# Appendix 5.10-F

# Visual Impact Assessment of Multiple Historic Properties

**TECHNICAL REPORT**

# VISUAL IMPACT ASSESSMENT OF MULTIPLE HISTORIC PROPERTIES CAPE WIND ENERGY PROJECT

**Nantucket Sound,**
**Cape Cod, Martha's Vineyard, and Nantucket,**
**Massachusetts**

Submitted to:
**Cape Wind Associates, LLC**
75 Arlington Street
Boston, Massachusetts 02116

Submitted by:
**PAL**
210 Lonsdale Avenue
Pawtucket, Rhode Island 02860

PAL Report No. 1485.03

June 2004

PAL Publications

CARTOGRAPHER AND ILLUSTRATOR
Dana M. Richardi

GRAPHIC DESIGN AND PAGE LAYOUT SPECIALISTS
Alytheia M. Laughlin/Gail M. Van Dyke

EDITOR
Ken Alber

PRODUCTION SUPERVISOR
Gail M. Van Dyke

# MANAGEMENT ABSTRACT

This visual impact assessment report presents the analysis and findings of an assessment, in accordance with Section 106 of the National Historic Preservation Act, of the visual effects to land-based, aboveground historic properties that will be caused by the Preferred Alternative of the proposed Cape Wind Project on Horseshoe Shoal in Nantucket Sound, Massachusetts. The project requires a Section 10 Permit from the U.S. Army Corps of Engineers (Corps), as well as a review under the Massachusetts Environmental Protection Act, and therefore falls under various federal and state regulatory reviews for cultural resources. This analysis has been completed as part of the Draft Environmental Impact Statement/ Draft Environmental Impact Report (DEIS/DEIR) process and is intended as a technical appendix to that document. PAL, cultural resources consultants, prepared this report under contract to Cape Wind Associates, LLC (CWA), the project proponent. PAL reviewed existing information and analyses prepared for the Cape Wind Project's alternatives analysis, visual simulation study, and DEIS/DEIR.

The analysis determined that there will be "No Historic Properties Affected" for one National Historic Landmark (NHL) property (Flying Horses Carousel), one historic district, and two individual properties. Findings of "Adverse Effect" are made for two NHL properties (Kennedy Compound and Nantucket Historic District), four historic districts, and 10 individual properties. Measures for avoidance, minimization and/or mitigation of adverse effects are discussed. Final mitigation measures will be the result of consultation leading to a Memorandum of Agreement for the Cape Wind Project among the Corps, the Massachusetts State Historic Preservation Officer, and other consulting parties.

# TABLE OF CONTENTS

**MANAGEMENT ABSTRACT** ..... **i**

**1 INTRODUCTION** ..... **1**
Purpose of Document ..... 1
Project Preferred Alternative Overview ..... 2

**2 VISUAL IMPACT ASSESSMENT METHODOLOGY AND REGULATORY FRAMEWORK** ..... **5**
Visual Impact Assessment Methodology ..... 5
Federal Statutes, Regulations, and Standards ..... 6
National Historic Preservation Act ..... 6
National Register of Historic Places Evaluation Criteria ..... 10
National Environmental Policy Act ..... 11
State Statutes, Regulations, and Standards ..... 12
Massachusetts General Laws Chapter 9, Sections 26-27C as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00) ..... 12
Massachusetts Environmental Policy Act, Massachusetts General Laws Chapter 30, Sections 61-62 H, inclusive ..... 12
State Register of Historic Places ..... 13

**3 IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES IN VISUAL APE** ..... **14**
Visual APE ..... 14
Historic Context Overview of Visual APE ..... 14
First Period (1620 to 1692) ..... 14
Colonial Period (1692 to 1775) ..... 17
Federal Period (1775 to 1830) ..... 17
Early Industrial Period (1830 to 1870) ..... 18
Late Industrial Period (1870 to 1915) ..... 18
Early Modern Period (1915 to 1940) ..... 19
Modern Period (1940-present) ..... 19
Historic Properties ..... 19
Falmouth (Cape Cod) ..... 20
Barnstable (Cape Cod) ..... 21
Chatham (Cape Cod) ..... 24
Tisbury (Martha's Vineyard) ..... 25
Oak Bluffs (Martha's Vineyard) ..... 25
Edgartown (Martha's Vineyard) ..... 28

Nantucket (Nantucket) ..... 30
Summary of Historic Properties ..... 31

**4 VISUAL EFFECT ANALYSIS AND MITIGATION ..... 32**
Visual Simulation Methodology ..... 32
Application of the Criteria of Adverse Effect ..... 34
Falmouth (Cape Cod) ..... 34
Barnstable (Cape Cod) ..... 36
Chatham (Cape Cod) ..... 38
Tisbury (Martha's Vineyard) ..... 39
Oak Bluffs (Martha's Vineyard) ..... 39
Edgartown (Martha's Vineyard) ..... 40
Nantucket (Nantucket) ..... 42
Summary of Effects Findings ..... 43
Resolution of Adverse Effects ..... 43

**REFERENCES ..... 45**

**APPENDICES**

**A VISUAL SIMULATION FIGURES FROM VISUAL SIMULATION METHODOLOGY, (EDR, P.C., NOVEMBER 2003) ..... 47**
**Figure 2 (Viewpoint Location Map)**
**Figure 5.10-3 (Sheets 1-12; Daytime Simulations)**
**Figure 5.10-4 (Sheets 1-11; Nighttime Simulations)**

# LIST OF FIGURES

Figure 1-1. Project Location ..... 1

Figure 1-2. Visual Impacts Assessment, Historic Properties ..... 3

## LIST OF TABLES

Table 3-1. Aboveground Historic Properties within the Cape Wind Project, Horseshoe Shoal, Preferred Alternative Visual APE ..... 15

Table 4-1. Section 106 Finding of Effect for Aboveground Historic Properties within the Cape Wind Project, Horseshoe Shoal, Preferred Alternative Visual APE ..... 35

# CHAPTER ONE

# INTRODUCTION

## Purpose of Document

This visual impact assessment report presents the analysis and findings of an assessment of the visual effects to land-based, aboveground historic properties that will be caused by the Preferred Alternative of the proposed Cape Wind Project on Horseshoe Shoal in Nantucket Sound, Massachusetts. The Project location is shown in Figure 1-1. The Project requires a Section 10 Permit from the U.S. Army Corps of Engineers (Corps), as well as a review under the Massachusetts Environmental Protection Act (MEPA), and therefore falls under various federal and state regulatory reviews for cultural resources. This analysis has been completed as part of the Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR) process and is intended as a technical appendix to that document. PAL prepared this report under contract to Cape Wind Associates, LLC (CWA), the Project proponent.

The Cape Wind Project is also taking into consideration the effects to both terrestrial and marine archaeological resources as well as any impacts to historic resources along the overland cable route.

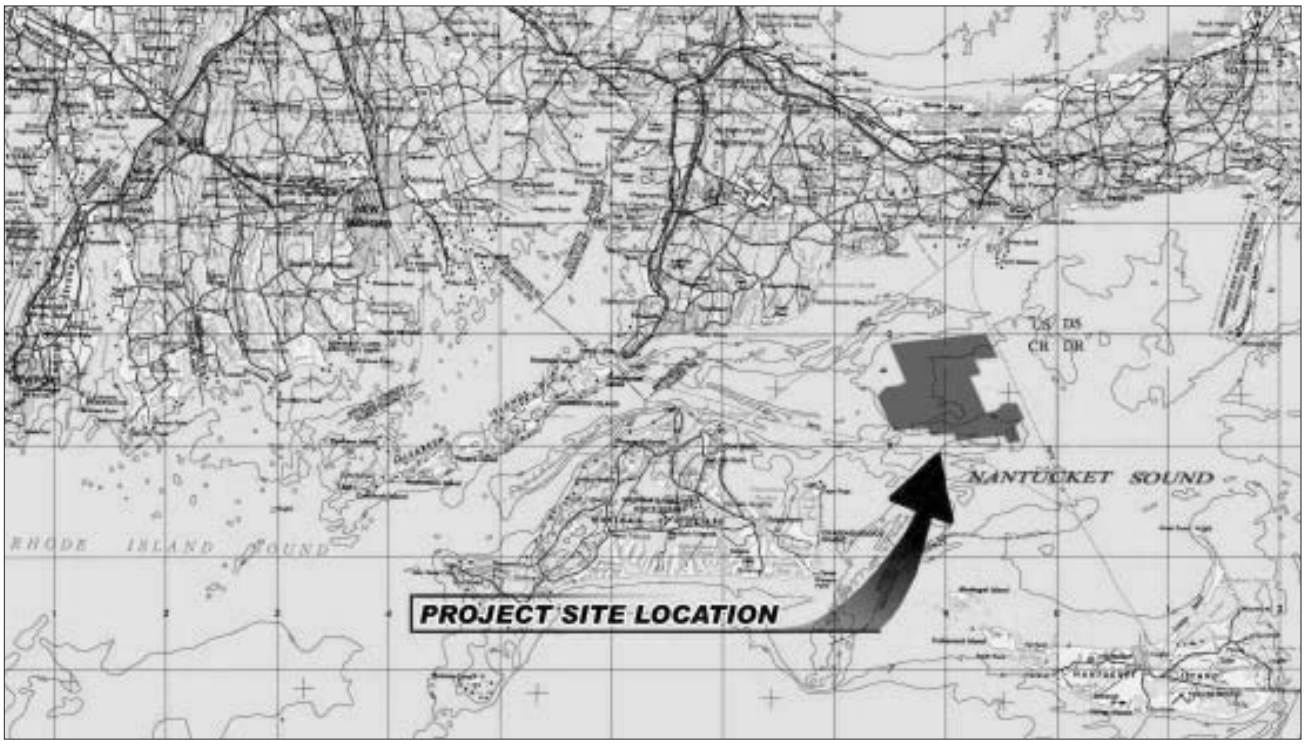



**Figure 1-1. Project Location.**

These topics are discussed in separate Project documents as part of the DEIS/DEIR at Section 3.0 (Alternatives Analysis), Section 5.10 (Cultural and Recreational Resources and Visual Studies), Appendix 5.10-A (Visual Simulation Methodology), Appendix 5.10-B (Known Historic Properties within Potential Visual Range of the Cape Wind Park), Appendix 5.10-C (Graves and Herbster 2004), and Appendix 5.10-D (Robinson 2003, 2004). For the purpose of this visual impact assessment report, the term "historic properties" pertains to only those aboveground historic and architectural resources that are encompassed within the visual APE, and meet the criteria for designation as "historic property," as presented in the Chapter 2 methodology. The location of the historic properties is shown in Figure 1-2.

**Project Preferred Alternative Overview**

CWA is proposing to develop an offshore "Wind Park" to generate 454 MW of electrical energy for the regional electric grid. The Preferred Alternative for the Project encompasses approximately 24 square miles on Horseshoe Shoal in Nantucket Sound, Massachusetts. Other alternatives that have been considered are discussed in the Project's DEIS/DEIR.

The Horseshoe Shoal Preferred Alternative for the offshore energy generation facility will consist of 130 wind turbine generators (WTGs) interconnected by 33 kV low voltage electrical cables buried beneath the sea floor to a central offshore electric service platform (ESP) in the wind park. A 115 kV low voltage buried cable system, consisting of two paired-cable circuits spaced 20 feet apart, will run from the ESP to a horizontally directionally drilled (HDD) conduit positioned approximately 100 feet from the cable system's landfall within Lewis Bay, in Yarmouth, Massachusetts. The nearest Project components will be located approximately 4.7 miles from Cape Cod (Point Gammon), 5.4 miles from Martha's Vineyard (Cape Poge), and 11.2 miles from Nantucket (Great Point).

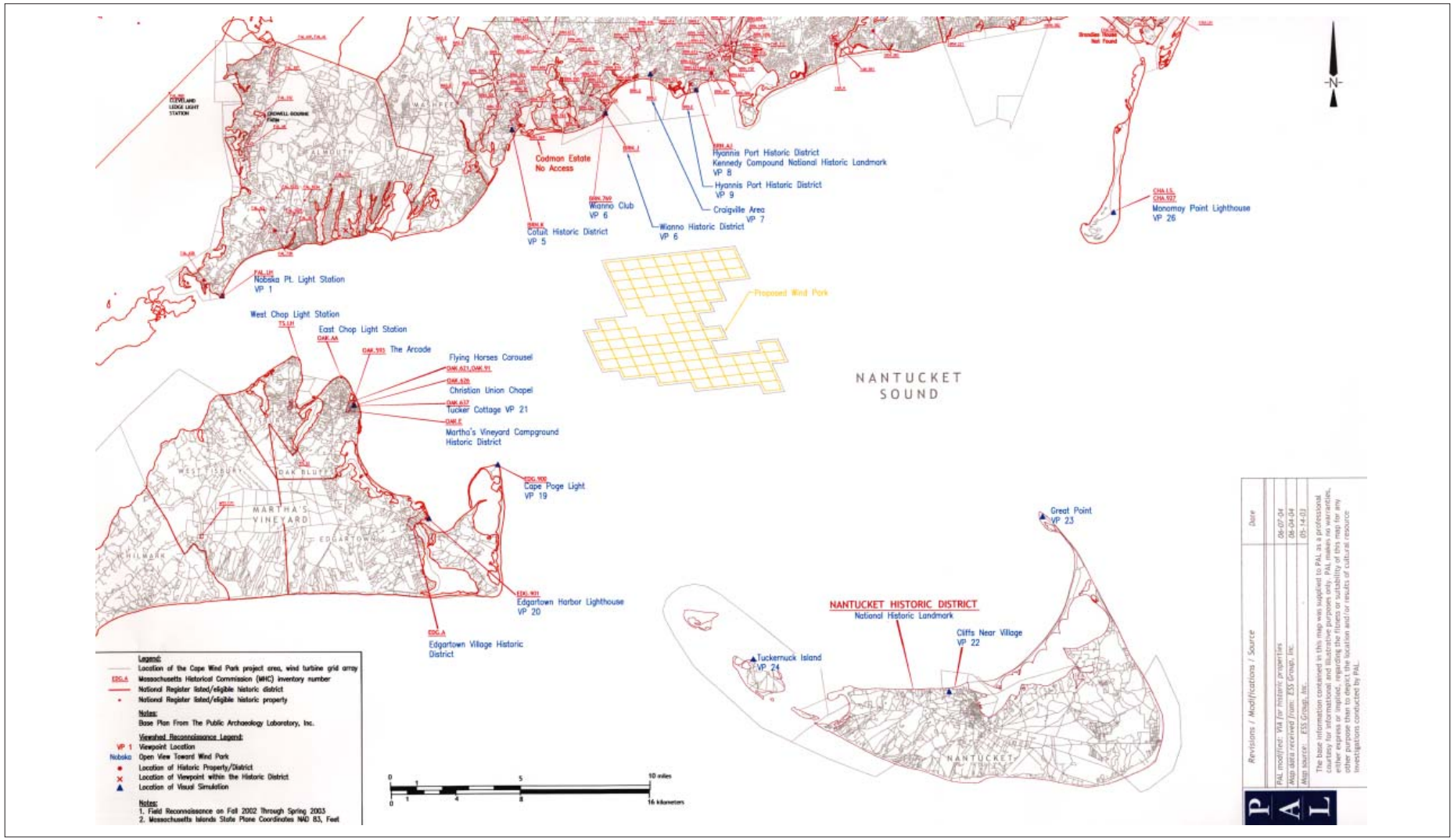



**Figure 1-2. Visual Impact Assessment, Historic Properties.**

# CHAPTER TWO

# VISUAL IMPACT ASSESSMENT METHODOLOGY AND REGULATORY FRAMEWORK

This chapter describes the visual impact assessment methodology within the framework of federal and state legislation and evaluation criteria relevant to the visual effects of the Cape Wind Project on historic properties. Historic properties (see definitions under 33 CFR 325, Appendix C and 36 CFR 800 below) are afforded special protection in federal activities through Section 106 of the NHPA and in state activities through Chapter 9, Sections 26 et seq. of the Massachusetts General Laws, both administered by the Massachusetts Historical Commission (MHC), and by the MEPA, as well as under the National Environmental Policy Act (NEPA). The lead federal agency for the Cape Wind Project is the Corps.

**Visual Impact Assessment Methodology**

PAL's methodology for completion of the visual impact assessment consisted of the review of information and analyses previously prepared by PAL and others for the Cape Wind Project's alternatives analysis (see DEIS/DEIR Section 3.0), including:

- compilation and mapping of historic properties within the towns having at least some expected visibility of the proposed Wind Park (see DEIS/DEIR Section 5.10.2.5, Figure 5.10-1 and Appendix 5.10-B;

- review of existing documentation in MHC files and available reports about the area's historic context and the historic properties with potential visual effects; and

- consultations with the Corps and MHC regarding the identification of historic properties to be assessed for visual impacts and the selection of representative historic properties for visual simulation;

- review of the visual simulation methodology (DEIS/DEIR Appendix 5.10-A), findings of field reconnaissance by others to determine potential Project visibility (DEIS/DEIR Section 5.10 and Table 5.10-1), current photographs of historic properties in the estimated visual APE and surrounding area [DEIS/DEIR Figure 5.10-2 (Sheets 1-64), daytime and night time visual simulations of the proposed Wind Park in Figures 5.10-3 and 5.10-4 and other information contained within Section 5.10 and related appendices, figures and tables];

- consultation with the Corps regarding the content and format of the visual impact assessment report, which includes only designated historic properties are defined in 33 CFR 325, Appendix C; and

- determinations of visual effect on historic properties, in accordance with Section 106 of the NHPA.

Resources that are included in the Inventory of the Historic Assets of the Commonwealth and have not yet been evaluated for National Register eligibility by the MHC were not included in the cultural resources identification studies. In addition, no additional architectural survey was conducted to identify other historic resources, not yet surveyed, that may exist in the visual APE. PAL did not conduct field visits to verify the existing appearance and condition of the historic properties, nor to view the visual simulation viewpoints.

## Federal Statutes, Regulations, and Standards

### National Historic Preservation Act

Congress enacted the NHPA in 1966, as amended in 1980, to preserve and protect the nation's historic buildings, neighborhoods, landscapes, and archaeological sites. The NHPA established the National Register of Historic Places (National Register) and created the Advisory Council on Historic Preservation (Council). The NHPA fostered the system by which federal agencies identify and evaluate impacts on historic properties through the Section 106 review process. This information is used to plan and implement projects that, wherever possible, preserve and protect designated cultural resources.

#### *Section 106*

Section 106 of the NHPA, and the regulations of the Council at 36 CFR 800, "Protection of Historic Properties," require Federal agencies to consider the effects of their actions on historic properties and to take the effects into account during project planning and implementation. The purpose of the Section 106 review process is to provide protection for "historic properties." Historic properties are listed or are eligible for listing in the National Register (36 CFR 800.16(l)(1). The Section 106 process seeks to accommodate historic preservation concerns with the needs of federal "undertakings" through consultation among the Federal Agency Official, the State Historic Preservation Officer (SHPO), and other parties – including the project proponent and the Council – with an interest in the effects of the undertaking on historic properties. In Massachusetts the SHPO is contained within the office of the MHC.

During the Section 106 review process, historic properties are identified and evaluated, potential effects from the project are assessed, avoidance options are considered, and mitigation procedures for adversely affected properties are examined. The selection of the preferred alternative for the undertaking is based in part on the consultations carried out through the Section 106 review process. The Council does not have the authority to halt or abandon projects that will affect historic properties; rather, its regulations emphasize consultation among the responsible federal agency, the SHPO, and other interested parties.

#### *Section 110*

Section 110(f) of the NHPA affords special consideration to any National Historic Landmark (NHL) property. This section requires that the Federal Agency Official, "to the maximum extent possible,

undertake such planning and actions as may be necessary to minimize harm to any National Historic Landmark that may be directly and adversely affected by an undertaking," and to afford the Council an opportunity to comment on such effects and their proposed resolution. The special consideration required for NHLs is carried out through the Section 106 review process (36 CFR 800.10).

***Department of the Army, 33 CFR Part 325, Procedures for the Protection of Historic Properties, Appendix C***

The Corps also implements Section 106 through its counterpart regulations 33 CFR Part 325, "Processing of Department of the Army Permits, Procedures for the Protection of Historic Properties, Appendix C." Under Appendix C, effects are assessed on designated historic properties. Designated properties are historic properties listed, formally determined eligible for listing (pursuant to 36 CFR 63), or determined eligible for listing by consensus of the SHPO and the Corps in the National Register.

Effects occur when the undertaking may alter the characteristics – including location and setting – or use of a property that qualified the property for inclusion in the National Register (33 CFR 325, Appendix C, Paragraph 15(a). If an adverse effect is found, measures to avoid, minimize, or mitigate the effects will be sought, through consultation between the SHPO and the Corps.

***Protection of Historic Properties 36 CFR 800***

The Council's Section 106 regulations are set forth in a process of steps, as follows:

*Initiation of the Section 106 Process*

The Agency Official determines whether the proposed federal action is an "undertaking" under Section 106 of the NHPA and if it is the type of activity that has the potential to cause effects on historic properties. The Corps has determined that the Cape Wind Project is subject to a Section 10 permit from the Corps, and thus constitutes an "undertaking" as defined under Section 106 and 36 CFR 800. The Corps issues Section 10 permits, under the Rivers and Harbors Act of 1899, to regulate activities conducted below the Ordinary High Water elevation of navigable waters of the United States. Therefore, the Corps initiated the Section 106 process as one part of the overall review process that will ultimately include its permit determination.

*Participants and Public Involvement*

The Corps is obligated to fulfill the requirements of Section 106 and Section 110 and ensure that an agency official with jurisdiction over the Project takes legal and financial responsibility for compliance. The agency official may authorize an applicant for federal assistance or for a federal permit, license, or approval to initiate consultation and prepare documentation, however the federal agency remains legally responsible for all findings and determinations charged to the agency official.

Participants defined as consulting parties [36 CFR 800.2(c)] in the Section 106 process, in addition to the Agency Official, are the SHPO, federally recognized Indian Tribes and Native Hawaiian organizations, representatives of local governments, and applicants for federal assistance.

In consultation with the SHPO and the Council, the Corps also involves the public in the Section 106 process as interested parties [36 CFR 800.2(d)]. Both the NEPA and MEPA review frameworks have an extensive public review process, and the Corps' Section 10 permitting process also has public notification and commenting provisions. These processes usually include public meetings and public review of environmental reports and documents.

Consulting parties in the Cape Wind Project Section 106 process with the Corps include: the Massachusetts SHPO/MHC; CWA, as the project proponent and Section 10 permit applicant; local governments (towns); and the Wampanoag Tribe of Gay Head (Aquinnah). Other interested parties include the Cape Cod Commission; and the Massachusetts Department of Indian Affairs. The Council may enter the Section 106 process for an individual project review under certain circumstances as defined in Part 800 Appendix A.

*Coordination with Other Reviews*

The Corps Agency Official is coordinating the steps of the Section 106 process with review required under NEPA in conjunction with CWA's Section 10 permit application. The Corps is also coordinating federal and state reviews through issuance of a joint environmental document.

*Area of Potential Effect*

As defined in the Council's regulations (36 CFR 800.16d), the APE for a project is the area or areas within which an undertaking may directly, indirectly, or cumulatively cause changes in the character or use of historic properties, if any such properties exist in that location. In addition to the actual site of the undertaking, the APE also includes other areas where the project may cause changes. Different impacts may produce more than one APE for a single undertaking.

This report focuses specifically on the APE for visual impacts that will be caused to onshore historic properties by the introduction of the WTGs in the offshore seascape horizon of Nantucket Sound. The APE, identification, and evaluation methodologies developed by the Corps for the Cape Wind Project aboveground historic properties are outlined in the following chapters. The overall APE for the Cape Wind Project is the marine and onshore geographic area within which the project may cause potential physical, noise, and visual effects on historic properties (see DEIS/DEIR Section 5.10.1.1 for further discussion).

*Identification of Historic Properties*

This step involves the identification of all historic properties included or eligible for inclusion in the National Register that are within the APE.

At this juncture in the process, the agency official can determine that there are no historic properties in the APE or that there are historic properties present but the undertaking will not have any effect on them and make a "No Historic Properties Affected" finding. The Corps has determined that there are historic properties that may be visually affected by the Cape Wind Project undertaking.

*Application of Criteria of Adverse Effect*

The criteria of adverse effect are found at 36 CFR 800.5(1). An adverse effect is found when a proposed undertaking may alter, directly or indirectly, the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration should be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for listing in the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.

Examples of adverse effects on historic properties include, but are not limited to:

i Physical destruction of or damage to all or part of a property;

ii Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines;

iii Removal of a property from its historic location;

iv Change of the character of a property's use or of physical features within the property's setting that contribute to its historic significance;

v Introduction of visual, atmospheric, or audible elements that diminish the integrity of a property's significant features that qualify the property for inclusion in the National Register;

vi Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian Tribe or Native Hawaiian organization; and

vii Transfer, lease, or sale of a property out of federal ownership control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance. (36CFR800.5(2)

The specific criteria of adverse effect addressed in this Cape Wind Project visual impact assessment is the introduction of visual elements to the character and setting that diminish the integrity of a property's significant features that qualify the property for inclusion in the National Register.

*Determination of Effect*

The agency official may determine that the Project has "No Adverse Effect" on historic properties when an undertaking's effects do not meet the criteria of adverse effect. If the agency official determines

that the project will have an "Adverse Effect" on historic properties, then the agency enters into consultation with the SHPO and other consulting parties to resolve the adverse effects.

*Resolution of Adverse Effects*

The agency official consults with the SHPO and consulting parties to develop and evaluate alternatives to avoid, minimize, or mitigate adverse effects on historic properties. The consultation may involve public meetings and public review of environmental documents, as noted in the Participants and Public Involvement section above.

*Programmatic Agreement/Memorandum of Agreement*

If the Corps, SHPO, project proponent, and other consulting parties agree on how the adverse effects will be resolved, a Programmatic Agreement (PA) or a MOA will be executed. Under the Council's regulations, a PA may be used in certain circumstances, such as for a program or a complex undertaking (36 CFR 800.14(b)). Execution and implementation of the PA or MOA by the Corps will serve as evidence that the Corps has complied with Section 106. The Corps will then complete its other review processes and determine whether to issue its permit. If the permit is issued, the Project may then proceed with the Corps carrying out the terms of the PA or MOA. A draft MOA for the Cape Wind Project is included in the DEIS/DEIR document.

*Failure to Resolve Adverse Effects*

The Corps, Council, or SHPO, after consulting pursuant to Section 106, may determine that further consultation will not be productive and may terminate consultation. If the Corps terminates, the head of the agency or equivalent will request Council comment and shall notify all consulting parties of the request; if the SHPO terminates, the Corps and Council may execute a PA or MOA without the SHPO's involvement; if the Council terminates, the Council will consult with the Corps Federal Preservation Officer to seek to resolve issues concerning the undertaking, but, ultimately, the agency official may permit the Project to go forward after consulting in good faith with the Council (see "Response to Council Comments").

*Response to Council Comments*

The head of the agency shall take into account the Council's comments in reaching a final decision on the undertaking. The Corps head's decision shall be documented by 1) preparing a summary of the decision that contains the rationale for the decision and evidence of consideration of the Council's comments and providing it to the Council prior to approval of the undertaking; 2) providing a copy of the summary to all consulting parties; and 3) notifying the public and making the record available for public inspection.

**National Register of Historic Places Evaluation Criteria**

Historic properties include significant districts, buildings, structures, objects, and archaeological sites that are listed in or eligible for listing in the National Register. The National Register, under 36 CFR

60, is the nation's official list of properties that meet specific criteria established by the Department of the Interior and therefore qualify for consideration as part of the Section 106 review process.

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in those districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that:

A. are associated with events that have made a significant contribution to the broad patterns of our history; or

B. are associated with the lives of persons significant in our past; or

C. embody the distinctive characteristic of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. have yielded, or may be likely to yield information important in prehistory or history.

Historic properties may be included in the National Register in the following categories:

- **National Historic Landmark (36 CFR 65)** is a historic property of outstanding national significance that the Secretary of the Interior has designated as a National Historic Landmark.

- **National Register Individually Listed Property (36 CFR 60)** is a historic property of local, state, or national significance that meets the criteria for listing in the National Register and has been so designated by the Secretary of the Interior through the State Historic Preservation Officer.

- **National Register Historic District (36 CFR 60)** is an area or district of historic properties that meets the criteria for listing in the National Register and has been so designated by the Secretary of the Interior through the State Historic Preservation Officer. Properties within districts are assessed as to whether or not they contribute to the historic and architectural significance of the district.

- **Determination of Eligibility (36 CFR 63)** property is an individual or district historic property of local, state, or national significance that meets the criteria for listing in the National Register of Historic Places and is formally Determined Eligible by the Keeper of the National Register.

**National Environmental Policy Act**

NEPA addresses the impact of federal government actions on all aspects of the human environment, including cultural resources. The NEPA review process is resulting in the preparation of a DEIS for the Cape Wind Project. Section 106 review is coordinated with NEPA review (36 CFR 800.8). The Corps' Scope for the DEIS requested that the visual assessment as described in the MEPA Certificate be included in the Cape Wind Project's DEIS/DEIR Appendices.

## State Statutes, Regulations, and Standards

### Massachusetts General Laws Chapter 9, Sections 26-27C as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00)

This law directs the MHC, among other tasks, to advise other state agencies as to the preservation of historic, architectural, and archaeological resources during any state undertakings; to conduct a statewide survey of historic properties; to maintain a State Register of Historic Places (State Register); and to develop a historic preservation plan. "Chapter 254 review" is similar to Section 106 review, with one notable exception being that properties subject to review must be listed in the State Register. The regulations implementing Chapter 9, Section 27C, as amended by Chapter 254, provide that upon a finding of adverse effect on a State Register property by the MHC, the state body undertaking the project shall consult with the MHC regarding feasible and prudent means to eliminate, minimize, or mitigate the adverse effects. Upon agreement, the state body, project proponent, and the MHC enter into a MOA. The MHC conducts Chapter 254 and Section 106 review simultaneously.

### Massachusetts Environmental Policy Act, Massachusetts General Laws Chapter 30, Sections 61-62 H, inclusive

MEPA and its implementing regulations (301 CMR 11.00) is intended to provide meaningful opportunity for public review of the potential environmental impacts of projects for which state agency action is required and to assist state agencies in using all feasible means to avoid, minimize, or mitigate environmental damage that has been identified. For the purposes of this law, adverse effects to historic properties are included within the definition of "environmental damage." The statute provides the procedure through preparation of a Draft and Final Environmental Impact Report (DEIR/FEIR) by which that obligation is satisfied and authorizes the Secretary of Environmental Affairs to oversee the review process. MEPA applies to projects directly undertaken by state agencies and to private projects for which state permits are sought or in which state funding or land transfer is involved. In addition, Section 61 of MEPA affirmatively requires that any Massachusetts agency or authority taking an action subject to MEPA must issue its finding, based on the FEIR, and specifying all feasible measures to avoid environmental damage, or, to the extent that damage cannot be avoided, measures to minimize and mitigate damage to the environment to the maximum extent practicable.

In its comment letter dated December 24, 2001 on the Cape Wind Project's Expanded Environmental Notification Form under MEPA, the MHC requested that a visual assessment study be conducted for aboveground architectural resources to evaluate the visual effects of the Project on the character and setting of historic resources. The Secretary's MEPA Certificate of April 22, 2002 likewise called for a visual assessment of the historic properties identified by MHC in its December 24, 2001 letter, including nighttime lighting conditions, using computer-generated photographs.

All historic properties listed in MHC's comment letter were previously assessed for potential Project visibility (see DEIS/DEIR Table 5.10-1). A detailed description of the visibility studies and methodology, nighttime lighting and visual simulations are found in DEIS/DEIR Section 5.10, Figures 5.10-3 and 5.10-4, and Appendices 5.10-A and 5.10-B. Locations of historic properties considered during the

studies, including those viewpoints selected for visual simulation with the concurrence of the Corps and MHC, are shown on DEIS/DEIR Figure 5.10-1.

**State Register of Historic Places**

The Massachusetts State Register, created in 1982, includes districts, sites, buildings, structures, objects, and landscapes. It is a compilation, or master list, of several different types of local, state, and federal designations:

- National Historic Landmark
- National Register of Historic Places
- Determined Eligible for the National Register
- Massachusetts Archaeological/Historic Landmarks
- Local Landmark
- Local Historic District
- Regional Historic District
- Preservation Restriction

The Cape Wind Project cultural resource studies included State Register-listed properties in towns with at least some visibility toward the proposed Wind Park. These properties are listed with National Register properties in Appendix 5.10-B of the DEIS/DEIR; locations are shown on Figure 5.10-1. At the direction of the Corps, only those properties that are designated as historic properties under the Corps Appendix C regulations (i.e., listed, determined eligible, or found eligible by the SHPO for the National Register) are included in the visual impact assessment.

It should be noted that no historic properties listed only in the State Register (with the exception of Tuckernuck Island west of Nantucket Island) were found with open unobstructed views toward the proposed Wind Park.

# CHAPTER THREE

# IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES IN VISUAL APE

This chapter summarizes the APE established by the Corps for visual impacts of the Cape Wind Project to aboveground historic properties, specifically the Preferred Alternative on Horseshoe Shoal in Nantucket Sound. The chapter presents information on the general historic context of the area and on each of the historic properties identified within that APE.

**Visual APE**

The Cape Wind Project's APE for visual effects includes the area on Cape Cod, Martha's Vineyard, and Nantucket from which components of the proposed Wind Park (aboveground or above water) would possibly be visible. The visual APE and location of historic properties in the Horseshoe Shoal Preferred Alternative is shown in Figure 5.10.1 "Visual Reconnaissance for Designated Historic Properties" of the DEIS/DEIR (see DEIS/DEIR Section 5.10.1.1 and Appendix 5.10-A for further discussion).

Based upon field reconnaissance of historic properties by others (as detailed in Sections 3.0 and 5.10 of the DEIS/DEIR), it was found that open unobstructed views of the Project from onshore historic properties would generally only available within approximately 300 feet of the shoreline in areas oriented toward the proposed Wind Park. This area was designated as the "estimated" APE for visual effects in the alternatives analysis presented in Section 3.0 in the DEIS/DEIR. Historic resources within the estimated APE for each alternative site were compiled and the number of potentially visually affected historic properties was compared, as one of the many criteria used in the selection process. The overall comparative analysis resulted in the choice of Horseshoe Shoal as the Preferred Alternative. For the Horseshoe Shoal Alternative, a total of 20 aboveground historic properties (including individual properties and historic districts) were identified within the estimated APE. These are listed, with their historic designation, on Table 3-1. It was subsequently found during confirmatory field reconnaissance by others that some of the properties that fell within the estimated 300 foot APE for visual effects did not in fact have visibility toward the proposed Wind Park, due to screening provided by topography, evergreen vegetation, or intervening structures. This analysis is presented in Chapter 4.

**Historic Context Overview of Visual APE**

**First Period (1620 to 1692)**

Nantucket Sound is situated between the south shore of Cape Cod and the Atlantic Ocean, and the islands of Martha's Vineyard and Nantucket. The area has long been associated with maritime history and with the discovery, settlement, and development of the New World. European explorers and fishermen visited the waters off of the Cape Cod peninsula and the associated islands as early as the

**Table 3-1. Aboveground Historic Properties within the Cape Wind Project, Horseshoe Shoal, Preferred Alternative Visual APE**

| Town | Name (Village) | Address/Location* | Designation(s) |
|---|---|---|---|
| **Cape Cod** | | | |
| Falmouth | Nobska Point Light Station | Nobska Road | Individually listed in the National Register, Lighthouses of Massachusetts Thematic Resource Area 1987 |
| Barnstable | Cotuit Historic District (Cotuit) | Main Street, Lowell and Ocean View Avenues, bounded by Osterville Harbor, Nantucket Sound and Popponessett | National Register District, Town of Barnstable Multiple Resource Area 1986 |
| | Col. Charles Codman Estate (Cotuit) | 43 Ocean View Avenue | Individually listed in the National Register, Town of Barnstable Multiple Resource Area 1986 |
| | Wianno Historic District (Osterville) | Roughly bounded by East Bay Road, Wianno and Sea View Avenues, between Nantucket Sound and Crystal Lake | National Register District, Town of Barnstable Multiple Resource Area 1986 |
| | Wianno Club (Osterville) | 107 Sea View Avenue | Individually listed in the National Register, Town of Barnstable Multiple Resource Area 1986 |
| | Hyannis Port Historic District (Hyannis) | Roughly bounded by Massachusetts Avenue and Edgehill Road, Hyannis Avenue, Hyannis Harbor and Scudder Avenue | National Register District, Town of Barnstable Multiple Resource Area 1986 |
| | Kennedy Compound (Hyannis) | Erving and Merchant Avenues | Individual National Historic Landmark 1972 |
| Chatham | Monomoy Point Lighthouse | Monomoy National Wildlife Refuge | National Register District 1979, Lighthouses of Massachusetts Thematic Resource Area 1987 |
| **Martha's Vineyard** | | | |
| Tisbury | West Chop Light Station | West Chop Road | Individually listed in the National Register, Lighthouses of Massachusetts Thematic Resource Area 1987 |

**Table 3-1. Aboveground Historic Properties within the Cape Wind Project, Horseshoe Shoal, Preferred Alternative Visual APE (continued).**

| | | | |
|---|---|---|---|
| Oak Bluffs | East Chop Light | Lighthouse Road on East Chop (east side of Vineyard Haven Harbor) | Individually listed in the National Register, Lighthouses of Massachusetts Thematic Resource Area 1987 |
| | Martha's Vineyard Campground Historic District | Roughly bound by Lake, Siloam, Central, Circuit and Clinton Streets and Dukes County Court House | National Register District 1978 |
| | Flying Horses Carousel | 33 Oak Bluffs Avenue | Individually listed in the National Register 1979; Individual National Historic Landmark 1987 |
| | The Arcade | 134 Circuit Avenue | Individually listed in the National Register 1994 |
| | Dr. Harrison A. Tucker Cottage | 42 Ocean Avenue | Individually listed in the National Register 1990 |
| | Oak Bluffs Christian Union Chapel | Bordered by Circuit, Kennebec Avenue, Narragansett Avenue and Grove Street | Individually listed in the National Register 1990 |
| Edgartown | Edgartown Village Historic District | Bounded by Water Street (north and south) and Pease's Point Way (north and south) | National Register District 1983 |
| | Edgartown Harbor Lighthouse | North Water Street | Individually listed in the National Register, Lighthouses of Massachusetts Thematic Resource Area 1987 |
| | Cape Poge Light | Chappaquiddick Island | Individually listed in the National Register, Lighthouses of Massachusetts Thematic Resource Area 1987 |
| **Nantucket** | | | |
| Nantucket | Nantucket Historic District | All of Nantucket Island | National Historic Landmark District 1966 |
| | Nantucket (Great Point) Light | Great Point | In Nantucket Historic Landmark District 1966; Individually listed in the National Register, Lighthouses of Massachusetts Thematic Resource Area 1987 |

* Visibility toward proposed Wind Park was assessed during viewshed reconnaissance field visits by ESS Group, Inc. and EDR, P.C. West Chop Light Station in Tisbury likely has no visibility to the Wind Park at ground level from the adjacent road; however views from the top of the lighthouse are likely.

sixteenth century. In 1602, Bartholomew Gosnold made the first documented landfall at Cape Cod and the islands. The Pilgrims landed first at Provincetown on the outer tip of Cape Cod in 1620 before choosing to settle at Plymouth. (MHC 1987:56-57).

Permanent European settlement of Cape Cod occurred in 1637 with the founding of Sandwich. Other towns followed, including Barnstable (1638), Yarmouth (1639), Falmouth (1686), Edgartown on Martha's Vineyard (1641; incorporated 1671), and Nantucket (1659; incorporated 1671). Tisbury was also incorporated in 1671 (MHC 1987:66, 70-71, 73).

**Colonial Period (1692 to 1775)**

European settlement grew more slowly than in other areas of Massachusetts at first, but expanded rapidly with the rise of a maritime economy based on fishing, near-shore and later off-shore whaling, and coastal trading of lumber, fish, sperm oil, spermaceti candles and other commodities. Town centers without exception were located on the coast, on or near a good harbor. The most dramatic growth was evidenced by Nantucket, with the largest number of and most far-reaching whaling vessels, which became the most populous and prosperous town in the region, replacing even Boston as the central market. Other towns, such as Barnstable, and Edgartown, also had major port harbors. Maritime traffic comprised of at least three categories: vessels bound for distant ports, including West Indies and Europe and whaling grounds off Africa, the West Indies, and Brazil; a growing, regularly scheduled sloop and packet itinerary on well defined routes as far as Long Island Sound; and expanding local travel, including the first ferry service, initiated between Falmouth and Martha's Vineyard in 1729. All three spurred the construction of wharves, warehouses, and other waterfront facilities, in addition to funding town infrastructure improvements, new institutional and civic buildings, and private investment in modest and high-style houses (MHC 1987:78-80, 90, 254-256).

**Federal Period (1775 to 1830)**

During the Revolution, the extensive coasts and indefensible open harbors of Cape Cod and the Islands made them vulnerable to the British blockade and attack. Fishing and trading came to a standstill. However, after the war maritime industries and coastal trading resurged, and maritime transport continued to be the most important means of movement of people and goods. Packet service and regular voyages linked Nantucket and Martha's Vineyard to one another and to Barnstable, Falmouth, and Yarmouth, and connected the region to New Bedford and New York. Characterized by small vessels and independent operators, this coastal trading remained strong until after the Civil War. (MHC 1987: 92-93, 239).

New industries developed, such as fish processing, shipfitting, saltmaking, and shipping related services. The federal government introduced navigational improvements, particularly lighthouses that marked harbor entrances and dangerous waters, authorized by an act of Congress in 1789. Among the early lighthouses were Brant Point (1746) and Great Point (1784) on Nantucket; Gay Head (1799), Cape Poge (1801), West Chop (1817), and Edgartown Harbor (1828) on Martha's Vineyard; Point Gammon (1816), Barnstable (Hyannis); Monomoy Point (1823), Chatham; and Nobska Point (1828), Falmouth. (MHC 1987:92-94). Harbor improvements by the federal government were funded beginning in 1824; one of the first was a new breakwater at Hyannis (expanded, extant). (MHC 1987:247).

**Early Industrial Period (1830 to 1870)**

Whaling from Nantucket, Martha's Vineyard, Falmouth, and Barnstable ports peaked in the second quarter of the nineteenth century. The capture of the first right whale by a Nantucket whaler in the Pacific Ocean off the northwestern United States in 1835, opened one of the most important whaling grounds in the world. Factors that combined to erode the whaling industry beginning in the 1840s included declining yields, a great fall in prices, the limitations of Nantucket Harbor, the exodus to the California Gold Rush in 1849, and finally the economic Panic of 1857 and the discovery of petroleum in Pennsylvania in 1859 (MHC 1987: 261-264).

In 1850, the Barnstable Custom House recorded its peak coastal trading tonnage, the highest in New England, comprised primarily of salt cod and pickled mackerel. After 1850, several factors combined to cause the gradual demise of coastal trading: the advent of the railroad which provided an alternative, affordable and reliable land-based transport system; the Civil War, which disrupted and effectively destroyed trade with the slave-based southern market; and the introduction of larger schooners designed to carry the coal fuel in demand in urban markets, and which could not be easily handled by the relatively shallow Cape Cod and islands ports. By the 1880s these ships were the mainstay of the American merchant marine. By the end of the nineteenth century, the maritime trade of Cape Cod and the islands had faded. Steam tugs and barges replaced sailing vessels, and railroads and roads competed effectively for the remaining freight traffic. Only passenger service remained, and in fact expanded as tourism grew. (MHC 1987:249-250, 252).

Tourism on Cape Cod and the islands began in the mid-nineteenth century, as urban dwellers sought respite and healing from cities and industrial areas along the seashore with its "bracing air and excellent water" (MHC 1987:308). The advent of the railroad to Sandwich on Cape Cod in 1848 brought about the first appearance of repeat summer residents in Falmouth and Barnstable. Initially, individuals purchased second homes and adapted existing large homes and inns for seasonal guests or for the infirm and invalid. Recreational hunting and fishing were favorite pastimes for part-time residents and rental visitors. Nantucket and Gosnold on the Elizabeth Islands were the earliest vacation retreats in the region. Visitors arrived by stagecoach or packet boat, and after about 1830, by regular steamer service. The introduction of dependable passenger steamer service brought Methodists from the region and beyond to Oak Bluffs. By the 1850s, the popularity of "Camp Meeting Sunday" brought the first "day trippers" to Martha's Vineyard. (MHC 1987: 307-309).

**Late Industrial Period (1870 to 1915)**

The completion of the railroad network to Provincetown and between Oaks Bluffs and Edgartown after the Civil War continued to attract summer visitors. The "Dude Train" introduced in 1886 between Boston and Woods Hole was the region's premier resort service. Small hotels and resort communities continued to appear throughout the Cape and islands region to accommodate the influx of travelers. Land companies organized to sell choice seaside real estate starting about 1870 with the Oak Bluffs Land and Wharf Company, followed by the Falmouth Heights Land and Wharf Company. Based off Cape Cod, the land companies drew their primary clientele from other areas and provided amenities such as a wharf, hotel, and centrally located park. By the 1880s and 1890s, seaside development on Cape Cod, Martha's Vineyard, and Nantucket exhibited a larger scale, with massive, self-sufficient

resort hotels and large private estates, often designed by notable architects and landscape architects. Boating, swimming, and walking and picnicking on the shore either at public beaches or private clubs were enjoyed by all visitors and residents.

The economic impact was pronounced, bringing only modest new and seasonal employment. Falmouth's land valuation, for example, rose over 220% in the years between 1863 and 1920. By the latter year more than 50% of taxes were paid by out of town residents (MHC 1987:313). Towns benefited primarily through fiscal and physical improvements to town institutions sponsored by wealthy summer residents. The completion of the Cape Cod Canal in 1914 and the original Bourne and Sagamore bridges in 1911 and 1912 respectively, for auto traffic opened the gates for this influx. (MHC 1987: 311-313).

**Early Modern Period (1915 to 1940)**

After 1920, the rapid expansion of the automobile and improved roads increased day trips, particularly to the mid-Cape area where real estate and commercial booms shaped Hyannis as the local metropolis. The original Canal bridges were replaced in the 1930s by the existing Bourne and Sagamore Bridges, and by 1940 the Canal widening project was completed. By 1940, tourism dominated the economic base of most towns in the region. (MHC 1987:313-314).

**Modern Period (1940-present)**

Seasonal development on Cape Cod and the islands continued throughout the twentieth century and eventually was supplemented by intensely increasing numbers of all-season homes for working and retired residents. Air travel grew after World War II, substantially shortening the commute from Boston and New York for those who could afford the fare. The introduction of fiberglass boats underscored an increase in recreational sailboat and powerboat ownership. High speed and regular ferries, whalewatch boats, and private power and sail boats of all sizes now ply the waters of Nantucket Sound from the growing combined year-round communities and summer resorts of Cape Cod and the islands. Hyannis achieved further renown in the 1960s when President John F. Kennedy used the Kennedy Compound and nearby houses at Hyannis Port as a "Summer White House."

Since the mid-1960s, an awareness of the value of the region's historic architecture, scenic landscapes, and ecology has shaped planning and historic preservation decisions. These include the establishment of one of the nation's first NHL districts for the entire island of Nantucket.

**Historic Properties**

The scope for identification of aboveground historic properties in the visual APE of the Cape Wind Project was established by the Corps, in consultation with the MHC. It is based on existing information in MHC files and includes individual historic properties and historic districts that meet one of the following criteria:

- National Historic Landmark;
- listed in the National Register;

- formally Determined Eligible for listing in the National Register by the Keeper of the National Register; and

- included in the Inventory of the Historic Assets of the Commonwealth and previously evaluated as National Register eligible with concurrence by the MHC.

The 20 historic properties identified within the Cape Wind Energy Project's Horseshoe Shoal Preferred Alternative APE are organized by town and listed in Table 3-1. The historic properties consist of 3 NHLS, 5 National Register historic districts, and 12 National Register individual properties. The location of these properties is shown in Figure 5.10.1 "Visual Reconnaissance for Designated Historic Properties" of the DEIS/DEIR. The existing conditions characterization photographs of the properties and their surroundings, as well as accompanying location maps, that were assembled for the visual simulation are included in Section 5.10 of the DEIS/DEIR at Figure 5.10-2 (Sheets 1-64) and are referenced here for each historic property.

The Cape Wind Project visual APE for the Horseshoe Shoal Preferred Alternative includes portions of, and historic properties within, two large thematic National Register nominations. Six of the individual historic properties in the Cape Wind Project APE are historic lighthouses that were listed in the National Register as part of the Lighthouses of Massachusetts Thematic Group in 1987. As a group, these structures exemplify the historical relationship of this coastal area with sea. All share an elevated exposed site dictated by their function as aids to nocturnal navigation (Zimmerman et al. 1987). Five individual historic properties and districts in the Town of Barnstable were listed in the National Register in 1987 as part of the Barnstable Multiple Resource Area nomination (Jenkins 1986). Barnstable is divided into seven villages, and three of these (Cotuit, Osterville, and Hyannis Port) are represented by the historic properties in the APE. Three of the historic properties are NHLs: Nantucket Island, Nantucket; Kennedy Compound, Barnstable (Hyannis Port); and Flying Horses Carousel, Oak Bluffs (Martha's Vineyard).

A description of each of the historic properties evaluated for visual impacts from the Horseshoe Shoal Preferred Alternative of the Cape Wind Project follows. This information was developed from sources listed in the References section and field observations by others (see DEIS/DEIR Section 5.10.2.7.1):

**Falmouth (Cape Cod)**

***Nobska Point Light Station***
***Woods Hole***

The Nobska Point Light Station complex dates from 1876, when the existing white cylindrical tower was constructed to replace a navigational light atop a keeper's dwelling that had operated since 1828. The light is a major navigational aid located on a rocky headland near the entrance to Woods Hole Harbor. The complex consists of the 40-foot-high light tower with entry porch (1876), two keeper's dwellings (1876, 1990) connected by a porch, a brick oil house (1876), paint lockers (1876), garage (1931) and a radio beacon building (1937). The light has been unmanned and automated since 1985. The 2.11-acre (0.009 $km^2$) site is largely bare of vegetation and the white tower can be seen clearly from

all directions. The base of the light is publicly accessible, and a plaque provides historic information to visitors that park at a small adjacent lot.

Nobska Point Light Station is important for its scenic qualities, sited on a bluff overlooking Vineyard Sound, and for its strategic location as well as for significant associations with the development of aids of navigation in Massachusetts. The Light Station complex was listed in the National Register in 1987 as part of the Lighthouses of Massachusetts Thematic Group. The complex possesses integrity of location, design, setting, materials and workmanship and meets criteria A and C of the National Register (Zimmerman et al. 1981).

The existing character of the Nobska Point Light Station and the view towards the Cape Wind Project is shown as Viewpoint 1 in DEIS/DEIR Figure 5.10-2 (Sheet 1). Locations are shown on Sheet 2 and character photographs are shown on Sheets 4-6.

**Barnstable (Cape Cod)**

***Cotuit Historic District***
***Cotuit***

The Cotuit Historic District, westernmost of the villages in Barnstable, occupies a neck of land surrounded by Popponesset Bay to the west, Nantucket Sound to the south, and Osterville Harbor and Cotuit Bay to the east. Most of the approximately 125 buildings in the district are residential, with some commercial and institutional buildings along Main Street in the village center. The district extends north-south along the west side of Cotuit Bay.

Cotuit was first settled in the early 1700s in the interior Santuit area, near what is now Route 28, to utilize fertile lands and early transportation corridors. As local economies shifted from land-based activities to the maritime industries in the early nineteenth century, the settlement shifted to the shore along the west side of Cotuit Bay. Key maritime activities included oystering, fishing, shipbuilding, coastal trade, and salt making. Many of the houses in the district were built by ship captains, and reflected their wealth. As the maritime trades ebbed in the late nineteenth century, summer residents discovered the village. Federal and Greek Revival architectural styles represent the district's early seafaring heritage, while later Italianate, Second Empire, Gothic Revival, Queen Anne and Colonial Revival structures reflect the area's later evolution into a quiet summer resort.

Most buildings are framed by mature wooded vegetation. Cotuit has retained a quiet, settled atmosphere due to its location several miles from busy main routes. Its small harbor offers moorings for many boats, and the village has an active local sailing program. The village is traditionally known for its oysters, which continue to be harvested in Cotuit Bay.

The Cotuit Historic District is significant as a major collection of nineteenth and early twentieth century buildings related to the maritime industries and summer resort activities. It includes the homes of many distinguished sea captains and summer visitors and continues to reflect, in an unusually well preserved fashion, the patterns of nineteenth and early twentieth century lifestyles on Cape Cod. The Cotuit Historic District was listed in the National Register in 1987 as part of the Town of Barnstable

MRA (Jenkins 1986). The district possesses integrity of location, design, setting, materials, workmanship, feeling and association, and meets National Register criteria A, B, and C (Jenkins, Village Summary Sheet: Cotuit and Form A 1986).

A representative historic structure in the Cotuit Historic District and the view towards the Cape Wind Project are shown as Viewpoint 5 on DEIS/DEIR Figure 5.10-2 (Sheet 8). The existing character of the historic district is shown in DEIS/DEIR Figure 5.10-2 (Sheet 10, 11; locations are shown on Sheet 9).

***Colonel Charles Codman Estate***
***43 Ocean Avenue***
***Cotuit***

The Codman Estate is a fine example of late nineteenth century summer resort architecture located on the Ocean Drive peninsula overlooking Cotuit Bay. The house was originally designed by Boston architect John R. Sturgis in the Queen Anne style and built in 1867 for Col. Charles Codman, a Civil War veteran, who had already summered at Cotuit for 20 years. Subsequent owners successfully remodeled the house in the Colonial Revival and Shingle styles in the early twentieth century.

The Codman Estate is significant for its role in Cotuit's limited summer resort development, and as a fine example of seaside resort architecture. The Col. Charles Codman Estate was listed in the National Register in 1987 as part of the Town of Barnstable MRA (Jenkins 1986). The property possesses integrity of location, design, setting, materials, workmanship, feeling and association, and meets National Register criteria A and C (Jenkins, Form B 1986).

A view of the Codman Estate entrance is shown in DEIS/DEIR Figure 5.10-2 (Sheet 11; the location is shown on Sheet 9). The property was posted private. Viewpoint 5 is representative of the existing view from the property.

***Wianno Historic District***
***Osterville***

The Wianno Historic District is comprised of 28 main buildings and 13 outbuildings on approximately 40 acres (0.16 $km^2$) along Sea View Avenue and Wianno Avenue. The lands were originally assembled in the late nineteenth century by a consortium of local, Boston, and New York businessmen and developed as a summer colony for leisure and recreation in the healthy sea air. The large well-kept lots on either side of Sea View Avenue along Nantucket Sound contain grand Shingle Style and Colonial Revival style summerhouses, most of which were constructed between the late nineteenth century and World War I. The Wianno Club (see separate entry below) is a centerpiece of the district.

The Wianno Historic District is significant as one of three well-preserved summer resort colonies developed in Barnstable in the late nineteenth century, and contains an extraordinary collection of Colonial Revival and Shingle Style architecture. The district is also significant for its association with a notable Boston architect and many prominent seasonal residents. The Wianno Historic District was listed in the National Register in 1987 as part of the Town of Barnstable MRA (Jenkins 1986). The

district possesses integrity of location, design, setting, materials, workmanship, feeling and association, and meets National Register criteria A, B, and C (Jenkins and Frontiero, Form A, 1986).

A representative historic structure in the Wianno Historic District and the view towards the Cape Wind Project are shown at Viewpoint 6 in DEIS/DEIR Figure 5.10-2 (Sheet 12). The existing character of the historic district and vicinity is shown in DEIS/DEIR Figure 5.10-2 (Sheets 14-16; locations are shown on Sheet 13).

***Wianno Club***
***107 Sea View Avenue***
***Osterville***

The Wianno Club on Sea View Avenue is a focal point of the Wianno Historic District. Designed in the Shingle Style by architect Horace Frazer of Boston (who also designed a number of private residences in the district) and erected in 1881, it is a massive three-story shingled main building and two-story rear ell, both with mansard roofs. The Club overlooks Nantucket Sound on almost 1,000 feet (304 meters) of beach frontage. The building is architecturally significant, as much of its original and interior detailing survives.

The Wianno Club was individually listed in the National Register in 1979, and was included in the Town of Barnstable MRA in 1987 (Jenkins 1986). The property possesses integrity of location, design, setting, materials, workmanship, feeling and association, and meets National Register criteria A, B, and C (Jenkins and Frontiero, Form A, 1986).

On the Sound side of Sea View Avenue, which runs parallel to the shore, the structures are regularly spaced with open well-maintained lawns and unobscured views toward the Wind Park site to the south. Across Sea View Avenue, views toward the Wind Park site are limited to areas between intervening structures. Mature trees and large hedges also effectively screen views.

A view of the Wianno Club is shown in DEIS/DEIR Figure 5.10-2 (Sheet 14, photograph Viewpoint 6-CE-10). Views of Nantucket Sound adjacent to the Wianno Club also at Viewpoint 6 is shown in Figure 5.10-2, Sheet 12, bottom photograph.

***Hyannis Port Historic District***
***Hyannis***

The Hyannis Port Historic District is a densely developed residential area in the southernmost part of the village of Hyannis. The most remarkable natural feature of the district is its encompassing views of Hyannis Harbor and Nantucket Sound beyond. The densely developed summer community is characterized by well-maintained colonial and shingled Victorian beach wood-frame buildings on small lots, with a few earlier structures. The district includes 149 main buildings and 58 outbuildings on 100 acres related to Hyannis' summer resort development in the late nineteenth and early twentieth centuries. The district is roughly bounded by Massachusetts Avenue and Edgehill Road, Hyannis Avenue, Hyannis Harbor and Scudder Avenue.

The Hyannis Port Historic District is for important its eighteenth century settlement period and ensuing maritime connections, but derives primary significance for its planned development as a seaside resort community. The Hyannis Port Historic District was listed in the National Register as part of the Town of Barnstable MRA in 1987 (Jenkins 1986). The district possesses integrity of location, design, setting, materials, workmanship, feeling, and association, and meets National Register criteria A, B, and C (Jenkins and Frontiero, Form A, 1986).

A representative historic structure in the Hyannis Port Historic District and the view towards the Cape Wind Project are shown at Viewpoint 8 in DEIS/DEIR Figure 5.10-2 (Sheet 21). The existing character of the historic district and vicinity is shown in DEIS/DEIR Figure 5.10-2 (Sheets 21, 25-28; locations are shown on Sheets 22 and 23).

***Kennedy Compound***
***Hyannis***

The Kennedy Compound is located along the shore within the Hyannis Port Historic District (see separate entry above). The Compound contains approximately 6 acres (0.02 $km^2$) of waterfront property on Nantucket Sound, and includes the white clapboard residences that formerly housed Kennedy family patriarch Joseph P. Kennedy and his sons Robert F. Kennedy and John F. Kennedy. The largest is the Joseph P. Kennedy house, where the family summered starting in 1926, and where Rose Kennedy lived until her death in 1995. The smaller houses were purchased by the sons for their families, and together comprise the Kennedy Compound. The Compound was the base of John F. Kennedy's presidential campaign in 1960, and served as the Summer White House in 1961. Subsequent presidential summer stays were nearby at Squaw Island, which provided better security and privacy (Mackintosh 1972).

The Kennedy Compound is nationally significant for its association with President John F. Kennedy and the Kennedy family; its "reputation is known to virtually all Americans of political consciousness during the early 1960s." The Compound was designated as a National Historic Landmark in 1972 (Mackintosh 1972).

Due to lack of access there are no existing conditions character photographs of the Kennedy Compound in DEIS/DEIR Figure 5.10-2. Expected views of Nantucket Sound from the Compound are represented by nearby Viewpoint 8 (Sheet 21, bottom photograph).

**Chatham (Cape Cod)**

***Monomoy Point Lighthouse***

The Monomoy Point Lighthouse is located at the southern end of Monomoy Island, a coastal barrier beach island extending approximately 10 miles (16.1 km) south of the Cape's elbow at Chatham. The island is an uninhabited coastal dune and marsh complex, and comprises most of the Monomoy National Wildlife Refuge managed by the U.S. Fish and Wildlife Service. The island is accessible only by boat, and little human disturbance or development is evident except for footpaths and the historic lighthouse and its associated buildings. The landform is characterized by rolling dunes and bluffs, with beach grass and sparse, scattered woody vegetation. Marshes and open water dominate views near the shoreline.

Wildlife such as gulls, terns and seals are abundant and add to the remote and undeveloped character of the island. The island is a National Wilderness Area, although the parcel that contains the lighthouse is not included in that designation. The Massachusetts Audubon Society has owned the parcel since 1977. A lighthouse has occupied the site since 1823. The present light was constructed around 1871. The lighthouse complex is unmanned, and includes a brick light tower and a two-story keeper's house, both of which have deteriorated.

Monomoy Point Lighthouse and this location are significant for providing a beacon that guided sailors safely around Pollock Rip, Stonehouse, and Little Round Shoals, perhaps the most dangerous shoals of the eastern seaboard. Monomoy Point was listed in the National Register in 1979 (Tougas 1978) and also included in the 1987 listing of the Lighthouses of Massachusetts Thematic Group (Zimmerman et al. 1981).

The existing character of Momonoy Island in the vicinity of Monomoy Point Lighthouse and the view west-southwest towards the Cape Wind Project at Viewpoint 26 are shown in DEIS/DEIR Figure 5.10-2 (Sheets 31 and 33; locations are shown on Sheet 32).

**Tisbury (Martha's Vineyard)**

***West Chop Light Station***
***West Shop Road***

The West Chop Light Station, on the western side of Vineyard Haven Harbor on Martha's Vineyard, was originally constructed in 1817, replaced with the present brick tower in 1838, and was moved back from the sea in 1848 and 1891.

West Chop Light Station was listed in the National Register in 1987 as part of the Lighthouses of Massachusetts Thematic Group (Zimmerman et al. 1981).

Due to lack of access there are no existing character views of the West Chop Light Station in DEIS/DEIR Figure 5.10-2.

**Oak Bluffs (Martha's Vineyard)**

***East Chop Light***
***Lighthouse Road***

The East Chop Light is located on the northern edge of the highest bluff on East Chop, on the east side of Vineyard Haven Harbor, Martha's Vineyard. The cast-iron lighthouse was constructed in 1876, to replace a private lighthouse erected in 1828 that was destroyed by fire.

East Chop Light is significant for its associations with the development of aids to navigation in Massachusetts. The Light was listed in the National Register in 1987 as part of the Lighthouses of Massachusetts Thematic Group. The complex possesses integrity of location, design, setting, materials and workmanship and meets National Register criteria A and C (Zimmerman et al. 1981).

The existing character of the historic property and the view east towards the Cape Wind Project are represented by Viewpoint 21 and are shown in DEIS/DEIR Figure 5.10-2 [Sheets 45 and 47 (Photograph VP 21-C3); locations are shown on Sheet 46].

***Martha's Vineyard Campground Historic District***

The Martha's Vineyard Campground Historic District (also called Wesleyan Grove) contains 306 nineteenth century cottages and 6 public buildings on 34 acres. The district is located close to, but does not border, Nantucket Sound. The campground was founded in 1835 a summer Methodist meeting area; the first participants stayed in tents that were later replaced by small cottages. Religious activity in the 19th century caused the campground to grow rapidly. The original week-long religious meeting in August evolved as people began arriving earlier in the summer, sparking the resort development of the adjacent area. The resulting town of Cottage City was created in 1880, and was renamed Oak Bluffs in 1907. The focal points of the camp are the iron Tabernacle and the Trinity Methodist Church, both located on Trinity Park near the center of the campground. The typical campground cottage is a simple 1.5-story rectangular structure, approximately 15 feet wide by 20 feet deep. Porches, typically late nineteenth century additions, are heavily ornamented with trim. Much of the historic district is shaded with mature trees and other vegetation.

The Martha's Vineyard Campground Historic District is significant for its unique architecture, state of preservation, and its association with nineteenth century religious practices. The Martha's Vineyard Campground Historic District was listed in the National Register in 1978 (Durfee and Gilmore 1978).

The existing character of the Martha's Vineyard Campground Historic district is shown in DEIS/DEIR Figure 5.10-2 [Sheets 48-50 (Photograph 21-C7); locations are shown on Sheet 46]. There is no visibility from Martha's Vineyard Campground Historic District to the Cape Wind Project area.

***Flying Horses Carousel***
***33 Oak Bluffs Aveune***

The Flying Horses Carousel is located in the business district of Oak Bluffs. The finely carved carousel of 20 prancing horses and four chariots in a simple wooden structure was built in 1876 and has operated at this location since 1889. The Carousel is indicative of the late nineteenth century interest in amusements and recreation at summer resorts such as Oak Bluffs.

The Flying Horses Carousel possesses integrity of location (since 1889), design, material, workmanship, and association, and is significant as the oldest platform carousel operating in the United States. It was listed on the National Register in 1979 (Jenkins 1979) and was designated as an NHL in 1987.

The existing character of the historic property is shown in DEIS/DEIR Figure 5.10-2 [Sheet 50 (Viewpoint 21-C18; the location is shown on Sheet 46]. There is no visibility from the Flying Horses Carousel to the Cape Wind Project area.

***The Arcade***
***31 (formerly 134) Circuit Avenue***

The Arcade was erected in 1871 by the Oak Bluffs Land & Wharf Company as part of an effort to profit from the success of the Methodist Campground at Wesleyan Grove by creating a secular resort community. The three-story, wood-frame building was designed in the Victorian Gothic style by architect Samuel Pratt. Pratt also designed Union Chapel (see separate entry below) and other buildings in Oak Bluffs. The Arcade remains today as a prominent and architecturally distinguished commercial building surrounded by other commercial buildings and shops along a busy street in downtown Oak Bluffs. The Arcade is screened from Nantucket Sound by intervening structures in the Oak Bluffs business district.

The Arcade is significant as only one of two remaining major works by a noted architect, as an excellent example of Victorian Gothic design, and for its association with the establishment and development of Oak Bluffs as a popular summer resort. The Arcade was listed in the National Register in 1994. The property possesses integrity of location, design, setting, materials, workmanship, feeling and association and meets National Register criteria A and C (Beard 1994).

One existing character view of The Arcade is shown in DEIS/DEIR Figure 5.10-2 [Sheet 49 (Photograph Viewpoint 21-C13); the location is shown in Sheet 46]. There is no visibility from The Arcade to the Cape Wind Project area.

***Dr. Harrison A. Tucker Cottage***
***42 Ocean Avenue***

The Tucker Cottage was originally built in the Stick Style in 1872 by Dr. Tucker, a nationally renowned patent medicine manufacturer, and then was substantially altered by him into a large Queen Anne summerhouse in 1877. The house and carriage house are part of the Ocean Park neighborhood of large, late nineteenth century summer homes near the Methodist camp meeting ground at Wesleyan Grove (see Martha's Vineyard Campground Historic District, above).

The street pattern of Ocean Park is a curvilinear series of narrow streets around Ocean Park, a 7-acre (0.03 $km^2$) semi-circular green space that faces Sea View Avenue and Nantucket Sound beyond. The Tucker Cottage overlooks the bandstand at Ocean Park on Ocean Avenue, the innermost crescent along the Park.

The Dr. Harrison A. Tucker Cottage is significant as the summer residence of a prominent medicine manufacturer and Oak Bluffs' most conspicuous host and civic minded citizen of the late nineteenth century, as well as being important as the most ornate Queen Anne cottage in Oak Bluffs. The Tucker Cottage was listed in the National Register in 1990. The property retains integrity of location, design, materials, workmanship, feeling, and association, and meets National Register criteria B and C (Baumhofer, Jessup, and Friedberg 1989).

One existing character view of the Dr. Harrison A. Tucker Cottage and representative Viewpoint 2 are shown in DEIS/DEIR Figure 5.10-2 (Sheet 45, top and bottom photographs; the location is shown on Sheet 46].

***Christian Union Chapel***
***Narragansett, Circuit, and Kennebec Avenues and Grove Street***

The octagonal-plan Oak Bluffs Christian Union Chapel (known as Union Chapel) is sited west of Ocean Park and close to the Wesleyan Grove Methodist campground. The chapel was built in 1870-71 in the Stick Style. The mature vegetation around the church partially obscures the chapel from contiguous streets, and fully screens the chapel from views of Nantucket Sound.

Union Chapel is significant as the first nonsectarian religious building to be erected on Martha's Vineyard for islanders and seasonal visitors, as one of two surviving major works by Samuel Pratt, and as an exemplar of the octagonal mode of design. Union Chapel was listed in the National Register in 1990. The property retains integrity of location, design, materials, workmanship, feeling, and association, and meets National Register criteria B and C (Guest, Jessup, and Friedberg 1989).

The existing character of the Christian Union Chapel is shown in DEIS/DEIR Figure 5.10-2 (Sheets 48, Viewpoint 21-C6 and C7; locations are shown on Sheet 46). There is no visibility from the Christian Union Chapel to the Cape Wind Project area.

**Edgartown (Martha's Vineyard)**

***Edgartown Village Historic District***

The Edgartown Village Historic District comprises approximately 150 acres (0.61 $km^2$) along the west side of Edgartown Harbor. This village area has relatively high-density residential and commercial land use, with well-maintained large homes, small shops, inns and restaurants connected by narrow streets. The district contains approximately 500 contributing buildings (constructed pre-1933), mostly wood frame houses of the nineteenth and early twentieth centuries. A smaller, locally designated district (the Edgartown Local Historic District) is contained within the National Register District. The village's two major periods of significance relate to late eighteenth to nineteenth century whaling activities, and late nineteenth century to present day summer tourism. Architectural styles vary from First Period Colonial, late Georgian and Federal sea captains homes, Greek Revival, Victorian, and Colonial Revival.

The Edgartown Village Historic District possesses significant historical associations with the early settlement of Martha's Vineyard, the development of whaling as the Island's principal business during the nineteenth century, and the establishment of tourism as a major element in the local economy at the turn of the twentieth century. The district contains a distinctive grouping of a range of architecture, including the residences of individuals who were regionally prominent in the whaling trade. The Edgartown Village Historic District was listed in the National Register in 1983. The District retains integrity of location, design, materials, workmanship, feeling, and association, and meets National Register criteria A, B, and C (Fitch, Pfeiffer, and DeStefano 1983).

A representative historic structure in the district and the view towards the Cape Wind Project from the district, represented by Viewpoint 20, are shown in DEIS/DEIR Figure 5.10-2 (Sheet 38, bottom photograph). The existing character of the historic district is shown in DEIS/DEIR Figure 5.10-2 (Sheets 40-44; locations are shown on Sheet 39).

### *Edgartown Harbor Lighthouse*

The Edgartown Harbor Lighthouse is located on a rock breakwater off a spit along the northeastern side of Edgartown Harbor opposite Chappaquidick Island. The original lighthouse at the eastern end of the Harbor was built in 1828 and destroyed following the Hurricane of 1938. The existing 1875 cast-iron lighthouse that originally stood at Crane's Beach in Ipswich, and was disassembled and moved by barge to Edgartown in 1939 replaced this structure and is the light standing today.

Edgartown Harbor Light is a well-preserved example of the cast iron lights that typify the second half of the nineteenth century period. Although moved, it still retains some associations with its former site and continues to mark a site that has been characterized by a beacon since 1828. Edgartown Harbor Light was listed in the National Register in 1987 as part of the Lighthouses of Massachusetts Thematic Group. The complex possesses integrity of design, setting, materials and workmanship and meets criteria A and C of the National Register (Zimmerman et al. 1981).

The existing character of the historic property and the view northeast towards the Cape Wind Project at Viewpoint 20 are shown in DEIS/DEIR Figure 5.10-2 (Sheet 38; locations are shown on Sheet 39).

### *Cape Poge Light*

The Cape Poge Lighthouse was built in 1922 on the northeastern tip of Chappaquiddick Island. The present wood-shingled lighthouse replaced several earlier decaying towers, the earliest of which was constructed in 1802. Encircling the top of the tower is a simple cast iron balustrade. The windows and doorway are pedimented.

This largely natural area on the north side of Chappaquiddick Island is protected by the Massachusetts Trustees of Reservations. The area contains dunes and low coastal vegetation, bordered in places by a steep 20- to 30-foot (6.1 to 9.1 meters) high sandy bluff at the ocean shoreline. The area is undeveloped other than perhaps 5 to 10 large homes and several unimproved sand roads.

Cape Poge Light is significant for its associations with the development of aids to navigation in Massachusetts, and as one of only seven wood-frame lighthouses in the state. Cape Poge Light was listed in the National Register in 1987 as part of the Lighthouses of Massachusetts Thematic Group. The complex possesses integrity of design, setting, materials and workmanship and meets criteria A and C of the National Register (Zimmerman et al. 1981).

The existing character of the historic property and the view northeast towards the Cape Wind Project at Viewpoint 19 are shown in DEIS/DEIR Figure 5.10-2 (Sheets 34, 36, and 37; locations are shown on Sheet 35).

**Nantucket (Nantucket)**

***Nantucket Historic District***

The Nantucket Historic District NHL encompasses the entire island of Nantucket, is approximately 75 miles in circumference and 30,000 acres in area. It was estimated to contain 2,400 historic properties in 1966. Outside of densely developed Nantucket Village on the north side of the island, there are a few small clusters of historic buildings, the largest of which is at Siasconset, and scattered historic and modern residential development. However, the overall character of the island is a natural unspoiled expanse with 1050 acres of ponds and peat swamps, open moors, and sweeping coastline.

Nantucket combines a near pristine natural coastal environment with a well-preserved collection of structures reflecting its early development, its emergence as major whaling center in the middle of the nineteenth century, and its subsequent summer resort expansion. The entire Nantucket island is nationally significant. It is listed in the National Register and was designated as the Nantucket Historic District NHL in 1966 (Heintzelman 1975).

A discussion of selected specific locations on Nantucket Island that have potential views to the Cape Wind Project area follow:

- Nantucket Village is a compact classic colonial New England maritime community on the western side of Nantucket Harbor. The historic character of the village is defined by eighteenth and nineteenth century architecture including the clean pious lines of the houses of former sailors, fishermen and clergy as well as the grand Federal-style mansions of former ship captains and owners. These varied structures are linked by cobblestone streets and shaded with large street trees. There are no street-level views from Nantucket Village to the Cape Wind Project. The existing character of Nantucket Village near Viewpoint 22 and representative photographs are shown in DEIS/DEIR Figure 5.10-2 (Sheets 53-58; locations are shown on Sheet 52).

- Nantucket Cliffs are located northwest of Nantucket Village along the elevated Cliff Road, where narrow roads traverse a landscape of rolling dunes and low-density residential development. The existing character of the Nantucket Cliffs at Viewpoint 22 and representative photographs are shown in DEIS/DEIR Figure 5.10-2 (Sheets 54; locations are shown on Sheet 52).

- Great Point is a unique undeveloped beach area that forms the northeastern-most part of Nantucket island, and separates the Atlantic Ocean to the east from Nantucket Sound to the west. The area is largely undeveloped with only one or two private homes, a sand road, and the Great Point Lighthouse, which is a visual focal point and is also individually listed in the National Register (see separate entry). Characterized by crashing surf, rolling sand dunes, low beach grass and tidal marsh, the area is a remote and wild setting. The point is managed by the Trustees of Reservations, and is accessible only by four-wheel drive along a sand track. The existing character of Great Point at Viewpoint 23 and representative photographs are shown in DEIS/DEIR Figure 5.10-2 (Sheets 59, 61; locations are shown on Sheet 60).

### *Nantucket (Great Point) Light*

The Nantucket Light (also called Great Point Light or Sandy Point Light) is located on 40 acres of remote and undeveloped beaches at the northerly tip of Nantucket. The 70 ft tall masonry tower overlooks open water on the north, east, and west, and the large saltwater pond of Polpis Harbor on the south. Great Point Light is the first landfall on Nantucket that is seen from the Atlantic Ocean to guide ships away from the Cross Rips and Tuckernuck Shoals area. Lighthouses have operated at Great Point since 1789. The existing unmanned masonry structure was constructed in 1818, and is one of the oldest surviving lighthouse structures in the state.

Great Point Light is significant for its associations with the development of aids to navigation in Massachusetts and as one of the earliest extant lights in the state, which furthermore retains unusual original features such as an elaborate wrought iron staircase. The tower is the first landfall on Nantucket seen from the Atlantic Ocean, and is an important component of the Nantucket Historic District NHL. Great Point Light was also individually listed in the National Register in 1987 as part of the Lighthouses of Massachusetts Thematic Group. The property possesses integrity of location, design, setting, materials, and workmanship and meets criteria A and C of the National Register (Zimmerman et al. 1981).

The existing character in the vicinity of Great Point Light at Viewpoint 23 and representative photographs are shown in DEIS/DEIR Figure 5.10-2 (Sheets 59, 61; locations are shown on Sheet 60).

### Summary of Historic Properties

Upon review of the information regarding the features, character, siting, history, and significance of the historic properties in the Horseshoe Shoal visual APE of the Cape Wind Project, particularly when placed within the overall historic context of Cape Cod, Martha's Vineyard and Nantucket, the ever-present theme of maritime associations is clear. The seven lighthouses are all aids to navigation that have continuously served all manner of pleasure and commercial vessels traveling Nantucket Sound waters for up to 200 years. Most of these vessels leave or enter one of the historic harbors on the south shore of Cape Cod, Martha's Vineyard, and Nantucket. The three NHLs and the five National Register historic districts derive their existence, history, and character from their relationship to the water. Whether associated with early settlement, fishing, coastal trading, whaling, summer resort, or as a Summer White House, all are undeniably linked to the proximity to coastal waters, and supported by activities that occurred on and in those waters. The historic properties' presence would not be possible otherwise. Finally, the 12 individual National Register properties each possess a specific history of construction and use within the context of summer resort development, again, inextricably tied to the water.

# CHAPTER FOUR

# VISUAL EFFECT ANALYSIS AND MITIGATION

This chapter summarizes the results of the visual simulation analysis completed by others for the Cape Wind Project's Horseshoe Shoal Preferred Alternative and provides a professional assessment of the project effects under Section 106 of the NHPA, the Council's regulations at 36 CFR 800, and the Corps' Appendix C regulations as discussed in Chapter 2. The historic property identification and evaluation process outlined in Chapter 3 inform the recommendations regarding the application of the criteria of effect. The report presents these effect recommendations for consideration by the Corps, the SHPO/MHC, and the consulting parties.

The final section of this chapter discusses the ongoing consultation regarding aboveground historic properties among the Corps, SHPO and consulting parties regarding measures to resolve adverse effects.

**Visual Simulation Methodology**

Environmental Design & Research, P.C. (EDR) completed the visual simulations for the Cape Wind Project in November 2003 (see DEIS/DEIR Appendix 5.10-A and DEIS/DEIR Section 5.10.2.7). Based on guidance provided by the Corps, MEPA, and the MHC, EDR prepared visual simulations of the visible components of the proposed Wind Park from, and in the vicinity of, representative designated historic properties and districts on Cape Cod, Martha's Vineyard, and Nantucket. This information is being used to help assess the potential overall visual impact of the project. The Corps and the MHC (in a letter dated December 26, 2002) concurred that 12 proposed selected viewpoint (VP) locations would adequately illustrate the project's visibility and visual impact from Cape Cod, Nantucket, and Martha's Vineyard. The 12 locations are listed in Table 1 and shown both in Figure 2 of the EDR report (DEIS/DEIR Appendix 5.10-A) and Appendix A of this report.

The visual simulation methodology was based on the following visual components of the Cape Wind Project:

- 130 3.6 MW General Electric (GE) offshore wind turbines generators (WTGs) painted a marine gray, each with
  - a 246 ft (75 m) -tall tubular steel monopole tower;
  - three-bladed rotors approximately 341 ft (104 m) in diameter that will reach a maximum height of approximately 417 ft (127 m) above sea level; and
  - a service platform located approximately 30 ft (10 m) above water surface.

- WTGs arranged in a grid pattern, with approximate separation distance of 0.3 to 0.5 mile.

For the purposes of the study, the following lighting program was assumed:

- every other WTG on the project perimeter - fixtures mounted on the nacelle, dual aviation warning lights (white strobes [FAA L865]) during day and flashing medium intensity red lights [FAA L864] during night;

- remaining perimeter WTGs - two low intensity flashing red lights (equivalent to FAA L810) during day and night;

- interior WTGs - two low intensity flashing red lights (equivalent to FAA L810) during day and night; and

- all WTGs - Coast Guard amber navigation warning lights on tower approximately 35 ft above water surface.

In addition to the WTGs, the following will be present and visible:

- a 197 ft-tall meteorological tower (SMDS) (already installed in Horseshoe Shoal) with monopole having a tubular steel tripod base, a 20 X 26 ft service platform, and FAA aviation warning light (equivalent to flashing red FAA L810) at the top;

- an electrical service platform (ESP) 60 ft high x 200 feet wide x100 feet long at a maximum hight of 100 ft above water level, with enclosed structure housing transformers and electrical switching with, metal panel siding, and tubular steel cross-braced legs.

- lighting - required Coast Guard amber navigation warning lights, and helicopter warning lights on helipad remotely activate as needed (no FAA lighting required).

General and specific observations regarding the visual simulations that are presented in the DEIS/DEIR at Section 5.10.4.3.2 and Appendix 5.10-C provide relevant background to this analysis of effect, but are not repeated in detail here. They include the open, unobstructed, and publicly available viewpoint locations selected; day and night lighting; the effects of weather conditions, earth curvature, and distance on visibility; and the views to the Wind Park from each viewpoint location. The DEIS/DEIR at Sections 5.10.2.5 and 5.10.2.7 discusses other historic properties with potential viewpoints that were not selected for simulation based on determinations by ESS Group, Inc. (ESS) and EDR following site visits that there were no open views of Nantucket Sound in the direction of the proposed Wind Park.

This visual impact assessment addresses 10 of the 12 total viewpoints in the EDR simulation study. In accordance with the methodology established in Chapter 2, which limits the visual impact assessment to designated historic properties, one viewpoint from the Craigville area (not in any historic district) in Barnstable (Viewpoint 7), and one from Tuckernuck Island (a State Register, but not National Register, property) near Nantucket Island (Viewpoint 24) are not included in the visual impact assessment. However, these viewpoints are discussed in the DEIS/DEIR at Section 5.10.4.3.2 and Appendix 5.10-A.

**Application of the Criteria of Adverse Effect**

The Section 106 and Council criteria of adverse effect (see Chapter 2) are applied here to each of the historic properties within the Cape Wind Project's visual APE (see Chapter 3), using the results of the visual simulation study (see DEIS/DEIR Appendix 5.10-A).

The specific type of adverse effect applicable to the Cape Wind Project's impact on aboveground historic properties is the introduction of visual elements that may diminish the integrity of a property's significant features that qualify the property for inclusion in the National Register. The pertinent features and qualities are those that were identified at the original evaluation, as well as those that may have been identified subsequently.

This analysis is based on EDR's visual simulation progress prints dated November 16, 2003. The 12 viewpoints selected for the purposes of the visual simulation study are single representative points that provide the most unobstructed views towards the Wind Park available to the general public. None of the views are from private property. The effects finding under Section 106 and the Council regulations must consider the significant qualities of the historic property, regardless of ownership, and must assess the overall effect of the proposed undertaking on the historic property, which may encompass more than a single location.

The effects findings for aboveground historic properties within the visual APE are listed in Table 4-1. Copies of the EDR visual simulation study Figures 2, 5.10-3 (Sheets 1-12) and 5.10-4 (Sheets 1-11) are included in Appendix A.

A discussion of the visual simulation and the effect finding for each of the 3 NHLS, 5 historic district and 12 individual National Register-listed historic properties follows:

**Falmouth (Cape Cod)**

***Nobska Point Light Station (VP 1)***
***Woods Hole***

The EDR study and DEIS/DEIR analysis determined that from Viewpoint 1 at the base of Nobska Point Light Station (approximately 50 ft above sea level) the full horizon is visible. The historic lighthouse possesses open views of Nantucket Sound from the southeast to the southwest, including views of Martha's Vineyard. All Wind Park structures are visible in the simulation along the horizon looking east southeast, and range in distance from 14.1 to 27.1 miles (22.7 to 35 km) [DEIS/DEIR Figures 5.10-3 (Sheet 1) and 5.10-4 (Sheet 1) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of Nobska Point Light Station. It will also impact views from the lighthouse, as well as from vessels looking towards the lighthouse for navigation assistance. These changes constitute a alteration of the character, setting, and viewsheds of this historic aid-to-navigation property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on Nobska Point Light Station.

**Table 4-1. Recommended Section 106 Findings of Effect for Aboveground Historic Properties within the Cape Wind Project, Horseshoe Shoal, Preferred Alternative Visual APE.**

| Town | Name | Viewpoint | Distance/Direction to Wind Park | Section 106 Effect |
|---|---|---|---|---|
| **Cape Cod** | | | | |
| Falmouth | Nobska Point Light Station | VP 1 | 14.1 miles ESE | Adverse Effect |
| Barnstable | Cotuit Historic District | VP 5 | 6.1 miles SE | Adverse Effect |
| | Col. Charles Codman Estate | VP 5 | 6.1 miles SE | Adverse Effect |
| | Wianno Historic District | VP 6 | 5.7 miles SSE | Adverse Effect |
| | Wianno Club | VP 6 | 5.7 miles SSE | Adverse Effect |
| | Hyannis Port Historic District | VP 8 | 6.2 miles S | Adverse Effect |
| | Kennedy Compound | VP 8 | 6.2 miles S | Adverse Effect |
| Chatham | Monomoy Point Lighthouse | VP 26 | 14.9 miles WSW | Adverse Effect |
| **Martha's Vineyard** | | | | |
| Tisbury | West Chop Light Station | None | | Adverse Effect |
| Oak Bluffs | East Chop Light | VP 21 | 9.4 miles ENE | Adverse Effect |
| | Martha's Vineyard Campground Historic District | None | | No Effect |
| | Flying Horses Carousel | None | | No Effect |
| | The Arcade | None | | No Effect |
| | Dr. Harrison A. Tucker Cottage | VP 21 | 9.4 miles ENE | Adverse Effect |
| | Oak Bluffs Christian Union Chapel | None | | No Effect |
| Edgartown | Edgartown Village Historic District | VP 20 | 8.8 miles NE | Adverse Effect |
| | Edgartown Harbor Lighthouse | VP 20 | 8.8 miles NE | Adverse Effect |
| | Cape Poge Light | VP 19 | 5.4 miles NE | Adverse Effect |

**Table 4-1. Recommended Section 106 Findings of Effect for Aboveground Historic Properties within the Cape Wind Project, Horseshoe Shoal, Preferred Alternative Visual APE (continued).**

| Nantucket | | | | |
|---|---|---|---|---|
| Nantucket | Nantucket Historic District:<br>Nantucket Cliffs<br>Tuckernuck Island | <br><br>VP 22<br>VP 24 | <br><br>13.6 miles NNW<br>11.1 miles N | Adverse Effect |
| | Nantucket (Great Point) Light | VP 23 | 11.2 miles NW | Adverse Effect |

* Visibility toward proposed Wind Park was assessed during viewshed reconnaissance field visits by ESS Group, Inc. and EDR, P.C. West Chop Light Station in Tisbury likely has no visibility to the Wind Park at ground level from the adjacent road; however views from the top of the lighthouse are likely.

**Barnstable (Cape Cod)**

***Cotuit Historic District (VP 5)***
***Cotuit***

The EDR study and DEIS/DEIR analysis determined that there are no publicly available views toward the shoreline in the historic district itself, as street level views toward the water are generally broken/partially screened by vegetation and structures. However, views will occur from private properties located at higher elevations and from many of the large shoreline homes, especially from the upper stories. Viewpoint 5 is located immediately south of the district at Loop Beach. Approximately 95 percent of the Wind Park structures, including the grid pattern layout, are visible in the simulation along the horizon looking southeast, and range in distance from the shore 6.1 to 14.2 miles (9.8 to 22.9 km) [DEIS/DEIR Figures 5.10-3 (Sheet 2) and 5.10-4 (Sheet 2) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of the Cotuit Historic District. It will also likely impact the water views of private properties within the district that contribute to its historic and architectural significance. These changes constitute a alteration of the historic character, setting, and viewsheds of this historic early settlement, maritime village, and summer resort property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Cotuit Historic District.

***Colonel Charles Codman Estate (VP 5)***
***Cotuit***

The EDR study and DEIS/DEIR analysis included the Col. Charles Codman Estate within the representative Viewpoint 5 for the Cotuit Historic District. The Codman Estate is located southeast of the district on a point of land jutting into Cotuit Harbor. The visual simulation study had no access to

this private property to assess the shoreline views to the south-southeasterly toward the proposed Wind Park. However, views are likely available, especially from the upper stories.

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of the Colonel Charles Codman Estate. It will also impact the water views from the Codman Estate. These changes constitute a alteration of the character, setting, and viewshed of this historic summerhouse property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Col. Charles Codman Estate.

***Wianno Historic District (VP 6)***
***Osterville***

The EDR study and DEIS/DEIR analysis determined that the view from Seaview Avenue at Viewpoint 6 towards the Wind Park is typical of the broken/partially obscured views available from the road that parallels the shore. Approximately 91 percent of the Wind Park structures will be visible in the simulation including the regular row pattern looking south southeast, and range in distance from the shore 5.7 to 12.6 miles (9.2 to 20.3 km) [DEIS/DEIR Figures 5.10-3 (Sheet 3) and 5.10-4 (Sheet 3) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of the Wianno Historic District. It will also impact the water views of private properties within the district that contribute to its historic and architectural significance. These changes constitute a alteration of the historic character, setting, and viewsheds of this historic noted summer resort community that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Wianno Historic District

***Wianno Club (VP 6)***
***Osterville***

The EDR study and DEIS/DEIR analysis included the Wianno Club within Viewpoint 6 for the Wianno Historic District. The Wianno Club is located in the Wianno Historic District. Approximately 91 percent of the Wind Park structures will be visible in the simulation including the regular row pattern looking south southeast, and range in distance from the shore 5.7 to 12.6 miles (9.2 to 20.3 km) [DEIS/DEIR Figures 5.10-3 (Sheet 3) and 5.10-4 (Sheet 3) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will significantly alter the historic Nantucket Sound setting of the Wianno Club. It will also impact the water views from the Wianno Club. These changes constitute a alteration of the historic character, setting, and viewsheds of this historic summer social and recreational property of the waterfront that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Wianno Club.

***Hyannis Port Historic District (VP 8)***
***Hyannis***

The EDR study and DEIS/DEIR analysis determined that views of the water to the south-southwest are available along the shorefront, and intervening structures and vegetation provide broken views from

the road and near shore locations. The view from Viewpoint 8 towards the Wind Park on Scudder Avenue just west of the Kennedy Compound is the most open, unobstructed public view. It is similar to what would be experienced from unobstructed locations within the Compound. From this viewpoint in the simulation, approximately 96 percent of the Wind Park structures, including the grid pattern layout, are visible along the horizon looking south, and range in distance from the shore 13.9 to 20.8 miles (22.4 to 33.5 km) [DEIS/DEIR Figures 5.10-3 (Sheet 5) and 5.10-4 (Sheet 5) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of the Hyannis Port Historic District. It will also impact the water views of private properties within the district that contribute to its historic and architectural significance. These changes constitute a alteration of the historic character, setting, and viewsheds of this historic early settlement, maritime village, and planned seaside resort that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Hyannis Port Historic District.

***Kennedy Compound (VP 8)***
***Hyannis Port***

The EDR study and DEIS/DEIR analysis included the Kennedy Compound, a NHL, within Viewpoint 8 for the Hyannis Port Historic District. The Kennedy Compound is located in the Hyannis Port Historic District. The visual simulation study had no access to this private property to assess the shoreline views to the south toward the Wind Park. Although the Kennedy Compound itself was not visited during the field reconnaissance as it is posted private property, observations from adjacent locations indicate that open views of the proposed Wind Park will be available from the Compound.

The interruption of the natural horizon line by the WTGs and related structures will significantly alter the historic Nantucket Sound setting of the Kennedy Compound, which served as the Summer White House for President John F. Kennedy. It will also impact the water views from the Kennedy Compound. These changes constitute a alteration of the historic character, setting, and viewsheds of this historic property and features make it nationally significant and designated as an NHL, as well as eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Kennedy Compound.

**Chatham (Cape Cod)**

***Monomoy Point Lighthouse (VP 26)***

The EDR study and DEIS/DEIR analysis found open views around the lighthouse. From the elevated Viewpoint 26, approximately 30 ft (9 m) up on a large dune approximately 96 percent of the Wind Park structures are visible in the simulation along the horizon looking west, and range in distance from 13.9 to 10.8 miles (22.4 to 33.5 km) [DEIS/DEIR Figures 5.10-3 (Sheet 6) in Appendix A. No night view was simulated per DEIS/DEIR Section 5.10.2.7.2].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of Monomoy Point Lighthouse. It will also impact views from the lighthouse,

as well as from vessels looking towards the lighthouse for navigation assistance. These changes constitute a alteration of the character, setting, and viewsheds of this historic aid-to-navigation property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on Monomoy Point Lighthouse.

**Tisbury (Martha's Vineyard)**

***West Chop Light Station***

The EDR study and DEIS/DEIR analysis determined that views toward the Wind Park are screened by a line of white pines from the roadside adjacent to the West Chop Light Station, which is posted private property. Ground level views from the property itself are expected to be screened by the trees, although open views from atop the light are anticipated.

The interruption of the natural horizon line by WTGs and related structures will alter the historic Nantucket Sound setting of West Chop Light Station. It will also impact views from the lighthouse, as well as from vessels looking towards the lighthouse for navigation assistance. These changes constitute a alteration of the character, setting, and viewsheds of this historic aid-to-navigation property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on West Chop Light Station.

**Oak Bluffs (Martha's Vineyard)**

***East Chop Light (VP 21)***

The EDR study and DEIS/DEIR analysis determined that from Viewpoint 21, the viewpoint from Ocean Park that is representative of East Chop Light, all of the Wind Park structures are visible along the horizon looking east northeast, and range in distance from 9.4 to 16.6 miles (15.1 to 26.7 km) [DEIS/DEIR Figures 5.10-3 (Sheet 7) and 5.10-4 (Sheet 6) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of East Chop Light. It will also impact views from the lighthouse, as well as from vessels looking towards the lighthouse for navigation assistance. These changes constitute a alteration of the character, setting, and viewsheds of this historic aid-to-navigation property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on East Chop Light.

***Martha's Vineyard Campground Historic District***

The EDR study and DEIS/DEIR analysis determined that there are no ground level views of Nantucket Sound within this district. Based on that finding, the Cape Wind Project would result in **No Effect** on the Martha's Vineyard Campground Historic District.

#### *Flying Horses Carousel*

The EDR study and DEIS/DEIR analysis determined that there are no ground level views of Nantucket Sound from this NHL property. Based on that finding, the Cape Wind Project would result in **No Effect** on the Flying Horses Carousel.

#### *The Arcade*

The EDR study and DEIS/DEIR analysis determined that there are no ground level views of Nantucket Sound at this historic property. Based on that finding, the Cape Wind Project would result in **No Effect** on The Arcade.

#### *Dr. Harrison A. Tucker Cottage (VP 21)*

The EDR study and DEIS/DEIR analysis determined that from Viewpoint 21, the viewpoint from Ocean Park that is representative of the Dr. Tucker Cottage, all of the Wind Park structures are visible in the simulation along the horizon looking east northeast, and range in distance from 9.4 to 16.6 miles (15.1 to 26.7 km) [DEIS/DEIR Figures 5.10-3 (Sheet 7) and 5.10-4 (Sheet 6) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of the Dr. Tucker Cottage. It will also impact views from the historic property. These changes constitute a alteration of the historic character, setting, and viewsheds of this historic seaside summer house property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Dr. Harrison A. Tucker Cottage.

#### *Oak Bluffs Christian Union Chapel*

The EDR study and DEIS/DEIR analysis determined that there are no ground level views of Nantucket Sound at this historic property. Based on that finding, the Cape Wind Project would result in **No Effect** on the Christian Union Chapel.

### Edgartown (Martha's Vineyard)

#### *Edgartown Village Historic District (VP 8)*

The EDR study and DEIS/DEIR analysis determined that from Viewpoint 8 from Lighthouse Beach near Edgartown Harbor Light all Wind Park structures are visible along the horizon looking northeast, although the lower portions of many are screened by Chappaquiddick Island. The boundaries of the historic district do not extend to Nantucket Sound except at Edgartown Light (also called the Harbor Light Lighthouse), but views of the Sound to the east and northeast are available from easternmost structures within the district. Public views toward the water from the village area are generally partially or fully screened by intervening structures and vegetation. Views toward the Wind Park to the northeast are available from shoreline residences and associated private beaches. The only publicly accessible unobstructed northeasterly views are from Water Street and Lighthouse Beach. The Edgartown Lighthouse at the entrance to Edgartown Harbor is the historic property with the most open view.

Almost all other views toward the Wind Park site from Edgartown are partially blocked by Chappaquiddick Island. They range in distance from 8.8 to 15.8 miles (14.2 to 25.4 km) [DEIS/DEIR Figures 5.10-3 (Sheet 8) and 5.10-4 (Sheet 7) in Appendix A].

The interruption of the natural horizon line by the grid of WTG and related structures will alter the historic Nantucket Sound setting of the Edgartown Historic District. It will also possibly impact the water views of private properties within the district that contribute to its historic and architectural significance. These changes constitute an alteration of the historic character, setting, and viewsheds of this historic early settlement, maritime village, and summer resort property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Edgartown Harbor Historic District.

***Edgartown Harbor Lighthouse (VP 8)***

The EDR study and DEIS/DEIR analysis considered Viewpoint 8 to be representative for simulation of the view at the Edgartown Harbor Light and that open views toward the Wind Park are available from this structure.

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of the Edgartown Harbor Lighthouse. It will also impact views from the lighthouse, as well as from vessels looking towards the lighthouse for navigation assistance. These changes constitute a alteration of the character, setting, and viewsheds of this historic aid-to-navigation property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Edgartown Harbor Lighthouse.

***Cape Poge Light (VP 19)***

The EDR study and DEIS/DEIR analysis determined that from Viewpoint 19 on the northeastern tip of Cape Poge is the closest point to the Wind Park on Martha's Vineyard. The visual simulation study found that Cape Poge offers expansive views at and near the shoreline. Once away from the shoreline, including at the base of the lighthouse, the dunes and dune vegetation effectively screen most views toward the water. The simulation of the open, elevated view at approximately 56 ft (17 m) above sea level shows 95 percent of the Wind Park structures visible along the horizon looking northeast. They range in distance from 5.4 to 12.4 miles (8.7 to 20 km) [DEIS/DEIR Figures 5.10-3 (Sheet 9) and 5.10-4 (Sheet 8) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of Cape Poge Light. It will also impact views from the lighthouse, as well as from vessels looking towards the lighthouse for navigation assistance. These changes constitute a alteration of the character, setting, and viewsheds of this historic aid-to-navigation property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on Cape Poge Light.

**Nantucket (Nantucket)**

***Nantucket Historic District (VPs 22, 23)***

The Nantucket Historic District visual simulation looked at three representative locations on the island. Each is discussed separately, followed by a summary finding of effect.

- Nantucket Village. The EDR study and DEIS/DEIR analysis determined that views northwest towards the Wind Park are not available from Nantucket Village itself, or from the wharves and harbor along the western side of Nantucket Harbor, although views from the upper levels of certain buildings are likely.

- Nantucket Cliffs (VP 22). The EDR study and DEIS/DEIR analysis determined that from Viewpoint 22 on Cliff Road, all Wind Park structures are visible in the simulation along the horizon looking north northwest, and range in distance from 11.1 to 13.6 miles (21.9 to 34.4 km) [DEIS/DEIR Figures 5.10-3 (Sheet 10) and 5.10-4 (Sheet 9) in Appendix A].

- Great Point (VP 23). The EDR study and DEIS/DEIR analysis determined that panoramic unobstructed views in all directions are available from many locations on Great Point, as well as along the sand access road, where not screened by sand dunes. The viewpoint from Great Point is also considered representative of open views toward the Wind Park from the Wauwinet area of Nantucket [DEIS/DEIR Figures 5.10-3 (Sheet 11) and 5.10-4 (Sheet 10)].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of the Nantucket Historic District NHL, a historic early settlement, maritime and premier whaling village, and summer resort. These changes constitute a alteration of the historic character, setting, and viewsheds that make Nantucket nationally significant and eligible for inclusion in the National Register and a NHL. Therefore, the Cape Wind Project will have an **Adverse Effect** on the Nantucket Historic District.

***Nantucket (Great Point) Light (VP 23)***

The EDR study and DEIS/DEIR analysis determined that from Viewpoint 23 at the base of Great Point Light that all Wind Park structures are visible in the simulation along the horizon looking northwest, and range in distance from 11.2 to 19.5 miles (18 to 31.4 km) [DEIS/DEIR Figures 5.10-3 (Sheet 11) and 5.10-4 (Sheet 10) in Appendix A].

The interruption of the natural horizon line by the WTGs and related structures will alter the historic Nantucket Sound setting of Great Point Light. It will also impact views from the lighthouse, as well as from vessels looking towards the lighthouse for navigation assistance. These changes constitute a alteration of the character, setting, and viewsheds of this historic aid-to-navigation property that make it eligible for inclusion in the National Register. Therefore, the Cape Wind Project will have an **Adverse Effect** on Great Point Light and the Great Point portion of the Nantucket Historic District NHL.

**Summary of Effects Findings**

The analysis of effects for the Horseshoe Shoal Preferred Alternative of the Cape Wind Project has resulted in a recommendation that one NHL property (Flying Horses Carousel), one historic district, and two individual properties will not be affected. Findings of "Adverse Effect" are recommended for two NHL properties (Kennedy Compound and Nantucket Historic District), four historic districts, and ten individual properties (see Table 4-1).

**Resolution of Adverse Effects**

This report addresses the effects of the Horseshoe Shoal Preferred Alternative of the Cape Wind Project to aboveground historic properties from visual impacts caused by the introduction of the Wind Park structures to the Nantucket Sound horizon. It has been prepared as part of the ongoing coordination among the Corps, SHPO and other consulting parties. Following the formal determination of effect by the Corps under Section 106, the Council's regulations, and the Corps' Appendix C regulations, and the concurrence with that finding by the SHPO, further consultation will occur to resolve adverse effects (36 CFR 800.6). The consultation process develops and evaluates alternatives or modifications that could avoid, minimize, or mitigate adverse effects on historic properties. The results of these negotiations will form the basis for the Cape Wind Project's MOA or PA.

The project proponent, CWA, and the Corps have completed an alternatives analysis that led to the selection of Horseshoe Shoal as the Preferred Alternative (See DEIS/DEIR Section 3.0). The Project's DEIS/DEIR explains that process and the justification for selecting Horseshoe Shoal, and addresses avoidance of adverse effects to historic properties in the context of the alternatives analysis and preferred alternative selection process. CWA has already taken steps to minimize visual effects from the Project by reducing the number of wind turbines from 170 to 130 and stipulating that all the wind park structures be painted marine gray.

A variety of measures to minimize and/or mitigate adverse effects to historic properties are commonly considered by Federal agencies, SHPOs, and consulting parties. Measures commonly used to minimize adverse visual effects to historic properties include the introduction of vegetation, fences, or other forms of screening to shield or interrupt the view from the historic property to the project area. The applicability or feasibility of these types of screening, however, is not appropriate for the Cape Wind Project given the broad scale of the horizon views. Materials and paint color that harmonize with the historic property and the surroundings often provide a way of reducing the visual impact of project elements. While the construction material itself is likely not a critical factor for the Cape Wind Project, the marine gray paint on visible structures will minimize their visibility and allow them to blend in with the sky and water.

In order to mitigate visual or other categories of adverse effects, archival photographic and narrative documentation of historic properties and their setting prior to any changes is often required. The documentation is filed in the State Archives and a designated local repository and forms a permanent record of each historic property's appearance for future scholars and the general public. Mitigation can include ongoing review by the Corps, SHPO, and consulting parties of project plans as they are developed. Sometimes mitigation measures are identified that are "off site", that may not specifically respond to

the project's actual effects, but may provide certain benefits to the affected historic properties. The enhancement of the historic character of the historic properties can thus partially offset the adverse effects of the project.

Opportunities for minimizing and mitigating the adverse effects of the Cape Wind Project that will reduce the visual impact of the Wind Park on historic properties will continue to be explored as the consultation process goes forward.

# REFERENCES


Baumhofer, Mark, Karen L. Jessup, and Betsy Friedberg
1989 *Dr. Harrison A. Tucker Cottage National Register of Historic Places Individual Property Nomination.* Oak Bluffs, MA. On file, Massachusetts Historical Commission, Boston, MA.

Beard, Christine S.
1994 *The Arcade National Register of Historic Places Individual Property Nomination.* Oak Bluffs, MA. On file, Massachusetts Historical Commission, Boston, MA.

Branford, S. S.
1967 *Nantucket Historic District National Survey of Historic Sites and Buildings Form.* Nantucket, MA.

DiStefano, Victoria L.
*1981* *Cape Poge Light (Lighthouse Number 10) Lighthouses of Massachusetts – Thematic Group National Register of Historic Places Nomination Form.* Edgartown, MA. On file, Massachusetts Historical Commission, Boston, MA.

Durfee, Elizabeth T., and Andrea Gilmore
1978 *Martha's Vineyard Campground (Wesleyan Grove) National Register of Historic Places Individual Property Nomination.* Oak Bluffs, MA. On file, Massachusetts Historical Commission, Boston, MA.

Fitch, Virginia A., Brien Pfeiffer, and Victoria DeStefano
1983 *Edgartown Village Historic District National Register of Historic Places Nomination.* Edgartown, MA. On file, Massachusetts Historical Commission, Boston, MA.

Fox, Leslie L., and Nancy L. Salzman
1981 *Lighthouses and Their Direct Support Structures: Keeper's Houses, Oil Houses, Walkways and Garage/Storage Sheds.* On file, Massachusetts Historical Commission, Boston, MA.

Frontiero, Wendy and Candace Jenkins
1986 *Centerville Historic District Massachusetts Historical Commission Area Form.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

1986 *Wianno Historic District Massachusetts Historical Commission Area Form.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

Graves, Anna K., and Holly Herbster
2004 *Terrestrial Archaeological Reconnaissance Survey Terrestrial Route Alternatives #1 and #2 and Intensive (Locational) Archaeological Survey, Terrestrial Route Alternative #1 Cape Wind Energy Project.* The Public Archaeology Laboratory, Pawtucket, RI Report No. 1485.01. Submitted to Cape Wind Associates, LLC, Boston, MA.

Guest, J. Alfred, Karen L. Jessup, and Betsy Friedberg
1989 *Union Chapel (Oak Bluffs Christian Union Chapel) National Register of Historic Places Individual Property Nomination.* Oak Bluffs, MA. On file, Massachusetts Historical Commission, Boston, MA.

Heintzelman, Patricia
1975 *Nantucket Historic District National Historic Landmark/National Register of Historic Places Nomination.* Nantucket, MA. On file, Massachusetts Historical Commission, Boston, MA.

Jenkins, Candace
1978 *Wianno Club (Cotocheset Hotel) National Register of Historic Places Individual Property Nomination.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

1979 *Flying Horses Carousel National Register of Historic Places Individual Property Nomination.* Oak Bluffs, MA. On file, Massachusetts Historical Commission, Boston, MA.

1986 *Barnstable Multiple Resource Area National Register of Historic Places Nomination.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

1986 *Colonel Charles Codman Estate Massachusetts Historical Commission Building Form.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

1986 *Cotuit Historic District Massachusetts Historical Commission Area Form.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

1986 *Craigville Historic District Massachusetts Historical Commission Area Form.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

1986 *Hyannis Port Historic District Massachusetts Historical Commission Area Form.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

Mackintosh, Barry
1972 *Kennedy Compound National Historic Landmark/ National Register of Historic Places Individual Property Nomination.* Barnstable, MA. On file, Massachusetts Historical Commission, Boston, MA.

Massachusetts Historical Commission
n.d. Multiple Inventory Files.

n.d. Multiple State Register and National Register of Historic Places Files.

1987 *Historic and Archaeological Resources of Cape Cod and the Islands.* Massachusetts Historical Commission, Boston, MA

Robinson, David S., Ben Ford, Holly Herbster, and Joseph N. Waller, Jr.
2003 *Marine Archaeological Sensitivity Assessment Cape Wind Energy Project.* The Public Archaeology Laboratory, Pawtucket, RI Report No. 1485. Submitted to Cape Wind Associates, LLC, Boston, MA.

2004 *Marine Archaeological Reconnaissance Survey Cape Wind Energy Project.* The Public Archaeology Laboratory, Pawtucket, RI Report No. 1485. Submitted to Cape Wind Associates, LLC, Boston, MA.

Salzman, N. L.
1982 *Edgartown Harbor Light (Lighthouse Number 17) Lighthouses of Massachusetts – Thematic Group National Register of Historic Places Nomination Form.* Edgartown, MA. On file, Massachusetts Historical Commission, Boston, MA.

Salzman, N., and J. Clarke
1981 *Nobska Point Light Station (Lighthouse Number 31) Lighthouses of Massachusetts – Thematic Group National Register of Historic Places Nomination Form.* Falmouth, MA. On file, Massachusetts Historical Commission, Boston, MA.

Salzman, N. L., and V. DiStefano
1981 *East Chop Light (Lighthouse Number 15) Lighthouses of Massachusetts – Thematic Group National Register of Historic Places Nomination Form.* Oak Bluffs, MA. On file, Massachusetts Historical Commission, Boston, MA.

Tougas, Christine E.
1978 *Monomoy Point Lighthouse National Register of Historic Places Individual Property Nomination.* Chatham, MA. On file, Massachusetts Historical Commission, Boston, MA.

Zimmerman, Sarah J., Candace Jenkins, and Anne Tait, with Leslie Fox., Nancy Salzman, and Lauren Boudreau
1986 *Lighthouses of Massachusetts – Thematic Group National Register of Historic Places Nomination Form.* On file, Massachusetts Historical Commission, Boston, MA.

# Appendix A

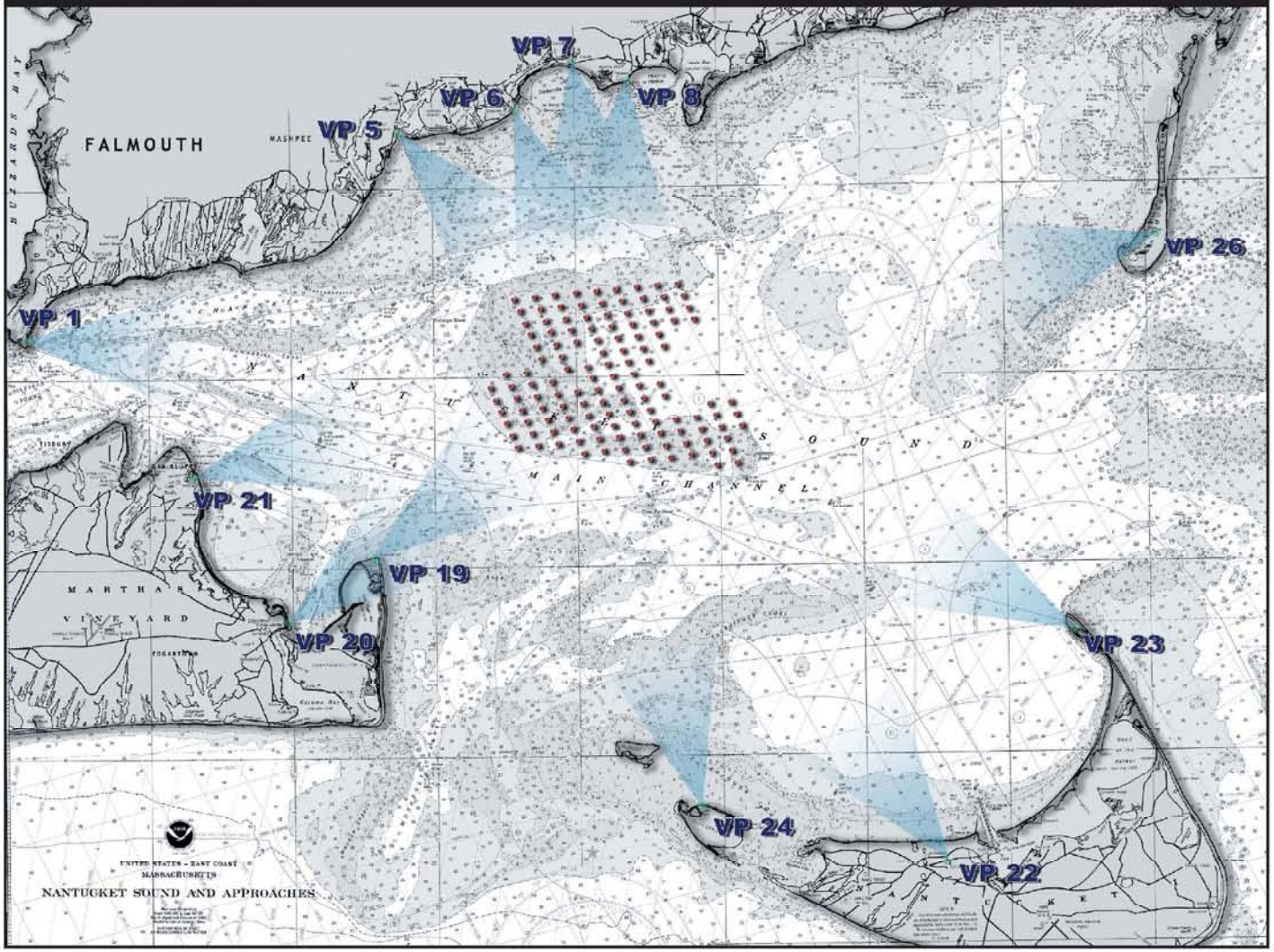
**VISUAL SIMULATION FIGURES FROM VISUAL SIMULATION METHODOLOGY, (EDR, P.C., NOVEMBER 2003)**

**Figure 2 (Viewpoint Location Map)**

**Figure 5.10-3 (Sheets 1-12; Daytime Simulations)**

**Figure 5.10-4 (Sheets 1-11; Nighttime Simulations)**

## Viewpoint Location Map




## Viewpoint Photo and Description

- 1 Nobska Lighthouse, Falmouth

- 5 Cotuit, Barnstable

- 6 Wianno,Barnstable

- 7 Craigville, Barnstable

- 8 Hyannis, Barnstable

- 19 Cape Poge, Martha's Vineyard

- 20 Edgartown, Martha's Vineyard

- 21 Oak Bluffs, Martha's Vineyard

- 22 Nantucket Village

- 23 Great Point, Nantucket

- 24 Tuckernuck Island, Nantucket

- 26 Monomoy Point, Chatham

Prepared for:

Cape Wind Energy for Life.

ESS Group Inc.

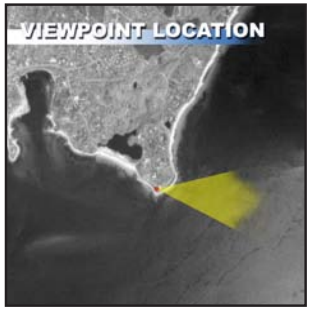
Prepared by:

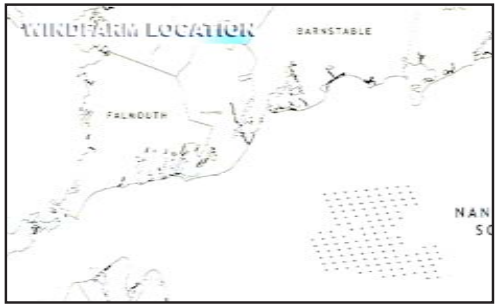
EDR PC

***Figure 2***

**Viewpoint Location Map**

11/6/03




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Nobska Lighthouse |
| Viewpoint # | 1 |
| Viewpoint Location | 41° 30' 56.80"N 70° 39' 18.28"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 1/22/2003 |
| Time | 11:53 AM |
| Temperature & Visibility | -7° C 19° F Clear |
| Direction of View | 3° South of East |
| Field Of View | 46.115° |
| Focal Length[1] | 49.3mm |
| Closest Turbine | 14.13 miles |
| Furthest Turbine | 21.66 miles |
| Camera Elevation | 55.74' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1]Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 12' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 1

**Nobska Lighthouse**

Falmouth, Cape Cod

November 2003

Prepared By:

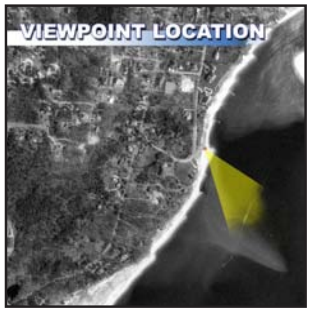
EDR

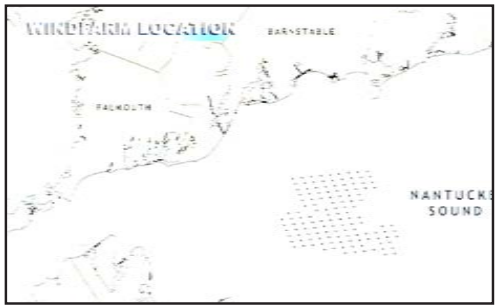
**Figure 5.10-3 Sheet 1 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Cotuit |
| Viewpoint # | 5 |
| Viewpoint Location | 41° 36' 22.64"N 70° 20' 13.70"W |
| Percentage of Total Turbines Visible | 95% |
| Date Taken | 1/22/2003 |
| Time | 1:47pm |
| Temperature & Visibility | -7° C 19° F Clear |
| Direction of View | 41° East of South |
| Field Of View | 40.73° |
| Focal Length[1] | 46.5mm |
| Closest Turbine | 6.08 miles |
| Furthest Turbine | 14.2 miles |
| Camera Elevation | 9.90' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1]Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=104 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of EBP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 5

**Cotuit** Barnstable, Cape Cod

November 2003

Prepared By:

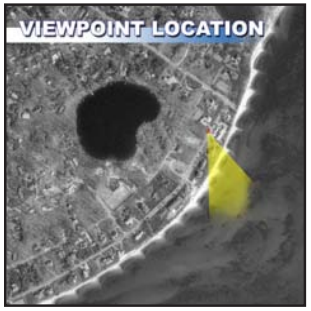
EDR

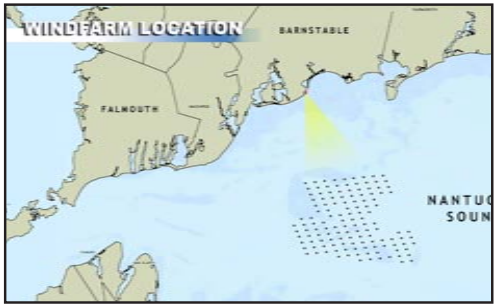
**Figure 5.10-3 Sheet 2 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Wianno |
| Viewpoint # | 6 |
| Viewpoint Location | 41° 37' 01.10"N 70° 22' 12.67"W |
| Percentage of Total Turbines Visible | 91% |
| Date Taken | 1/22/2003 |
| Time | 4:28pm |
| Temperature & Visibility | -10° C 14 F° Clear |
| Direction of View | 20° East of South |
| Field Of View | 39.966° |
| Focal Length[1] | 49.5mm |
| Closest Turbine | 5.67 miles |
| Furthest Turbine | 12.63 miles |
| Camera Elevation | 28.58' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1]Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 40' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 6

**Wianno** Barnstable, Cape Cod

November 2003

Prepared By:

EDR

**Figure 5.10-3 Sheet 3 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.

## INFORMATION

### Viewpoint Specific Data

| | |
|---|---|
| Viewpoint Name | Craigville |
| Viewpoint # | 7 |
| Viewpoint Location | 41° 38' 17.74"N 70° 20' 9.69"W |
| Percentage of Total Turbines Visible | 95% |
| Date Taken | 1/21/2003 |
| Time | 1:10pm |
| Temperature & Visibility | -6° C 21° F Clear |
| Direction of View | 7° East of South |
| Field Of View | 39.238 |
| Focal Length* | 50.5mm |
| Closest Turbine | 6.99 miles |
| Furthest Turbine | 13.03 miles |
| Camera Elevation | 34.51' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

*Displayed in 35mm equivalent

### Model Dimensions and Data

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 12' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 7

**Craigville** Barnstable, Cape Cod

November 2003

Prepared By:

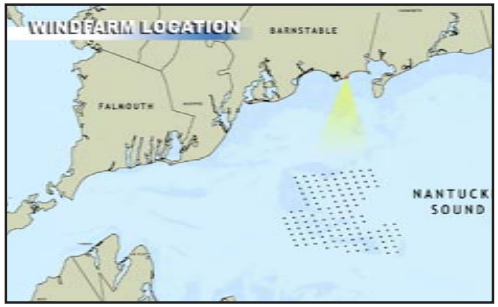
EDR

**Figure 5.10-3 Sheet 4 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Hyannis Port |
| Viewpoint # | 8 |
| Viewpoint Location | 41° 37' 46.66"N 70° 18' 14.59"W |
| Percentage of Total Turbines Visible | 97% |
| Date Taken | 1/21/2003 |
| Time | 11:12am |
| Temperature & Visibility | -7° C 19° F Clear |
| Direction of View | 3° West of South |
| Field Of View | 42.323° |
| Focal Length* | 46.5mm |
| Closest Turbine | 6.216 miles |
| Furthest Turbine | 11.99 miles |
| Camera Elevation | 22.44' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

*Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 15.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 46 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 8

**Hyannis Port** Barnstable, Cape Cod

November 2003

Prepared By:

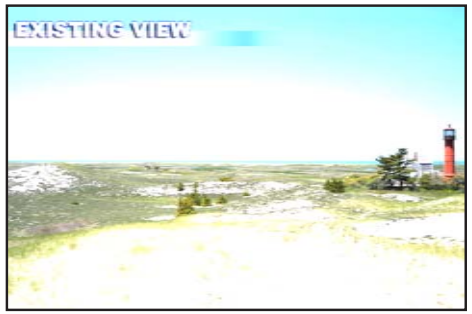
EDR

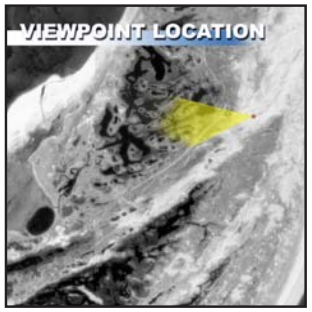
**Figure 5.10-3 Sheet 5 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.



## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Monomoy |
| Viewpoint # | 26 |
| Viewpoint Location | 41° 33' 32.67"N 69° 59' 31.46"W |
| Percentage of Total Turbines Visible | 96% |
| Date Taken | 6/10/2003 |
| Time | 10:12am |
| Temperature & Visibility | 21° C 70° F Clear |
| Direction of View | 5° South of West |
| Field Of View | 40.3° |
| Focal Length[1] | 46.5mm |
| Closest Turbine | 13.9 miles |
| Furthest Turbine | 20.8 miles |
| Camera Elevation | 30.03' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1] Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 411' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of EBP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 26

**Monomoy**

Falmouth, Cape Cod

November 2003

Prepared By:

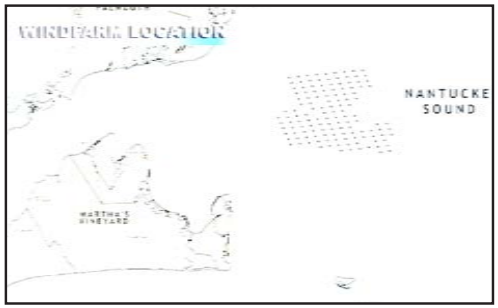
EDR

**Figure 5.10-3 Sheet 6 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Oak Bluffs |
| Viewpoint # | 21 |
| Viewpoint Location | 41° 27' 20.09"N 70° 33' 23.92"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 2/6/2003 |
| Time | 3:03pm |
| Temperature & Visibility | -2° C 28° F Clear |
| Direction of View | 76° East of North |
| Field Of View | 46.65° |
| Focal Length[1] | 46.6mm |
| Closest Turbine | 9.35 miles |
| Furthest Turbine | 16.63 miles |
| Camera Elevation | 54.49' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1] Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 46' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 21

**Oak Bluffs** Martha's Vineyard

November 2003

Prepared By:

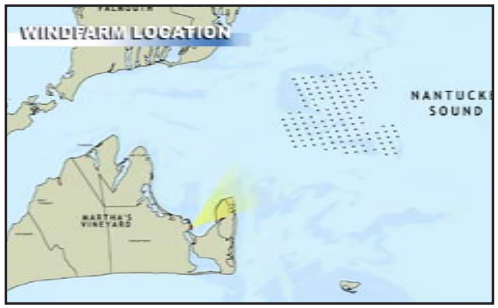
EDR

**Figure 5.10-3 Sheet 7 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Edgartown |
| Viewpoint # | 20 |
| Viewpoint Location | 41° 23' 26.27"N 70° 30' 11.29"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 2/6/2003 |
| Time | 10:49am |
| Temperature & Visibility | 2° C 35° F Clear |
| Direction of View | 53° East of North |
| Field Of View | 41.35° |
| Focal Length[1] | 47.7mm |
| Closest Turbine | 8.82 miles |
| Furthest Turbine | 15.75 miles |
| Camera Elevation | 35.85' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1]Expressed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 109' X 200' X 109' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 20

**Edgartown** Martha's Vineyard

November 2003

Prepared By:

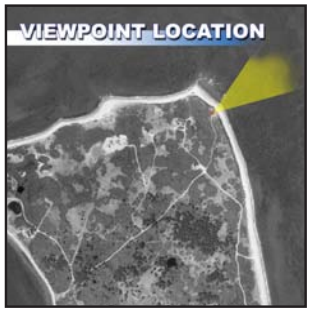
EDR

**Figure 5.10-3 Sheet 8 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.



## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Cape Poge |
| Viewpoint # | 19 |
| Viewpoint Location | 41° 25' 12.64"N 70° 27' 4.57"W |
| Percentage of Total Turbines Visible | 95% |
| Date Taken | 2/5/2003 |
| Time | 2:14pm |
| Temperature & Visibility | 3° C 37° F Clear |
| Direction of View | 52° East of North |
| Field Of View | 40.646° |
| Focal Length* | 46.6mm |
| Closest Turbine | 5.43 miles |
| Furthest Turbine | 12.37 miles |
| Camera Elevation | 56.77' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

*Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 19

**Cape Poge** Martha's Vineyard

November 2003

Prepared By:

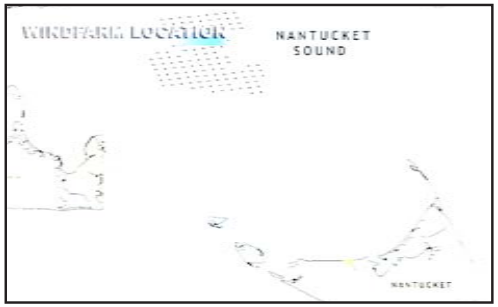
EDR

**Figure 5.10-3 Sheet 9 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Nantucket |
| Viewpoint # | 22 |
| Viewpoint Location | 41° 17' 14.18"N 70° 07' 8.40"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 3/19/2003 |
| Time | 11:01am |
| Temperature & Visibility | 2° C 36° F Clear |
| Direction of View | 47° West of North |
| Field Of View | 44° |
| Focal Length[1] | 44.5mm |
| Closest Turbine | 13.6 miles |
| Furthest Turbine | 21.4 miles |
| Camera Elevation | 44.61' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1] Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40 X 27' |
| Maximum Width of Tower | 18' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 22

**Nantucket**

Nantucket

November 2003

Prepared By:

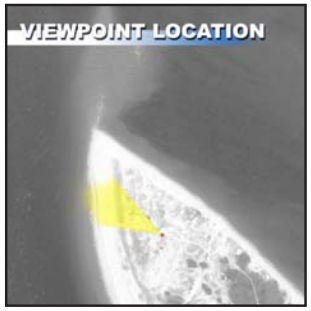
EDR

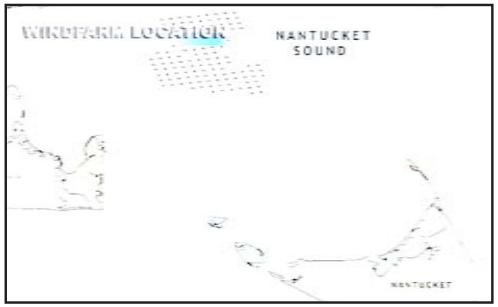
**Figure 5.10-3 Sheet 10 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

### Viewpoint Specific Data

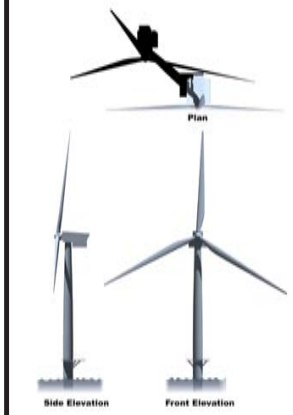
| | |
|---|---|
| Viewpoint Name | Great Point |
| Viewpoint # | 23 |
| Viewpoint Location | 41° 23' 22.95"N 70° 02' 52.17"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 3/19/2003 |
| Time | 2:55pm |
| Temperature & Visibility | 2° C 35° F Clear |
| Direction of View | 29° North of West |
| Field Of View | 40.7° |
| Focal Length[1] | 48.5mm |
| Closest Turbine | 11.2 miles |
| Furthest Turbine | 19.5 miles |
| Camera Elevation | 16.20' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1] Displayed in 35mm equivalent

### Model Dimensions and Data

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 12' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |




Viewpoint 23

**Great Point** Nantucket

November 2003

Prepared By:

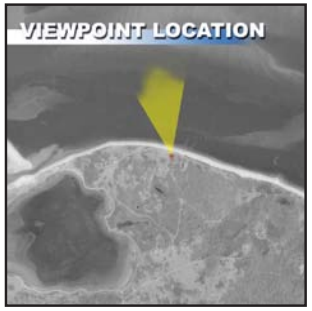
EDR

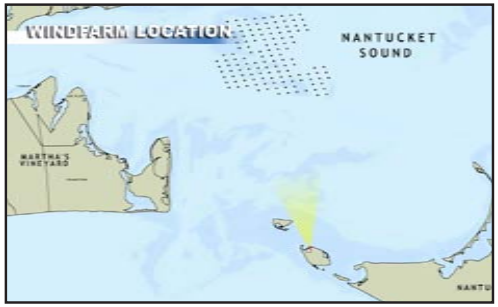
**Figure 5.10-3 Sheet 11 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Tuckernuck Island |
| Viewpoint # | 24 |
| Viewpoint Location | 41° 18' 30.41"N 70° 15' 44.85"W |
| Percentage of Total Turbines Visible | 97% |
| Date Taken | 5/20/2003 |
| Time | 7:27 PM |
| Temperature & Visibility | 13° C 56° F Partly Cloudy |
| Direction of View | 35° West of North |
| Field Of View | 38.7° |
| Focal Length[1] | 51.2 mm |
| Closest Turbine | 10.387 miles |
| Furthest Turbine | 16.4 miles |
| Camera Elevation | 23.95 |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

[1] Displayed in 35mm equivalent

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 48' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 13' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 24

**Tuckernuck Island** Nantucket

November 2003

Prepared By:

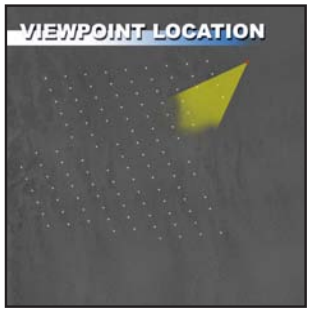
EDR

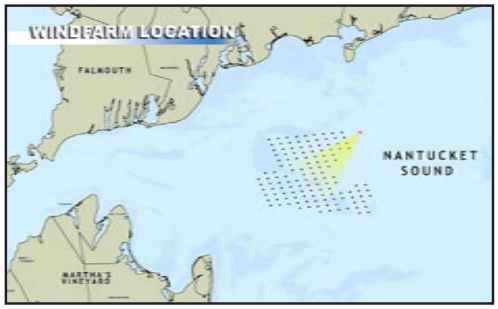
**Figure 5.10-3 Sheet 12 of 12**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Hyannis - Nantucket Ferry |
| Viewpoint # | 25 |
| Viewpoint Location[1] | 41° 32' 25.97"N 70° 15' 08.70"W |
| Percentage of Total Turbines Visible | 49% |
| Date Taken | 5/19/2003 |
| Time | 9:15am |
| Temperature & Visibility | 15° C 60° F Low Fog |
| Direction of View | 45° South of West |
| Field Of View | 39.6° |
| Focal Length[2] | 50.0mm |
| Closest Turbine | 1.1 miles |
| Furthest Turbine | 7.8 miles |
| Camera Elevation | 35.0' |

Please note that at distances over 3 miles (for viewers at sea level) the bases of the turbines would fall below the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon line in the simulations, which may create minor exaggerations in turbine height.

Displayed in 35mm equivalent [1]Accurate to 100 ft. (Handheld GPS)

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (R=77 G=194 B=215) |
| Height to Hub | 240' |
| Hub Diameter | 13.3' |
| Bounding Dimensions of Nacel (LxWxH) | 46' X 40 X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341' |
| Maximum Rotor Blade Width | 12' |
| Maximum Height above Sea Level | 417' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 30' |
| Bounding Dim. of ESP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber USCG Lights |

Viewpoint 25

**Ferry**

Hyannis Port to Nantucket

September 2003

Prepared By:

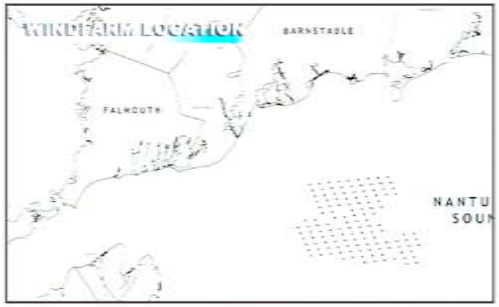
EDR

**Figure 5.10-3 Sheet 13 of 13**

Daytime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Nobska Lighthouse |
| Viewpoint # | 1 |
| Viewpoint Location | 41° 32' 30.00"N 70° 39' 12.00"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 1/22/2003 |
| Time | 5:15 PM |
| Temperature & Visibility | 10 C 50 F Clear |
| Direction of View | S South of East |
| Field Of View | 46° (°) |
| Focal Length* | 46.3 mm |
| Closest Turbine | 10.10 miles |
| Furthest Turbine | 23.98 miles |
| Camera Elevation | 55 ft |

Please note that at distances over 5 miles, for viewers at sea level, the bases of the turbines would be further to the visible horizon due to curvature of the earth. However, refraction could potentially bounce the ocean surface of the earth's curvature. Therefore, turbines are shown at the visible horizon. Visibility calculations will always consider the voluggs above mature height.

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL Series 6 [illegible]) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxthxw) | 42' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 340 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 412 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BSP (Lxthxw) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

NOTE: All data provided * is needed to calculate Viewpoint from the eye. This photo was at an elevation not affected by marine curvature or refraction. Lighthouse Bay was also provided by the Photographer.

Viewpoint 1

**Nobska Lighthouse**
Falmouth, Cape Cod

**September 2003**

Prepared By:

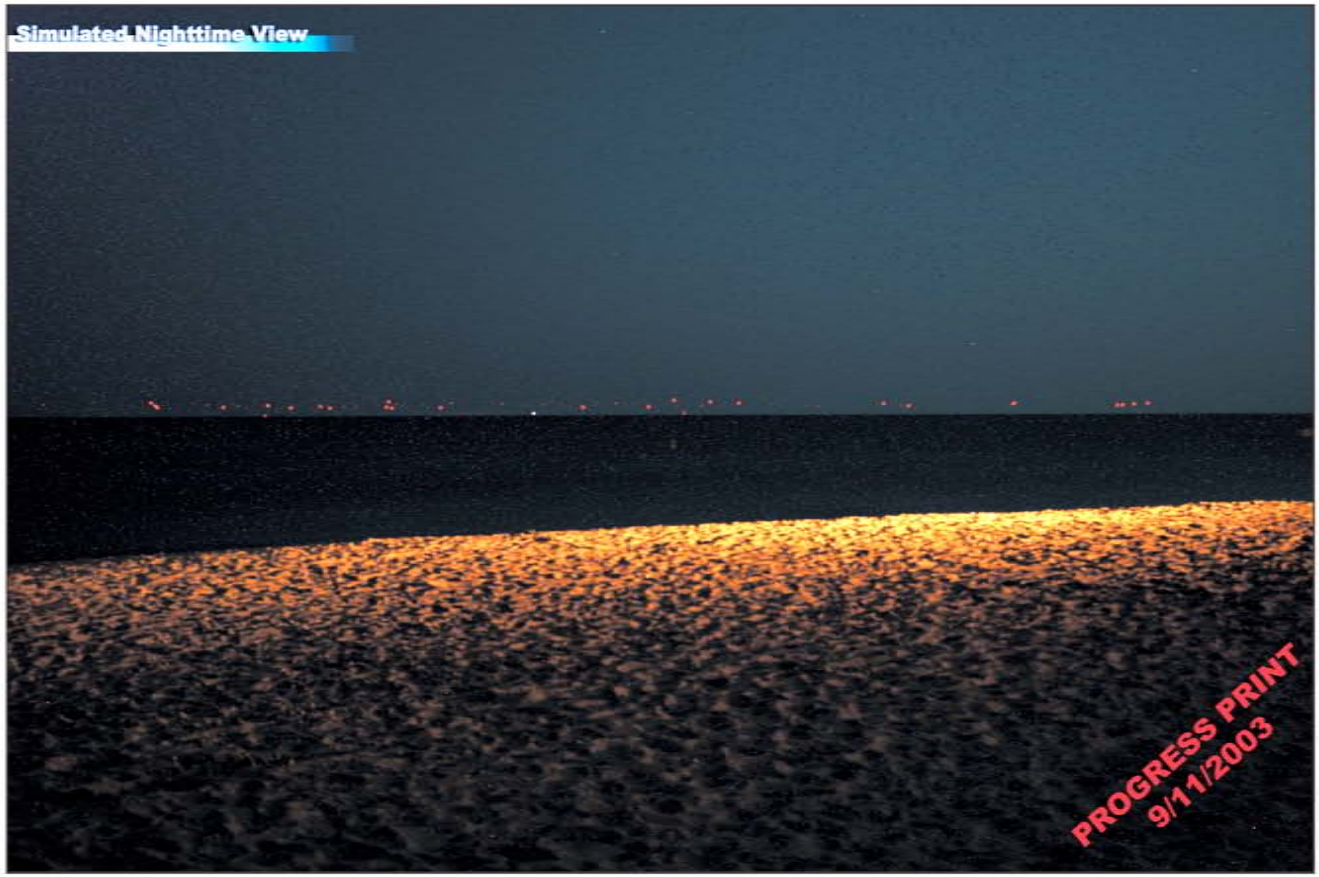
EDR

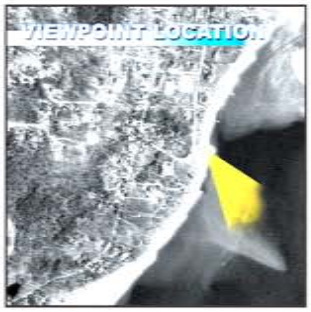
**Figure 5.10-4 Sheet 1 of 11**

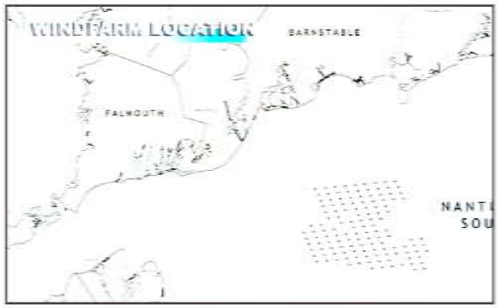
Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.






## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Site 1 |
| Viewpoint # | 5 |
| Viewpoint Location | 41° 38' 33.64"N 70° 20' 13.72"W |
| Percentage of Total Turbines Visible | 90% |
| Date Taken | 8/8/2003 |
| Time | 9:28 PM |
| Temperature & Visibility | 78 °C 65 °F Clear |
| Direction of View | 41° East of South |
| Field Of View | 48.8° |
| Focal Length* | 45.3 mm |
| Closest Turbine | 5.86 miles |
| Furthest Turbine | 14.2 miles |
| Camera Elevation | 8.00 |

Please note that all distances over 3.1 miles for viewers at sea level, the bases of the turbines would be further to be the visible horizon due to curvature of the earth. However, refraction could potentially bounce the ocean significance of the earth's curvature. Therefore, turbines are shown at the visible horizon. Note that in locations, will drop lower than waterline above. Turbine height.

*Equivalent 35mm lens value

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL# Series 9010) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxwhxh) | 42' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 417 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BSP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

Note: All data accurate * Unreliable to gauge distance from this eye. This photo has, at times been enhanced to more accurately represent lighting as they would be perceived by the human eye.

Viewpoint 5

**Cotuit**

Barnstable, Cape Cod

**September 2003**

Prepared By:

EDR

**Figure 5.10-4 Sheet 2 of 11**

Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.

## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Warren Area |
| Viewpoint # | 6 |
| Viewpoint Location | 41° 37' 61.10"N 71° 22' 12.57"W |
| Percentage of Total Turbines Visible | 37% |
| Date Taken | 1/22/2003 |
| Time | 3:42 PM |
| Temperature & Visibility | -12 C 8 F Clear |
| Direction of View | 20° East of South |
| Field Of View | 39.600 |
| Focal Length* | 49.5mm |
| Closest Turbine | 5.67 miles |
| Furthest Turbine | 12.63 miles |
| Camera Elevation | 20' 00 |

Please note that at distances over 3.1 miles, for viewers at sea level, the bases of the turbines would fall further below the visible horizon due to curvature of the earth. However, refraction could potentially bounce the ocean significantly off of the earth's curvature. Therefore, turbines are shown at the visible horizon. Note that in such cases, all of the rotor blades and nacelle above the horizon.

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL# Series 9010) |
| Height to Hub | 240' |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacelle (Lxwhxw) | 40' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 340' |
| Maximum Rotor Blade Width | 12' |
| Maximum Height above Sea Level | 410' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20' |
| Bounding Dim. of BSP (LxWhxW) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

Note: All data provided * Intended to give a feeling from the eye. This photo has not been modified to make it more or less yellow or present lighter than was actually perceived by the human eye.

Viewpoint 6

**Wianno**

Barnstable, Cape Cod

**September 2003**

Prepared By:

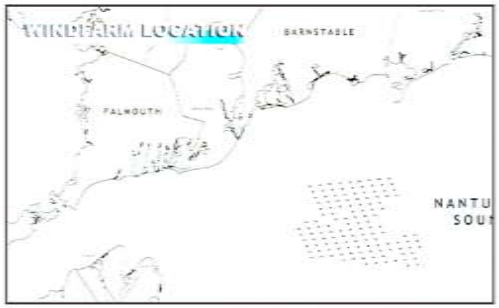
EDR

**Figure 5.10-4 Sheet 3 of 11**

Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

### Viewpoint Specific Data

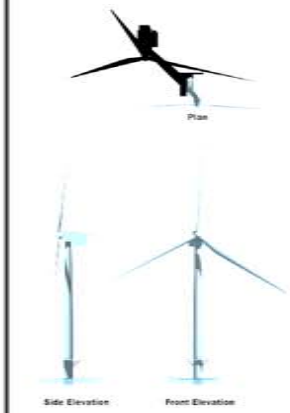
| | |
|---|---|
| Viewpoint Name | Craigville Area |
| Viewpoint # | 7 |
| Viewpoint Location | 41° 38' 17.34"N, 70° 30' 5.26"W |
| Percentage of Total Turbines Visible | 80% |
| Date Taken | 1-21-2003 |
| Time | 5:00 PM |
| Temperature & Visibility | 10 C, 34 F, Clear |
| Direction of View | 7° East of South |
| Field Of View | 39.600 |
| Focal Length* | 49.5mm |
| Closest Turbine | 5.88 miles |
| Furthest Turbine | 10.93 miles |
| Camera Elevation | 34.57' |

Based on the [illegible] distances over 5.1 miles, for viewers at sea level, the bases of the turbines would fall further below the visible horizon due to curvature of the earth. However, refraction could potentially bounce the ocean significantly of the earth's curvature. Therefore, turbines are shown at the visible horizon. Hub heights, locations, and drawings remain true to scale above. [illegible]

### Model Dimensions and Data

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL# Series 9010) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxwhx) | 42' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 410 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BEP (Lxwhx) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

Note: At long distances, * is made to lens therefore, from the eye. This photo was, at times been modified to more accurately represent lights as they would be perceived by the human eye.




Viewpoint 7

**Craigville**

Barnstable, Cape Cod

**September 2003**

Prepared By:

EDR

**Figure 5.10-4 Sheet 4 of 11**

Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.

## INFORMATION

### Viewpoint Specific Data

| | |
|---|---|
| Viewpoint Name | Hyannis Port |
| Viewpoint # | 8 |
| Viewpoint Location | 41° 37' 46.65"N 70° 16' 14.55"W |
| Percentage of Total Turbines Visible | 87% |
| Date Taken | 1-21-2003 |
| Time | 10:15 PM |
| Temperature & Visibility | 10 C 50 F Clear |
| Direction of View | 3 West of South |
| Field Of View | 46.34° |
| Focal Length* | 49.8 mm |
| Closest Turbine | 6.216 miles |
| Furthest Turbine | 11.94 miles |
| Camera Elevation | 22.44 |

Please note that all distances over 3.1 miles for viewers at sea level, the bases of the turbines would be further to see the vessel horizon due to curvature of the earth. However, refraction could potentially bounce the ocean significance of the earth's curvature. Therefore, turbines are shown at the visible horizon. Visibility calculations will always consider the voltage above mounting height.

### Model Dimensions and Data

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL Series 6H10) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxwhxw) | 42' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 417 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BSP (Lxwhxw) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Anchor 2500 Lights |

Note: All data approximate. * Intended to give a feeling from the eye. These photos have not been modified to make accurately represent lighting as they would be perceived by the human eye.

Viewpoint 8

**Hyannis Port**

Barnstable, Cape Cod

**September 2003**

Prepared By:

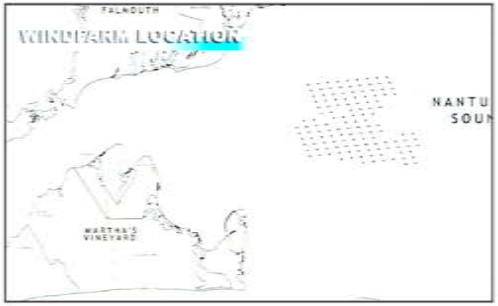
EDR

**Figure 5.10-4 Sheet 5 of 11**

Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Oak Bluffs Area |
| Viewpoint # | 21 |
| Viewpoint Location | 41° 27' 28.00"N 71° 33' 33.00"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 9/4/2003 |
| Time | 9:48pm |
| Temperature & Visibility | 12 C 54 F Clear |
| Direction of View | 76 East of North |
| Field Of View | 48.6deg |
| Focal Length* | 40.8mm |
| Closest Turbine | 9.26 miles |
| Furthest Turbine | 15.83 miles |
| Camera Elevation | 54.4 |

Please note that at distances over 3.1 miles, for viewers at sea level, the bases of the turbines would be further below the visible horizon due to curvature of the earth. However, refraction could potentially bounce the ocean significantly of the earth's curvature. Therefore, turbines are shown at the visible horizon. Visibility of turbines will vary, depending on weather and height.

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL# Series 9010) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxwhh) | 42' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 340 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 410 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BEP (Lxwhh) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

NOTE: All data calculated. * Information provided by camera manufacturer. These photos were taken with a fixed focal length camera. Lighting conditions, particularly at night, may affect focal length.

Viewpoint 21

**Oak Bluffs**

Martha's Vineyard

**September 2003**

Prepared By:

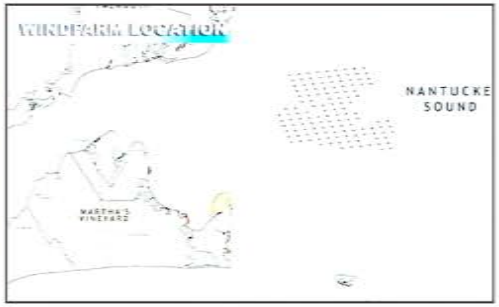
EDR

**Figure 5.10-4 Sheet 6 of 11**

Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Edgartown |
| Viewpoint # | 20 |
| Viewpoint Location | 41° 22'26.27"N 70° 30' 11.25"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 9/4/2003 |
| Time | 9:14 PM |
| Temperature & Visibility | 12 C 26 F Overcast |
| Direction of View | 53 East of North |
| Field Of View | 47.75 |
| Focal Length* | 47.8mm |
| Closest Turbine | 6.82 miles |
| Furthest Turbine | 15.79 miles |
| Camera Elevation | 20.00 |

Please note that at distances over 3.1 miles, for viewers at sea level, the bases of the turbines would be further below the visible horizon due to curvature of the earth. However, when combined potentially higher the ocean significantly of the earth's curvature. Therefore, turbines are shown at the visible horizon - not at the actual locations, which may result in an exaggerated height.

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL# Series 9010) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxwhxw) | 42' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 340 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 410 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BSP (LxWhxW) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

NOTE: All data provided * is needed to calculate Field of View. The photo lens, at times known to differ by more or less than a present lighthouse lens, which is provided by the Photographer.

Viewpoint 20

**Edgartown**

Martha's Vineyard

**September 2003**

Prepared By:

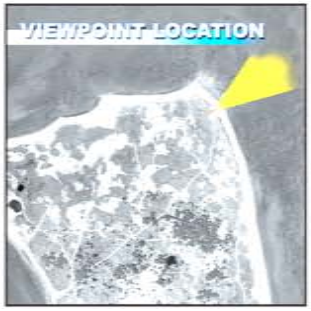
EDR

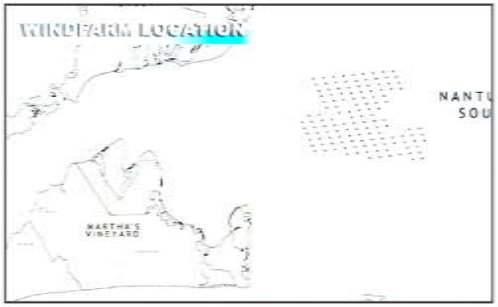
**Figure 5.10-4 Sheet 7 of 11**

**Nighttime Visual Simulation of Proposed Wind Park**

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

### Viewpoint Specific Data

| | |
|---|---|
| Viewpoint Name | Cape Poge |
| Viewpoint # | 19 |
| Viewpoint Location | 41° 25' 12.647N 70° 27' 4.571W |
| Percentage of Total Turbines Visible | 80% |
| Date Taken | 9/9/2003 |
| Time | 9:30 PM |
| Temperature & Visibility | 21 C 68 F Clear |
| Direction of View | 152 East of North |
| Field Of View | 48 Mm |
| Focal Length* | 48 Mm |
| Closest Turbine | 5.43 miles |
| Furthest Turbine | 10.37 miles |
| Camera Elevation | 10.77' |

Please note that all distances over 3.1 miles (for viewers at sea level) the bases of the turbines would be further to be the visible horizon due to curvature of the earth. However, refraction could potentially counter the effect significant of the earth's curvature. Therefore, turbines are shown at the visible horizon. Visibility of locations will vary, depending on weather and height.

### Model Dimensions and Data

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL# Series 9010) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxwhh) | 40' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 340 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 410 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BSP (Lxwhh) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

NOTE: All data provided * is needed to get a filament, from the eye. This photo was, or will be taken on, or close to, noon so it will vary by present lighting. Sky was also partly cloudy at the time of the photo.

Viewpoint 19

**Cape Poge** Martha's Vineyard

**September 2003**

Prepared By:

EDR

**Figure 5.10-4 Sheet 8 of 11**

Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.

## Simulated Nighttime View

## EXISTING VIEW

## VIEWPOINT LOCATION

## WINDFARM LOCATION

## INFORMATION

### Viewpoint Specific Data

| | |
|---|---|
| Viewpoint Name | Town of Nantucket |
| Viewpoint # | 22 |
| Viewpoint Location | 41° 46' 58.1"N 71° 02' 17.7"W |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 5/1/2003 |
| Time | 10:45 PM |
| Temperature & Visibility | In Progress |
| Direction of View | 17° West of North |
| Field Of View | 44 |
| Focal Length* | 44.5mm |
| Closest Turbine | 10.6 miles |
| Furthest Turbine | 21.4 miles |
| Camera Elevation | 44.5 |

Please note that at distances over 3.1 miles, for viewers at sea level, the bases of the turbines would be further to one the visible horizon due to curvature of the earth. However, refraction could potentially counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon. Visibility of turbine bases will vary, based on wave height.

### Model Dimensions and Data

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL# Series 9010) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxwhx) | 42' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 340 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 412 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BSP (LxWhx) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

NOTE: All data calculated. * Information taken from the eye. This photo was, at times taken in order to maximize visibility of present lighting. Blue was also provided by the Nantucket.

Plan

Side Elevation Front Elevation

Viewpoint 22

Nantucket

September 2003

Prepared By:

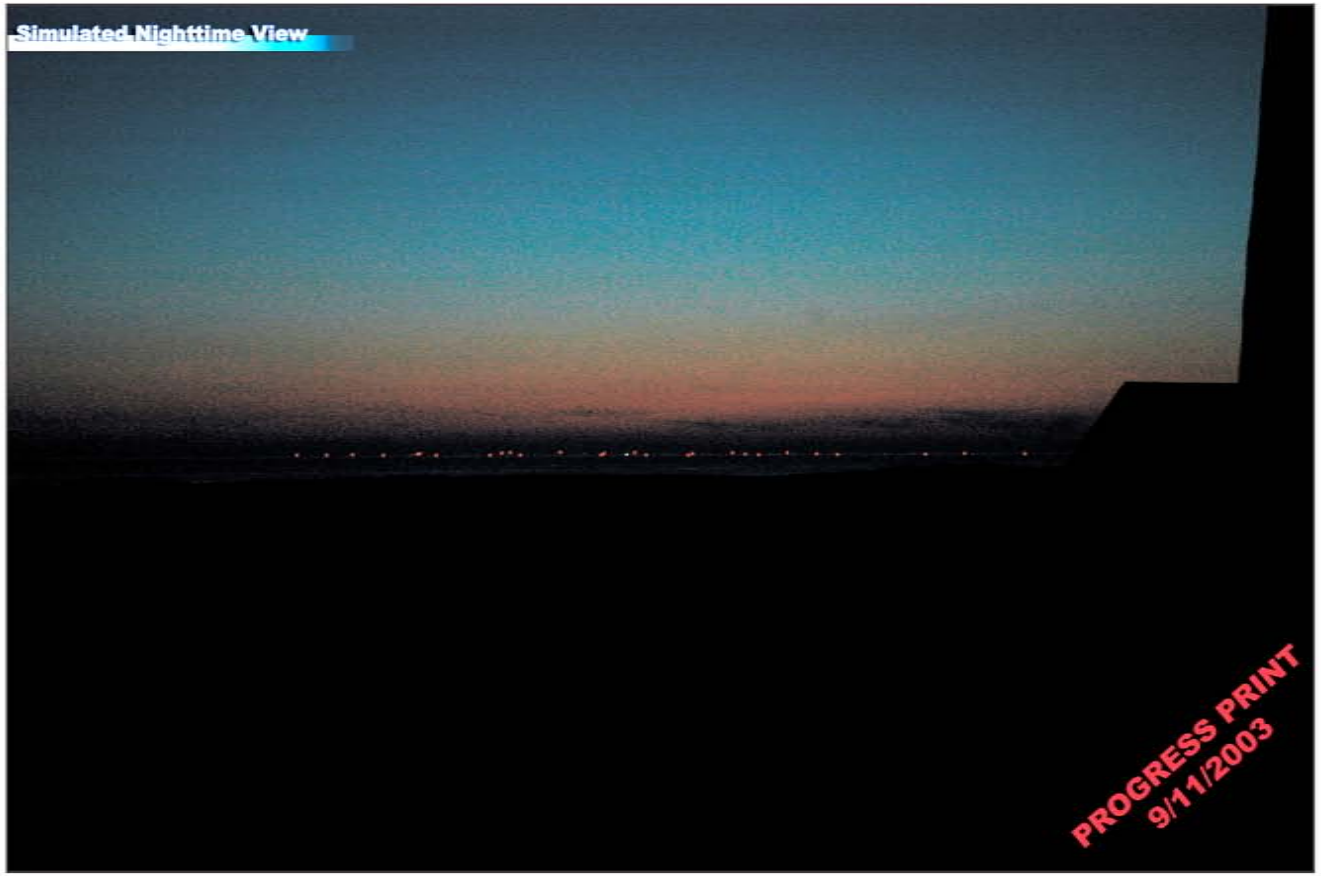
EDR

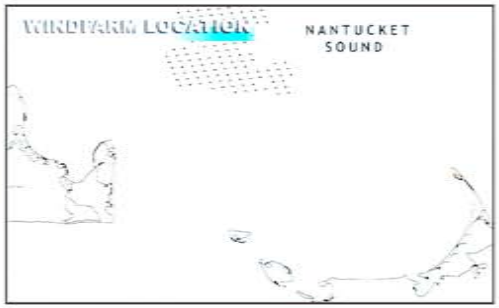
**Figure 5.10-4 Sheet 9 of 11**

Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.






## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Great Point |
| Viewpoint # | 23 |
| Viewpoint Location | 41° 00' 16.0376 N 70° 32' 33.1478 |
| Percentage of Total Turbines Visible | 100% |
| Date Taken | 5/16/2003 |
| Time | 7:30 PM |
| Temperature & Visibility | In Progress |
| Direction of View | 29° North of West |
| Field Of View | 46.70° |
| Focal Length* | 45.0 mm |
| Closest Turbine | 11.2 miles |
| Furthest Turbine | 15.0 miles |
| Camera Elevation | 16.0' |

Please note that all distances over 3.1 miles for viewers at sea level, the bases of the turbines would fall further on the visible horizon due to curvature of the earth. However, refraction could potentially counter the effect of the earth's curvature. Therefore, turbines are shown at the visible horizon. Visibility of locations will vary, based on tide and buoyage above. Turbine height.

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL# Similar 6H10) |
| Height to Hub | 240' |
| Hub Diameter | 12.0' |
| Bounding Dimensions of Nacel (Lxwhxw) | 40' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 340' |
| Maximum Rotor Blade Width | 12' |
| Maximum Height above Sea Level | 410' |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20' |
| Bounding Dim. of BSP (Lxwhxw) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

Note: All data approximate. * Is equal to 50 mm lens in 35 mm format. This photo lens, as it relates to human vision, is not a perfect representation of what the human eye perceives as the human eye.

Viewpoint 23

**Great Point**

Nantucket

**September 2003**

Prepared By:

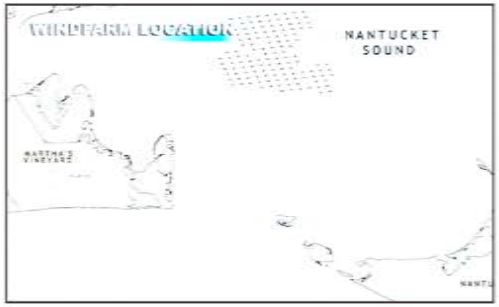
EDR

**Figure 5.10-4 Sheet 10 of 11**

Nighttime Visual Simulation of Proposed Wind Park

Prepared For:

Cape Wind™
Energy for Life.




## INFORMATION

**Viewpoint Specific Data**

| | |
|---|---|
| Viewpoint Name | Tuckernuck Island |
| Viewpoint # | 24 |
| Viewpoint Location | 41° 15' 25.41"N 70° 15' 44.55"W |
| Percentage of Total Turbines Visible | 87% |
| Date Taken | 8/26/2003 |
| Time | 7:50 PM |
| Temperature & Visibility | 13 C, 55 F, Overcast |
| Direction of View | 35° West of North |
| Field Of View | 38.80° |
| Focal Length* | 52.0 mm |
| Closest Turbine | 10.287 miles |
| Furthest Turbine | 19.4 miles |
| Camera Elevation | 22.55 |

Please note that at distances over 5 miles for viewers at sea level, the bases of the turbines would fall below the visible horizon due to curvature of the earth. However refraction could possibly counter the screening effects of the earth's curvature. Therefore, turbines are shown at the visible horizon in the simulations, which may create minor exaggeration of turbine height.

**Model Dimensions and Data**

| | |
|---|---|
| Proposed Color of Turbine | Blue Gray (RAL Series 9010) |
| Height to Hub | 240 |
| Hub Diameter | 12.3 |
| Bounding Dimensions of Nacel (Lxwxh) | 42' X 40' X 27' |
| Maximum Width of Tower | 16' dia |
| Minimum Width of Tower | 11' dia |
| Rotor Diameter | 341 |
| Maximum Rotor Blade Width | 12 |
| Maximum Height above Sea Level | 417 |
| Wind Direction | SW |
| Height of Turbine Platform above Sea Level | 20 |
| Bounding Dim. of BSP (LxWxH) | 100' X 200' X 100' |
| Aviation Warning Lights | FAA L864/L865 L810 |
| Coast Guard Warning Lights | Dual Amber 2500 Lights |

NOTE: All data calculated. * Is needed to get a filmed image from the eye. This photo lens, at times been shown to affect the more accurate representation of the sun. Photo taken on the Fujinon lens.

Viewpoint 24

**Tuckernuck Island**

Nantucket

**September 2003**

Prepared By:

EDR

**Figure 5.10-4 Sheet 11 of 11**

**Nighttime Visual Simulation of Proposed Wind Park**

Prepared For:

Cape Wind™
Energy for Life.