental issues to be addressed in the EIS, were held in Boston (March 6, 2002) and in West Yarmouth (March 7, 2002), Massachusetts. A public meeting was held on Martha's Vineyard on April 18, 2002 by the USACE in conjunction with the Martha's Vineyard Commission in order to receive public comments. A public meeting was also held by the USACE on November 21, 2002 at the Upper Cape Cod Regional Technical School to discuss the status of the EIS.

The Environmental Notification Form was noticed in the Environmental Monitor on November 24, 2001. The public comment period was closed on April 11, 2002 (147 days long). A Certificate was issued by the Secretary of the Executive Office of Environmental Affairs on April 22, 2002.

The Corps is seeking further agency comments on this DEIS and especially agency recommendations on appropriate measures to mitigate anticipated impacts. Corps of Engineers permits typically include permit conditions for measures necessary to ensure that potential impacts are minimized. Federal resource agencies typically provide advice and comment in their area of expertise through the permit review process.

1.2 Project Applicant, Name and USACE/EOEA/DRI Number

The Applicant for the Project is Cape Wind Associates, LLC (the Applicant). The project name is the Cape Wind Energy Project (the Project). The Project is designated as U.S. Army Corps of Engineers (USACE) File No. NAE – 2004-338-1 (formerly 20012913) following the filing of an Individual Permit Application on November 22, 2001; Executive Office of Environmental Affairs (EOEA) File No. 12643 by the Massachusetts Environmental Act office

(MEPA) after filing an Expanded Environmental Notification Form (ENF) on November 15, 2001; and Cape Cod Commission File No. JR#20084 following the filing of a Development of Regional Impact (DRI) on November 15, 2001. The Project's mailing address is:

Cape Wind Associates, LLC
75 Arlington Street, Suite 704
Boston, Massachusetts 02116
(617) 904-3100

1.3 Summary of Project Purpose and Need

The purpose and need as independently determined by the USACE in accordance with NEPA requirement is: to provide a utility-scale renewable energy facility providing power to the New England grid. Renewable sources of energy are needed to provide additional power to meet demand and to reduce dependency on non-local, non-renewable energy sources. The proposed project would help to address the need for new renewable energy supplies to advance achievement of the Massachusetts Renewable Portfolio Standard (RPS); improve fuel source diversity of the power supply in Massachusetts; provide a new source of competitive market power to the New England region consistent with the goals of the Electric Industry Restructuring Act of 1997; and, help to buffer increases in retail energy costs to consumers resulting from existing and future fossil fuel price volatility.

The Applicant proposes to meet the demonstrated need for new regionally-significant renewable energy production by installing and operating a wind-powered electric generating facility comprising 130 offshore wind turbine generators (WTGs), a centrally located Electrical Service Platform (ESP) and associated transmission cables and equipment. This offshore Wind Park will be capable of producing an average annual output of approximately 170 megawatts (MW) with a maximum deliverable capacity of approximately 454 MW. The Project will utilize offshore wind energy as its renewable fuel source.

1.4 Summary of Alternatives Analysis

The alternatives analysis, as discussed in detail in Section 3.0 of this document, includes the no action alternative, an assessment of alternative energy generating technologies including renewable energy technology, a comparison of upland and offshore wind park sites, and an assessment of submarine and upland cable routes.

An assessment and comparison of alternative energy generating power plant technologies including fossil fuel fired, oil fired, coal-fired, and natural gas fired power plants were conducted for both mainland and coast line sited plants.

An assessment of alternative renewable energy technologies including photovoltaic (Pv)/solar, tidal power plant, biomass power, hydroelectric power, wave energy, and wind power was conducted. Each of the renewable technologies was evaluated for reliability, the current status of the technology, its ability to serve regional need, and its associated environmental impacts.

Criteria were developed for screening site selection of upland and offshore alternative wind park sites. Factors considered included:

- Wind power classification of 4 or greater. (Wind speeds >15.7 mph at 50 meters);
- Sufficient surplus electric transmission capacity to transport 200 – 1,500 MW to load centers throughout the ISO-NE transmission system;
- Commercially available land or permissible use of offshore watersheet area sufficient to accommodate a 200-1,500 MW wind energy project;
- Engineering and design limitations; and
- Legal or regulatory constraints.

A list of potential sites throughout New England was developed through inter-agency discussions and public suggestions. Eight upland alternative site locations, described in detail in Section 3.4.2.1, were evaluated against each of the siting criteria. Nine offshore alternative site locations, described in Section 3.4.2.2, were evaluated

against each of the siting criteria. Through the preliminary screening of these 17 locations throughout New England, four alternatives were identified for additional environmental review and comparison purposes:

- Massachusetts Military Reservation: a terrestrial alternative
- Nantucket Sound (including the Applicant's proposed Alternative sub-site at Horseshoe Shoal, as well as two other sub-sites): an offshore shallow water alternative
- South of Tuckernuck Island: an offshore deeper water alternative
- Offshore of New Bedford, Massachusetts, combined with a reduced footprint at Horseshoe Shoal: a combination alternative

The intent of this alternatives analysis is not to select a preferred alternative. The Corps of Engineers public interest review includes an analysis of the practicability of using reasonable alternative locations and methods to accomplish the objectives of the proposed project.

Environmental resources at each of the four alternative sites were described and a qualitative analysis of impacts was conducted. Three specific geographic areas within Nantucket Sound, identified as Horseshoe Shoal, Monomoy / Handkerchief Shoal and Tuckernuck Shoal were evaluated against additional Project design siting criteria described in Section 3.4.4.1. Horseshoe Shoal was shown to be technically, environmentally and economically preferable to the other two Nantucket Sound alternatives for the proposed Project. As described in detail in Section 3.5, the Applicant identified six alternative transmission line routes, including submarine and upland transmission components that appeared reasonable. These routes would provide the necessary interconnection between the ESP at the Proposed Alternative on Horseshoe Shoal and the proposed interconnection point to the existing New England electric transmission system at the Barnstable Switching Station. The Massachsuetts Energy Facilities Siting Board has tentatively approved the transmission line route.

1.5 Summary of Proposed Alternative

1.5.1 Project Overview

The proposed Wind Park will consist of 130 WTGs located at the applicant's proposed location on Horseshoe Shoal in Nantucket Sound, Massachusetts (Figure 1-1). The WTGs will be arranged to maximize the Wind Park's energy generating capacity in order to achieve a maximum potential electric output of approximately 454 MW of renewable power. The wind-generated electricity from each of the turbines will be transmitted via a 33 kV submarine transmission cable system to the Electric Service Platform (ESP) centrally located within the WTG array. The ESP will then transform and transmit this electric power to the Cape Cod mainland via two 115 kilovolt (kV) alternating current (AC) submarine cable circuits. These submarine cable systems will make landfall in the Town of Yarmouth (Lewis Bay). From this landfall, an upland transmission system will be installed in an underground conduit system within existing roadways and rights-of-way (ROW) where it will intersect with the existing NSTAR Electric ROW near Willow Street in Yarmouth. The upland transmission line will continue within the ROW to the Barnstable Switching Station. The Project's interconnection with the existing NSTAR electric transmission line will allow wind-generated energy from the WTGs to be transmitted and distributed to users connected to the New England transmission system, including users on Cape Cod and the Islands. These areas in their entirety constitute the Project area.

The Project has been designed with sufficient spacing between WTGs (a minimum of 0.34 nautical mile (629 meters) x 0.56 nautical mile (1,000 meters) grid) so that the construction and operation of the proposed Project will not preclude or prohibit traditional uses of the water-sheet area within or around the Wind Park turbine array. Use of the water sheet area within the turbine array would include the continuation of general commercial and recreational navigation, commercial and recreational aviation, commercial and recreational fishing, and other traditional water-based activities that promote the use and enjoyment of this area of Nantucket Sound.

1.5.2 Project Location

The proposed location of the Wind Park will be located on Horseshoe Shoal in Nantucket Sound. As shown in Figure 1-1, the northernmost WTGs will be approximately 4.7 miles from the nearest point of land on the mainland (Point Gammon), the southeastern portion of the Wind Park will be approximately 11 miles from

Nantucket Island (Great Point), and the westernmost WTGs will be approximately 5.5 miles from the island of Martha's Vineyard (Cape Poge).

The proposed submarine cable system route is approximately 12.2 miles in length (6.6 miles within the Massachusetts 3-mile territorial line) from the ESP to the landfall location in Yarmouth. The submarine transmission lines would travel north to northeast in Nantucket Sound into Lewis Bay past the westerly side of Egg Island, and then make landfall at New Hampshire Avenue. The submarine transmission lines would transition to the upland transmission line by using horizontal directional drilling (HDD) methodologies to a transition vault situated at the end of New Hampshire Avenue.

Upon making landfall, the proposed transmission line route would then follow New Hampshire Avenue north, merging with Berry Avenue. The route continues north on Berry Avenue, crossing Route 28 and continuing north on Higgins Crowell Road to Willow Street. Continuing north on Willow Street, the route passes under Route 6, to the proposed intersection point with the existing NSTAR Electric 115 kV transmission line ROW, approximately 500 feet north of Summer Street. The route then turns westerly within the NSTAR Electric's existing ROW to the Barnstable Switching Station, crossing under Route 6. The proposed upland transmission line would be located entirely within existing public roadways for a length of approximately 4.0 miles from landfall to the NSTAR Electric transmission line ROW located on the west side of Willow Street. The upland transmission line would then proceed underground approximately 1.9 miles along the existing NSTAR Electric ROW to the Barnstable Switching Station.

1.5.3 Project Changes Since filing ENF

Table 1-1: Project Changes Since Filing the ENF

Subject	ENF (November 2001)	DEIR-DEIS Proposed Alternative (August 2004)
Number of Wind Turbines	170 WTGs	130 WTGs
Desired Installed Capacity	460 MW	468 MW
Maximum Potential Electric Output	420 MW	454 MW
Net Energy Production	1,491,000 MW hours/year	1,489,200 MW hours/year
Wind Turbine Capacity	Approx. 2.7 MW±	Approx. 3.6 MW±
Nacelle Hub Height	263 feet (80 meters)	246 feet (75 meters)
Datum Used	Mean Sea Level (MSL)	Mean Lower Low Water (MLLW)
Monopile Base Diameter	20 feet (6 meters) at MSL	16.75 feet and 18 feet (5.1 – 5.5 meters) at MLLW depending upon water depth
Monopile Foundation Design	One design for all sites	Two designs, based on water depth
Rotor Diameter	328 feet (100 meters)	341 feet (104 meters)
Overall WTG Height (max)	426 feet (130 meters)	417 feet (127 meters)
Monopile Penetration Depth	Approximately 80 feet (24.4 meters)	Approximate range of 50-90 feet (15.2-27.4 meters depending upon specific site; Approximately 85 feet (26 meters) when using one general value
WTG Foundation Scour Protection	To Be Determined	Scour Control mats to be installed at each WTG and ESP piles
Proposed FAA lighting	Medium intensity dual red/white flashing on all perimeter w/ medium intensity red on interior	Medium intensity dual red/white flashing on corners and alternating perimeter WTGs w/ Low intensity Red Flashing on balance
USCG Fog Signals	Audible to 1 nautical mile (NM)	Audible to 0.5 NM
WTG Spacing	.34 mile x .56 mile grid	.36 nautical mile x .54 nautical mile (629 meters x 1000 meters)
Project Area	28 square miles	24 square miles
Offshore Distances:		
From Point Gammon (mainland)	4.1 miles	4.7 miles
From Cotuit	5.5 miles	6.0 miles
From Craigville Beach	6.2 miles	6.8 miles
Electric Service Platform (ESP)	100 x 150 feet (30.5 x 45.7 meters)	100 x 200 feet (30.5 x 61 meters); 39

Subject	ENF (November 2001)	DEIR-DEIS Proposed Alternative (August 2004)
		feet (11.9 meters) above MLLW in approximately 28 feet of water
ESP Piles	Six each at 36 inch diameter	Six each at 42 inch diameter
ESP Electrical Configuration	3 switchgear lineups and 3 transformers	4 switchgear lineups and 4 transformers
Inner-Array Submarine Cable sizes	34.5 kV submarine cable will be utilized in two different sizes	33 kV submarine cable will be utilized in three different sizes
Submarine Cable Length	10.2 miles (6.5 miles within 3-mile territorial seas limit)	12.2 miles (6.6 miles within 3-mile territorial seas limit)
Submarine Cable Horizontal Separation	40 to 60 feet between circuits	20 feet between circuits
Interconnection Cable Specification	2 circuits, each to consist of either a three-conductor cable with all phases under a common jacket or …	2 circuits, each consisting of two (2) three-conductor cables, resulting in a total of four (4) cables. Each cable consists of three 800mm^2 (approx. 1600 kcmil) copper conductors, XLPE insulated to 123kV and lead/PE sheathed, plus an interstitial fiber optic cable equipped 24 single mode ITU-T G.652 fibers. The entire cable assembly will be wound and protected by a single layer of galvanized steel wire armor and an outer sheathing of polypropylene strings. The four submarine cables will be installed as two circuits by bundling two cables per circuit together. The conductor cross section is 3x800mm^2 (approx. 3x1600 kcmil) and the overall diameter of the cable is 197 mm (7.75 inches)
Upland Transmission Length	4.0 miles (terminated at NSTAR ROW)	5.9 miles (continues on NSTAR ROW; 4.0 miles to ROW, 1.9 miles within ROW)
Upland Interconnection	Interconnection tie-in point located off of Willow Street to the east within the NSTAR Electric ROW requiring a riser tower.	Interconnection will occur at the Barnstable Switching Station with the transmission line continuing underground within the NSTAR Electric ROW off of Willow Street.
Landfall Location	43 Shore Road, Yarmouth	New Hampshire Avenue, Yarmouth
Landfall Transition Vault	One (1) below grade vault with interior dimensions of 14 x 24 x 8 feet)	Two (2) parallel below-grade vaults, interior dimensions of 7 x 34 x 7.5 feet, containing one circuit each.
Landfall Transition	Originally proposed as approx. 1000 foot long Horizontal Directional Drill (HDD) and subsequently changed to jet plowing to the seawall with a replacement seawall containing conduits for the cables	Approximately 200 foot HDD. Four 18 inch High Density Polyethylene (HDPE) conduit pipes (one for each of three-conductor 115kV cable and fiber optic cable set) installed to reach from the onshore transition vaults to beyond the mean low water level. The offshore end will terminate in a pre-excavated pit where the jet plow cable machine will start (a temporary cofferdam will be constructed at the end of the boreholes – approx. 65 feet wide x 45 feet long (approx. 2925 sq. ft.) and open at the seaward end. Approx. 840 cubic yards of sediment will be excavated from the cofferdam). The four conduits will have an approx. 10 foot separation within the pre-excavation area. The four bore holes will be approx. 200 ft. long

Subject	ENF (November 2001)	DEIR-DEIS Proposed Alternative (August 2004)
		(borehole diameters will be slightly larger than the conduit diameter to allow the conduit to be inserted in the borehole.
Underground Vaults Spacing	Every 2,000 feet	Every 500-1700 feet
Upland Trench Opening	6 feet wide	Minimum of 10 feet wide within roadways, and minimum of 8 feet wide in NSTAR ROW
Ductbank Burial Depth	4 feet	Minimum of 56 inches (to the top of ductbank) within roadways, and minimum of 24 inches within NSTAR ROW (with exception of road crossings along the ROW which revert to 56 inches)
Ductbank Conduits	8 PVC conduits (6 for the cables, one for the fiber optic, and one spare)	16 PVC conduits (12 for the cables, 2 fiber optics, and 2 spares)
Coating	A coal tar epoxy-polymide coating system will be applied to all surfaces 10 feet below the mud line up, including all surfaces that come in contact with seawater	The transition piece of the WTGs, which will be located on top of the monopile at the water line / splash zone, will be coated with a product equal or similar to Interzone® 954. The portions of the structural steel and steel surfaces not directly exposed to seawater, such as the tower (above the transition piece), will be coated with an epoxy-polyamide.
Cathodic Protection	Sacrificial aluminum anodes to be installed. These will be put on well after installation when signs of corrosion show up on the pile (4 to 8 years)	Sacrificial anodes (pure aluminum) will be installed initially upon WTG installation instead of waiting 4-8 years.

1.5.4 Anticipated Project Schedule

The anticipated schedule for the entire project, if the project receives the necessary local, state and Federal approvals and financing is achieved in the first quarter of 2005, is as follows: (1) during the winter of 2005-2006 the upland ductbanks, landfall transition and the temporary cofferdam will be installed; (2) during the first two quarters of 2006 the ESP, the submarine 115 kV cables, and the upland 115 kV cables will be installed; and (3) beginning the third quarter of 2006, the WTGs, the inner-array cables and the scour mats will be erected and installed.

1.6 Summary of Environmental Effects, Benefits and Mitigation

The following section summarizes the potential impacts, benefits and proposed mitigation measures anticipated to be associated with the proposed action. For a complete detailed discussion of each environmental resource beyond the summary level presented below (including specific data and references) the reader is referred to Section 5.0 of this DEIS / DEIR / DRI.

Geology (Section 5.1)

Potential impacts to Geology from the installation of the inner-array and submarine cable system, the WTG foundations, pilings for the ESP, placement of scour control mats, and vessel anchoring and anchor line sweep would cause temporary and localized marine sediment disturbance. Migration of sand waves across Horseshoe Shoal should have no impact on the integrity of Project structures, since they are set deep into the sediments (50 to 90 feet (15.2 to 27.4 meters), depending on water depth). Migration of sand waves across the shoals should not be substantially affected by the presence of the WTGs, which would be widely spaced (minimum of 2,066 feet (629 meters) between WTG edges) and have highly localized connections to the seabed.

Mitigation for potential impacts to geology and sediment:

- Hydraulic jet plow embedment-This method of simultaneously laying and burying the cables ensures the placement of the submarine cable system at the target burial depth with minimal bottom disturbance.
- Horizontal Directional Drilling (HDD) will be used to avoid impacts to the shoreline and intertidal zone. A temporary cofferdam will be used during construction to minimize sediment resuspension at the interface between the HDD conduit and submarine cable system.
- To minimize the release of bentonite drilling fluid into Lewis Bay during HDD, freshwater will be used as a drilling fluid to the extent practicable prior to the drill bit or the reamer emerging in the pre-excavated pit.
- The following preventative/contingency plans will be in place during Project construction/decommissioning and operation to prevent erosion and sedimentation, respond if a release to the environment occurs, and ensure proper operation and maintenance of equipment. These plans are likely to include:
  - *Spill Prevention Control and Countermeasure (SPCC) Plan* – The Applicant will prepare a SPCC Plan that will detail the means to prevent, control, and mitigate potential impacts to seabed sediments, wetlands, and water quality that could result from spills of fuel, lubricating oils, or other substances associated with the use of construction vehicles/vessels and other equipment and machinery.
  - *Storm Water Pollution Prevention Plan (SWPPP)* **–**a SWPPP describes erosion and sedimentation controls to be used during Project construction/decommissioning and incorporates applicable best management practices (BMPs) for erosion control and stormwater management during construction.
  - *Operation and Maintenance (O&M) Plan* –The O&M Plan will specify operating guidelines, maintenance schedules, and materials approved for maintenance activities. The maintenance program will include preventive and emergency maintenance functions including shore-based predictive maintenance analysis of the WTGs and ESP.
- A bathymetric survey of limited portions of the same representative reaches used to document pre-construction conditions within the Project Area will be conducted, following construction, to assess post-construction seabed elevation and surface conditions.
- Scour protection will be installed and designed using artificial frond scour control mats, to control scour around monopile foundations. Post-construction inspection for scour and erosion will be conducted during the first year following construction.

Physical Oceanography (Section 5.2)

*Water Depths/Bathymetry***:** Seabed elevations in the vicinity of the WTGs and cables would be modified slightly as a result of sediment displacement. Changes in seabed elevation around each WTG would be limited to localized scour around each WTG. The maximum estimated scour distance from a WTG is approximately 60 feet (18.3 meters) (2.9% of the minimum distance between WTGs), with an associated estimated scour depth of approximately 8 feet (2.4 meters). A slight depression, estimated to be between 0.5 to 2 feet (0.15 to 0.61 meters) deep, is anticipated to result from installation of the inner-array cables and the submarine cable. This slight depression is expected to fill in over time through natural sediment resuspension, deposition, and consolidation.

Construction of the temporary cofferdam at the exit hole of the HDDs to be used for cable installation under the Cape Cod Shoreline would include the dredging of sediments to an elevation of approximately -10 feet (-3 meters) MLLW. When the temporary cofferdam sheeting is removed, the sediment on the outside of the sheeting would shift into the cofferdam excavation as a result of gravity. This would result in a depression in the sediment surface that could be several feet deep. This depression would be allowed to naturally fill in over time through natural sediment resuspension, deposition, movement and consolidation.

Currents: The Project is not expected to have large-scale impacts on tidal or wind-driven currents in Nantucket Sound because of the small cross sectional area of the WTGs and the wide spacing between them. Small eddies may develop in the immediate vicinity of the WTGs but are expected to dissipate a short distance from the WTG.

Waves: Due to the proposed spacing of the WTGs (0.34 nautical mile (629 meters) from north to south, and 0.54 nautical mile (1,000 meters) from east to west, the Project would not be expected to have significant large-scale impacts to wave conditions.

Temperature: The Project is anticipated to have no measurable impacts to water temperature in Nantucket Sound because the cables will be buried a minimum of 6 feet (1.8 meters) below present bottom.

Sediment Transport Regimes: Localized effects to sediment transport patterns may occur immediately around the WTG foundation base. However, it is expected that a localized sediment transport equilibrium condition would be reached shortly after construction of the Wind Park given the cyclical nature of both the tidal regime and scour.

Water column sediment concentrations and deposition thickness resulting from jet plow cable installation: Model simulations indicate that sediment deposition ranges from zero to approximately 0.9 inches (23 mm) adjacent to the jet plow trench in sandy sediments (which are typical for the Project area). The majority of the sediment deposition is expected to remain within or immediately adjacent to the cable trench. The model simulation indicates that sediment deposition quickly tapers off to below 0.2 inches (5 mm) at approximately 100 feet (30.5 meters) on either side of the cable trench in sandy sediments. These deposited sediments are anticipated to dissipate over time through natural tidal and storm-related sediment processes. The near bottom suspended sediment concentrations associated with the jet plow are within the range of natural variability resulting from tidal currents, waves, storms, trawling, and vessel propulsion.

Proposed mitigation for potential impacts to physical oceanography:

- Monopile-type foundation system results in the least amount of seabed disturbance. Minimal disturbance of sand and sediment would take place in association with pile driving activities.
- A grouping of scour control mats anchored below the seabed to mitigate scour potential at each WTG.
- Burying the cables beneath the seafloor, water depths, sediment transport regime, tidal or freshwater circulation patterns, and/or wave current regime would not be significantly affected.

Benthic and Shellfish Resources (Section 5.3)

Although some mortality of benthos and shellfish residing in the area of temporary disturbance resulting from monopile and cable installation is anticipated, such impacts would be limited because of the relatively small area of sediment disturbance of a commonly occurring habitat type. Benthic invertebrates are able to opportunistically invade unoccupied areas after disturbance. For these reasons, the limited area of direct disturbance is unlikely to result in anything more than a localized, temporary impact to the benthic community.

The vertical structure that would be created from the installation of wind turbine towers is not anticipated to result in adverse impacts to the ecology of the immediate Project area or to Nantucket Sound. The walls of the towers represent a source of new hard substrate with a vertical orientation in an area that has a limited amount of such habitat. Although the monopile foundations would create additional attachment sites for benthic organisms that require fixed (non-sand) substrates, the additional amount of surface area being introduced would be a minor addition. The wide spacing (0.34 to 0.54 nautical mile (629 to 1,000 meters) apart) of these monopile structures would not result in the creation of a concentrated area of vertical or hard substrate that may otherwise act as a larger reef. Therefore, it is likely that these isolated structures would generate a small amount of additional patch reef type habitat, common in the Sound, and would not substantially alter the ecology of Nantucket Sound.

Due to the predominance of sands in the Project area, sediment resuspension associated with construction activities is anticipated to be relatively low and confined to the area immediately surrounding tower foundations and cable routes. In the predominantly sandy sediments, elevated suspended sediment concentrations from the jet plow are estimated to occur in a limited area in close proximity to the cable trench and exist for short durations of less than an hour at any fixed location. Sediments in the Project area were found to have relatively low contaminant concentrations, therefore, the resuspension of these sediments during foundation placement and cable embedment is not anticipated to have a long-term adverse affect on the seabed, marine water quality, or aquatic biota.

Most organisms living on or in these sandy sediments are adapted for movement or settlement in sand and recovery from burial and should not be adversely impacted by the Project. The naturally dynamic environment of the Project area is already subject to fluctuations in suspended sediment concentrations at the seabed/water interface as a result of relatively strong tidal currents and wind and storm generated waves, particularly in shoal areas. Consequently, benthic organisms in the Project area are adapted to relatively wide fluctuations in water column suspended sediment concentrations and should not be substantially impacted by short-term sediment resuspension associated with Project construction.

Direct impacts to lobsters are expected to be minimal, with potential mortality limited to less mobile individuals in the direct path of construction activities.

Proposed mitigation for potential impacts on benthic and shellfish:

- Impacts to the benthic community will be minimized through the use of jet plow technology in offshore areas and through the use of HDD methodology under the intertidal zone and shoreline.
- The Applicant will work with the Town Shellfish Constable to appropriately avoid or minimize impacts to designated shellfish areas from installation of the submarine cable.
- The Applicant will provide the Town of Yarmouth with funds to mitigate through reseeding for the direct area of impact within the Town's designated recreational shellfish bed in accordance with the Town's mitigation policies.
- Potential conflict with commercial lobstering activity and gear, if there is any in the Project Area at the time of construction, will be minimized by notifying registered lobster fishers well in advance of mobilization as to the location and timeframe of Project construction activities, as well as a daily broadcast on marine channel 16 as to the construction activities for that and upcoming days.
- The proposed cable route avoids privately licensed shellfish areas or grants in Lewis Bay.
- Potential thermal impacts will be minimized by proper cable system design and burial of cables a minimum of 6 feet beneath the seafloor.
- In order to minimize the area of benthic habitat loss, most, if not all, structural contact with the seabed during construction of the WTG will originate from vibratory or impact driven pilings.
- Scour control around each permanent vertical structure will be achieved through the use of biologically neutral scour control mats.
- The use of mid-line buoys on anchor lines will reduce the amount of anchor line sweep impacts.
- The duration and sequencing of construction has been designed to minimize the period of disturbance.

Finfish and Commerical/Recreational Fisheries (Section 5.4)

Benthic habitat is similar throughout Nantucket Sound, and thus demersal finfish in the area of Project construction/decommissioning are likely to be able to find suitable benthic habitat adjacent to the Project area or in other areas of the Sound. Pelagic species are likely to be able to occupy the water column in other parts of the Sound. Finfish are expected to rapidly return to these areas once construction in the specific area is ceased.

Project construction/decommissioning is not expected to result in measurable direct mortality to adult and juvenile pelagic finfish, since these life stages are mobile in the water column and are capable of avoiding or moving away from the disturbances associated with construction. During winter construction periods, demersal finfish may experience higher levels of injury or mortality since avoidance of anchors and anchor cables may be hampered due to sluggish response under cold water conditions. No measurable effects on populations would be expected. Displacement of juvenile and adult finfish is likely to be temporary and localized, as no stressor is likely to extend great distances or for long durations associated with any of the construction activities. Demersal eggs and larvae of finfish, however, may experience localized increases in physical abrasion, burial or mortality during Project construction due to their limited motility. The greatest areal impacts to demersal eggs and larvae would occur from anchor positioning and anchor line sweep during construction. Larvae in the latter stages of development are capable of some motility, which may allow for movement from the construction area. Pelagic eggs and larvae are not likely to be substantially affected. Predatory fish species, which may feed on larvae, may be temporarily displaced from the area as a result of disturbance during construction or decommissioning activities. No substantial impact to finfish is expected as a result of temporarily elevated suspended sediment levels, due to the predominant presence of fine to coarse-grained sand in Nantucket Sound.

Finfish are likely to avoid the immediate area around a monopile while it is being driven. Simulations of the temporary, maximum underwater sound expected to be produced by Project activities reveal levels would be below 180 dB beyond a 500 meter (1,640-foot) Initial Safety Radius for the protection of marine mammals. Therefore, at this distance, underwater sound would be well below levels that would cause permanent damage to finfish. Direct measurements made during the installation of the Cape Wind Scientific Measurement Devices Station (SMDS) on Horseshoe Shoal, as well as modeling simulations to evaluate underwater sound during all phases of the Project, suggest that acoustical impacts on local fish populations would be minimal. Fish near the construction activities may experience some localized effects if they do not move from the area. Modeling

simulations to evaluate underwater sound during all phases of the Project, including operations, suggest that impacts to finfish from normal operation of the WTGs would be minimal or non-existent.

The presence of the WTG monopile foundations and ESP piles is not predicted to dramatically impact finfish species composition from pre-Project conditions. Proposed mitigation for potential impacts on fisheries:

- Installation of the submarine cables by jet plow embedment minimizes sediment disturbance and suspension and results in only temporary impacts to finfish resources and habitat in and immediately adjacent to the cable installation areas.
- Impacts to finfish and finfish habitat within the intertidal zone and near-shore area in Lewis Bay will be minimized by using HDD methodology to transition the submarine cable system to the upland.
- To avoid or minimize impacts to the commercial fishing industry, the submarine cable system will be buried to a minimum of 6 feet below the seabed to avoid the potential for conflicts with fishing vessels and gear operation.
- No restrictions on fishing activities within the Wind Park during operation have been proposed by the Applicant. Potential conflict with commercial fishing activity and gear, will be minimized by notifying registered fishermen well in advance of mobilization as to the location and timeframe of Project construction activities, including a daily broadcast on marine channel 16 as to the construction activities for that and upcoming days.
- During installation of the monopiles, impacts from pile driving equipment will be minimized by using a "soft start" of the pile driving equipment to allow fish to move away from the area.

Protected Marine Species (Section 5.5)

The sound levels anticipated to occur during Project construction at and beyond the 500-m Safety Radius[1] are below the 180 dBL threshold level suggested by NMFS for preventing injury or harassment to marine mammals and sea turtles.

If marine mammals or sea turtles are present in the Project area, they are likely to temporarily avoid the area during construction activities. Given the rarity of sea turtle observances in Nantucket Sound and that little vessel traffic would be present in the vicinity of pile driving activities, sea turtles should be able to easily avoid vessels moving at slower speeds, such as those associated with Project construction.

Temporary avoidance behavior in marine mammals and sea turtles in the Project vicinity is expected during Project construction. These behavior changes would be short-term and would likely be similar to the avoidance behaviors observed during heavy pleasure boat use, ferry traffic, or heavy fishing activity in the area. The rarity with which the protected whale species and sea turtles occur within Nantucket Sound, and the significant distances between Project activities within the Wind Park site and seal haul-out and breeding sites further reduce the potential of Project-related acoustical impacts to these species.

Gray and harbor seals can be expected to occur in Nantucket Sound year-round and could be subject to impacts however, known breeding and haul out sites are 7 to 11 nautical miles (13 to 20.4 km) from the Proposed Wind Park site on Horseshoe Shoal. Gray and harbor seals utilizing these breeding and haul-out grounds are not likely to be adversely affected by Project construction or decommissioning, including the passage of project vessels.

Once operational, the presence of the WTG monopile foundations and ESP piles is not expected to substantially impact marine mammal and sea turtle movement and populations from pre-Project conditions. The WTGs and scour control mats within the array would be spaced approximately 0.34 by 0.54 nautical miles (629 by 1,000 meters) apart, movement and populations of marine mammals and sea turtles that may occur in the vicinity are not predicted to substantially change from pre-Project conditions. The additional amount of surface area being introduced is relatively small (approximately 0.03 acres/1,200 square feet (111.5 square meters) per tower

[1] The 1,640–foot (500-meter) safety radius is based on a condition in the USACE Permit granted to the Applicant for construction and operation of the Scientific Measurement Devices Station (SMDS) [Permit No. 199902477]. The condition requires that sound level monitoring during pile driving procedures be conducted at an initial safety zone radius of 500 meters to determine compliance with the 180-dBL NMFS threshold. A similar safety radius was established by NMFS for pile installation at the San Francisco-Oakland Bay Bridge [SRS Technologies. 2004. San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. Revised Marine Mammal Monitoring Plan.] [Illingworth & Rodkin, Inc. 2001. Pile Installation Demonstration Project Construction Report. *In:* San Francisco-Oakland Bay Bridge East Span Seismic Safety Project.]

assuming an average water depth of 30 feet (9.1 meters) below MHW) and the wide spacing of these monopiles is also not expected to greatly increase the production of finfish and benthic invertebrates in the Project area.

The following is a comprehensive summary of the proposed mitigation for potential impacts on protected marine species as a result of the Cape Wind Project:

- Vessels transporting construction materials and crew to the Project site in Nantucket Sound will travel at slow speeds, usually well below 14 knots.
- Potential vessel impacts to marine mammals or sea turtles will be further minimized by requiring that Project vessels follow NOAA whale watching procedures[2] while in transit to and from the Project area so as not to disturb any individuals that may be in the area.
- While limited localized impacts are anticipated during Project construction and operation, measures will be implemented to prevent and minimize these impacts. These measures include posting a NMFS-certified observer on-site during initial construction activities, using state-of-the-art hydraulic jet plow technology for cable installation, monopile foundations for WTGs, and post-construction monitoring to document habitat disturbance and recovery.
- Potential impacts to marine mammals and sea turtles associated with noise levels created by pile driving will be minimized by conducting a "soft-start" to each piling event.
- Underwater sound monitoring will be performed during initial monopile construction identical to that done to protect marine mammals and sea turtles during the installation of the SMDS tower foundation piles.
- If, during initial pile driving activities, listed species are observed within the Safety Zone by the NMFS-approved observer, the observer will ensure that work will cease until the animal is clear of the work area and safety zone.

Terrestrial Ecology, Wildlife, and Protected Species (Section 5.6)

The proposed upland cable route is configured to utilize previously developed or disturbed transportation and utility corridors providing limited function for wildlife. Impacts to wildlife and vegetation communities from installation and operation along the proposed onshore transmission line route would be minimal, as all of the onshore portion of the transmission line system would be located below grade within existing roadways, roadway shoulders, and maintained ROWs.

Central Nantucket Sound is not preferred habitat for bats, so the potential collision risk of the Project to resident bats would likely be extremely low. The bats that occur in southeastern Massachusetts generally prefer upland areas, have limited home ranges, and are unlikely to cross large open waterbodies like Nantucket Sound in large numbers or on a regular basis. While there may be limited collision risk for migratory bats, central Nantucket Sound is not known to be a bat flyway.

Potential impacts on terrestrial ecology, wildlife, and protected species:

- The Applicant will coordinate with the Yarmouth and Barnstable Conservation Commissions, the MADEP, and NHESP as appropriate to prevent impacts to state-listed species as part of the Project.
- A pre-construction survey will be performed to document the occurrence of state-listed rare species along the NSTAR Electric ROW route. Should a state-listed species be located within the proposed transmission line route, a Conservation Permit under MESA will be obtained and efforts will be made to eliminate, minimize, or mitigate for any potential impacts.
- Site- and species-specific habitat requirements will be incorporated into the construction methods for the proposed route in order to avoid impacts to the state-listed plant and animal species and habitat.
- Post-construction monitoring will document habitat disturbance and recovery.
- In the event that a state-listed rare species is identified within the footprint of the upland transmission cable route, post-construction monitoring of these species will be conducted according to a Conservation Plan developed to document habitat disturbance and recovery. These monitoring efforts may be repeated periodically on an on-going basis to determine that recovery has occurred.

Avian Resources (Section 5.7)

During construction, birds in the immediate vicinity of construction/decommissioning activities could be temporarily displaced out to a distance of a couple thousand feet (several hundred meters) from the activities.

[2] http://www.nero.nmfs.gov/ro/doc/nr051999.pdf

Bird species that may be utilizing the area for feeding or resting purposes may temporarily avoid the immediate area of construction or decommissioning. However, construction and decommissioning activities would be temporary, and would occur only in a small portion of the entire Project area at any one time. Some bird species are more likely to avoid the immediate area of construction/decommissioning than others. Species such as alcids, seaducks, loons, grebes, certain diving birds, and some pelagic species would be less likely to feed or rest in the immediate area during construction. However, since benthic habitat is similar throughout Nantucket Sound, birds are likely to be able to find suitable benthic habitat and associated prey items adjacent to the immediate area under construction or in other areas of the Sound. Other species – such as terns, gulls, and cormorants – may continue their activities, including feeding within a few feet of construction activities, because these species habituate rapidly to human structures/presence and have been observed and documented to forage near such structures/presence on a regular basis. The presence of vessels and construction activities should have negligible effects on foraging terns because they are regularly observed foraging in close proximity to vessels and waterfront locations where there is substantial human activity. Disturbance from construction activities to species such as migrating land birds is also expected to be minimal, since these birds would be found at high altitudes above the construction activities. During Project construction, and to a much lesser extent during decommissioning, disturbances to the seafloor from burying (or removing) the cables and installing (or removing) foundations would lead to temporary and localized increases in turbidity and to temporary changes to/displacement of bottom fauna. This could have minor indirect effects on birds by temporarily affecting their prey and food availability. It is possible that benthic disturbance from cable and monopile installation may slightly increase avian foraging if injured invertebrates become more susceptible to avian predation. The cable landfall location is not immediately adjacent to any known bird nesting sites, including those of the Piping Plover and Least Tern and construction and decommissioning activities near the landfall are not expected to disturb or displace shorebirds or wading birds or significantly alter their habitat. Increased construction vessel traffic is expected to have negligible effects on most waterbirds and shorebirds, including loons, cormorants, gulls, terns and plovers, because these birds are generally not disturbed by vessel traffic, however seaducks may exhibit avoidance behavior in the vicinity of Project vessels (as they do with other existing marine vessel activities in the area).

The WTG array would add a new structural system to the surface of Nantucket Sound. Avian mortality is a possible consequence of erecting tall structures, and mortality due to collisions with the Cape Wind project may result in an unavoidable impact on avifauna. The presence of the WTG array is not anticipated to affect bird nesting activity, since nesting activities would occur onshore and the Proposed Site is located more than 4 miles (6.4 km) from the shores of Cape Cod, more than 5.5 miles (8.9 km) from Martha's Vineyard, and more than 11 miles (17.7 km) from other islands. Similarly, shorebirds (including the Piping Plover) should not be disturbed or displaced by the presence of the WTG array because the array is located so far from shore. Some species of birds that occur in the Project vicinity, such as various species of waterbirds and waterfowl, may avoid or refrain from activity near these structures. Terns are most likely to spend time foraging close to their nesting sites on shore. During the periods following spring arrival and between breeding and fall migration, a limited amount of offshore foraging by terns may occur near the Project area. For those terns that feed or forage in the vicinity of the WTG array, there will be ample areas in which to forage because of the wide spacing of the WTGs. In addition, there will be substantial undisturbed areas nearby both within Nantucket Sound and in the Atlantic Ocean, and so terns should not be substantially affected by the Project. Similarly, species such as Common Loons, seaducks, and grebes should also have ample area available for foraging and should not experience substantial displacement from foraging or resting areas. Turbine access platforms and the ESP could offer convenient resting places for terns, gulls, cormorants, and other species. This could be beneficial to some species by offering a resting area, but may increase the risk of collision with the WTGs for birds taking off and landing within the wind park. It is likely that birds affected by Project operation would exhibit some habituation within a short time after construction. Any potential displacement of birds from areas occupied by the WTGs is expected to be accommodated in nearby areas of Nantucket Sound. Observations during field studies show that other portions of the study area provide similar habitat characteristics and resources, are presently being utilized by the same species groups, and appear to have adequate capacity to accommodate the additional presence of displaced birds. With respect to migration – especially use of areas by staging birds – habituation behavior varies by species and age classes. Although adults may have come into contact with wind turbines during a previous migration, birds of the year may not have been introduced to similar structures. In the case of flocking species, young birds may be reluctant to approach turbines even if adults in their flock fly or swim close to turbines. Therefore, some birds may choose to fly around WTGs. Such avoidance behavior is analogous to waterbirds

avoiding flight over land. Such birds (e.g., scoters) simply follow coastlines or deviate around jetties and headlands.

Collisions with turbine blades, and possibly turbine towers, cause some avian mortality. The estimated small number of birds killed by wind turbines is unlikely to cause bird population declines. For Horseshoe Shoal, there may be risks to gulls when following fishing boats and to Northern Gannets while foraging. Both of these birds were observed flying at or above the plane's altitude during aerial surveys and both hunt prey from within the rotor-swept zone (75 to 417 feet (23 to 127 meters) asl). However, the majority of waterbirds observed in the Project area during avian surveys were flying well below the height of the rotors. Collision mortalities of migrating songbirds, shorebirds, and other "landbirds" are expected to be infrequent, because most night migrants fly well above the altitude of the turbine rotors. Any limited collision mortalities are not expected to have population-level effects. While localized impacts, including some displacement and mortality, are anticipated during Project construction and operation, measures would be implemented to prevent and minimize these impacts and none would result in a significant adverse impact affecting population sizes of any bird species.

Two federally-listed bird species (the endangered Roseate Tern and the threatened Piping Plover) were evaluated to determine if the Project is likely to result in adverse impacts to these species as required by Section 7 of the Endangered Species Act. Population modeling and analysis of potential impacts shows that it is unlikely that biologically significant risks to these two avian species could result from the construction/decommissioning or operation/maintenance of this Project. Some infrequent collision mortality is possible and would represent an adverse impact, but this very small risk will not adversely affect overall population levels of either species.

Proposed mitigation for potential impacts on birds:

- The Project's proposed location on Horseshoe Shoal involves only a subset of the general population of avian species present in Nantucket Sound and studies conducted by the Applicant and Massachusetts Audubon Society found that areas near Monomoy Island and the southwestern part of Nantucket Sound have higher densities of birds present throughout the year. Of the areas studied, Horseshoe Shoal was found to be the best location within the Sound for minimizing impacts to bird species.
- The proposed towers will be tubular, rather than of lattice construction, which reduces perching opportunities for birdds.
- Wide spacing between each WTG [a minimum of 2,066 feet (629 m)] will likely reduce the potential for collision to bird species, allowing them more open space to fly between each WTG.
- To reduce perching opportunities, perimeter fence on the WTG platforms would be equipped with thin wire to deter terns and other birds from perching and/or the ability to nest. The ESP would also be constructed with similar deterrents so as to be unsuitable for use by birds. The deterrent methods would be tested by field experiments on the existing Cape Wind Scientific Measurement Devices Station (SMDS). Existing literature and recommendations by the USFWS and USDA would also be considered in developing the design.
- The proposed WTG lighting does not possess the characteristics that are known to attract birds and includes some of the features recommended by the USFWS in Guidelines for Communications Towers for reducing potential bird problems on land.
- Operational lighting of the ESP, including the helipad, and other lighting will only be switched on when the platform or the landing pad are in use. All ESP lighting, with the exception of the USCG amber navigational lights, will be used as little as possible and shielded from direct view from sky or ocean. These provisions apply to lights in emergency quarters as well as in working areas.
- The proposed turbines for the Project will be less than 500 feet in height and will not have guy wires.
- The turbine rotors will not come within approximately 75 feet (23 m) of the ocean surface. Given that most waterbirds have been observed to fly close to the water or below 20 feet asl, impacts to many waterbirds (pelagic species and seaducks) that fly close to the water will be minimized.
- The Project would utilize larger, slower-turning, variable speed rotors which would help reduce blade impacts to bird species.
- Plans and methodology for post-construction monitoring will be developed in consultation with the USFWS and other agencies to ensure that the Project is in compliance with regulations created to protect avian species. The principal purposes of this monitoring will be to assess any impacts resulting from habitat loss or mortality and to investigate methods for measuring and mitigating any such effects.
- Post-construction field surveys will be conducted to quantitatively assess bird resources and patterns of use in the Project Area. These surveys will span a 12-month period to capture variability in seasonal use.

Coastal and Freshwater Wetland Resources (Section 5.8)

Due to the predominance of sand in the Project area, turbidity associated with construction activities (pile driving, anchoring, cable embedment) is anticipated to be relatively low, and confined to the area immediately surrounding tower foundations and cable trenches. Resuspended sediments are expected to settle back to the seafloor within a short period of time (one to two tidal cycles).

Potential impacts to Land Containing Shellfish from submarine cable installation activities are anticipated to be localized and short-term, resulting primarily from direct sediment disturbance. The only shellfish beds that would be impacted are recreational. No commercial beds will be directly impacted.

The proposed submarine cable system would be installed beneath Coastal Bank and Coastal Beach by HDD, in order to avoid open excavation that would expose the Coastal Bank and Beach to wave action and potential erosion. The proposed submarine cable system would be pulled beneath Coastal Bank, Coastal Beach, and Land Subject to Tidal Action, and would not adversely affect these resource areas with respect to wave action, the movement of sediment, storm damage prevention, flood control, post-construction shellfish productivity, or marine fisheries.

Along the proposed onshore transmission line route from the landfall location to the NSTAR Electric ROW, the installation work has been designed to minimize impacts to wetland resource areas. No work is proposed within a freshwater wetland, salt marsh, or culvert. From the landfall to the NSTAR Electric ROW, work would be required within existing paved portions of state- and locally-regulated Land Subject to Coastal Storm Flowage, Riverfront Area, and 100-foot (30.5-meter) Buffer Zone of freshwater and coastal wetland resource areas. No permanent aboveground structures are proposed. The work within the NSTAR Electric ROW would result in no impacts to wetland resource areas. Work may be required within the 100-foot (30.5-meter) Buffer Zone of Wetland 6 in Yarmouth. No work is proposed in wetland jurisdictional areas in Barnstable.

Proposed mitigation for potential impacts on freshwater and coastal resources:

- The use of hydraulic jet plowing within Nantucket Sound and Lewis Bay and HDD at the landfall will minimize sediment disturbance and avoid direct impacts to shoreline and coastal wetland resource areas at the submarine cable landfall. Staging areas and the transitional cable vault will be located in the upland. The submarine cable system will be routed to avoid areas of submerged aquatic vegetation mapped as part of the MADEP Eelgrass Mapping Inventory (1995). Field investigation has been conducted to determine the extent of submerged aquatic vegetation (SAV) beds in the vicinity of the proposed submarine cable system route and to modify the proposed route accordingly to avoid direct impacts. Potential indirect impacts to SAV as a result of sediment resuspension will be minimized by maintaining an appropriate distance between the proposed jet plow embedment and the mapped SAV beds.
- The Applicant will work with the Barnstable and Yarmouth Town Shellfish Constables to appropriately avoid and minimize impacts to designated shellfish areas from installation of the submarine cable. Mitigation may include reseeding or relocation of shellfish to a suitable location approved by the shellfish constable(s) and the Department of Marine Fisheries.
- Prior to construction, an erosion and sedimentation control barrier will be installed to protect the adjacent salt marshes during the construction phase of the Project.
- An Erosion and Sedimentation Control Plan, a Dewatering Plan and a Storm Water Management Plan will be developed which will incorporate applicable BMPs for erosion control and water management during construction.
- Measures will be taken to restore vegetation and contours to pre-existing conditions. Trenches within paved roadways will be backfilled and repaved, and trenches within the maintained electric ROW will be backfilled and seeded.
- The transmission line will not contain any fluids, petroleums, oils, or lubricants. As such, there is no threat to groundwater or surface water from the installation, presence, or future maintenance of the transmission line and/or associated infrastructure.
- Prior to the start of installation of the submarine cable system, an additional pre-construction SAV survey will be conducted to verify the limits of SAV previously surveyed in July of 2003. Should SAV beds be identified in the vicinity of the proposed submarine cable system route, a post-construction monitoring plan will be developed to document potential indirect impacts from cable embedment and subsequent habitat recovery.

Habitat recovery would be considered successful if it is found that SAV has migrated back to the site of disturbance. Should the habitat not recover naturally, replanting will mitigate the disturbance.
- By mechanical pile-driving the pilings into place, seabed disturbance and turbidity associated with the foundation installation would be minimized.

Water Quality (Section 5.9)

Potential marine water quality impacts would be limited to temporary and localized sediment disturbance along the cable corridors and at monopile locations from construction vessel anchoring, anchor line sweep, and installation of the scour protection, foundation and cables. Chemical analysis results indicate that constituents of concern were present in sediment samples from Lewis Bay and Nantucket Sound and were determined to be at trace concentrations below the levels that would cause either chronic or long-term biological impacts and should pose little or no risk to water quality. The installation of WTG foundations and inner-array and submarine cables would physically displace sediment at specific locations through sediment suspension, transport, and deposition. In these sandy sediments, the majority of disturbed sediments are expected to settle and refill cable trenches and areas immediately surrounding these trenches shortly after installation. A small depression may remain over the cables after installation, depending on localized sediment depositional processes. Water quality impacts related to sediment disturbance from installation would be comparable to disturbance already occurring within Nantucket Sound from natural events and fishing gear. The volume and extent of sediment disturbance as well as the biological impacts associated with the jet plow are less than those associated with both one tidal cycle and one commercial trawling event.

The nature of potential impacts to surface waterbodies associated with Wind Park operation is limited to minor changes in magnetic fields and thermal conditions that may be associated with submarine transmission cable operation. The cable system would generate a limited amount of heat that is absorbed by, and dissipated into, the surrounding subsurface environment. This loss of heat to the sediments is essential for proper operation of cables. Any increase in sediment temperatures resulting from operations of the submarine cables are expected to be on the order of fractions of a degree, which may not be measurable and is not expected to impact water quality. Because the cable would be buried to a depth of approximately 6 feet (1.8 meters) of cover, this small level of heat dissipation should not result in impacts to surface waters or biota in the vicinity of the Project. Potential water quality impacts associated with the offshore cable system would be limited to temporary, localized sediment disturbance along proposed cable corridors during installation.

Proposed mitigation for potential impacts to water quality:
- SWPPP, SPCC, and O&M Plans will be implemented prior to and during construction/ decommissioning and operation to prevent potential impacts to water quality that could result from improper stormwater management, spills of fuel, lubricating oils, or other substances associated with the use of marine vessels and other equipment and machinery, and erosion / sedimentation. Installation of transmission cables by jet plow embedment would minimize impacts to water quality through sediment suspension, transport, and deposition.
- The transition of the interconnecting 115 kV submarine transmission lines from water to land will be accomplished through the use of HDD methodology in order to minimize disturbance within the intertidal zone and nearshore area.
- To minimize the release of the bentonite drilling fluid into Lewis Bay during HDD, freshwater will be used as a drilling fluid to the extent practicable prior to the drill bit or the reamer emerging in the pre-excavated pit.

Cultural and Recreational Resources / Visual (Section 5.10)

Results of a marine archaeological survey identified organic material interpreted as paleosols (ancient land surfaces) in limited areas within the easternmost portion of the proposed WTG array. Avoidance of ground disturbing activities was recommended in these limited areas. Avoidance would require adjustment of locations for 6 specific WTGs and seven limited portions of the inner array cable grid. If avoidance is not possible, then additional survey may be required.

No submerged historic cultural resources (e.g., shipwrecks) were identified based upon a review of geophysical and geotechnical information collected in 2001. The 115 kV transmission line route has been re-routed to avoid Bishops and Clerks Shoal, since three shipwrecks have been reported in the vicinity of these shoals. A marine archaeological geophysical reconnaissance survey along the revised 115 kV cable route was conducted during

2003. No potential submerged historic cultural resources such as shipwrecks were identified along the revised 115 kV route.

Based on the results of the terrestrial archaeological intensive survey, no significant prehistoric or historic archaeological resources have been identified for ground disturbance along the onshore transmission line route. No known or designated historic structures or districts have been identified for ground disturbance on land, which consists of paved roadway and cleared NSTAR ROW. There would be no temporary, permanent or cumulative physical impacts to onshore historic structures and districts due to construction/decommissioning, operation and maintenance of the Project.

The Project will be visible from a number of designated National Register listed or eligible historic districts and individual structures, and is therefore subject to an assessment of effects on these historic properties. The historic properties are located near or at the shorefront along the south side of Cape Cod, the northeast side of Martha's Vineyard, and the north side of Nantucket. A Visual Impact Assessment (VIA) was conducted by an architectural historian, to provide a professional assessment of the Project's effects on historic properties. In brief, the analysis of visual effects undertaken in the VIA resulted in recommended adverse effect findings for two NHL properties (the Kennedy Compound and the Nantucket Historic District), four historic districts and 10 individual historic properties. No Effect was recommended for one historic district (the Martha's Vineyard Campground Historic District), and three individual properties, all in Oak Bluffs (the Flying Horses Carousel, the Arcade and the Oak Bluffs Christian Union Chapel). These properties are generally screened from water views by intervening structures, vegetation and/or topography. The VIA found that the visual alteration to the historic Nantucket Sound settings of these properties, caused by the addition of the WTGs and related structures, will constitute an alteration of the historic character, setting and viewshed of the properties and will have an adverse visual effect on them.

Recreational boaters in the waters of Nantucket Sound would experience open views of the above water components of the Wind Park during clear days and nights. No topographic or vegetative screening is feasible or available. The size and perspective of the turbine array would be a function of the viewer's location and orientation at sea level. The Project would add a built element to existing daytime views of the seascape, and would cause a change in daytime views of the Horseshoe Shoals area as presently experienced by recreational boaters. The flashing lights would create a visual change to the existing relatively unbroken nighttime view under clear sky conditions.

Proposed mitigation for potential impacts to visual, cultural and archaeological resources:

- The 115 kV marine transmission route has been shifted to the west to avoid several reported shipwrecks on Bishop and Clerk's Shoals.
- The upland transmission route will be located entirely below ground within paved roads and existing utility ROWs to avoid visual impacts and impacts to potential unidentified archaeological resources.
- Additional siting modifications may be made as necessary to avoid cultural resources based on the results of marine and terrestrial archaeological studies.
- Adverse impacts to cultural resources determined to be significant (i.e., listed or eligible for listing on the National Register of Historic Places) will be avoided, minimized. For those significant cultural resources for which adverse Project effects cannot be avoided, a Memorandum of Agreement detailing methods to mitigate potential impacts may be required.
- The visible structures of the Wind Park will be painted a marine gray color, to minimize contrast with the surrounding sea and sky.
- Daytime and night time lighting has been designed to use the lowest intensity lighting considered safe for navigation by the FAA and USCG.
- The USCG flashing amber lights mounted at 35 feet above sea level on each turbine should not be visible at distances beyond 2 miles.

Noise (Section 5.11)

Based on modeling, no noise impacts on recreational boaters approaching the Project area are anticipated due to operation of the Project at either the cut-in or design wind speed conditions. The Wind Park would be equipped with foghorns for boating safety. Several different devices would be deployed around the perimeter of the Wind Park, each with a different characteristic sound. The horns would operate only when fog is present, day or night,

and would have a ½-mile audible range. Thus, boaters traveling near the Wind Park in dense fog would certainly hear these warning devices, just as they now hear various gongs and bells in Nantucket Sound from fixed buoy locations. Persons on land (5+ miles away) would not hear the foghorns.

No noise impacts are anticipated at any onshore locations due to Project operation for either the cut-in or design wind speed conditions. The foghorns deployed around the Wind Park for boating safety would not be audible at Lewis Bay or onshore. For the design wind condition, calculated continuous underwater sound levels from Project operations show that there would be no measurable underwater sound from the Project beyond the boundaries of the Wind Park.

The sound effects of construction would be temporary and are associated with the installation of the monopiles (one for each WTG), installation of six smaller diameter piles for the ESP, and vessel traffic for transporting equipment, piles, and workers to the site. The jet plow embedment process for laying submarine power cables with a cable barge produces no sound beyond typical vessel traffic in Nantucket Sound. The principal sound from construction would therefore be temporary pile driving of the WTG monopiles. Modeling at 11 near-shore and onshore locations for calm to moderate (0 to 10 mph) wind conditions reveals that pile driving sound would be below existing sound levels at 9 of the 11 near-shore and onshore locations and is therefore expected to be largely inaudible along most of the coast. At Point Gammon in Yarmouth, construction could be audible when pile driving is done for the monopiles in the northeast corner of the Wind Park closest to shore (sounds up to 43 dBA when winds are onshore) when existing sound levels are very low (possibly as low as 35 dBA). At Cape Poge on the northeast tip of Martha's Vineyard, construction could be audible when pile driving is done for the monopiles in the southwest corner of the Wind Park closest to the Vineyard (sounds up to 40 dBA when winds are onshore) when existing sound levels are very low (possibly as low as 40 dBA). Even in these instances, however, the temporary short-term sound levels would be low and would not interfere with any activities.

Onshore construction activities would be temporary, lasting 4 to 6 weeks, and would be audible to persons near the cable corridor; sound levels would be similar to roadway construction equipment. The underwater sound effects of construction would be temporary and are associated with the installation of the monopiles (one for each WTG), installation of six smaller diameter piles for the ESP, vessel traffic for transporting equipment, piles, and workers to the site and vessel traffic associated with installation of submarine cables. The jet plow itself produces no audible noises other than the sound of water exiting the nozzles, which is only audible when immediately adjacent to the nozzles. The principal sound from construction would therefore be temporary pile driving of the WTG monopiles using a drop hammer similar to an IHC S-600.

Proposed mitigation program for potential impacts from noise:

- Noise mitigation for upland construction activity will consist of scheduling activities during normal working hours and ensuring that all equipment has properly functioning noise mufflers.
- A noise barrier will be placed around the upland HDD pit.
- Above water sound level measurements will be made at Point Gammon over a 7-day period during the time that the initial monopiles are being driven to document what, if any, sound levels were measurable and audible. The monitoring location will be identical to that used for baseline monitoring at Point Gammon.
- During initial monopile installation at the Wind Park, underwater sound monitoring will be performed identical to that done to protect marine mammals during the installation of the SMDS foundation piles for the Project. For the pile driving of the first monopile, underwater sound pressure level measurements will be made at an Initial Safety Zone radius of 500 meters to determine compliance with the 180 dB NMFS threshold for protecting marine mammals.
- Underwater noise mitigation will consist of having a NMFS approved observer present during initial pile driving activities to ensure no listed marine species are within the 500 meter Initial Safety Radius during construction, similar to the procedure used during the installation of the SMDS foundation piles.
- The use of state-of-the-art, very low noise WTGs will minimize operational sound effects.
- Noise measurements comparable to those conducted to assess pre-construction conditions will be conducted at representative locations to monitor Project noise during operation. This monitoring will be conducted in a manner sufficient to confirm that any noise limits imposed in permit conditions are met during operation.

Transportation and Navigation (Section 5.12)

There would be minimal temporary impacts to marine navigation in the immediate vicinity of ongoing construction operations. Any restrictions that are necessary to protect the safety of mariners would be implemented in coordination with the USCG. Anchors would have pennant buoys and mid-line anchor buoys to assist in identifying the extent of the anchor spread. During construction, it is likely that temporary vessel access restrictions in the immediate vicinity of construction operations may be required to protect public safety. These restrictions, however, would be limited to small sections of the Wind Park as the WTG installations and cable embedment processes are completed.

Once operational, the WTGs would be arranged in a grid pattern (minimum 0.34 nautical mile (NM) (629 meters) by 0.54 NM (1,000 meters) spacing), rather than randomly scattered throughout the Wind Park area. This would provide mariners with the ability to navigate through the area by maintaining an essentially straight course that passes easily between the WTGs. The large spacing would allow those vessels not restricted by depth to navigate between the WTGs with large spaces between the vessel and the WTGs. Once installed, the submarine cable system and inner-array cables would have no impact to navigation since the cables would be buried at a minimum of 6 feet (1.8 meters) below the seabed.

The large spacing between WTGs, combined with the natural tidal circulation in Nantucket Sound, will prevent rafting of ice between WTGs. Localized rafting of sea ice around individual WTGs may occur, although infrequently, if weather conditions permit. Although rotor blades will have a slick surface for aerodynamic efficiency, which will allow most ice to slide off prior to any significant buildup, ice may collect on the WTG structure and blades under certain meteorological conditions (i.e., a combination of high relative humidity, freezing temperatures, and overcast or nighttime sky). This ice usually takes the form of a thin sheet as it attaches to wind turbines (similar to how ice attaches to an airplane's wings during flight). The risk of ice fragments being thrown from a turning rotor and causing injury is relatively small.

The WTGs would be aids-to-navigation (ATON) and marked on NOAA navigation charts, and would serve as points of reference for mariners navigating in and around Nantucket Sound. Each WTG would be clearly marked with an alphanumeric designation that would also assist mariners in determining their position within the Wind Park.

The risk of a vessel colliding with a WTG is low, given the Wind Park's location away from typical vessel routes, the small diameter of the towers (approximately 16.75 feet and 18 feet (5.1-5.5 meters) and the large spacing between the WTGs. The location of the Wind Park relative to established vessel routes, physical water depth restrictions on Horseshoe Shoal and the large WTG grid spacing combine to limit the potential for a vessel to collide with a WTG. USCG aircraft would be able to operate in and around the Wind Park during periods of good visibility, including nighttime operations. Search and Rescue (SAR) aircraft would not likely conduct operations in the area during times of very low cloud ceilings or dense fog, and a vessel-based response would be more appropriate during those times. The wide turbine spacing would allow those USCG vessels that are not restricted by the existing water depths to continue to operate within the Wind Park

It is expected that the construction and operation of the Wind Park and the installation of the inner-array and submarine cable systems would not substantially adversely impact general commercial/recreational vessel navigation or ferry operations in this area of Nantucket Sound. The spacing between the WTGs, in combination with NOAA chart revisions and establishment of private ATON, would provide adequate watersheet area for unrestricted and safe navigational access in and around the Wind Park by vessels that are currently able to safely navigate on the shoal. However, a vessel's ability to safely navigate in and around the WTGs must be determined by the vessel's captain. Installation of the WTGs would result in structures being present where no structure has previously existed. As such, the presence of the Wind Park would require that all mariners (including recreational boaters) be more attentive to the types of navigational equipment needed onboard to safely operate in and around the Wind Park, their vessel's position, and the proximity of other vessels and WTGs to their own vessel as they navigate in and around the Wind Park. This would be especially important during foggy conditions or other times of reduced visibility, high winds or waves.

Aeronautical Studies conducted by the Federal Aviation Administration (FAA) found that the WTGs at the Proposed Site would:

- Not have an adverse effect on physical, electromagnetic, or line of sight interference or existing or proposed air navigation, communications, radar, control system facilities;
- Not have an adverse effect on air traffic operations enroute through the Nantucket Sound airspace under VFR conditions;
- Not have an adverse effect on any air traffic operations either inbound to or outbound from any Nantucket Sound vicinity airport under VFR conditions;
- Not have an adverse effect on air traffic operations inbound, outbound, or enroute through the Nantucket Sound airspace under IFR conditions;
- Not have an adverse effect on any existing or planned runway length;
- Not have an adverse effect or derogation to any airport efficiency;
- Not have an adverse effect on any planned IFR and VFR airport operations indicated by plans on file; and
- Not be located within any airport traffic pattern and would not have an effect on traffic.

The FAA issued a Determination of No Hazard to Air Navigation on April 9, 2003

Transportation impacts associated with the installation of onshore transmission line facilities would be temporary in nature. Installation of the underground ductbanks for the onshore transmission line would require limiting the roadway width to approximately 18 to 22 feet (5.5 to 6.7 meters) and would progress along the route at a rate of approximately 150 feet (46 meters) per day. Some combination of road detours or lane closures would be required for cable installation within roadways.

Proposed mitigation for potential impacts to transportation as a result of the Cape Wind Project:

- The location of the Project will be published in the Notice to Mariners and noted on all applicable NOAA marine charts.
- The submarine cable system will be buried 6 feet below the present bottom in firm sand.
- A Construction Traffic Management Plan will be prepared in consultation with local and state officials to ensure that safe access is maintained for vehicular traffic during upland cable system installation.
- Installation of the upland cable system will occur outside of the height of the summer tourist season to minimize any vehicular disruption.
- Trenchless technologies will be used at major intersections and railroad crossings in order avoid major traffic disruptions.
- The installation of the submarine cable system will be accomplished using low-impact jet plow embedment process.
- WTGs have been spaced such that adequate watersheet area will exist between turbines (minimum of 0.34 NM x 0.54 NM) allowing for unrestricted and safe navigational access around and within the Wind Park.
- WTGs will be equipped with private Aids to Navigation (ATON) as required by the USCG.
- The steel composition of the turbine structures will make them clearly visible to radar during poor visibility conditions.
- Each WTG will be clearly marked with an alphanumeric designation on the tower, and the USCG, other local, states, and federal agencies, and commercial salvors will be provided with a plan showing designations for each WTG. This designation could be used by mariners in distress as a primary or additional positional reference to provide to the USCG when requesting assistance.
- A USCG-approved lighting scheme is proposed to ensure safe passage in proximity to the turbine array.
- Sound signals which are audible to 0.5 NM will be installed on the four WTGs located at the corners of the WTG array to assist mariners navigating in fog conditions. These will be controlled by fog sensors and only operational during periods of poor visibility.
- The anchoring of recreational vessels on Horseshoe Shoal or within the Wind Park will not be restricted by the presence of the buried submarine cable system within the WTG array.
- Each WTG will be lighted with FAA approved flashing lights.
- In order to assist USCG in SAR, direct communication will be established between Air Station Cape Cod SAR personnel and the CWA Operations Center (manned 24 hours) in order to facilitate rapid remote WTG shut down in the event of bad weather SAR by air, at the request of USCG.

Electrical and Magnetic Fields (Section 5.13)

The proposed submarine cable system for the transmission line would contain grounded metallic shielding that effectively blocks any electric field generated by the operating cable system.

Aside from the exposure to maintenance and other workers, the only possible magnetic exposure scenarios for humans involve boaters in the proximity of the ESP or divers on the sea floor in the vicinity of the buried cables or in the vicinity of cables that rise from the sea floor to the ESP. Due to the low field strengths and the extremely short duration a vessel would be over the cable path, exposure to this group is minimal to non-existent. Potential exposures for marine organisms would be the same as for divers. The maximum levels of exposure occur over an extremely small space, and decrease rapidly within a few feet of such locations. Marine benthos such as bi-valves and worms may spend more time in the vicinity of the buried cables and therefore experience more exposure. Only a very small fraction of the available habitat would have potential exposure to the higher fields in the vicinity of the ESP

The magnetic field levels experienced by residential or other properties along the upland section of the route will be the same as experienced with the existing overhead distribution lines along the roadway. Likewise, the resultant magnetic fields on the side of the road closest to the Marguerite E. Small School are unchanged from those experienced under current peak loading on the existing overhead distribution lines. For the portion of the upland cable route located within the NSTAR ROW the predicted impact of adding the underground transmission lines is a negligible change from existing conditions within the ROW and no change in field strength at the ROW edges.

Proposed mitigation for potential impacts of EMF:

- The Project has been designed with all of the proposed transmission cables containing grounded metallic shields, therefore they will produce no external electric fields. Economically and environmentally viable and prudent steps to reduce magnetic fields have been utilized and because the Project does not exceed established guidelines or standards for EMF, no additional mitigation is required.

Telecommunications Systems (Section 5.14)

The proposed submarine cable system associated with the Project would be buried beneath the seafloor and, therefore, no interference with the telecommunications towers, marine VHF radio, or radar is anticipated from that Project element. An evaluation of the FCC-permitted antennae in the study area (existing and proposed) compared with the proposed WTG locations indicated no impact to line-of-sight telecommunications. The FAA analyzed the potential for the WTGs to affect aviation radar. Based on its aeronautical studies, the FAA issued a "Determination of No Hazard to Air Navigation. Analysis of marine communication (VHF radio and radar) at the Horns Rev Wind Farm off the coast of Denmark has shown that vessels of various sizes working amongst the grid of 80 turbines experienced no difficulty communicating with each other or the nearby port of Esbjerg. There were no observations or reports of problems with vessel-mounted VHF communication or shadows on radar from rotating turbine blades. GPS positioning systems are not expected to be affected by the presence of the Wind Park.

Proposed mitigation for potential impacts to telecommunications:

- The proposed submarine cable system and upland transmission line associated with the Project will be buried either beneath the seafloor or on land, and the only potential aboveground section of the 115 kV transmission line is located at the interconnection with the existing Barnstable Switching Station. Most telecommunication devices operate on a line-of-sight basis, meaning that the source of the transmission and the receiving antennae communicate in a linear path. Therefore, no interference with the telecommunications towers, marine VHF radio or radar is anticipated from Project transmission lines.

Air and Climate (Section 5.15)

The proposed Wind Park would not emit air pollutants and therefore would have no air quality related regulatory requirements or impacts. Rather, the Project would present significant air emissions reductions and opportunities for improved air quality in the region. Significant reductions in the quantity of pollutants emitted from existing fossil fuel-fired power plants could be achieved with the operation of the proposed Wind Park. In addition to reductions in criteria pollutant emissions, operation of a non-emitting Wind Park could serve to reduce emissions of toxic compounds such as mercury from existing fossil-fuel power plants, by displacing energy produced from fossil fuel power plants, by several hundred pounds per year, based on a presumed peak capacity of 454 MW emission level using factors provided by the USEPA. The operation of the Wind Park will not alter the local climate. The turning of the WTG rotors, which react to the wind rather than create or modify it, will not affect

the wind speed and/or wind direction in the waters of Nantucket Sound. Conditions such as the formation or dissipation of fog will not be affected by the WTGs operation because fog is formed during specific psychrometric (atmospheric temperature and moisture) conditions. It cannot be created or dissipated by the turning of the rotors.

The activities associated with construction and decommissioning of the offshore and upland cables will result in some level of air emissions due to the use of fossil fuel fired mobile sources (e.g., trucks, ships, cranes and other powered construction equipment). In addition, the construction of the upland cable will generate fugitive particulate emissions resulting from land alteration activities (e.g., clearing, excavation, backfilling and grading, etc.). Other construction activities, such as welding, cleaning and degreasing, painting, etc. may also result in minor air emissions but will not require any air permits. Emissions will be localized, short term, temporary in nature, and unlikely to result in air quality impacts.

The clean energy provided by the proposed Wind Park will facilitate Massachusetts' efforts to achieve attainment for ozone. The power produced by the proposed Wind Park will serve to reduce demand on fossil-fuel fired facilities and thereby reduce air emissions from these facilities.

In addition, air emissions from Massachusetts affect downwind regions, and measures taken to improve air quality and reduce emissions in Massachusetts will also improve air quality in regions downwind. Therefore, the proposed Wind Park will increase the likelihood of downwind states achieving attainment and reducing impaired visibility conditions experienced in areas such as Acadia National Park in Maine. The proposed Wind Park would reduce the need to construct additional fossil fuel-fired electric generation facilities as energy demand increases, facilitating the regions air quality goals while providing for economic growth.

The Project provides an opportunity, and an example of how to achieve a significant annual and long-term reduction of greenhouse gases emitted by existing or new fossil fuel plants to help stem global warming processes and inhibit their associated environmental effects;

Proposed mitigation for potential impacts to air and climate:

- The only negative air quality impacts from the project will be the emissions from powered equipment used for construction and maintenance. Mitigation for these minor, temporary impacts will be accomplished through maintenance of construction equipment.

Socioeconomics (Section 5.16)

The Project at this time is not seeking public funding or grant awards. The Project could be eligible for the Production Tax Credit (PTC), however, the actual applicability and impact of the PTC in the case of Cape Wind is somewhat speculative, since the Project would not be eligible for the PTC unless Congress extends the currently-stated expiration date for credit eligibility. If the PTC is extended, the tax credit that would be potentially available would depend upon the actual output of the Project. If the average output at the interconnection with the New England Power Pool (NEPOOL) facilities is assumed to be approximately 1,489,200 megawatt hours (MWh) annually for each of the first ten years of operation, the aggregate annual amount of potentially available credits can be estimated to be $26,805,600 (i.e., 1,489,200,000 kwhs x $0.018/kwh.) Applicable limitations on claiming business credits would apply, so investors may or may not be able to use the full credit.

The Massachusetts Energy Facility Siting Board's (EFSB's) Tentative Decision of July 2, 2004, includes the findings that (i) "there is a need for the capacity provided by the wind farm beginning in 2007 for reliability purposes", (ii) "there will be a need for the renewable resources provided by the wind farm to meet regional RPS requirements", (iii) "there is a need for the power generated by this wind farm for economic purposes", and (iv) "operation of the wind farm would provide average annual savings of $25 million for New England customers, including $10 million annually for Massachusetts customers, during the first five years of operation."

Energy produced by the Cape Wind Project will displace an equivalent amount of energy from the next available, more expensive fossil fuel fired unit(s) in the bid stack. By displacing a more expensive unit, Cape Wind will place downward pressure on the price of power in any given hour in the New England spot market for all consumers. The Project would diversify the region's energy mix in terms of fuel supply and generation technology, with associated decreased reliance on imported fossil fuels. By decreasing the region's overall

dependency on, and demand for, natural gas, the Project would save money for natural gas customers by helping to stabilize volatile gas price fluctuations.

Cape Wind will reduce the cost of compliance with the Renewable Energy Portfolio Standards (RPS) for Massachusetts electric consumers. The market price of Renewable Energy Credits (RECs) will depend, in part, on the amount of new renewable energy generation that qualifies to be issued as RECs. The market price of RECs will be lower with a greater supply of qualified renewable energy, thereby further driving down the cost incurred by electricity suppliers and subsequently ratepayers.

The Cape Wind Project could have a cumulative beneficial effect on public health, and result in a related reduction in the costs of adverse health impacts from existing power plant emissions. The yearly monetary savings associated with these reductions in adverse public health impacts is estimated at approximately $53 million dollars.

The manufacturing, construction, and operation of the Cape Wind Project would have a positive economic and fiscal impact on the mainland cities and towns located in Barnstable County, especially the towns of Barnstable and Yarmouth, and also on the Commonwealth of Massachusetts and adjacent areas of Rhode Island. The additional transmission capacity on Cape Cod, as a result of the Project's interconnection with the regional transmission system, will provide an additional source of needed energy supply at the Barnstable Switching Station to service the local grid demand. The Project would have a positive impact on regional employment producing an estimated 391 full time jobs during construction and installation, and once operational creating approximately 50 full-time jobs for operation and maintenance activities.

The combination of the direct, indirect, and induced effects would generate the following permanent economic changes in Massachusetts (beginning in 2007) during the operation phase, most of which would be concentrated in Barnstable County:

- An annual permanent increase of 154 jobs;
- An annual permanent increase of $21.8 million in output;
- An annual permanent increase of $10.2 million in value added; and
- An annual permanent increase of $6.93 million in labor income.

The total permanent employment increase presented above of 154 jobs is the sum of the 50 full-time jobs at the Wind Park, and an additional 104 jobs produced by indirect and induced effects.

Based on the estimated capital cost for the onshore improvements associated with the onshore transmission cable system of approximately $26,250,000, there would be an estimated permanent annual increase in the real property tax revenues of $62,510 for the Town of Barnstable and $217,168 for the Town of Yarmouth. Other benefits to the Town of Yarmouth would be implemented if the Project becomes operational. These benefits are outlined in a Host Community Agreement (the Agreement) that Cape Wind entered into with the Town of Yarmouth, dated July 25, 2003. Among other things, the Agreement provides that Cape Wind would take a number of steps to mitigate impacts of its proposed transmission line on the Town, including: making physical improvements to Berry Avenue, New Hampshire Avenue, and the Englewood Beach area; and, if feasible, locating its operations center in the Town. Following its commercial operation, Cape Wind has agreed to make payments of $250,000 annually to cover any real and personal property taxes (which as stated above are estimated at $217, 168), increased by inflation, and will also contribute $100,000 annually, increased by inflation, to a charitable fund for benevolent purposes in the Town. The Agreement further provides that the Town agrees to act reasonably and in good faith with respect to any street opening permits, grants of location, or other similar authorizations requested by Cape Wind. Accordingly, Cape Wind will pay a total of $350,000 annually or $7,000,000 over twenty years of operation, (excluding the effects of inflation) to the Town of Yarmouth according to the Agreement.

According to the DOE the proposed Cape Wind Project would also have economic benefits at the national level on the US economy in the range of $1.5 to $2.0 billion.

A study prepared by the Renewable Energy Policy Project (Sterzinger et al., 2003) reviewed data on property sales in the vicinity of wind farms, and determined through statistical analysis that there is no evidence that wind farm development has harmed property values within an established viewshed.

As evidenced by the experiences at other wind farms, the Project will likely have a negligible effect on the use of recreational resources and a positive effect on tourism in general for Cape Cod and the Islands. It is conceivable that the additional tourist activity could result in an increase in other recreational activities in the area. The Project will likely help to maintain and add to the current tourism activity on Cape Cod and the Islands.

The presence of the Wind Park will not result in large-scale changes to recreational or commercial vessel movements on Horseshoe Shoal. Nevertheless, the presence of the Wind Park may be perceived as an adverse impact by some mariners. Mariners are reminded that, once appropriate design measures to promote safe navigation and installation of required ATON are incorporated in a project proposed for federal and state waters, it is the responsibility of each vessel's captain to ensure that his vessel can pass safely through any given area on those waters. Wildlife and sightseeing tours will not be impacted as they generally stay closer to shore and their primary viewing targets are focused toward land, including seal watching, bird watching, and tours of the Kennedy Compound. It is likely that the presence of the Wind Park will generate interest in sightseeing tours within the Wind Park.

The Project is not anticipated to have substantial impacts on commercial fishing activities currently occurring in the vicinity, since the Applicant will not request any restrictions on fishing within the Wind Park during Project operation. Temporary impacts to all vessels (including commercial fishing vessels) will be limited to the temporary confined work area around the cable and each WTG actively under construction during installation. The proposed Project should not adversely affect recreational fishing in Nantucket Sound. The majority of recreational anglers surveyed in the MRFSS program reported hook and line as gear type used and most recreational anglers reported fishing from a private/personal or rented boat as the type or mode of recreational fishing. Due to the wide spacing of the WTGs, the physical presence of these structures should not interfere with recreational fishing activity, including maneuvering of recreational vessels or using recreational gear. The presence of the WTGs may in fact enhance recreational fishing for certain species such as Atlantic cod, black sea bass, and scup. The Project should not affect other modes of recreational fishing such as fishing from shore. Given that no substantial adverse impacts to finfish and commercial/recreational fishing are anticipated from the Project, no net change in the socioeconomic condition of the fishing industry on the Cape and Islands is expected as a result of the Project. Recreational fishing may be enhanced for certain species.

There will be no environmental justice issues created by construction or operation of the Cape Wind Project, based upon the federal guidance. The Cape Wind Project does not trigger thresholds requiring environmental justice analysis under the Massachusetts EOEA Policy. Because the Cape Wind Project will generate non-polluting electricity, operation of the Project will be beneficial to human health relative to production of electricity from the burning of fossil fuels.

In summary, the Project will add energy with a near zero marginal cost (and zero emissions) to the New England electric distribution grid and, as a result, the renewable energy generated by the Cape Wind Project will impose downward pressure on market-clearing prices in the region whenever it is producing power. These reductions in market-clearing prices will accrue to the direct benefit of electric retail consumers in the region, with savings to ratepayers conservatively estimated to be on the order of $25 million per year. In addition, the Project is needed to meet supply requirements in the region on its operational date and thereafter. The Project has also demonstrated that it will provide a significant new source of renewable power at a commercially meaningful scale that will: (1) facilitate compliance with the Massachusetts Electric Utility Restructuring Act of 1997 (Restructuring Act) and the Massachusetts Division of Energy Resources' (DOER's) Renewable Portfolio Standards (RPS); (2) help supply the expanding consumer demand for renewable power; and (3) contribute to a more reliable and diverse energy supply for Massachusetts and the New England Region. Once on-line the Project could displace equivalent energy production from fossil plants that would otherwise annually emit on the order of 1,000,000 tons of carbon dioxide (a greenhouse gas which is a major contributor to global warming).

As evidenced by the experiences at European offshore wind farms and U.S. land based wind farms, the most influential factors potentially affecting property values are visibility and distance from the wind turbines. Even

though existing studies do not indicate a negative impact on property values, the Applicant has proposed or completed the following mitigation measures to help protect coastal property values:

- The Project has been sited as far from shore as practicable, considering the effects on the cost and safety of construction and operation imposed by constraints associated with water depths and distance from shore. The distance from major population centers in proximity to the Project are as follows: Hyannis (6 miles), Cotuit (6 miles), Edgartown (8.9 miles), and Nantucket (13.8 miles). At the closest point of land, Point Gammon, the nearest WTG will be 4.7 miles from shore.
- In order to further minimize visibility from shore, the WTGs will be painted light blue/gray to better blend with the horizon.
- The navigational warning lights (both FAA and USCG) use the lowest intensity lighting to minimize visual impact at night, while ensuring safe navigation for mariners and aviators.
- The WTGs are located far enough offshore that noise associated with operation of the Project will not be audible on land.

1.7 List of Required Permits and Approvals –Proposed Alternative

A summary list of required federal, state, regional and local permits, reviews and jurisdiction for the proposed Project are listed below. Refer to Section 7.0 for a description of each permit required for the Project and a demonstration of Project compliance with applicable performance standards.

Table 1-2: List of Required Permits and Approvals for the Proposed Alternative

Agency	Jurisdiction	Permit Description	ID Number	Date Applied	Date Approved
Federal					
United States Army Corps of Engineers	Rivers and Harbors Act Section 10 jurisdiction is for work in navigable waters of the United States	Individual Permit – Section 10	USACE NAE-2004-338-1 (formerly 200102913)	11/22/01	Pending
	Direct and indirect effects on designated historic properties, offshore and upland	Review for compliance with Section 106 of National Historic Preservation Act (NHPA), as amended through 2000			
Council on Environmental Quality, National Environmental Policy Act	NEPA jurisdiction is over the entire project	Draft Environmental Impact Statement	USACE NAE-2004-338-1 (formerly 200102913)	November 2004	
		Final Environmental Impact Statement		To be filed	
		Record of Decision		Pending	
United States Environmental Protection Agency	USEPA jurisdiction is on the upland component of the Project and under the Clean Air Act for emissions and for NEPA (Section 309) review	NPDES General Stormwater Permit		To be filed	
Federal Aviation Administration	Structures exceeding 200 feet into navigable airspace	Notice of Proposed Construction or Alteration Form (FAA Form 7460-1)	2002-ANE-982-OE through 1111-OE	10/25/02	04/09/03
US Coast Guard	Structures located in navigable waters of the U.S.	Permit to Establish and Operate a Private Aid-to-Navigation to a Fixed Structure		To be filed	

Agency	Jurisdiction	Permit Description	ID Number	Date Applied	Date Approved
State					
Massachusetts Environmental Policy Act (MEPA)	Jurisdiction is within three-mile state territorial seas limit	Environmental Notification Form (ENF)	12643	11/15/01	4-22-02
		Draft Environmental Impact Report (DEIR)		11/15/04	
		Final Environmental Impact Report (FEIR)		To be filed	
		Issuance of Certificate		Pending	
Massachusetts Energy Facility Siting Board (EFSB)	Jurisdiction is within three-mile state territorial seas limit	Petition to Construct Jurisdictional Facilities	EFSB 02-02/D.T.E. 02-53	9/17/02	Tentative Decision 7/2/04; Final Decision Pending
		Certificate of Environmental Impact and Public Need		Pending	
Massachusetts Department of Environmental Protection (MADEP) – Wetlands and Waterways Regulation Program	Jurisdiction is within three-mile state territorial seas limit	Chapter 91 Waterways License		To be filed	
		MADEP Water Quality Certification		To be filed	
		Superceding Order of Conditions		To be filed, if required	
Massachusetts Coastal Zone Management (MCZM)	State jurisdiction is within the three-mile limit under the Coastal Zone Management Act (CZMA). Federal Consistency Review jurisdiction is three mile limit and specific activities beyond three miles that may affect Massachusetts Coastal Zone	Concurrence with Federal Consistency Certification Statement		11/21/01	The CZM Review is currently be coordinated
Massachusetts Ocean Sanctuaries Act Department of Environmental Management	Jurisdiction is within three-mile state territorial seas limit	Regulatory Review		ongoing	
Massachusetts Highway Department (MHD)	Jurisdiction is within 3-mile limit	Permit to Access State Highway and Access Agreement		To be filed	
State Historic Preservation Officer (SHPO)	Invited to participate as a cooperating agency, to provide comments to USACE under Section 106 of NHPA, enabling regulations 33 CFR Part 325, Appendix C	Regulatory Review		To be filed	
Massachusetts Historical Commission (MHC): State Archaeologist	Jurisdiction is within three-mile state territorial seas limit	Permit for Upland Reconnaissance Archaeological Survey	2246	3/12/03	3/28/03
		Permit for Upland Intensive Archaeological Survey	2595	9/18/03	9/23/03
Massachusetts Board of Underwater Archaeology (MBUAR)	Jurisdiction is inland and coastal waters within three-mile state territorial seas limit	Reconnaissance Permit; Excavation Permit			To be filed, if required

Agency	Jurisdiction	Permit Description	ID Number	Date Applied	Date Approved
Regional					
Cape Cod Commission	Jurisdiction is within three-mile state territorial seas limit	Development of Regional Impact (DRI) Review	JR#20084	11/15/01	Pending
		Issuance of DRI		Pending	
Local					
Yarmouth Conservation Commission	Jurisdiction is within three-mile state territorial seas limit	Notice of Intent		To be filed	
		Issuance of Order of Conditions			
Barnstable Conservation Commission	Jurisdiction is within three-mile state territorial seas limit	Notice of Intent		To be filed	
		Issuance of Order of Conditions			
Yarmouth Department of Public Works (DPW)	Jurisdiction is within three-mile state territorial seas limit	Street Opening Permit		To be filed	
Barnstable DPW	Jurisdiction is within three-mile state territorial seas limit	Street Opening Permit		To be filed	